RASHTRAPATI BHAVAN
LIBRARY



Reg. No 9 Vol. 19

Clas. No. I – E

PRESIDENT'S SECRETARIAT

(LIBRARY)

Acc. No..... Class No.....

The book should be returned on or before the date last stamped below.

THE ENCYCLOPÆDIA BRITANNICA



FOURTEENTH EDITION

THE ENCYCLOPÆDIA BRITANNICA

FIRST EDITION	1768
SECOND EDITION	1777
THIRD EDITION	1788
FOURTH EDITION	1801
FIFTH EDITION	1815
SIXTH EDITION	1823
SEVENTH EDITION	1830
EIGHTH EDITION	1853
NINTH EDITION	1875
TENTH EDITION	1902
ELEVENTH EDITION	1910
TWELFTH EDITION	1922
THIRTEENTH EDITION	1926
FOURTEENTH EDITION	1929, 1932

THE ENCYCLOPÆDIA BRITANNICA

FOURTEENTH EDITION

A NEW SURVEY OF UNIVERSAL KNOWLEDGE

VOLUME
19
RAYNAL TO
SARREGUEMINES



THE ENCYCLOPÆDIA BRITANNICA COMPANY, LTD.
LONDON

ENCYCLOPÆDIA BRITANNICA, INC.
NEW YORK

INITIALS AND NAMES OF CONTRIBUTORS

A. Wo.	ABRAHAM WOLF, M.A., D.LITT. Professor of Logic and Scientific Method in the University of London. Sometime Fellow of St. John's College, Cambridge. Fellow of University College, London. Author of *The Oldest Biography of Spinoza; Textbook of Logic.* Editor of the Philosophy and Psychology section, 14th Edition, *Encyclopædia Britannica.*	**Royal Society, The** (*in part*).
A. W. R.	SIR ALEXANDER WOOD RENTON, G.C.M.G., K.C., M.A., LL.B. Puisne Justice, Supreme Court and Procureur and Advocate-General, Mauritius, 1901–5, Ceylon, 1905–15. Chief Justice, 1914. Author of *Law and Practice of Lunacy;* editor of *Encyclopaedia of English Law;* etc.	**Rent.**
A. Yo.	ALLYN YOUNG, PH.D. Late Professor of Political Economy in the University of London.	**Rent: In Economics.**
B. A. W. R.	HON. BERTRAND ARTHUR WILLIAM RUSSELL, M.A., F.R.S. Formerly Lecturer and Fellow of Trinity College, Cambridge. Author of *Philosophical Essays; The A. B. C. of Relativity; An Outline of Philosophy;* etc.	**Relativity: Philosophical Consequences.**
B. F. C. A.	B. F. C. ATKINSON, PH.D. Under Librarian, University Library, Cambridge.	**S.**
B. H. L. H.	CAPTAIN B. H. LIDDELL HART, F.R.HIST.S. Military Historian and Critic. Military Correspondent to the *Daily Telegraph.* Editor of the Military and Military History section, 14th Edition, *Encyclopædia Britannica.*	**St. Quentin, Battle of, 1918; Salonika Campaigns.**
B. Mack.	BENTON MACKAYE, A.M. Regional Planning Association of America, New York. Former investigator in the United States Forest Service. Author of *The New Exploration; A Philosophy of Regional Planning.*	**Regional Planning** (*in part*).
B. P. C.	BENNING P. COOK. Director of Publicity, San Francisco Chamber of Commerce, California.	**San Francisco.**
C. A. M.	CARLILE AYLMER MACARTNEY. Scholar of Trinity College, Cambridge. H.B.M. Acting Vice-Consul for Austria, 1921–6. Passport Control Officer for Austria, 1922–5. Intelligence Officer, League of Nations Union, 1926. Author of *The Social Revolution in Austria; Survey of International Affairs for 1925, Part II.* (in part).	**Rudolph of Habsburg; Ruthenians.**
C. B.	CYRIL BAILEY, M.B.E., M.A. Jowett Fellow and Classical Tutor of Balliol College, Oxford. Author of *The Legacy of Rome; Religion of Ancient Rome;* etc.	**Roman Religion.**
C. Bn.	CURTIS BROWN. Managing Director of Curtis Brown, Limited, International Publishing Bureau, London and New York. Formerly London correspondent of various American newspapers and writer for magazines.	**Royalties.**
C. C. J. W.	CLEMENT CHARLES JULIAN WEBB, M.A., F.B.A. Oriel Professor of the Philosophy of Christian Religion and Fellow of Oriel College, Oxford. Fellow and Tutor of Magdalen College, 1899–1922. Author of *In Times of War; Divine Personality and Human Life, Kant's Philosophy of Religion;* etc.	**Sacrament.**
C. C. K	CHARLES C. KNIGHTS. Lecturer in Salesmanship to the London County Council. Author of *Training for More Sales; Building Retail Sales;* etc.	**Salesmanship.**
C. De.	CALVIN DERRICK. Superintendent, State Home for Boys, Jamesburg, N. J.	**Reformatory School** (*in part*).
C. E. G	C. E. GOLDING, LL.D., F.S.S. Treaty Insurances, Ltd., London.	**Reinsurance** (*in part*).
C. E. T.	CECIL EDGAR TILLEY, B.Sc., PH.D., F.G.S. Demonstrator in Petrology, University of Cambridge.	**Salite.**
C. E. Ta.	C E. TATTERSALL, B.A. Assistant, Department of Textiles, Victoria and Albert Museum, South Kensington. Joint Author of *Handwoven Carpets, Oriental and European; Fine Carpets at the Victoria and Albert Museum.*	**Rugs and Carpets.**
C. F. A.	CHARLES FRANCIS ATKINSON. Major, Late East-Surrey Regiment. Scholar of Queen's College, Oxford. Author of *The Wilderness and Cold Harbour.*	**Rossbach.**
C. G. Ro.	SIR CHARLES GRANT ROBERTSON, C.V.O., M.A., HON.LL.D. Principal and Vice-Chancellor of Birmingham University. Fellow of All Souls, Oxford. Senior Tutor in Modern History, 1905–20, Magdalen College, Oxford. Author of *England under the Hanoverians; A Historical Atlas of Modern Europe; Bismarck;* etc.	**Reform Movement** (*in part*).
C. H. Br.	CHARLES HERBERT BRESSEY, C.B., C.B.E., F.S.I. Chevalier of the Legion of Honour. Chief Engineer, Roads Department, Ministry of Transport. Divisional Road Engineer (London), Ministry of Transport, 1919.	**Roads and Streets** (*in part*).
C. H. R.	CHARLES HERBERT REILLY, O.B.E., M.A., F.R.I.B.A. Roscoe Professor of Architecture, University of Liverpool. Member of Council of the Royal Institute of British Architects. President, British Confederation of Arts. Author of several books on modern architecture.	**Renaissance Architecture** (*in part*).
C. J.	CHARLES JAMES. Professor of Chemistry, University of New Hampshire, Durham, N. H.	**Samarium.**
C. J. F.	LIEUTENANT-COLONEL CHARLES JAMES FOX, F.R.G.S. Formerly Chief Officer, London Salvage Corps, and President of Association of Professional Fire Brigade Officers. Vice-President of National Fire Brigades Association.	**Salvage Corps** (*in part*).

C. J. Hi.	CHARLES JAMES HIGGINSON, C.B.E. Barrister-at-Law. Secretary and Hon. Director to the Restriction of Enemy's Supplies Department, 1916–20. Sometime Secretary to the Home and Foreign Produce Exchange.	**Restriction of Enemy Supplies Department.**
C. L. K.	CHARLES LETHBRIDGE KINGSFORD, M.A., F.R.HIST.S., F.S.A. Assistant Secretary, Board of Education, 1905–12. Sometime member of the staff of the *Dictionary of National Biography*. Ford Lecturer in English History, University of Oxford, 1923–4. Author of *Life of Henry V*. Editor of *Chronicles of London* and Stow's *Survey of London*.	**Richard II.; Richard III.; Salisbury, Thomas de Montacute.**
C. Ma.	CHARLES MARRIOTT, HON.A.R.I.B.A. Art critic, *The Times*, 1924. Author of *Modern Art; Modern English Architecture;* etc.	**Religious and Memorial Architecture.**
C. Pf.	CHRISTIAN PFISTER, D-ÈS-L. Professor at the Sorbonne, Paris. Chevalier of the Legion of Honour. Author of *Etudes sur le règne de Robert le Pieux*.	**Salic Law** (*in part*).
C. P. Sa.	CHARLES PERCY SANGER. Of Lincoln's Inn, Barrister-at-Law.	**Russell, Bertrand Arthur William** (*in part*).
C. Se.	C. SEIGNOBOS, D-ÈS-L. Professor of History at the Sorbonne, Paris.	**Reform Movement** (*in part*).
C. Si.	CHARLES SINGER, M.D., D.LITT., F.R.C.P. Formerly Lecturer in History of the Biological Sciences at Oxford and now Lecturer in the History of Medicine in the University of London. Author of *Greek Biology and Greek Medicine; History of the Discovery of the Circulation of the Blood*.	**Salerno.**
C. Te.	CHARLES TENNYSON, C.M.G. Deputy Director of the Federation of British Industries. Formerly Assistant Legal Adviser to the Colonial Office, London.	**Safeguarding of Industry.**
C. T. R.	CHARLES TATE REGAN, M.A., F.R.S. Director of Natural History Museum, London. Member of Freshwater Fish Committee, 1917–20. Author of *British Fresh Water Fishes; Animal Life and Human Progress;* etc.	**Salmon and Salmonidae.**
C. Tu.	CHRISTOPHER TURNER. Author of *Land Problems and the National Welfare; Our Food Supply; The Land and the Empire*.	**Rural Depopulation** (*in part*).
C. We.	CECIL WEATHERLY. Formerly Scholar of Queen's College, Oxford. Barrister-at-Law.	**Saddlery and Harness.**
C. W. J.	C. W. JOHNSON. Government Agent for Sarawak, Whitehall, London.	**Sarawak** (*in part*).
C. W. Ro.	MAJOR-GENERAL CHARLES WALTER ROBINSON, C.B., D.C.L. Assistant Military Secretary, Headquarters of the Army, 1890–2. Governor and Secretary, Royal Military Hospital, Chelsea, 1895–8. Author of *Strategy of the Peninsular War;* etc.	**Salamanca** (*in part*).
D. C. M.	DANA C. MUNRO, A.M., L.H.D. Professor of Mediaeval History, Princeton University. Author of *Middle Ages; A Source Book of Roman History; Essays on the Crusades*.	**Rome** (*in part*).
D. E. S.	DAVID EUGENE SMITH, PH.D. Professor Emeritus of Mathematics, Teachers College, Columbia University, New York. Author of *A History of Mathematics; Progress of Arithmetic in Twenty-five Years*. Editor of the Mathematics section, 14th Edition, *Encyclopædia Britannica*.	**Root.**
D. F. T.	DONALD FRANCIS TOVEY, M.A., MUS.DOC. Reid Professor of Music in Edinburgh University. Author of essays in *Musical Analysis*, comprising the *Classical Concerto, The Goldberg Variations*, and analyses of many other classical works. Editorial Adviser, Music section, 14th Edition, *Encyclopædia Britannica*.	**Rhythm.**
D. Gr.	DOUGLAS GRIESEMER. Director of Public Information and Roll Call, American Red Cross, Washington.	**Red Cross** (*in part*).
D. H.	DAVID HANNAY. Formerly British Vice-Consul at Barcelona. Author of *A Short History of Royal Navy, 1217–1688; Life of Don Emilio Castelar*.	**St. Vincent, John Jervis; St. Vincent, Battle of.**
D. L. B.	DAVID LAWRENCE BRYCE, F.R.S.E., F.R.M.S. Salfords, Surrey.	**Rotifera** (*in part*).
D. M. S. W.	DAVID MEREDITH SEARES WATSON, M.Sc., F.R.S. Jodrell Professor of Zoology and Comparative Anatomy, University College, London. Author of many papers on Vertebrate Palaeontology and connected subjects in *Proceedings of the Zoological Society; Journal of Anatomy;* etc.	**Reptiles.**
D. S. M.	PRINCE D. S. MIRSKY. Lecturer in Russian Literature, King's College, London University. Author of *Modern Russian Literature; Pushkin; Russian Literature, 1875–1925*.	**Russian Language and Literature** (*in part*).
E. A.	CAPTAIN EDWARD ALTHAM, C.B., R.N. Secretary and Chief Executive Officer, Royal United Services Institution since 1927. Senior Naval Officer, Archangel River Expedition, 1918–9. Secretary and Editor of the Journal of the Royal United Service Institution. Editor of the Naval section, 14th Edition, *Encyclopædia Britannica*.	**Rule of the Road at Sea; Russia** (*in part*).
E. Cam.	E. CAMPBELL.	**Rule of the Road** (*in part*).
E. Cl.	E. CLOUZOT. Head of secretarial department, International Red Cross Committee, Geneva.	**Red Cross** (*in part*).

G. Ml.	GABRIEL MARCEL. Dramatist and Literary Critic for *L'Europe Nouvelle*. Contributor to *La Nouvelle Revue Française*. Author of studies on contemporary philosophers.	**Romains, Jules.**
G. Sa.	GEORGE EDWARD BATEMAN SAINTSBURY, LL.D., D.LITT., F.B.A. Professor of Rhetoric and English Literature at Edinburgh University, 1895–1915. Author of *Short History of English Literature*. *See* biographical article: SAINTSBURY, GEORGE EDWARD BATEMAN.	**Romance.**
G. S. Co.	G. S. COLEMAN, D.Sc., A.M.I.C.E., M.R. SAN. I. Lecturer in Sanitary Engineering and in the Faculties of Bacteriology, and Preventive Medicine and Technology, Victoria University of Manchester.	**Sanitation of Buildings** (*in part*).
G. T. M.	GILBERT T. MORGAN, O.B.E., D.Sc., F.I.C., F.R.S. Director, Chemical Research Laboratory, Department of Scientific and Industrial Research, London. Formerly Mason Professor of Chemistry, University of Birmingham, Professor in the Faculty of Applied Chemistry, Royal College of Science for Ireland and Professor of Applied Chemistry, Technical College, Finsbury. Editor of the Chemistry section, 14th Edition, *Encyclopædia Britannica*.	**Resorcinal; Saccharin; Salicylic Acid.**
G. W.	MAJOR-GENERAL GEOFFREY WHITE, C.B., C.M.G., D.S.O., R.A. Commandant, Royal Military Academy, Woolwich, 1918–20. Commandant, Woolwich Sub-area, 1920–3.	**Rule of the Road** (*in part*).
H. A. Dr.	HUGH A. DRUM, A.B. Brigadier General, United States Army. Commandant, Director and Instructor, Army Staff School. Chief of Staff, I. Army A.E.F.	**St. Mihiel** (*in part*).
H. B.	HARRY BREARLEY, M.I.M.E. Author of *The Heat Treatment of Tool Steel*.	**Rustless Steel.**
H. Bp.	REV. HERBERT LOUIS BISHOP. Missionary, Lourenço Marques, 1909–26.	**St. Thomas.**
H. C.	HUGH CHISHOLM, M.A. Editor of the 11th and 12th Editions of the *Encyclopædia Britannica*.	**Representation** (*in part*).
H. C. Br	HAROLD CHALTON BRADSHAW, A.R.I.B.A. Secretary, Royal Fine Art Commission. Hon Secretary, Faculty of Architecture, British School at Rome. Member of Council, Royal Institute of British Architects.	**Roman Architecture** (*in part*).
H. C. L.	H. C. LONG, B.Sc. Ministry of Agriculture and Fisheries, London. Editor of Journal of Ministry of Agriculture and Fisheries. Author of *Common Weeds of the Farm and Garden; Plants Poisonous to Livestock; Poisonous Plants on the Farm*.	**Rye** (*in part*).
H. De.	REV. HIPPOLYTE DELEHAYE, S.J. Joint Editor of Bollandist publication *Acta Sanctorum*.	**Roch, St.**
H. E. Wh.	WING COMMANDER HAROLD E. WHITTINGHAM, M.B., D.PH. Royal Air Force Pathological Laboratory, Halton, Buckinghamshire.	**Sandfly Fever.**
H. Fe.	HUGH FERRISS. Special Lecturer on Architecture at numerous universities in America. Architectural Designer and Illustrator, New York City.	**Rendering, Architectural.**
H. F. J.	H. F. JOLOWICZ, M.A., LL.B. All Souls Reader in Roman Law, University of Oxford, and Professor of Law, University College, London University.	**Roman Law.**
H. F. P.	HENRY FRANCIS PELHAM. Late Camden Professor of Ancient History in the University of Oxford, Curator of the Bodleian Library and President of Trinity College. Author of *Outlines of Roman History*. *See* the biographical article: PELHAM, HENRY FRANCIS.	**Rome** (*in part*).
H. Got.	HUGH GOITEIN. Of Gray's Inn, Barrister-at-Law. Author of *Primitive Ordeal and Modern Law;* etc.	**Sale of Goods** (*in part*).
H. Hag.	HERMANN HAGEDORN, A.B. Executive Director and Trustee, Roosevelt Memorial Association. Author of *Theodore Roosevelt* and Editor of Memorial and National editions of the *Works of Theodore Roosevelt*.	**Roosevelt, Theodore.**
H. Hn.	REV. H. HARRINGTON. St. Edmunds College, Ware.	**Roman Catholic Church** (*in part*).
H. Hy.	HENRI SIMON HYMANS, PH.D. Late Keeper of the Bibliothèque Royale de Belgique, Brussels. Author of *Rubens: sa vie et son oeuvre*.	**Rubens, Peter Paul** (*in part*).
H. J. Mac.	H. J. MACINTIRE, S.B., M.M.E. Professor of Refrigeration, University of Illinois. Author of *Principles of Mechanical Refrigeration; Mechanical Refrigeration*.	**Refrigeration and Ice Manufacture.**
H. M. Di.	H. M. DIXON. Extension Economist, United States Department of Agriculture, Washington. Author of many monographs on farm management.	**Rotation of Crops.**
H. M. T.	HORACE MANN TOWNER, LL.B. Governor, Porto Rico.	**Río Piedras; San Juan.**
H. P.	HANS PRZIBRAM. Professor of Experimental Zoology, University of Vienna.	**Regeneration in Animals.**
H. Pal.	HOWARD PALMER, B.A., LL.B., F.R.G.S. Explorer. Assisted in organizing Mt. Logan Expedition to Alaska. Author of *Mountaineering and Exploration in the Selkirks*.	**Rocky Mountains, The.**
H. S. F.	HERBERT SINCLAIR FAIRBANK, C.E. Assistant to the Chief, Bureau of Public Roads, United States Department of Agriculture.	**Roads and Streets** (*in part*).

INITIALS AND NAMES OF CONTRIBUTORS

H. S. J.	HENRY STUART JONES, M.A., D.LITT., F.B.A. Principal of University College of Wales, Aberystwyth. Camden Professor of Ancient History in the University of Oxford, 1920–7.	**Roman Art** (*in part*); **Rome** (*in part*).
H. S. L.	H. SPENCER LEWIS, F.R.C. Imperator of the Rosicrucian Order for North America; Vice-President of the International Council.	**Rosicrucianism.**
H. Tr.	SIR HENRY TROTTER. H.B.M. Consul-General for Rumania, 1894–1906, and British Delegate on the European Commission of the Danube.	**Rumania** (*in part*).
H. W. C. D.	HENRY WILLIAM CARLESS DAVIS, M.A. Late, Director *Dictionary of National Biography*, Fellow and Tutor of Balliol College, Oxford and Regius Professor of Modern History.	**Richard I.**; **Richard** (Earl of Cornwa
H. W. W.	HERBERT WRIGLEY WILSON, M.A. Assistant Editor of the *Daily Mail* and Director of Associated Newspapers, Ltd. Author of *Ironclad in Action;* etc. Contributor to *The Cambridge Modern History.*	**Rothermere, Harold Sid Harmsworth.**
H. Y.	SIR HENRY YULE, K.C.S.I., C.B. British Orientalist. Author of *Cathay and the Way Thither; The Book of Ser Marco Polo;* etc.	**Ricci, Matteo** (*in part*).
I. A.	ISRAEL ABRAHAMS, M.A. Formerly Reader in Talmudic and Rabbinic Literature in the University of Cambridge. Author of *A Short History of Jewish Literature; Jewish Life in the Middle Ages; Judaism;* etc.	**Samuel of Nehardea.**
J. Al.	J. ALLAN, M.A. Deputy Keeper of Coins and Medals, British Museum.	**Sanskrit Language and Literature** (*in part*).
J. A. S.	JOHN ADDINGTON SYMONDS, LL.D. Author of *Renaissance in Italy; Studies of the Greek Poets;* etc. *See* the biographical article: SYMONDS, JOHN ADDINGTON.	**Renaissance** (*in part*).
J. A. Th.	SIR JOHN ARTHUR THOMSON, M.A., LL.D. Regius Professor of Natural History in the University of Aberdeen. Gifford Lecturer, St. Andrews, 1915. Terry Lecturer, Yale University, 1924. Author of *The Study of Animal Life; Outlines of Zoology; Heredity; Darwinism and Human Life; What is Man?; Concerning Evolution.*	**Reproduction.**
J. Bar.	JOSEPH BARCROFT, C.B.E., M.A., B.Sc., M.D., F.R.S. Louvain Fellow and Lecturer, King's College, Cambridge. Professor of Physiology, Cambridge University. Fullerian Professor of Physiology, Royal Institution, 1923–6. Author of *The Respiratory Function of the Blood* and many other works. Editor of the Physiology section, 14th Edition, *Encyclopædia Britannica.*	**Respiration.**
J. B. B.	JOHN BAGNELL BURY, D.LITT., LL.D., D.C.L. Late Regius Professor of Modern History in the University of Cambridge. Editor of Gibbon's *Decline and Fall of the Roman Empire*, 1896–1900. Author of *History of the Later Roman Empire, 198–800. See* biographical article: BURY, J. B.	**Roman Empire, Later.**
J. E. F. de K.	J. E. F. DE KOK. Managing Director, Royal Dutch Oil Co.	**Royal Dutch Oil Compar**
J. Eg.	H. JULIUS EGGELING, PH.D. Formerly Professor of Sanskrit and Comparative Philology, Edinburgh, and Secretary and Librarian to the Royal Asiatic Society.	**Sanskrit Language and Literature** (*in part*).
J. F. C. F.	COLONEL JOHN FREDERICK CHARLES FULLER, C.B.E., D.S.O. Military Assistant to the Chief of the Imperial General Staff; Chief General Staff Officer, Tank Corps, 1917–8. Formerly Chief Instructor, Camberley. Author of *The Reformation of War; Sir John Moore's System of Training;* etc.	**Religion, Wars of.**
J. F.-K.	JAMES FITZMAURICE-KELLY, LITT.D., F.R.HIST.S. Late Gilmour Professor of Spanish Language and Literature, University of Liverpool. Author of *A History of Spanish Literature.*	**Ruiz, Juan.**
J. F. W.	JOHN FORBES WHITE, M.A., LL.D. Joint Author of *Life and Art of G. P. Chalmers, R. S. A.*	**Rembrandt.**
J. G. B.	J. G. BULLOCKE, M.A. Civilian Lecturer, Royal Naval College, Greenwich.	**Saints, Battle of the** (*in part*).
J. G. D.	CAPTAIN J. G. DOLLMAN. Assistant Keeper, Department of Zoology, Natural History Museum, South Kensington.	**Rodentia.**
J. H.	JOHN HILTON. Director of Statistics, Ministry of Labour, London.	**Rebates, Deferred.**
J. H. H.	J. H. HUTTON, D.Sc., C.I.E. Director of Ethnology, Assam. Deputy Commissioner, Naga Hills. Author of *The Angami Nagas; The Sema Nagas;* etc.	**Rejang**; **Sakai.**
J. H. J.	SIR JAMES HOPWOOD JEANS, M.A., D.Sc., LL.D., F.R.S. Secretary of the Royal Society, London. Professor of Applied Mathematics, Princeton University, 1905–9. Stokes Lecturer in Applied Mathematics, Cambridge, 1910–2. Research Associate, Mt. Wilson Observatory, 1923. Author of *Astronomy and Cosmogony.*	**Relativity.**
J. H. Mi.	JOHN HENRY MIDDLETON, M.A., LITT.D., F.S.A., D.C.L. Slade Professor of Fine Art in the University of Cambridge, 1886–95. Director of the Fitzwilliam Museum, Cambridge, 1889–92. Art Director of the South Kensington Museum, 1892–6. Author of *The Engraved Gems of Classical Times; Illuminated Manuscripts in Classical and Mediaeval Times.*	**Ring** (*in part*).
J. Hn.	JULIE HELEN HEYNEMAN. Portrait painter, and literary contributor to *The Observer*, London; *Harper's Magazine; The Metropolitan; The Review of Reviews;* etc.	**Sargent, John Singer.**

J. Hud.	JOSEPH HUDNUT, M.S. Professor of Architecture, Columbia University, New York.	Renaissance Architecture (*in part*).
J. I. P.	J. I. PLATT, M.Sc., F.G.S. Lecturer in Geology, University College of Wales, Aberystwyth.	St. Helena (*in part*).
J. J. F.	JAMES J. FOX, O.B.E., D.Sc., F.I.C. Superintending Chemist, Government Laboratory, London.	Salt (*in part*).
J. J. P.	GENERAL JOHN J. PERSHING, G.C.B. Chief of Staff, United States Army, 1921–4. Commander in Chief, American Expeditionary Forces in Europe, 1917–9.	St. Mihiel (*in part*).
J. L. My.	JOHN LINTON MYRES, O.B.E., M.A., D.Sc., F.B.A. Wykeham Professor of Ancient History and Fellow and Librarian of New College, Oxford. General Secretary British Association for the Advancement of Science.	Salamis.
J. M. K.	JAMES M. KETCH, B.S., E.E. Illuminating Engineer, National Lamp Works of General Electric Company, Cleveland, Ohio. Author of *Cotton Mill Lighting*.	Reflectors.
J. M. Ku.	JAMES M. KURN. President, St. Louis-San Francisco Railway Company, St. Louis.	St. Louis-San Francisco Railway Company.
J. Mof.	REV. JAMES MOFFATT, M.A., D.LITT., D.D. Washburn Professor of Church History in Union Theological Seminary, New York. Professor of Church History, United Free College, Glasgow, 1915–27. Yates Professor of Greek and New Testament Exegesis, Mansfield College, Oxford, 1911–5.	Romans, Epistle to the.
J. R. B.	J. R. BOND, M.B.E., M.Sc., N.D.A. Agricultural Organiser for Derbyshire. Contributor to the *Journal of the Ministry of Agriculture*.	Rye (*in part*).
J. R. S.	JAMES ROUCH STERN, A.M., D.D. Stated Clerk, General and Eastern Synods, Reformed Church in the United States. Editor of Minutes of General Synod and Eastern Synod of Reformed Church in the United States.	Reformed Church in the United States.
J. S.	SIR JOSIAH CHARLES STAMP, G.B.E., D.Sc., LL.D., F.B.A. Chairman, and President of the Executive, London Midland and Scottish Railway. Director of the Bank of England. Member of the British Royal Commission on Income Tax, 1919; of the Committee on Taxation and National Debt, 1924. British Representative on the Reparation Commission's Committee on German Currency and Finance, 1924, and Member of the Committee of Experts, Paris, 1929.	Reparations and the Dawes Plan (*in part*).
J. S. D.	J. S. DAVIS, M.A. Secretary to the Education Authority for the County of Norfolk, and formerly Vice-Principal and Master of Method to the Culham Training College.	Rural Education (*in part*).
J. S. F.	SIR JOHN SMITH FLETT, K.B.E., D.Sc., F.R.S. Director Geological Survey of Great Britain and Museum of Practical Geology.	Rhyolite.
J. S. McD.	J. S. MCDANIEL. Secretary, Cordage Institute, New York.	Rope and Rope-Making (*in part*).
J. S. R.	JAMES SMITH REID, M.A., LL.M., LITT.D., LL.D. Formerly Professor of Ancient History in the University of Cambridge and Fellow and Tutor of Gonville and Caius College. Hon. Fellow, formerly Fellow and Lecturer, Christ's College. Editor of Cicero's *Academica*.	Rutilius Claudius Namatianus.
J. Wh.	JOSHUA WHATMOUGH, M.A. Professor of Comparative Philology in Harvard University; sometime Faulkner Fellow of the University of Manchester and Research Student (Craven Award) of the University of Cambridge. Joint Editor of *Liber Glossarum*.	Sabellic.
J. W. Sc.	JAMES W. SCHADE, A.B. Director of Research, B. F. Goodrich Company, Akron, Ohio.	Rubber: Production and Manufacture.
K. A. Eck.	KARL AUGUST ECKHARDT. Professor in the Faculty of Law, University of Göttingen.	Salic Law (*in part*).
K. N. L.	KARL N. LLEWELLYN. Professor of Law, Columbia University, New York.	Sale of Goods (*in part*).
L. A. Tu.	LEON ARTHUR TULIN, A.B., LL.B. Assistant Professor of Law, Yale University.	Riot (*in part*).
L. B.	L. M. BRANDIN, PH.D. Professor of French and of Romance Philology in the University of London.	Rhaeto-Romance Languages; Romance Languages; Rumanian Language and Literature (*in part*).
L. C. M.	SIR LEO CHIOZZA MONEY, F.R.STAT.S., F.R.G.S., F.Z.S. Author and Journalist. Member of the War Trade Advisory Committee, 1915–8. Parliamentary Secretary to the Ministry of Shipping, 1916–8. Chairman of the Tonnage Priority Committee, 1917–8. Editor of the Economics, Engineering and Industries section, 14th Edition, *Encyclopædia Britannica*.	Royal Mail Steam Packet Company.
L. F. V.-H.	LEVESON FRANCIS VERNON-HARCOURT, M.A., M.INST.C.E. Professor of Civil Engineering, University College, London, 1882–1905. Author of *Rivers and Canals; Harbours and Docks; Civil Engineering as Applied in Construction*.	River and River Engineering (*in part*).
L. J. S.	LEONARD JAMES SPENCER, M.A., Sc.D., F.G.S., F.C.S., F.R.S. Keeper of Department of Mineralogy, Natural History Museum, South Kensington; formerly Scholar of Sidney Sussex College, Cambridge, and Harkness Scholar. Editor of the *Mineralogical Magazine*.	Realgar; Rutile.
L. Mu.	LEWIS MUMFORD. Member of Executive Committee, Regional Planning Association of America. Author of *The Golden Day: A Study of American Experience and Culture*.	Regional Planning (*in part*).

L. P. E.	L. P. EISENHART. Professor of Mathematics in Princeton University.	**Riemannian Geometry.**
L. T.	LORADO TAFT, LITT.D. Sculptor. Member National Commission of Fine Arts since 1925. Author of *History of American Sculpture; Recent Tendencies in Sculpture.*	**Saint-Gaudens, Augustus.**
Lu.	FREDERICK DEALTRY LUGARD, 1ST BARON LUGARD OF ABINGER, P.C., G.C.M.G., C.B., D.S.O., D.C.L., LL.D. Commander of Legion of Honour. Governor-General of Nigeria, 1914–9. Served Afghan War, Sudan Campaign, Burma Campaign. British Member of Permanent Mandates Commission, League of Nations since 1922.	**Ruanda-Urundi.**
L. V.	LUIGI VILLARI. Italian Vice-Consul in New Orleans, 1906, Philadelphia, 1907. Acting Consul Boston, 1907–10. On the secretariat of the League of Nations, 1920–3. Author of *Italian Life in Town and Country; The Fascist Experiment; The Awakening of Italy.*	**Rimini** (*in part*).
L. W. H.	COLONEL LAWRENCE WHITAKER HARRISON, D.S.O., F.R.C.P., R.A.M.C. Special Medical Officer (Venereal Disease), Ministry of Health, London. Director of Venereal Department and Lecturer on Venereal Diseases, St. Thomas's Hospital, London.	**Salvarsan.**
M. Be.	MARCU BEZA, L-ÈS-L. Consul General at the Rumanian Legation, London. Lecturer on Rumanian, King's College, London University. Author of *Rumanian People and Literature.*	**Rumanian Language and Literature** (*in part*).
M. Bo.	MORITZ JULIUS BONN. Professor of Economics at the School of Commerce, Berlin. Author of *Die Englische Kolonisation in Irland; Amerika als Feind;* etc.	**Rhineland, The; Ruhr.**
M. Bra.	MARY N. L. BRADSHAW, M.A. Mary Ewart Travelling Student of Newnham College, 1915. Sometime Lecturer in Classics, East London College and Birmingham University.	**Roman Architecture** (*in part*).
M. Bt.	MICHAEL BRETT. Barrister-at-Law, Middle Temple.	**Salvage** (*in part*).
M. Bu.	MILLARD BUCKLEY. Publicity Manager, Rolls-Royce Limited, London.	**Rolls-Royce Limited.**
M. C.	MAX CARY, M.A., D.LITT. Reader in Ancient History in the University of London. Secretary to the Classical Association, 1911–4.	**Salamis.**
M. D. C.	SIR MACKENZIE DALZELL CHALMERS, K.C.B., C.S.I., M.A. Late Barrister-at-Law. First Parliamentary Counsel to Treasury, 1902–3. Permanent Under Secretary of State for Home Department, 1902–8. Author of *Digest of the Law of Bills of Exchange;* etc.	**Sale of Goods** (*in part*).
M. E. P.	MARLEN EDWIN PEW Editor of *The Editor and Publisher*, New York.	**Reporting** (*in part*).
M. Fa.	MICHAEL FARBMAN. Editor of *The Europa Year Book.*	**Russia** (*in part*).
M. F. Bé.	M. F. BÉHAR. Mechanical Engineer, New York.	**Regulation, Automatic.**
M. H.	MAX HÜBER. Swiss Lawyer. Professor of Law in the University of Zürich, 1902–21. Judge of the Permanent Court of International Justice and Member of the Permanent Court of Arbitration.	**Red Cross** (*in part*).
M. H. D.	MAURICE H. DOBB., M.A. Lecturer in Economics, Cambridge University. Author of *Russian Economic Developments since the Revolution.*	**Russia** (*in part*).
M. H. S.	MARION H. SPIELMANN, F.S.A. Formerly Editor of *The Magazine of Art.* Member of Fine Art Committee of International Exhibitions of Brussels, Paris, Buenos Aires, Rome and the Franco-British Exhibition, London. Author of *History of Punch; British Portrait Painting to the Opening of the 19th Century.*	**Repoussé; Roubiliac, Louis François.**
M. Macd.	MICHAEL MACDONOGH. Journalist. On the staff of *The Times*, London. Has worked for 42 years in the Press Galleries of the Commons and Lords. Author of *The Reporters' Gallery; The English King;* etc.	**Reporting** (*in part*).
M. P.	LEON JACQUES MAXIME PRINET. Director of Studies of the Ecole pratique des Hautes Etudes. Auxiliary of the Institut de France (Academy of Moral and Political Sciences). Author of *L'Industrie du sel en Franche Comté;* etc.	**St. Pol, Counts of.**
M. Pal.	MAURICE PALÉOLOGUE. Diplomat and Writer. French Ambassador to Russia, 1914–7. Author of *La Russie des Tsars pendant la grande guerre.*	**Romanoff Dynasty.**
M. V. R.	REV. MYLES V. RONAN, M.R.I.A. Curate of Dun Laoghaire Co., Dublin.	**Roman Catholic Church** (*in part*).
M. W. C.	MARY W. CALKINS, LITT.D., LL.D. Professor of Philosophy and Psychology, Wellesley College, Mass. Author of *A First Book of Psychology; The Persistent Problems of Philosophy.*	**Royce, Josiah** (*in part*).
N. A. C.	NELSON ANTRIM CRAWFORD, M.A. Editor-in-Chief of *Household Magazine*, Topeka, Kan. Formerly Director of Information, United States Department of Agriculture. Co-author of *Agricultural Journalism.*	**Rye** (*in part*).

N. B. J.	N. B. JOPSON, B.A. Reader in Comparative Slavonic Philology, London University.	**Russian Language and Literature** (*in part*).
N. E. C.	NORMAN E. CRUMP. Statistical Correspondent to the *Financial Times*, London. Member of the Council of the Royal Statistical Society. Joint-Author of *Clare's A. B. C. of the Foreign Exchanges.*	**Reichsbank; Rupee.**
N. G. G.	NICHOLAS G. GEDYE, O.B.E., B.Sc., M.INST., C.E. Consulting Civil Engineer. Formerly Chief Engineer, Tyne Improvement Commission. Served B. E. F. Lieut.-Colonel (late R. E.). Acting Director, Civil Engineer-in-Chief's Department, Admiralty; Chief Civil Engineer for Docks, Harbours and Inland Waterways, Ministry of Transport.	**River and River Engineering** (*in part*).
N. L. F.	NORMAN L. FORTER. With H.M. Legation in Rumania as Translator and Archivist. Correspondent of *Daily Telegraph* and *Financial Times*, London.	**Rumania** (*in part*).
N. P. C. M.	N. P. C. MELLOR. Private Secretary to President, Saar Territory Governing Commission.	**Saar (Sarre) Territory.**
O. B.	OSWALD BARRON, F.S.A. Editor of *The Ancestor*, 1902–5.	**Russell (Family).**
O. v. F.	OTTO V. FRIESEN. Professor of Swedish Language, University of Uppsala, Sweden.	**Runes.**
P. D.	COLONEL P. DRAUDT. League of Red Cross Societies.	**Red Cross** (*in part*).
P. G. H. B.	P. G. H. BOSWELL, O.B.E., D.Sc., M.INST.M.M., F.G.S. George Herdman Professor of Geology in the University of Liverpool. Author of *Sands;* etc.	**Sand; Sandstone.**
P. Gu.	PETER GUILDAY. Professor of American Church History, Catholic University, Washington.	**Roman Catholic Church** (*in part*).
P. J. N. B.	P. J. NOEL BAKER, M.A. Sir Ernest Cassel Professor of International Relations in the University of London since 1924. M. P. for Coventry, 1929. League of Nations Section of British Delegation during Peace Conference. Late Fellow of King's College, Cambridge.	**Sanctions and Guarantees.**
P. J. R.	P. J. REILLY. Director of Associated Merchandising Corporation and Retail Research Association, New York.	**Retailing.**
P. K.	PHILIP HENRY KERR, C.H., M.A. Secretary of Rhodes Trust.	**Rhodes Scholarships.**
P. L.-B.	PERCY LAZARUS-BARLOW, M.D. Pathologist to the East Sussex Hospital, Hastings; formerly Assistant Bacteriologist, Metropolitan Asylums Board; Pathological Registrar, Middlesex Hospital. Assistant to the Professor of Pathology and Director of the Bland Sutton Institute, Middlesex Hospital.	**Rheumatism; Rheumatoid Arthritis.**
P. M.	PAUL MILYUKOV, HON. LL.D. Former Member of the 3rd and 4th Dumas; former minister of Foreign Affairs in the 1st Provisional Government of Prince Luov.	**Russia** (*in part*).
P. McC.	PRIMROSE MCCONNELL, B.Sc., F.G.S. Member of the Royal Agricultural Society. Author of *Diary of a Working Farmer.*	**Reaping.**
P. P. Cr.	PAUL PHILLIPPE CRET. Professor of Architectural Design, University of Pennsylvania, Philadelphia. Fellow of American Institute of Architects. Architect of Pan American Union Bldg., Washington, Valley Forge Memorial Arch, Philadelphia.	**Renaissance Architecture** (*in part*).
P. S.	PRESERVED SMITH, LITT.D. Professor of Mediaeval History, Cornell University, Ithaca, N. Y. Author of *The Age of the Reformation; Life and Letters of Martin Luther.*	**Renaissance** (*in part*).
P. V.	PASQUALE VILLARI. Italian Historian and Statesman. Author of *I primi due secoli della storia di Firenza;* etc. *See* the biographical article: VILLARI, PASQUALE.	**Rimini** (*in part*).
P. Z. C.	MAJOR GENERAL SIR PERCY Z. COX, G.C.M.G., G.C.I.E., K.C.S.I., F.R.G.S. Acting British Minister to Persia, 1918–20. High Commissioner in Mesopotamia, 1920–3. Secretary Foreign Department, Government of India, 1914. Consul and Political Agent, Muscat, Arabia, 1899–1904.	**Resht.**
R. A. Y.	ROBERT ARTHUR YOUNG, C.B.E., M.B., F.R.C.P. Senior Physician, Middlesex Hospital; Physican to Hospital for Consumption and Diseases of the Chest, London.	**Respiratory System, Diseases of** (*in part*).
R. B. H.	RICHARD B. HALL, A.M., PH.D. Assistant Professor of Geography, University of Michigan. Co-author of *Elementary College Geography; Source Book in the Geography of Commercial Production; Market Places of Haiti.*	**Santo Domingo.**
R. C. J.	SIR RICHARD CLAVERHOUSE JEBB, O.M., LL.D., D.C.L. Public Orator, Cambridge University, 1869–75, and Professor of Greek, 1889–1905. Author of *Translations into Greek and Latin;* etc. *See* the biographical article: JEBB, SIR RICHARD C.	**Rhetoric** (*in part*).
R. G.	RICHARD GARNETT, C.B., LL.D. Late Superintendent of the Reading Room, British Museum, and Keeper of the Printed Books. Co-editor with Edmund Gosse of *English Literature.* Author of *A Chaplet from the Greek Anthology; Emerson; Milton; Essays in Librarianship and Bibliophily.*	**Sarpi, Paolo.**

R. H. Lo.	ROBERT H. LOWIE. Professor of Anthropology, University of California, Berkeley, California.	**Relationship Terms.**
R. L. A.	SIR REGINALD LAURENCE ANTROBUS, K.C.M.G., C.B. Governor of St. Helena, 1889–90. Senior Crown Agent for the Colonies, 1909–18. Member of National Assembly of Church of England, 1920–5 and Central Board of Finance since 1925.	**St. Helena** (*in part*).
R. L. T.	RALPH LILLEY TURNER, M.C., M.A. Professor of Sanskrit in the University of London. Sometime Fellow of Christ's College, Cambridge. Author of *Gujarati Phonology; The Position of Romani in Indo-Aryan;* etc.	**Romany Language; Sanskrit Language and Literature** (*in part*).
R. M. F.	MISS R. M. FLEMING. Librarian, The Geographical Association, Aberystwyth. Author of *Ancient Tales from Many Lands; Stories from the Early World;* etc.	**Russia** (*in part*).
R. N. B.	ROBERT NISBET BAIN. Assistant Librarian, British Museum, 1883–1909. Author of *Scandinavia—The Political History of Denmark, Norway and Sweden, 1513–1900; The First Romanows, 1613 to 1725; Slavonic Europe—The Political History of Poland and Russia from 1469 to 1796;* etc.	**Razin, Stenka.**
R. P. Co.	RICHARD P. COWL, M.A. Late Professor of English at Bristol University. Author of *Poetic Theory in England.* Editor of *Henry the Fourth, parts I. and II.*, in Arderne Shakespeare.	**Saga** (*in part*).
R. R.	SIR RICHARD STUDDERT REDMAYNE, K.C.B., M.Sc., M.INST.C.E., M.I.M.E., F.G.S. Past President, Institute of Mining and Metallurgy. Hon. Member, Surveyors' Institute. H.M. Chief Inspector of Mines, 1908–20. Author of *The British Coal Industry.*	**Royalty, In Mining; Safety Lamp.**
R. Ret.	ROBERT RETZER. Director, Life-Insurance Training Course, School of Commerce, Accounts and Finance, New York University.	**Reinsurance** (*in part*).
R. R. M.	ROBERT RANULPH MARETT, M.A., D.Sc., F.R.A.I. Rector of Exeter College, Oxford. University Reader in Social Anthropology. Author of *Anthropology; Psychology and Folklore.*	**Religion** (*in part*).
R. T. F.	RUSSELL T. FISHER. Secretary, National Association of Cotton Manufacturers, Boston.	**Sailcloth and Sailmaking** (*in part*).
R. T. Gl.	SIR RICHARD TETLEY GLAZEBROOK, K.C.B., D.Sc., F.R.S. Fellow of Trinity College, Cambridge. Zaharoff Professor of Aviation and Director of the Department of Aeronautics, Imperial College of Technology, 1920–3. Editor of *Dictionary of Applied Physics.*	**Research, Industrial** (*in part*).
R. U. S.	R. U. SAYCE, M.A. Lecturer in Material Culture and Physical Anthropology, University of Cambridge. Formerly Lecturer in Geology and Geography, University College, Natal, South Africa.	**Rhodesia** (*in part*).
R. W. F. H.	ROBERT WILLIAM F. HARRISON. Barrister-at-Law, Inner Temple. Formerly Assistant Secretary of the Royal Society, London.	**Royal Society, The** (*in part*).
R. W. L.	ROBERT WARDEN LEE, D.C.L. Rhodes Professor of Roman-Dutch Law in the University of Oxford and Fellow of All Souls College. Author of *Introduction to Roman-Dutch Law.*	**Roman-Dutch Law.**
R. W. P.	RAYMOND WILLIAM POSTGATE. Editorial Staff of the 14th edition of the *Encyclopædia Britannica.* Author of *The Bolshevik Theory; Revolution from 1789–1906; The Builders' History;* ed. *Pervigilium Veneris.*	**Sabotage.**
S. A. C.	STANLEY ARTHUR COOK, M.A., LITT.D. University Lecturer in Hebrew and Aramaic, Cambridge. Lecturer in Hebrew and Syriac, and Fellow of Gonville and Caius College, Cambridge. Examiner in Hebrew and Aramaic, London University, 1904–5. Editor for Palestine Exploration Fund. Co-editor of the *Cambridge Ancient History.* Author of *Religion of Ancient Palestine.*	**Ruth, Book of; Sabbath** (*in part*); **Samuel, Books of.**
S. Ca.	STANLEY CASSON, M.A., F.S.A. Fellow of New College and Reader in Classical Archaeology in the University of Oxford. Corresponding Member of the German Archaeological Institute. Sometime Assistant Director of the British School at Athens and Director of the Excavations at Constantinople carried out by the British Academy. Author of *Macedonia, Thrace and Illyria; Ancient Greece.*	**Rumania** (*in part*).
S. F.	SIMON FLEXNER, M.D., LL.D. Director, Laboratories of The Rockefeller Institute for Medical Research.	**Rockefeller Benefactions** (*in part*).
S. Ph.	SAVA POPOVITCH. Belgrade University and Art School. Research Worker in Art and Aesthetics at Munich, Moscow, Florence, Paris, Rome and Cambridge.	**Russian Art.**
S. V.	SERGE VORONOFF. Director of the biological laboratory of the Ecole Pratique des Hautes Etudes. Director of Experimental Surgery of Station Physiologique du Collège de France.	**Rejuvenation.**
T. A.	THOMAS ASHBY, D.LITT., F.B.A., F.S.A., HON.A.R.I.B.A. Formerly Director of the British School at Rome. Author of *Turner's Visions of Rome; The Roman Campagna in Classical Times; Roman Architecture.* Revised and completed for press a *Topographical Dictionary of Ancient Rome* (by the late J. B. Plattner). Author of numerous archaeological articles.	**Sardinia** (*in part*).

T. Ar.	TREVOR ARNETT, Sc.D. President, General Education Board. President, International Education Board. President, Association of American Colleges. Author of *College and University Finance.*	**Rockefeller Benefactions** (*in part*).
T. D. K.	T. D. KENDRICK, M.A. Of the Department of British and Mediaeval Antiquities, British Museum.	**Sardinia** (*in part*).
T. F.	TENNEY FRANK, PH.D. Professor of Latin, Johns Hopkins University, Baltimore. Author of *Roman Imperialism: A History of Rome;* etc.	**Rome** (*in part*).
T. F. H.	TALBOT F. HAMLIN, B.A., B.ARCH. Instructor in the History of Architecture, Columbia University, New York. Chairman, City Plan Committee of the Merchants' Association, New York. Author of *The Enjoyment of Architecture; The American Spirit in Architecture.*	**Renaissance Art; Romanesque Art; Rosette; Rose Window.**
T. G. C.	THOMAS GILBERT CARVER, K.C., M.A. Late Judge of County Courts. Author of *On the Law Relating to the Carriage of Goods by Sea.*	**Salvage** (*in part*).
T. H. MacD.	THOMAS H. MACDONALD, B.C.E. Chief, United States Bureau of Public Roads, Department of Agriculture.	**Roads and Streets** (*in part*).
T. M. M.	THOMAS MAITLAND MARSHALL, PH.D. Professor of History, Washington University, St. Louis. Author of *A History of the Western Boundary of the Louisiana Purchase, 1819–41; Report of the Archives of Idaho.*	**St. Louis.**
T. N. T.	T. N. THOMSON. Sanitary and Heating Engineer. Consulting Engineer and Technical Editor of the *Plumbers and Heating Contractors Trade Journal,* New York.	**Sanitation of Buildings** (*in part*).
T. S. T.	THOMAS SMITH TAIT, F.R.I.B.A. Partner in Sir John Burnett and Partners, Architects, London.	**Russian Architecture** (*in part*).
T. W.	THOMAS WOODHOUSE. Head of Weaving and Textile Designing Department, Technical College, Dundee.	**Sailcloth and Sailmaking** (*in part*).
V. C.	VIVIAN CARTER. Editor in Chief of the publications of Rotary International, Chicago, London and Zürich. General Secretary of the Rotary Clubs of Great Britain and Ireland, 1921–8.	**Rotary Club** (*in part*).
V. H. B.	VERNON HERBERT BLACKMAN, Sc.D., F.R.S. Professor of Plant Physiology and Pathology, Imperial College of Science and Technology, London. Editor of the Botany section, 14th Edition, *Encyclopædia Britannica.*	**Rice** (*in part*).
W. A. G.	WILLIAM A. GANOE, M.A. Major, United States Army. Author of *The English of Military Communications; The History of the United States Army.*	**Resaca de la Palma.**
W. A. H.	W. A. HARDENBERGH, Associate Editor of *Public Works,* New York.	**Refuse Disposal.**
W. A. Ha.	W. A. HAMOR. Chemist. Assistant Director, Mellon Institute for Industrial Research.	**Research, Industrial** (*in part*).
W. B. P.	WILLIAM BELMONT PARKER, A.B. Editor of *South Americans of Today.*	**Rodó, José Enrique; Rosas, Juan Manuel de; San Martín, José de; Sarmiento, Domingo Faustino.**
W. B. W.	WILLIAM BASIL WORSFOLD, M.A. Author of *A History of South Africa; Lord Milner's Work in South Africa; The Empire on the Anvil; The Union of South Africa;* etc.	**Rhodesia** (*in part*).
W. D. A.	W. D. ARMENTROUT, A.M., ED.D. Director of Instruction, Colorado State Teachers' College, Greeley, Colo. Author of *The Conduct of Student Teaching in State Teachers' Colleges.* Co-author of *An Introduction to Education.*	**Rural Education** (*in part*).
W. de B. H.	WILLIAM DE BRACY HERBERT. Barrister-at-Law. Recorder of Newcastle-under-Lyme.	**Riot** (*in part*).
W. Du.	WILLIAM JAMES DURANT, M.A., PH.D. Author of *The Story of Philosophy; Philosophy and the Social Problem.*	**Santayana, George.**
W. Dy.	WALTER DURANTY. Correspondent in Moscow for the *New York Times.*	**Russia** (*in part*).
W. E. H.	WILLIAM E. HOCKING, A.M., PH.D., L.H.D. Professor of Philosophy, Harvard University. Author of *The Meaning of God in Human Experience; Human Nature and Its Remaking.*	**Royce, Josiah** (*in part*).
W. E. I.	MAJOR GENERAL SIR WILLIAM EDMUND IRONSIDE, K.C.B., C.M.G., D.S.O. G. O. C. Meerut District, India since 1928. Commander-in-Chief, British Forces in Russia, 1918–9. Commandant, Staff College, Camberley, 1922–6. Author of *Tannenberg: the First Thirty Days in East Prussia.*	**Russia, Campaign in North; Russo-Polish Campaign.**
W. E. Ma.	WILBUR E. MALLALIEU, M.E. General Manager, National Board of Fire Underwriters, New York.	**Salvage Corps** (*in part*).
W. F. K.	WINIFRED F. KNOX. Author of *The Court of a Saint.*	**Saladin.**
W. H. Dr.	REV. WILLIAM HAMILTON DRUMMOND, D.D., LL.D. Secretary of the International Congress of Free Christians and Other Religious Liberals. Formerly Editor of *The Enquirer.*	**Reunion, Church.**

W. H. Tu.	WILLIAM HOMER TURNER, B.S., M.E., B.LITT. Editorial Staff, New York, 14th Edition, *Encyclopædia Britannica.*	Robot.
W. J. E. B.	W. J. E. BINNIE, M.A., F.G.S., F.R.M.S. Of Sir Alexander Binnie, Son and Deacon, London. Member of the Council of Civil Engineers. Past President of the Institutions of Water and Sanitary Engineers.	Reservoirs.
W. L. Mu.	W. L. MURRAY. Secretary, Reuters Limited.	Reuters.
W. L. W.	REV. W. L. WARDLE, M.A., D.D. Lecturer in Biblical Criticism and Exegesis of the Old Testament, Manchester University. Principal of Hartley College, Manchester.	Reuben; Sabbath (*in part*); Samson; Samuel.
W. Ol.	W. OLTAR-JEVSKY. Graduated as Architect from Moscow Academy of Fine Arts.	Russian Architecture (*in part*).
W. P. A.	LIEUTENANT-COLONEL WILLIAM PATRICK ANDERSON, M.INST.C.E., F.R.G.S. Late Chief Engineer, Department of Marine and Fisheries of Canada, and Member of the Geographic Board of Canada. Past President of Canadian Society of Civil Engineers.	St. Lawrence.
W. R.	WILLIAM RIPPER, D.SC., M.INST.C.E., M.INST.MECH.E. Emeritus Professor of Engineering, University of Sheffield, since 1923. Vice-Chancellor, 1917–26. Chairman, Joint Advisory Council of the Sheffield Trades Technical Societies.	Razor.
W. R. S.	WILLIAM ROBERTSON SMITH, LL.D. Scottish Philologist, Physicist, Archaeologist, Biblical Critic. Editor of the 9th Edition of the *Encyclopædia Britannica.*	Sabbath (*in part*).
W. S. L.-B.	WALTER SYDNEY LAZARUS-BARLOW, B.A., M.D., F.R.C.P. Member of the Cancer Committee, Ministry of Health. Formerly Professor of Experimental Pathology, Middlesex Hospital Medical School, London University. Author of *A Manual of General Pathology; Elements of Pathological Anatomy and Histology for Students.* Editor of the Medicine section, 14th Edition, *Encyclopædia Britannica.*	Respiratory System, Diseases of (*in part*).
W. S. T.	WARREN S. THOMPSON, A.M., PH.D. Professor of Sociology and Director of Scripp's Foundation for Research in Population Problems, Miami University, Oxford, Ohio. Author of *Population—A Study in Malthusianism.*	Rural Depopulation (*in part*).
W. T. C.	WILLIAM THOMAS CALMAN, D.SC., F.R.S. Keeper of the Department of Zoology, British Museum (Natural History). Author of "Crustacea" in Lankester's *Treatise on Zoology.*	Rotifera (*in part*).
W. Tho.	WALLACE THOMPSON, B.SC., LITT.D. Editor-in-Chief of *Ingenieria Internacional* (New York). Fellow of the Royal Geographical Society. Author of *The People of Mexico; The Mexican Mind; Rainbow Countries of Central America.*	Salvador.
W. W. S.	WILLIAM WARREN SWEET, A.B., B.D., PH.D. Professor of History of American Christianity, University of Chicago. Author of *The Methodist Episcopal Church and the Civil War; Rise of Methodism in the West; Our American Churches.*	Revivals, Religious.
X.	Initial used for anonymous contributors.	

THE ENCYCLOPÆDIA BRITANNICA

FOURTEENTH EDITION

VOLUME 19

RAYNAL TO SARREGUEMINES

RAYNAL, GUILLAUME THOMAS FRANÇOIS (1713–1796), French writer, was born at Saint Geniez, Rouergue, on April 12, 1713. He was educated at the Jesuit school of Pezenas, and received priest's orders, but he was dismissed for unexplained reasons from the parish of Saint-Sulpice, Paris, to which he was attached, and thenceforward he devoted himself to society and literature. The Abbé Raynal wrote for the *Mercure de France*, and compiled a series of popular but superficial works, which he published and sold himself. These—*L'Histoire du stathoudérat* (The Hague, 1748), *L'Histoire du parlement d'Angleterre* (London, 1748), *Anecdotes historiques* (Amsterdam, 3 vols., 1753)—gained for him access to the salons of Mme. Geoffrin, Helvétius, and the baron d'Holbach. He had the assistance of various members of the *philosophe* coteries in his most important work, *L'Histoire philosophique et politique des établissements et du commerce des Européens dans les deux Indes* (Amsterdam, 4 vols., 1770). Diderot indeed is credited with a third of this work, which was characterized by Voltaire as "du réchauffé avec de la declamation." The other chief collaborators were Pechméja, Holbach, Paulze, the farmer-general of taxes, the Abbé Martin, and Alexandre Deleyre. The "philosophic" declamations constituted its chief interest for the general public, and its significance as a contribution to democratic propaganda. The *Histoire* went through many editions, being revised and augmented from time to time by Raynal; it was translated into the principal European languages, and appeared in various abridgments. Its introduction into France was forbidden in 1779; the book was burned by the public executioner, and an order was given for the arrest of the author, whose name had not appeared in the first edition, but was printed on the title page of the Geneva edition of 1780. Raynal escaped to Spa, and thence to Berlin, where he was coolly received by Frederick the Great, in spite of his connection with the *philosophe* party. At St. Petersburg he met with a more cordial reception from Catherine II., and in 1787 he was permitted to return to France, though not to Paris. He was elected by Marseilles to the States-general, but refused to sit on the score of age. Raynal now realized the impossibility of a peaceful revolution, and, in terror of the proceedings for which the writings of himself and his friends had prepared the way, he sent to the Constituent Assembly an address, which was read on May 31, 1791, deprecating the violence of its reforms. This address is said by Sainte-Beuve (*Nouveaux lundis*, xi.) to have been composed chiefly by Clermont Tonnerre and Pierre V. Malouet, and it was regarded, even by moderate men, as ill-timed. The published *Lettre de l'abbé Raynal à l'Assemblée nationale* (Dec. 10, 1790) was really the work of the comte de Guibert. During the Terror Raynal lived in retirement at Passy and at Montlhéry. On the establishment of the Directory in 1795 he became a member of the newly organized Institute of France. He died in the next year on March 6, at Chaillot.

A detailed bibliography of his works and of those falsely attributed to him will be found in Quérard's *La France littéraire*, and the same author's *Supercheries dévoilées*. *See* also the anonymous *Raynal démasqué* (1791); B. Lunet, *Biographie de l'abbé Raynal* (Rodez, 1866); and J. Morley, *Diderot* (1891).

RAYNAUD'S DISEASE, a malady first described by P. Edouard Raynaud in 1862 in a paper on "Local Asphyxia and Symmetrical Gangrene of the Extremities." It is a disease of childhood or early adult life, and females are more frequently affected than males. Raynaud attributed the symptoms to an arrest of the passage of blood to the affected parts, and considered this due to a spasm of the arterioles. That the skin capillaries in the various stages correspond with this view has been shown by G. E. Brown but the more fundamental aetiology is unknown. If the spasm be sufficiently prolonged and intense to close completely the arterial channels, gangrene of the part may result.

The local symptoms are divided into three well-marked stages. The first is *local syncope*, in which the affected parts become temporarily bloodless, white, cold and anaesthetic. The condition is familiar in what is termed a "dead finger," and is usually bilateral. After a variable time the circulation may become restored with a tingling sensation, or the disease may progress to the second stage, that of *local asphyxia*. In this condition some part of the body, usually a finger, toe or the whole hand or foot, becomes painful, bluish-purple or mottled, and cold. The discoloration may deepen until the skin is almost black, the tactile sense being lost. After several hours, the attack may pass off. Such attacks of local asphyxia may return every day for a time. Sometimes severe abdominal pain is present, accompanied by haematuria. In the third stage, that of *local gangrene*, the involved areas assume a black and shrivelled appearance, livid streaks marking the course of the arteries; blebs may form containing bloody fluid. The degree of destruction varies from the detachment of a patch of soft tissue down to the loss of even a whole limb, the part becom-

ing separated by a line of demarcation as in senile gangrene.

In Raynaud's disease the patients have been noticed to be very susceptible to cold; the extremities must be kept warm; and the activity of the circulation roused by douches and exercise; by these means an attack may be prevented. Should local asphyxia have taken place, one of the best treatments to lessen pain and obtain the return of the natural colour is the application of the constant current, the limb being placed in a bath of warm salt and water. Cushing's method of inducing active hyperaemia has been attended with much success. This treatment is only applicable when the vascular spasm affects the extremities, and consists in the artificial constriction of the limb by the application of a tourniquet or Esmarch's bandage for a few minutes daily. This is followed by hyperaemia and increased surface temperature, and affords much relief to the pain of the stage of asphyxia. Drugs which dilate the peripheral vessels, such as amyl nitrite and trinitrine, have also been recommended. The disease tends towards recovery with more or less loss of tissue if the stage of gangrene has been reached.

See G. E. Brown, Arch. Int. Med., 1925, xxxv. 56.

RAYNOUARD, FRANÇOIS JUSTE MARIE (1761–1836), French dramatist and *savant*, was born at Brignoles (Provence), on Sept. 8, 1761. He was educated for the bar and practised at Draguignan. In 1791 he went to Paris as deputy to the Legislative Assembly, but after the fall of the Girondists, he was imprisoned in Paris. During his imprisonment he wrote his play *Caton d'Utique* (1794). *Eléonore de Bavières* and *Les Templiers* were accepted by the Comédie Française. *Les Templiers* was produced in 1805, and, in spite of the protests of Geoffroy, had a great success. Raynouard was admitted to the Academy in 1807, and from 1817 to 1826 he was perpetual secretary. He was admitted to the Academy of Inscriptions in 1815. His later life was spent in studying the Provençal language and literature. His chief works are *Choix de poésies originales des troubadours* (6 vols., 1816–1821), of which the sixth volume, *Grammaire comparée des langues de l'Europe latine dans leurs rapports avec la langue des troubadours* (1821), was separately published; and *Lexique roman* (6 vols., 1838–1844). He died at Passy on Oct. 27, 1836.

RAYON. This word was first used as a textile term in the United States in the year 1924 and is the name by which some of the synthetic fibres, frequently called artificial silk in Great Britain, are commonly known in the United States. For processes, products, statistics, etc., *see* SILK, ARTIFICIAL; CELLULOSE.

The technical definition usually accepted (U.S. Dept. of Commerce) is as follows: *Rayon* is the generic name of filaments made from various solutions of modified cellulose by pressing or drawing the cellulose solution through an orifice and solidifying it in the form of a filament or filaments, by means of some precipitating medium.

RAYONNANT STYLE, in architecture, the fully developed French Gothic style (*see* GOTHIC ARCHITECTURE) of the latter half of the 13th and the first three quarters of the 14th centuries. It is characterized by a complete mastery of the structural ideas of the Gothic vaulted church; great skill in stone cutting; the elimination of wall surface; the reduction in area of all supports to the minimum; thorough development and lavish use of bar tracery based on geometric forms; reduction in size and importance of the triforium gallery, and a general attempt to accent all vertical lines. In carved ornament the spherical crocket of the earlier Gothic was replaced by a fully opened, upturned leaf, and naturalistic foliage decorated capitals, string courses and the like. Figure sculpture was lavishly used around entrance doors, and in its combination of decorative validity and realistic presentation, it approached Greek sculpture of the 4th century B.C. Towards the end of the period, realism in sculpture became dominant and the decorative value of the work diminished. Characteristic examples are: later portions of Amiens cathedral (apse completed 1269, side chapels 1292–1375); transept and side chapels of Notre Dame at Paris (1258–1315); Sainte Chapelle, Paris (1245–48); S. Urban at Troyes (1262–76), famous for its delicate tracery and enormous window area; the Portail des Libraires at Rouen cathedral (1280); and the east end of the great abbey church of S. Ouen at Rouen (choir and transepts begun 1318).

RAZIN, STENKA [STEPHEN TIMOFEEVICH] (d. 1671), Cossack hetman and rebel, whose parentage and date and place of birth are unknown. We first hear of him in 1661 on a diplomatic mission from the Don Cossacks to the Kalmuck Tatars, and in the same year we meet him on a pilgrimage of a thousand miles to the great Solovetsky monastery on the White Sea "for the benefit of his soul." After that all trace of him is lost for six years, when he reappears as the leader of a robber community established at Panshinskoe, among the marshes between the rivers Tishina and Ilovlya, from whence he levied blackmail on all vessels passing up and down the Volga. His first considerable exploit was to destroy the "great water caravan" consisting of the treasury-barges and the barges of the patriarch and the wealthy merchants of Moscow. He then sailed down the Volga with a fleet of thirty-five galleys, capturing the more important forts on his way and devastating the country. At the beginning of 1668 he defeated the voivode Jakov Bezobrazov, sent against him from Astrakhan, and in the spring embarked on a predatory expedition into Persia which lasted for eighteen months. Sailing into the Caspian, he ravaged the Persian coasts from Derbend to Baku, massacred the inhabitants of Resht, and in the spring of 1669 established himself on the isle of Suina, off which, in July, he annihilated a Persian fleet sent against him. Stenka, as he was generally called, had now become a potentate with whom princes did not disdain to treat. In August 1669 he reappeared at Astrakhan, and accepted a fresh offer of pardon from the tsar there. In 1670 Razin rebelled against the government, captured Cherkask, Tsaritsyn and other places, and on June 24 burst into Astrakhan. After massacring all who opposed him, and giving the rich bazaars of the city over to pillage, he converted Astrakhan into a Cossack republic. After a three weeks' carnival of blood and debauchery Razin quitted Astrakhan with two hundred barges full of troops to establish the Cossack republic along the whole length of the Volga, as a preliminary step towards advancing against Moscow. But his forces were stayed by the resistance of Simbirsk, and after two bloody encounters close at hand on the banks of the Sviyaga (October 1st and 4th), Razin was ultimately routed and fled down the Volga.

But the rebellion was by no means over. The emissaries of Razin, armed with inflammatory proclamations, had stirred up the inhabitants of the modern governments of Nizhniy-Novgorod, Tambov and Penza, and penetrated even so far as Moscow and Great Novgorod. It was not difficult to rouse the oppressed population by the promise of deliverance from their oppressors. Razin proclaimed that his object was to root out the boyars and all officials, to level all ranks and dignities, and establish Cossackdom, with its corollary of absolute equality, throughout Muscovy. Even at the beginning of 1671 the issue of the struggle was doubtful. Eight battles had been fought before the insurrection showed signs of weakening, and it continued for six months after Razin had received his quietus. At Simbirsk his prestige had been shattered. Even his own settlements at Saratov and Samara refused to open their gates to him, and the Don Cossacks, hearing that the patriarch of Moscow had anathematized Stenka, also declared against him. In 1671 he was captured at Kagalnik, his last fortress, and carried to Moscow, where, on June 6, after bravely enduring unspeakable torments, he was quartered alive.

See N. I. Kostomarov, *The Rebellion of Stenka Razin* (Rus.) (2nd ed. Petersburg, 1859); S. M. Solovev, *History of Russia* (Rus.), vol. ii. (Petersburg, 1895, etc.); R. N. Bain, *The First Romanovs* (London, 1905). (R. N. B.)

RAZMAK, the new military cantonment opened in Waziristan after the suppression of the Waziristan rebellion which followed the third Afghan war. It is some 6,000 feet above the sea and 13 miles from the old military frontier of Bannu, and is occupied by mixed forces.

RAZOR. The ordinary razor is an instrument used for shaving and consists of a hardened steel blade, made with an extremely fine sharp edge and fitted into a handle.

The early razor of modern times was made of steel which had a wedge-shaped section, with straight sides tapering to a sharp

edge, and although simple in form it was an extremely good and useful instrument for its purpose. It possessed very durable properties, lasting in many cases the whole lifetime of its owner.

In the early part of the last century, the practice was introduced of hollowing out the sides of the blade by grinding, the idea being to facilitate the process of sharpening and re-sharpening the blade, and to improve the fineness of the cutting edge. At first the degree of hollowness, or concavity of the sides of the blade was only small, but in more recent times with great skill, hollow-grinding has been carried considerably further, increasing the lightness and flexibility of the blade. The full hollow blade is actually thinner in the centre of the blade than nearer the cutting edge, and such a hollow ground blade can be made to give a resonant ring. The process of hollow-grinding is performed by using grinding wheels of successively diminishing diameters.

The processes of the production of the blade consist of:—the forging under the hammer, marking with the name of the maker, drilling the hole for the pin, then the hardening and tempering of the blade, the grinding and hollowing as above described, the glazing and buffing on small leather-covered wheels with suitable polishing material. The blade is then etched, fitted with a handle and finally whetted to a fine sharp edge. The process of etching is sometimes a very elaborate one, some beautiful effects on the etched surface of the blade being obtained.

Safety Razor.—The razor is naturally considered a dangerous instrument, and many attempts have been made to make it entirely safe for its purpose. It was not until the introduction of the "Gillette" type of razor, at the beginning of this century, that a satisfactory solution was found. The principle of the "safety" type of razor, is to place a guard between the skin and the cutting edge of the razor blade, so that the guard permits the edge of the razor to pass over the uneven surface of the part to be shaved removing the hair but without cutting the skin.

The blade of the safety type of razor is generally made out of very thin sheet or strip steel of the finest quality for its purpose, and the fine cutting edges of the blade are formed by whetting on suitable wheels.

In some cases devices are provided to enable the user to strop or re-sharpen the blades, and the action applied in this operation, when used after shaving, enables the blade to be effectively cleaned and dried at the same time, thereby preventing corrosion of the fine edge and preserving it for future use. The quality of the steel strip supplied by the steel-maker for ultimate use as blades in the safety-razor, is the result of a combination of the highest grade of skill and experience both on the part of the steel-maker and of the rolling-mill engineer.

Other types of safety devices have been introduced which are based on the desire to retain the general form and make up of the ordinary razor, while rendering it as safe in use as the more modern type. These take the form of the fitting of a suitable guard to the blade of the ordinary razor, or the substitution for it of a holder, carrying an adjustable blade of the strip-steel type, in place of the ordinary blade.

The modern type of "safety-razor" has revolutionized the practice of domestic shaving, reducing the operation to the simplest possible form, but the ordinary razor still holds its own, in the judgment of the professional barber, as the most convenient all-round instrument for its purpose. (W. R.)

RAZORBILL or **RAZOR-BILLED AUK,** *Alca torda,* a member of the Auk family, known also as Marrot, Murre, Scout, Tinker or Willock; some of these names it shares with the GUILLEMOT (*q.v.*), and PUFFIN (*q.v.*). It is a common sea-bird of the north Atlantic, resorting in vast numbers to certain rocky cliffs for breeding, and returning to the open sea for the rest of the year. It is in many respects intermediate between the guillemot and the garefowl (*q.v.*). In habits the razorbill agrees with the guillemots, laying its single egg on ledges of cliffs. It breeds on both sides of the north Atlantic, wandering as far south as the Mediterranean on the east and Long Island on the west in winter. It feeds on fish.

RÉ, ÎLE DE, an island of western France, belonging to the department of Charente-Inférieure, distant about 2 m. from the mainland. The island has an area of nearly 33 sq.m., with a breadth varying from 1 to 4½ m. and a length of 15 m. It is separated from the coast of Vendée on the N. by the Pertuis Breton, some 6 m. broad, and from the island of Oléron on the S. by the Pertuis d'Antioche, 7½ m. broad. The coast facing the Atlantic is rocky, but there are several harbours on the landward side, of which the busiest is La Flotte. In the north-west of the island there is a deep gulf, the Fier d'Ars, which leaves an isthmus only 230 ft. wide, strengthened by a breakwater. The north coast is fringed by dunes and by salt-marshes. Industries are fishing, oyster-cultivation and the collection of seaweed for manure; the island has corn-lands and vineyards and grows early vegetables. There are two cantons, St. Martin (pop. in 1926, 6,478) and Ars-en-Ré (pop. 3,562) forming part of the arrondissement of La Rochelle. St. Martin, the capital, which has a safe harbour, was fortified by Vauban in 1681.

REA, SAMUEL (1855–1929), American railroad official, was born at Hollidaysburg (Pa.), on Sept. 21, 1855. In 1871 he entered the service of the Pennsylvania Railroad as chainman and rodman. From 1875 to 1877 he was assistant engineer on construction of the Monongahela river bridge at Pittsburgh. He was next appointed assistant engineer for the Pittsburgh and Lake Erie Railroad and returned to the Pennsylvania lines in 1879 in a similar capacity. In 1888 he was appointed assistant to the second vice president of the Pennsylvania Railroad, which position he retained until 1889 when he was made chief engineer on construction of the belt line tunnel under Baltimore for the Baltimore and Ohio Railroad.

In 1892 he again returned to the Pennsylvania Railroad as assistant to the president, and became first vice president in 1911. In 1913 he was elected president. He was in charge of the construction of the Pennsylvania Station in New York city (completed in 1910), the connecting tunnels under the Hudson and East rivers, the New York Connecting Railroad and Hell Gate bridge over the East river (opened in 1917). In 1917 he became a member of the executive committee on national defence of the American Railway Association, known as the Railroads War Board. He retired from the presidency of the Pennsylvania Railroad on Sept. 30, 1925. He died at Gladwyne, Pa., on March 24, 1929. He wrote *The Railways Terminating in London* (1888).

READE, CHARLES (1814–1884), English novelist and dramatist, the son of an Oxfordshire squire, was born at Ipsden, Oxfordshire, on June 8, 1814. He entered Magdalen college, Oxford, proceeded B.A. in 1835, and became a fellow of his college. He was subsequently dean of arts, and vice-president of Magdalen college, taking his degree of D.C.L. in 1847. His name was entered at Lincoln's Inn in 1836; he was elected Vinerian fellow in 1842, and was called to the bar in 1843. He kept his fellowship at Magdalen all his life, but after taking his degree he spent the greater part of his time in London. He began his literary career as a dramatist, and it was his own wish that the word "dramatist" should stand first in the description of his occupations on his tombstone. He was dramatist first and novelist afterwards, not merely chronologically but in his aims as an author, always having an eye to stage-effect in scene and situation as well as in dialogue.

His first comedy, *The Ladies' Battle,* appeared at the Olympic Theatre in May 1851. It was followed by *Angelo* (1851), *A Village Tale* (1852), *The Lost Husband* (1852), and *Gold* (1853). But Reade's reputation was made by the two-act comedy, *Masks and Faces,* in which he collaborated with Tom Taylor. It was produced in Nov. 1852, and later was expanded into three acts. By the advice of the actress, Laura Seymour, he turned the play into a prose story which appeared in 1853 as *Peg Woffington* as did also *Christie Johnstone,* a close study of Scottish fisher folk. In 1854 he produced, with Tom Taylor, *Two Loves and a Life* and *The King's Rival;* and, unaided, *The Courier of Lyons*—well known under its later title, *The Lyons Mail*—and *Peregrine Pickle.* In the next year appeared *Art,* afterwards known as *Nance Oldfield.*

He made his name as a novelist in 1856, when he produced *It's Never Too Late to Mend,* a novel written with the purpose of reforming abuses in prison discipline and the treatment of

criminals. Five minor novels followed in quick succession,—*The Course of True Love never did run Smooth* (1857), *Jack of all Trades* (1858), *The Autobiography of a Thief* (1858), *Love Me Little, Love Me Long* (1859), and *White Lies* (1860), dramatized as *The Double Marriage*. Then appeared in 1861, his masterpiece, *The Cloister and the Hearth*, relating the adventures of the father of Erasmus; it is undoubtedly one of the finest historical novels in existence. Returning from the 15th century to modern English life, he next produced another startling novel with a purpose, *Hard Cash* (1863), in which he strove to direct attention to the abuses of private lunatic asylums. Three other novels "with a purpose" were *Foul Play* (1869), in which he exposed the iniquities of ship-knackers, and paved the way for the labours of Samuel Plimsoll; *Put Yourself in his Place* (1870), in which he grappled with the trades-unions; and *A Woman-Hater* (1877), on the degrading conditions of village life. The *Wandering Heir* (1875), of which he also wrote a version for the stage, was suggested by the Tichborne trial.

Outside the line of these moral and occasional works Reade produced three elaborate studies of character,—*Griffith Gaunt* (1866), *A Terrible Temptation* (1871), *A Simpleton* (1873). The first of these was in his own opinion the best of his novels. His greatest success as a dramatist attended his last attempt—*Drink*—an adaptation of Zola's *L'Assommoir*, produced in 1879. In that year his friend Laura Seymour, who had kept house for him since 1854, died. Reade's health failed from that time, and he died on April 11, 1884, leaving behind him a completed novel, *A Perilous Secret*, which showed no falling off in the arts of weaving a complicated plot and devising thrilling situations. Reade was an amateur of the violin, and among his works is an essay on Cremona violins with the title, *A Lost Art Revived*.

It was characteristic of Reade's open and combative nature that he admitted the public freely to the secrets of his method of composition. By his will he left his workshop and his accumulation of materials open for inspection for two years after his death. He had collected an enormous mass of materials for his study of human nature, from personal observation, from newspapers, books of travel, blue-books of commissions of inquiry, from miscellaneous reading. This vast documentation, and Reade's use of it, shows him as a precursor of the school of Zola.

See Charles L. Reade and Compton Reade, *Charles Reade, a Memoir* (2 vols., 1887); A. C. Swinburne, *Miscellanies* (1886); John Coleman, *Charles Reade as I knew him* (1903); Walter C. Phillips, *Dickens, Reade and Collins, Sensation Novelists* (1919).

READING, RUFUS DANIEL ISAACS, 1ST MARQUESS OF (1860–), British statesman, was born on Oct. 10, 1860, in London, the second son of Joseph Isaacs, merchant. He was educated at University college school, London, and abroad. At the age of 14 he ran away to sea, and served two years before the mast in a sailing ship. A subsequent venture on the Stock Exchange was a failure. He then read for the bar, and was called in 1887; the same year he married Miss Alice Cohen. His legal career was one of unbroken and immediate success. Perhaps the most sensational of his cases was the prosecution of Whitaker Wright for fraud, which was followed by the defendant's suicide.

He entered parliament as a Liberal Imperialist, winning a seat for his party at Reading in a by-election in 1904, which he retained till he went to the House of Lords. In political oratory, although an effective speaker in the country, he failed, as so many great lawyers have failed, to impress the House of Commons, being far more inclined to address his opponents as a jury with a view to their conversion than to stimulate enthusiasm for the policy of his own party. But his party had the highest opinion of him and he became attorney-general in 1910, and in 1912 was given a seat in the cabinet; which no attorney-general had held before. Then followed the great Marconi shares scandal, in which he and Lloyd George were alleged to be involved. The substance of the charge was that he had bought American Marconi shares, some of which he sold to Lloyd George, while the British Marconi company was contracting with the Government. It was investigated by a committee of the House and his reputation was certainly vindicated. A few months later (Oct. 20, 1913) he was made lord chief justice, and created Baron Reading of Erleigh. In this office he distinguished himself by humanity in the conduct of criminal cases and by the establishment of the principle that the court of criminal appeal should act as a real court of revision, upsetting verdicts or reducing sentences even of the individual high court judges. He presided over the trial of Casement in Ireland during the World War.

After the outbreak of the war in Aug. 1914, he assisted in the drafting and the administration of those measures which saved England from financial ruin. The most sensational of these was the granting of the British guarantee to the great accepting houses, to bills amounting to many hundred millions of pounds. In 1915 he was president of the Anglo-French Loan Commission to the United States, where he succeeded in floating a great war loan. On June 26, 1916, he was created Viscount Reading of Erleigh.

In 1917 he was appointed high commissioner and special envoy to the United States, and in December of that year was created an earl. In 1918 he was appointed high commissioner and special ambassador at Washington.

Lord Reading's term as viceroy of India began at the end of the war. He was faced immediately by four acute problems. First the diarchy system of the Montagu-Chelmsford Government of India Act, devised as a step in advance towards complete self-government, was definitely rejected by the leaders of the united Hindu and Mohammedan educated population, who in the movement known as Swaraj had resolved to make it unworkable. The second was the influence of Mahatma Gandhi, one of the most remarkable men of all time, who had inflamed millions of Indians to a boycott of the West by the East and a kind of gigantic movement of passive resistance, in which both English products and English Government were to be alike rejected. The third was that the national temper of India had been aroused by prohibitions and indignities put upon Indians in other parts of the empire. The fourth, the ghastly story of the Punjab rebellion and the slaughter at Amritsar in 1919, with the support of Gen. Dyer's action there by the governing classes in England, had excited a feeling of such fierce resentment throughout the length and breadth of the peninsula as might well have caused a general uprising. In dealing with the revolt against the diarchy, he found himself compelled to imprison the two Mohammedan leaders, the brothers Ali. And although he was able before the end to establish some kind of self-government in most of the local provinces and even something like friendly co-operation in the Central Legislative council the constitution broke down in the Central Provinces and had to be suspended in Bengal, with a return to complete autocratic government. In the case of the boycott of the West the viceroy, after several attempts at reconciliation with Gandhi, authorized his prosecution for inciting to mass civil disobedience which resulted in a sentence of six years' imprisonment, although the mahatma was released on the grounds of ill health after two years.

In the matter of the treatment of Indian immigrants in other parts of the empire, Lord Reading showed himself a determined supporter of the rights of India. In the case of Amritsar and the memories of the rebellion he could only exhibit his sympathy with the Indian population and work for the healing influences of time.

In the struggle for financial stability he was compelled to exercise the power of certification by the viceroy against the Assembly of the much-hated salt tax. But he saw, and acquiesced in, India, like many other of the dominions, converting itself from a free trade into a protectionist country, a change produced partly by a passionate nationalism which rejected the excise cotton duties, and partly by the need for compensating revenues by a big import duty on iron and steel. That he could exercise sternness when required was shown by his action towards the maharajah of Indore, who was compelled to abdicate as an alternative to trial by his peers for the murder of an Indian merchant. Upon his return to England in April 1926 he was raised to the rank of marquess. (*See* INDIA.)

READING, a county borough and county town of Berkshire, England, 36 m. W. by S. of London by the G.W.R. Pop. (1931) 97,153.

Reading early became a place of importance. In 871 the Danes encamped here, and in 1006 it was burned by Sweyn. It consisted of only 30 houses at the time of the Domesday Survey. It is thought that a fortification existed there before the Conquest, and Stephen built a masonry castle which Henry II. destroyed. On the foundation of Reading abbey the town, hitherto demesne of the crown, was granted to the abbey by Henry I. Henceforth, until the 16th century, its history was that of the struggle as to rights and privileges between the abbey and the merchant gild. A 16th-century account of the gild merchant shows that many trades were then carried on, but Leland says the town "chiefly stondith by clothing." By the 17th century the trade began to decline; the bequest of Kendrich did little to revive it, and it was greatly injured by the Civil War. In the 18th century the chief trade was in malt. The first town charter is that given by Henry III. (1253) confirmed and amplified by succeeding sovereigns. The governing charter until 1835 was that of Charles I. (1639) incorporating the town under the title of the mayor, aldermen and burgesses. The town surrendered to the parliamentary troops, after a siege, in 1643; it was occupied subsequently by the forces of both parties: in 1688 a skirmish took place in the town between some Irish soldiers of James II. and the troops of William of Orange. The market, chiefly held on Saturday, can be traced to the reign of Henry III.; four fairs granted by the charter of 1562 are still held.

Reading is an important junction on the G.W.R. and has communication southward by the S.R. The Kennet and Avon canal, to Bath and Bristol, and the Thames, afford it connections by water. It lies on the Thames where the Kennet joins the main river. All the ancient churches are restored. Greyfriars church, formerly monastic, was completed early in the 14th century; and after the dissolution of the monasteries served successively as a town hall, a workhouse and a gaol, being restored to its proper use in 1864. St. Mary's was rebuilt in 1551 from the remains of a numnery founded by Aelfthryth in expiation of the murder of her stepson Edward the Martyr. St. Lawrence's is a Perpendicular building, and St. Giles's was much damaged during the siege of 1643 by the parliamentary forces, and is almost wholly rebuilt. A Benedictine abbey was founded in 1121 by Henry I., with a church among the largest in the country. By Henry VIII. the abbey was converted into a palace, which was destroyed during the civil wars. The greater part of the site is occupied by public gardens.

A University College was opened in 1892 and affiliated to Oxford; its success led to the gathering of an endowment fund and it became an independent university with a charter in 1926. Its agricultural researches have been of special importance. The grammar school, founded in 1485, occupies modern buildings. There are also a blue-coat school (1656), and other charitable schools of early foundation. The municipal museum, besides an art gallery and other exhibits, includes a collection of Romano-British relics from Silchester.

Reading is a railway centre and an agricultural centre with famous nursery gardens. The industry for which it is chiefly famous is biscuit manufacture. There are also iron foundries, engineering works and factories for agricultural implements, and manufactures of tin boxes, potteries, sauces, velvet and silk, and sacking, together with riverside boat-building yards. Reading gives title to a suffragan bishopric in the diocese of Oxford. The parliamentary borough returns one member. A new bridge over the Thames to Caversham was opened in 1923, and the old one adjacent was closed for rebuilding in 1925.

READING, a town of Middlesex county, Massachusetts, U.S.A., 12 m. N. by W. of Boston, on the Boston and Maine railroad. Pop. (1920) 7,439 (84% native white); 1930 Federal census 9,767. It has numerous manufactures, including shoes, rubber goods, radio outfits, instruments for the deaf and organ pipes. The town was set off from Lynn and incorporated in 1644.

READING, a village of Hamilton county, Ohio, U.S.A., on the Pennsylvania railroad, 12 m. N. of Cincinnati. Pop. (1920) 4,540; and 5,723 in 1930. The principal industries are the manufacture of glass, matches and fireworks. About 800 of the residents are employed outside the village. Reading was founded in 1797 and incorporated in 1851.

READING, a city of south-eastern Pennsylvania, U.S.A., the county seat of Berks county; on the Schuylkill river, 58 m. N.W. of Philadelphia. It is on Federal highways 22, 222, 422 and 120; has a municipal airport; and is served by the Pennsylvania and the Reading railways, interurban trolleys, motorbus and truck lines. Pop. (1920) 107,784 (90% native white); 1930 Federal census 111,171. An unusually large proportion of the population (88% in 1920) are natives of the State, and the "Pennsylvania German" element predominates. The city occupies 9·5 sq.m. on the east bank of the river, at an altitude ranging from 242 to 1,100 feet. To the east rises Mt. Penn (1,100 ft.) and to the south Neversink mountain (878 ft.). There are several summer hotels and sanatoria on the neighbouring hills. The city's parks and playgrounds cover 600 acres. Penn Common (50 ac.) is a recreation ground in the heart of the city, reserved for the public when the town was laid out. On the eastern slope of Mt. Penn is a park of 63 ac. and a boulevard winds along the southern slope of the mountain to the pagoda on the summit, which commands a wide view of the surrounding country. Among the interesting landmarks in the environs are several colonial farmhouses, the Conrad Weiser farm and sites of early forts and iron furnaces.

The public-school system comprises continuation, evening and summer schools, in addition to the usual instruction from kindergarten through high school. Pennsylvania State college and the University of Pennsylvania maintain extension centres in Reading, and it is the seat of Schuylkill college (Evangelical; 1926). The public library contains over 50,000 volumes and has three branch stations; the county historical society has a building full of interesting exhibits; and the public museum and art gallery occupy a beautiful new building, completed in 1926. Among the displays in the museum is a fine private collection of butterflies, owned by the curator. The city supports a symphony orchestra. It is also noted for the cultivation of rare peonies and irises. There are two daily papers; weeklies published in Polish and Italian and one devoted to the interests of labour and socialism; and the monthly organ of the retail coal merchants of Pennsylvania.

Reading has operated under a commission form of government since 1912. It is the centre of Pennsylvania's first super-power system, which supplies electric current to the region extending from Harrisburg to eastern New Jersey. The water-supply is filtered mountain water, stored in reservoirs with a capacity of 216,000,000 gal., and the city's daily consumption averages 20,000,000 gallons. The assessed valuation of property for 1927 was $161,260,000. Reading has a large retail and wholesale trade, and is an important shipping point for agricultural produce. It is within a short haul of the anthracite fields, and also of some of the richest bituminous coal-fields of the State. The classification yards of the Reading company are a vast distributing centre for anthracite shipments consigned to the East, West and South. Industrially, Reading ranks third among the cities of Pennsylvania, with an output in 1927 valued at $121,094,958. There are some 700 manufacturing establishments in the city and its immediate suburbs, including the shops of the Reading railway, and the largest plants in the country producing wrought iron pipe, glove-silk underwear, full-fashioned hosiery, glass door-knobs, goggles, optical goods, children's shoes, narrow silk fabrics, and certain kinds of hosiery knitting machines and lace-making machinery. Reading is the principal centre in the country for the manufacture of wool felt hats, and ranks second in the production of hosiery and knit goods and builders' hardware. There is a large proportion of skilled mechanics in the population, and many of the trades are organized. The proportion of women employed is relatively large (30·5% of all ten years of age and over in 1920); the proportion of boys and girls (10 to 15 years of age) working for wages is 13% and the proportion attending school is also high (68% of all 7 to 20 years of age). Bank clearings in 1927 aggregated $223,700,000.

Reading was founded in 1748 by Thomas and Richard, sons of William Penn, and was named after the county-town of Berkshire, England. It was incorporated as a borough in 1783, as a city in 1847. Though there were many Germans among the first set-

tlers, the control of local affairs remained in the hands of the English colonists until the outbreak of the Revolutionary War, after which, as the English were largely Loyalists, it passed to the Germans. In the French and Indian Wars Reading became a military base for a chain of forts along the Blue mountains. During the Revolution it was a depot of military supplies, and was the site of a prison camp in which the Hessians taken at the battle of Trenton were detained. This region was one of the first in America to manufacture iron and iron products. Cannon for use in the Revolution were made here, and Reading supplied much of the heavy ordnance used by the Northern Army in the Civil War. The first cooking stove made in America was cast in the Hereford furnace, 20 m. E. of the city, in 1767. The industrial development of the town was greatly stimulated by the opening of the Schuylkill canal to Philadelphia in 1824 (abandoned in 1922), the Union canal to Lebanon and Middletown in 1828 (abandoned about 1880), and the Philadelphia and Reading railway in 1838. A company of Reading and Berks militiamen was the first unit to report to Gen. Washington at Cambridge in response to the call for troops by the Second Continental Congress; and the Ringgold light artillery (later known as "the First Defenders"), largely recruited from Reading and Berks county, was the first volunteer company to reach the national capital when Lincoln called for troops.

READING COMPANY, a corporation operating or controlling 2,253 m. of railroad in the States of Pennsylvania, New Jersey and Delaware, which became a common carrier through merger on Dec. 31, 1923, of Reading Company (incorporated May 24, 1871), Philadelphia and Reading Railway Company (successor to The Philadelphia and Reading Railroad Company—incorporated April 4, 1833), and 12 other railroad companies theretofore forming part of the Reading system. Actual operations on some of its subsidiary lines began, however, as early as 1831, and a portion of its railroad was constructed under a charter granted Sept. 29, 1791. On Dec. 31, 1927, it had total assets of $434,367,562. It then owned 1,047 locomotives, 945 passenger cars, 43,719 freight cars, 760 work cars and 141 vessels. It maintains at Port Richmond, Philadelphia, the most extensive freight terminal in the world under one management, including a 2,500,000 bu. capacity modern concrete export grain elevator. It controls among other corporations the Central Railroad of New Jersey, Atlantic City railroad, Port Reading railroad and Perkiomen railroad, and furnishes terminal facilities at tide water for the trunk line systems having eastern connections. Its total gross receipts in 1927 were $105,495,655, excluding receipts of controlled companies. Of its operating revenues 43·6% were derived from the transportation of merchandise, 41·3% from anthracite and bituminous coal and 15·1% from passengers, mail and other sources. (A. T. D.)

READYMONEY, SIR COWASJI JEHANGIR (1812–1878), "the Peabody of Bombay," belonged to a family descended from Parsee merchants of the early 18th century who had adopted their nickname of "Readymoney" as a surname. At the age of 15 he entered the firm of Duncan, Gibb & Co. as "godown keeper," or warehouse clerk. In 1846 he began trading on his own account. He was made a J.P. for the town and island of Bombay, and a member of the board of conservancy, and in 1866 was appointed a commissioner of income tax. He was made C.S.I. in 1871, and in 1872 K.B. His donations to the institutions of Bombay amounted to close on £200,000.

See J. Cowasji Jehangir, *Sir Cowasji Jehangir Readymoney* (1890).

REAGAN, JOHN HENNINGER (1818–1905), American politician, was born in Sevier county, Tennessee, on Oct. 8, 1818. He removed to Texas in 1839, was admitted to the bar in 1846, and in 1857–61 was a representative in Congress. His political views were determined by the ultra-democratic influence of Andrew Jackson and the state-sovereignty philosophy of John C. Calhoun. In 1861 he was appointed postmaster general in President Davis's cabinet, and served in this capacity throughout the war. He was captured with the Davis party on May 10, 1865, and was imprisoned in Ft. Warren, Boston Harbour, until the following October. While in prison he wrote the "Fort Warren letter" (Aug. 11), in which he urged the people of Texas to recognize their defeat, grant civil rights to the freedmen, and try to conciliate the North. From 1875 to 1887, when he entered the U.S. Senate, he was again a representative in Congress. In 1891, believing that his first duty was to his State, he resigned from the Senate to accept the chairmanship of the newly established State railway commission. In 1901 he retired from public service. He died at Palestine, Tex., on March 6, 1905.

See his *Memoirs; with Special Reference to Secession and the Civil War* (1906), edited by W. F. McCaleb.

REALGAR, a mineral species consisting of arsenic monosulphide, AsS, and occurring as monoclinic crystals of a bright red colour. There is a perfect cleavage parallel to the plane of symmetry; hardness is 1·5–2, specific gravity 3·55. On exposure to light the crystals crumble to a yellow powder. The mineral usually occurs with ores of silver and lead in mineral veins. Realgar has been used as a pigment and in pyrotechny for producing a brilliant white fire; but it is now replaced by the artificially prepared compound. The other native arsenic sulphide, As_2S_3, is known as Orpiment (*q.v.*). (L. J. S.)

REALISM, a philosophical term used in two opposite senses. The older of these is the scholastic doctrine that universals have a more "real" existence than things. Universals are, in scholastic language, *ante res, in rebus* and *post res.* In the most extreme form realism denies that anything exists in any sense except universals. It is opposed to nominalism (*q.v.*) and conceptualism (*q.v.*). For the history of the doctrine, *see* SCHOLASTICISM. In this sense, realism has been called "an assertion of the rights of the subject," and some part of the teaching of Socrates concerns itself with the scholastic doctrine of realism. The modern application of the term is to the opposing doctrine that there is a reality apart from its presentation to consciousness. In this sense it is opposed to idealism (*q.v.*), whether the purely subjective or that more comprehensive idealism which makes subject and object mutually interdependent. In its crude form it is known as "Natural" or "Naïve" Realism. It appears, however, in more complex forms, *e.g.*, as Ideal Realism (or Real Idealism), which combines epistemological idealism with realism in metaphysics. Again, Kant distinguishes "empirical" realism, which maintains the existence of things in space independent of consciousness, from "transcendental" realism, which ascribes absolute reality to time and space. (*See* PHILOSOPHY, HISTORY OF.)

In literature and art "realism" again is opposed to "idealism" in various senses. The realist is (1) he who deliberately declines to select his subjects from the beautiful or harmonious, and, more especially, describes ugly things and brings out details of an unsavoury sort; (2) he who deals with individuals, not types; (3) most properly, he who strives to represent the facts exactly as they are.

REALITY: *see* LOGIC; ONTOLOGY.

REAL PRESENCE: *see* TRANSUBSTANTIATION and EUCHARIST.

REAL PROPERTY AND CONVEYANCING: *see* LAWS RELATING TO REAL PROPERTY AND CONVEYANCING.

REAPING, the action of cutting ripe grain crops. Till the invention of the reaping machine, which came into practical use only about the middle of the 19th century, sickles and scythes were the sole reaping implements. Of the two the sickle is the more ancient, and indeed there is some reason to conclude that its use is coeval with the cultivation of grain crops. Among the remains of the later Stone period in Great Britain and on the European continent curved flint knives have occasionally been found, the form of which has led to the suggestion that they were used as sickles. Sickles of bronze occur quite commonly among remains of the early inhabitants of Europe. Some of these are deeply curved hooks, flat on the under side, and with a strengthening ridge or back on the upper surface, while others are small curved knives, in form like the ordinary hedge-bill. Among the ancient Egyptians toothed or serrated sickles of both bronze and iron were used. Ancient Roman drawings show that both the scythe and the sickle were known to that people, and Pliny makes the distinction plain. (*Hist. Nat.* xviii. 67.) Although both implements have lost much of their importance since the general intro-

duction of mowing and reaping machinery, they are still used very extensively, especially in those countries like France where small agricultural holdings prevail. The principal modern forms are the toothed hook, the scythe hook, the Hainault scythe and the common scythe.

It was not until the beginning of the 19th century that any attempt was made to invent a reaping machine on anything like the lines that have been adopted since. In 1826 the Rev. Patrick Bell of Carmylie in Fifeshire brought out the first successful machine. He had worked at the making of it when a young man on his father's farm, and the principle he adopted, that of a series of scissors fastened on the "knife-board," was followed for a long time.

McCormick's Reaper, 1831.—After many modifications, however, the common reaper was evolved by C. H. McCormick in America in 1831. A truck or carriage is carried on two travelling wheels some 30 to 36 in. high, with spuds or teeth on the circumference to make them "bite" the ground and thus give motion to the machinery without skidding; two horses are yoked in front with a pole between, with martingale and surcingle belts as part of their harness, to ease the backing of the machine by the horses; the knife-board is fixed out at right angles to the side of the carriage and in front, while the knives consist of a series of triangular "sections" on a bar which travels backwards and forwards in slots in the "fingers," as the dividing teeth are called. The motion is given to the knives by a connecting rod and crank driven by suitable gearing from the truck wheels. The cutting is thus done by a straight shearing action and not by clipping like scissors as in Bell's machine.

In the early days—from about 1860 to 1870—machines were fitted with a tilting board behind the cutting bar which caught the corn as it fell, and it was held there until enough for a sheaf was gathered, when the load was "tilted" off by a suitable rake handled by a man who sat and worked the tilting board simultaneously with his foot and dropped the corn, to be lifted and tied into a sheaf by hand afterwards. The same machine was generally used for mowing (grass) by an interchange of parts, and the "combined" reaper and mower was in common use in the '70s and '80s. Later, various devices were adopted to do the tilting or sheafing mechanically, and the self end-delivery and self side-delivery were long in use whereby through the adoption of revolving rakes on frames the sheaf-lots were delivered in sizes ready for tying up by hand. The subsequent tying or binding was done variously in different parts of the country. In the south of England it was customary for five men to make bands, lift the sheaf-lot, place in the band and tie and leave the sheaf lying on the ground to be set up afterwards, the gang of five being expected to keep up to a reaper cutting round the four sides of a field. In the north and in Scotland the cutting was only done on one side at a time, the machine riding back empty, and three boys made the bands ("straps"), three women lifted the lots and laid them on the bands and three men bound the sheaves and set up in stooks. Thus three gangs of three each were required to keep a machine going, but only about five acres per day could be reaped.

The development of the modern binder to reduce all this labour has been a very gradual process. There was no great difficulty in cutting the corn and delivering the stuff, but the tying of it into sheaves was the problem to be solved. As early as 1858 Marsh in America designed and carried out an arrangement whereby the cut grain crop was caught on revolving webs of canvas and carried up on to a table, where two men stood who made bands of its own material and bound it into sheaves as it fell in front of them, dropping the sheaves off on to the ground as made, while the machine travelled along. The invention of a tying apparatus was the next advance, and in the 'seventies the American firm of Walter A. Wood & Co. brought out an arrangement for tying the sheaves up with wire. So slow and expensive had been the process of evolution, however, that it was reported at the time that the above firm had spent £20,000 in invention and experiment before they had even a wire-binder fit to put on the market.

The String Binder.—Binding with string, however, was the aim of all, and it was reserved for J. F. Appleby, an English inventor, to hit on the arrangement now in use, or which was the prototype of all the "knotters" now to be met with in different varieties of the string-binder throughout the world.

While the string-binder is now in universal use in Great Britain, the British Colonies, America and all countries where farming and farm work are advanced, and hand labour is only followed where peasant-farming or small farming obtains, it must be noted that in certain regions the system of reaping or harvesting of corn crops has developed a good deal beyond this. In Australia and some of the hotter districts in the west of the United States the "stripper" is in use, an implement which carries long grooved teeth which are passed through the standing grain crop and strip off the heads, leaving the straw standing. The heads are passed backwards to a thrashing (rubbing) arrangement, which separates the corn from the cobs, chaff, etc., and the grain is sacked up straight away. The sacks are dropped off the machine as the work proceeds and are picked up by wagon for transport afterwards. It is a significant fact that strippers worked by hand, though pushed through the crop by oxen, were in use on the plains of Gaul in the first century of our era, though this system seems to have been lost sight of till re-invented by the Australians.

Again, in the Western states of America, where the climate is not hot and dry enough for stripping purposes, the method followed is to cut the straw as short as possible—just below the heads—and these fall on to a travelling canvas and are carried up into a thrasher and the grain separated and sacked as the work proceeds. An immense combined implement is used for this reaping and thrashing purpose, taking a width of up to 40 ft. of crop at a time, and being propelled by a 50-horse-power traction engine running on broad roller-wheels, though smaller machines of, say, 20 horse-power are also common. Sometimes the "heading" only is carried out, and the cut heads carried on a canvas up into a wagon travelling alongside, and then carted away for subsequent thrashing, the "header" thus being the form of reaper adopted also in the Western states of America. Indeed this form of harvesting is now being introduced into the middle States, wherever the weather and the grain are dry enough to enable the latter to be stored in bulk straight away. It has even been suggested that it might be tried in Great Britain, but the climate would make it necessary to kiln-dry the grain before it could be stored in granaries, while the straw of all kinds is valuable for feeding and littering live stock. In those western regions, as in many other places on the prairies in general, the straw is of no value, and therefore the whole is set fire to and burned off, thus returning a certain amount of fertility to the soil in the ashes.

In the normal and ordinary system of reaping with the string-binder in Great Britain the rule is to "open up" a field by cutting "roads" round it: that is, a headland or roadway is mowed by the scythe and tied up by hand. Then the string-binder is started to cut around and continued till a finish is made at the centre of the field. Sometimes the crop is partly lodged and can only be cut on three sides of the field, and the binder is "slipped" past the fourth side. It is customary in some parts to yoke three horses to the machine and keep these at work all day with an interval for the midday meal only, but a better plan is to allow two men and four horses to each, and put one couple on and one couple off for meals and resting alternately. By this means the binder is kept going continuously without any stoppage for perhaps 14 hours daily in fine harvest weather. With a six-feet cutting width an acre per hour is fair work, but some have exceeded that, especially with wider cutting widths. A ball of twine weighing 3 to 4 lb. is the usual requisite per acre for binding the sheaves, and it ought to be of Manila hemp.

The sheaves are dropped off on to the ground as tied, but some farmers use the "sheaf-carrier," which catches these as they are shot out from the binding apparatus, and dumps them in lots of six or so—sufficient to make a stook or shock. The stooking—that is, the setting up of the sheaves on end to dry—is a separate operation, and from two to three men can set up an ordinary good crop as fast as the binder can cut it. In this work the sheaves are set with their butts wide apart and the heads leaning against one another like the two legs of the letter A: a full-sized stook or

"threave" is 24 sheaves—a relic of the days when the crop was all hand-reaped by piecework at so much per threave—but in practice now seldom more than 6 sheaves (3 each side) are put to each stook. When sufficiently dried or "fielded" the sheaves are then carried by cart or wagon to the stackyard, where they are built up sheaf by sheaf into round or oblong stacks or sheds: that is, they are stored until required for thrashing and foddering purposes. The drying may be a tedious affair, and wet weather in harvest time may be a national disaster from the spoiling of the corn, both in grain and straw.

The tremendous development in labour-saving in the matter of reaping the corn crops is well exemplified in a comparison of harvesting with the hand hook or sickle as compared with the string-binder. With hand-reaping six men (or women) cut the corn and laid it on the bands in sheaf-lots: one man came behind and tied the sheaves and set them up in stooks. Thus a gang of seven worked together and harvested about two acres per day. With the binder three or four men handle say twelve or fourteen acres daily: in other words, there is only one-tenth of the manual labour required now in reaping that was necessary fifty years ago, for harvesting machinery has revolutionized farming as a whole, and given the nations cheap bread. (P. McC.)

See also HARVESTING MACHINERY.

REAR VAULT, in architecture, a vault supporting the thickness of the wall inside a window or door opening, usually with a splayed or sloped surface, and often laid out upon a different curve from that of the arch over the window or door itself. In Gothic architecture, especially in England, the rear vault is usually decorated at its inner edge by a projecting rib known as a scoinson rib, which is itself often supported by colonnettes known as scoinson shafts, at the inner edges of the opening.

REASON, in philosophy, the faculty or process of drawing logical inferences. Thus we speak of man as essentially a rational animal, it being implied that man differs from all other animals in that he can consciously draw inferences from premises. It is, however, exceedingly difficult in this respect to draw an absolute distinction between men and animals, observation of which undoubtedly suggests that the latter have a certain power of making inferences. Between the higher animals and the lower types of mankind the distinction is so hard to draw that many psychologists argue that the difference is one of degree rather than of kind (*see* also INSTINCT). There can be little doubt, however, that inference by man differs from that of the brute creation in respect of self-consciousness, and, though there can be no doubt that some animals dream, it is difficult to find evidence for the presence of ideas in the minds of the lower animals. In the nature of the case satisfactory conclusions as to the rationality which may be predicated of animals are impossible.

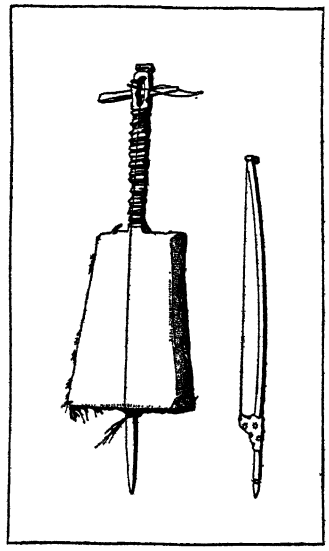
The term "reason" is also used in several narrower senses. Thus reason is opposed to sensation, perception, feeling, desire, as the faculty (the existence of which is denied by empiricists) by which fundamental truths are intuitively apprehended. These fundamental truths are the causes or "reasons" (ἀρχαί) of all derivative facts. With Kant, reason (*Vernunft*) is the power of synthesizing into unity, by means of comprehensive principles, the concepts provided by the intellect (*Verstand*). The reason which gives *a priori* principles Kant calls "Pure Reason," as distinguished from the "Practical Reason" which is specially concerned with the performance of actions. In formal logic the drawing of inferences (frequently called "ratiocination," from Lat. *ratiocinari*, to use the reasoning faculty) is classified from Aristotle downwards as deductive (from generals to particulars) and inductive (from particulars to generals); *see* LOGIC, INDUCTION, SYLLOGISM. In theology, reason, as distinguished from faith, is the human intelligence exercised upon religious truth whether by way of discovery or by way of explanation. The limits within which the reason may be used have been laid down differently in different churches and periods of thought: on the whole, modern Christianity, especially in the Protestant churches, tends to allow to reason a wide field, reserving, however, as the sphere of faith the ultimate (supernatural) truths of theology.

The Greek words for reason are *νοῦς* and λόγος, both vaguely used. In Aristotle the λόγος of a thing is its definition, including its formal cause, while the ultimate principles of a science are ἀρχαί, the "reasons" (in a common modern sense) which explain all its particular facts. Νοῦς in Plato and Aristotle is used both widely for all the meanings which "reason" can have, and strictly for the faculty which apprehends intuitively. Thus, in the *Republic*, νοῦς is the faculty which apprehends necessary truth, while δόξα (opinion) is concerned with phenomena.

The Schoolmen distinguished between *ratio cognoscendi* (a reason for acknowledging a fact) and *ratio essendi* (a reason for the existence of this fact).

RÉAUMUR, RENÉ ANTOINE FERCHAULT DE (1683–1757), French scientist, was born on Feb. 28, 1683, at La Rochelle, where he received his early education. In 1703 he came to Paris, where he continued the study of mathematics and physics, and in 1708 was elected a member of the Académie des Sciences. In 1710 he was charged with the official description of the useful arts and manufactures of France, which led him to many practical researches that resulted in the establishment of new manufactures and the revival of neglected industries. For discoveries regarding iron and steel he was awarded a pension of 12,000 livres; but he requested that the money should be secured to the Académie des Sciences for the furtherance of experiments on improved industrial processes. In 1735 family arrangements obliged him to accept the post of commander and intendant of the royal and military order of Saint-Louis; he discharged his duties with scrupulous attention, but declined the emoluments. Réaumur died at La Bermondière, Maine, on Oct. 17, 1757. He bequeathed his manuscripts, which filled 138 portfolios, and his natural history collections to the Académie des Sciences.

Réaumur's papers deal with nearly all branches of science. He examined and reported on the auriferous rivers, the turquoise mines, the forests and the fossil beds of France. He devised the method of tinning iron that is still employed, and investigated the chemical differences between iron and steel. His book on this subject (1722) was translated into English and German. The thermometric scale by which he is now best remembered was constructed on the principle of taking the freezing-point of water as 0°, and graduating the tube of the thermometer into degrees each of which was one-thousandth of the volume contained by the bulb and tube up to the zero mark. It was an accident dependent on the coefficient of expansion of the particular quality of alcohol employed which made the boiling-point of water 80° C; and mercurial thermometers the stems of which are graduated into eighty equal parts between the freezing- and boiling-points of water are Réaumur thermometers in name only. Réaumur wrote widely on natural history, his best known work on this subject being the *Mémoires pour servir à l'histoire des insectes* (6 vols., 1734–42).



BY COURTESY OF THE METROPOLITAN MUSEUM OF ART

AN ARABIAN REBAB AND BOW

REBAB or **RABAB,** an ancient stringed instrument, sometimes plucked and sometimes played with a bow, having a body either pear-shaped or boat-shaped and the characteristics of vaulted back and the absence of neck; also a generic modern Arabic term applied by the Mohammedans of northern Africa to various stringed instruments played with a bow. The rebab exercised a very considerable influence on the history of stringed instruments in Europe, and was undoubtedly the means through which the bow was introduced to the West, though whether it may be accepted as the ancestor of the violin, as is held by some, is another matter.

The bowed instruments of the middle ages fall naturally into

two distinct classes, according to the principles observed in construction. One is the type having a body formed on the model of a Greek or a Roman cithara, with back and sound board connected by ribs, from which it was evolved by the addition of a neck and finger-board (*see* GUITAR and GUITAR-FIDDLE). The other is the type derived from the Eastern rebab, with vaulted back attached directly to the sound board, which has never attained to any serious artistic development.

For the European development of the rebab, *see* REBEC.

REBATES, DEFERRED. A deferred rebate is a discount on the invoice price returned after a lapse of time to a trader, on certain conditions, as a means of maintaining monopoly and keeping out would-be competitors from the trade. The system is in use in many branches of British trade and industry. It consists in returning to the trader (merchant or retailer) at the end of every six or 12 months a rebate equal to perhaps 10 or 15% on his purchases, on condition that he shall not, during the period, have sold, displayed (or, it may be, offered) any of the kind of goods produced by the combination except those made by the combination. The effect of the arrangement is that if at any time during that period the customer is offered an article of better value by an outside maker or by a new firm starting in the industry, the buying of that article will cost him anything from one to 12 months' accumulated rebates on his association purchases and may result in his being placed on the association's "black list," which means that he shall not again be supplied with association goods except at prices which will yield an insufficient profit on resale. The reasons advanced by combinations for the use of the deferred rebate are not altogether reasons of monopoly. They contend that steadiness and continuity of custom are essential to economical manufacture; that by maintaining an even level of prices (which, as the market fluctuates, may be temporarily under-profitable as sometimes over-profitable) they are serving the best interest of the customer; and that these mutual advantages cannot be secured if the customer is left free to trade with the combination when its prices are below average, and go elsewhere when they are above. The most notable example of the use of the deferred rebate is to be found in the case of the shipping companies operating liner services, where the fluctuating competition of the "tramp" and the great importance of securing a steady volume of freights if a regular service is to be maintained lend particular weight to the arguments quoted above. In the manufacturing industries there is less agreement among members of combinations as to the advantage of the deferred rebate, and instances have occurred of the system being voluntarily abandoned. (J. H.)

REBEC or **REBECK,** a mediaeval stringed instrument played with a bow, derived from the Oriental rebab, and sometimes regarded as the ancestor of the viol and violin. Like the rebab (*q.v.*), the rebec assumed at first one of two forms—the pear-shaped body with a wide base, strung with three strings, or the long, narrow pear- or boat-shaped body with two strings and, in addition, the other Oriental characteristics of the rebab, *i.e.*, the vaulted back, the absence of ribs, and pegs set in the back of the head. Except for the addition of a fingerboard, what is now recognized as the rebec underwent no structural development and never entered the domain of art, despite the wide favour which it enjoyed throughout the middle ages.

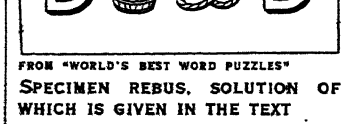
REBECCA RIOTS, the name given to some disturbances which occurred in 1843 in South Wales. The rioting was directed against the charges at the toll-gates on the public roads, and the rioters took as their motto the words in Gen. xxiv. 60, "And they blessed Rebekah, and said unto her, Thou art our sister, be thou the mother of thousands of millions, and let thy seed possess the gate of those which hate them." Many of the rioters were disguised as women and were on horseback; each band was led by a captain called "Rebecca," his followers being known as "her daughters." They destroyed not only the gates but also the toll-houses, the work being carried out suddenly and at night, but usually without violence to the toll-keepers, who were allowed to depart with their belongings. Emboldened by success, the Rebeccaites turned their attention to other grievances. The government despatched soldiers and police to south Wales, and the disorder was quelled. South Wales was relieved from the burden of toll-gates, while the few rioters who were captured were only lightly punished. The movement was separate from Chartism (*q.v.*), but was supported by the same class and arose from the same economic causes.

REBELLION, the act of one who engages in armed resistance to the government to which he owes allegiance. For instance the supporters of the Old Pretender in 1715 and of the Young Pretender in 1745 were regarded and punished as rebels. In the American Civil War of secession, the Federal Government continued for two years to regard the Confederates as rebels although they had been recognized as belligerents by neutral states. And in the South African War of 1899–1902 it was held by the Supreme Court of the Cape of Good Hope that rebels who joined the Burgher forces, and thus committed high treason, remained liable to be punished for criminal offences, although the Burghers had been recognized as belligerents; *Rex* v. *Louw* 21 C. G. H. Supreme Court Rep. 36 (1905). *See* LAWS OF WAR.

REBIKOV, VLADIMIR (1866–), Russian composer, was born at Krasnoyarsk in 1866, and studied in Moscow, Berlin and Vienna. He then went to live at Odessa, where, in 1894, his first opera, *The Thunderstorm,* was produced. Other dramatic works are *The Christmas Tree* (1903), *Narcissus, The Fables of Krylov* (his best-known work); *Prince Charming,* a fairy opera, and the pantomime *Snow-White* (1909). He has also written suites for pianoforte, including the *Mélomimiques,* and mimetic vocal pieces. His music makes no appeal to the popular mind, and is difficult to grasp on account of its harshness and lack of form. Rebikov's literary work includes a translation of Gevaert's *Traité d'Instrumentation* (1899) and *La musique de 1960.*

REBOUX, PAUL (1877–), French novelist and man of letters, was born in Paris on May 21, 1877, and educated at the *école Fénélon* and under private tuition. He became editor of *La Charreite* and dramatic critic of the *Journal du Peuple* and then literary director of *Le Journal.* He has used many different countries for the background of his novels, Spain, Italy and Brittany. To the literature of war he has contributed a novel in two volumes, *Les Drapeaux* (1921), directed against militarism, of which Lalou says that it attempts "to annex to the novel the science of statistics." One of the most read and most amusing of his works is *A la manière de . . .*, a series of parodies on well known writers.

REBUS, a sort of riddle consisting of the representation of some sentence or thing by means of pictures or words, or a combination of both. Rebuses first became popular in France, where they were at first called *rébus de Picardie,* that province, according to G. Ménage (1613–92), having been the scene of their origin. Camden mentions an instance of this kind of wit in a gallant who expressed his love to a woman named Rose Hill by painting in the border of his gown a rose, a hill, an eye, a loaf, and a well; this, in the style of the rebus, reads "Rose Hill I love well." A specimen of a modern rebus is given here, the solution of which is: "Be independent but not too independent" (B in D pendant, butt knot 2 in D pendant).



FROM "WORLD'S BEST WORD PUZZLES"
SPECIMEN REBUS. SOLUTION OF WHICH IS GIVEN IN THE TEXT

The name is also applied to arrangements of words in which the position of the several vocables is to be taken into account in divining the meaning. Thus "I understand you undertake to overthrow my undertaking" makes the rebus

Stand	take	to	taking
I	you	throw	my.

A simple French rebus is expressed by the two letters G a, which may be read, *J'ai grand appétit* (*G grand, a petit*).

"Rebus" (or "allusive arms"), in heraldry (*q.v.*), is a coat of arms which bears an allusion to the name of the person—as three castles for Castleton, three cups for Butler.

Ben Jonson happily ridiculed this kind of wit in his description of Abel Drugger's device in the *Alchemist.*

RECALL, a device by which the voters may remove an official from office before the expiration of his regular term. It is based upon the principle that officials are properly mere agents of the popular will, and as such should be constantly subject to their control. Under the plan, if a specified percentage of the electorate are dissatisfied with an official's conduct and sign a petition for his removal, the officer must face a general election to determine the majority opinion.

Like the initiative and referendum the recall originated in Switzerland where it is applicable not only to individuals but to the entire legislature. In the United States where its widest use is now found, it first appeared in 1903 in the city charter of Los Angeles. It was soon adopted by many cities with the commission form of government as the most effective way to control the commissioners into whose hands such large powers were put. It was first adopted with State-wide application in Oregon in 1908, followed by California in 1911, Arizona, Idaho, Washington, Colorado and Nevada in 1912, Michigan in 1913, Louisiana, North Dakota and Kansas in 1914. Most of these were States with a large number of elective officers, who, since they were not subject to removal by the governor, were, in effect, beyond control during their term of office. In one State, Kansas, the recall extends to appointed as well as elected officials. In four of the eleven, Idaho, Louisiana, Michigan and Washington, it is not applicable to judges on the ground that the judiciary should be independent of popular passions and political issues.

Though the general principle of the recall is simple, there are many variations in its practical application, which considerably alter its effect. For instance under some plans the question of removal may be decided in one election, and the question of a successor in a subsequent election. For economy's sake the two are often combined into one election in which the official whose conduct is under question may stand as a candidate if he desires. In the latter case the question of his record is evidently complicated by the element of his comparative popularity. The vote required to remove an official may be a simple majority or a higher percentage. The percentage of signatures required to force an election ranges widely, the average being about 25%; and the methods by which it is permissible to secure signatures may vary sufficiently to affect the result. The recall has, in fact, been but seldom resorted to and then almost entirely for local officers. Only twice has it found State application, notably in North Dakota in 1921 when the governor, attorney-general and commissioner of agriculture were removed. Only a few instances of its being applied to judges are on record, all of them in minor courts. In its State-wide application it becomes too cumbersome to be frequently resorted to. Its chief value is perhaps not to be measured by the frequency with which it is applied, but by the restraining influence which its existence may exercise.

See W. E. Rappard, "Initiative, Referendum and Recall in Switzerland," *Annals of the Amer. Acad. of Political and Social Science* (Sept. 1912); W. B. Munro, *The Initiative, Referendum and Recall* (1912); J. D. Barnett, *Operation of the Initiative, Referendum and Recall in Oregon* (1915). The argument against the recall of judges is presented by W. H. Taft in his veto of the enabling act for the admission of Arizona, whose Constitution allowed such a recall (*House Ex. Doc. No. 106,* 62nd Cong. 1st Sess.).

RÉCAMIER, JEANNE FRANÇOISE JULIE ADÉLAÏDE (1777–1849), a famous Frenchwoman in the literary and political circles of the early 19th century, was born on Dec. 4, 1777, at Lyons. Her maiden name was Bernard. She was married at fifteen to the banker Jacques Récamier (d. 1830), who was more than old enough to be her father. From the early days of the consulate to almost the end of the July monarchy her salon in Paris was one of the chief resorts of literary and political society that pretended to fashion. The *habitués* of her house included many former royalists, with others, such as Bernadotte and General Moreau, more or less disaffected to the government. Through her friend Madame de Staël, Madame Récamier became acquainted with Benjamin Constant (*q.v.*). She was eventually exiled from Paris by Napoleon's orders. After a short stay at Lyons she proceeded to Rome, and finally to Naples, where she was on good terms with Murat and his wife, who were then intriguing with the Bourbons. She persuaded Constant to plead the claims of Murat in a memorandum addressed to the congress of Vienna, and also induced him definitely to oppose Napoleon during the Hundred Days. Her husband had sustained heavy losses in 1805, and she visited Madame de Staël at Coppet in Switzerland. In her later days she lost most of the rest of her fortune; but she continued to receive visitors at the Abbaye-aux-Bois, the old Paris convent to which she retired in 1814. Here Chateaubriand was a constant visitor, and in a manner master of the house; but even in old age, ill-health and reduced circumstances Madame Récamier never lost her attraction. She numbered among her admirers Mathieu de Montmorency, Lucien Bonaparte, Prince Augustus of Prussia, Ballanche, J. J. Ampère and Constant, but none of them obtained over her so great an influence as did Chateaubriand, though she suffered much from his imperious temper. Her sincerest affection seems to have been for Prosper de Barante, whom she met at Coppet. She died in Paris on May 11, 1849.

There are well-known portraits of her by Louis David in the galleries of the Louvre, and by François Gérard in the possession of the préfecture of the Seine. In 1859 *Souvenirs et correspondances tirés des papiers de Madame Récamier,* was edited by Mme. Lenormant. *See* Mme. Lenormant's *Madame Récamier, les amis de sa jeunesse et sa correspondance intime* (1872); Mme. Mohl, *Madame Récamier,* with a sketch of the history of society in France (1829 and 1862); also Guizot in the *Revue des deux mondes* for December 1859 and February 1873; H. Noel Williams, *Madame Récamier and her Friends* (London, 1901); E. Herriot (Eng. trans., by Alys Hallard), *Madame Récamier et ses amis* (1904) (elaborate and exhaustive); L. de Launay, *Un amoureux de Madame Récamier; journal de J. J. Ampère* (1927).

RECANATI, a city of the Marches, Italy, in the province of Macerata, 8 m. direct N.N.E. of the city of that name. Pop. (1921) 15,309 (town); 15,787 (commune). It has a station on the railway 17½ m. S. of Ancona, and distant 4½ m. from the town, which is built on a hill, 931 ft. above the sea. It was the birthplace of the poet Leopardi (1798–1837). It possesses a Gothic cathedral, built towards the close of the 14th century and dedicated to S. Flavianus, patriarch of Constantinople. The churches of S. Maria dei Mercanti and San Domenico contain pictures by Lorenzo Lotto, as also does the municipal palace, with a fine old battlemented tower, while the palace of Cardinal Venier has a fine Renaissance portico by Giuliano da Maiano. The help given the popes in their struggles with the Sforza caused the decline of the city which suffered from an earthquake in 1741 and from wars (1797–99).

RECEIPT, in law, an acknowledgment in writing that a sum of money or other valuable consideration has been received by the person signing the acknowledgment in discharge of a debt or other obligation. Such a receipt is *prima facie* evidence of payment. By the Stamp Act of 1891 a duty of 1d. was imposed on every receipt or form of writing discharging a debt of £2 or upwards; the payment of the duty is denoted by affixing a stamp to the document, and the cancelling of the same by the person giving the receipt. By s. 103 if a person gives a receipt, liable to duty, not duly stamped, or refuses to give a receipt, liable to duty, duly stamped or, on payment to the amount of £2 or upward, gives a receipt for a less sum than £2 or divides the amount paid with intent to evade the duty, he is liable to a fine of £10. A receipt not duly stamped may be stamped at the Inland Revenue Office within 14 days on payment of a fine of £5 or within one month on payment of £10. By the Finance Act of 1920 the receipt stamp was increased to 2d.

American Law.—There are no stamp duties on receipts in the United States. On the effect of a receipt in full, given against payment of less than the amount due, see *Discharge.* On receipts for goods given by transportation or storage agencies see *Bill of Lading, Warehouse Receipt.* The commercial practice of a debtor requiring a receipt on paying a debt has, curiously, no warrant in law except in particular cases: a debtor paying a negotiable instrument (*see* BILL OF EXCHANGE) is entitled to have it surrendered to him, which serves as a receipt; and a mortgagor paying off a mortgage is entitled to receive from the mortgagee a "satisfaction piece" which serves as evidence that the obligation and the mortgage are discharged. In other cases,

in general, the debtor's assurance of procuring a receipt rests partly on business custom, partly on the creditor's practical desire to collect his debt and on his willingness to accept payment by check, which will then serve as a receipt.

RECEIVER, in English and American law, a person appointed by a court to administer property for its protection, to receive rent or other income and to pay authorized outgoings. Receivers may be either appointed *pendente lite* or by way of equitable execution, *e.g.*, for the purpose of enabling a judgment creditor to obtain payment of his debt, when the position of the real estate is such that ordinary execution will not reach it. Formerly receivers were appointed only by the court of chancery, but by the Judicature Act of 1873 it is now within the power of all divisions of the High Court to appoint receivers. Their powers and their duties are set forth by Kerr, *On Receivers* (5th ed., 1905), who classifies the cases in which they may be appointed under the following heads: (*a*) infants; (*b*) executors and trustees; (*c*) pending litigation as to probate; (*d*) mortgagor and mortgagee; (*e*) debtor and creditor; (*f*) public companies; (*g*) vendor and purchaser; (*h*) covenanter and covenantee; (*i*) tenant for life and remainderman; (*j*) partners; (*k*) lunacy; (*l*) tenants in common; (*m*) possession under legal title, and (*n*) other cases. The appointment of receivers is entirely within the discretion of the courts. In bankruptcy practice a receiver, termed official receiver, is an officer of the court who in this capacity takes possession of all a debtor's assets. In the United States the appointment of receivers lies within the jurisdiction of courts that are invested with equity powers and in exercise of their equity jurisdiction. Under statutes in many States the power to appoint receivers has been extended to actions at law in various types of cases. (*See* BANKRUPTCY.)

RECEIVING: *see* LARCENY.

RECEIVING SET, the equipment that reproduces speech, music, visible messages or signals from radio waves. (*See* RADIO RECEIVER.)

RECHABITES or **SONS OF RECHAB,** a sort of religious order among the Israelites, analogous to the NAZARITES (*q.v.*), with whom they shared the rule of abstinence from wine. They eschewed settled life, and lived in tents, refusing to sow grain or plant vineyards. They represented a protest against the contemporary civilization and a reaction towards simplicity of life. Their "father," or founder, was that Jehonadab (or Jonadab) son of Rechab, who encouraged Jehu to abolish the Tyrian Baal-worship (2 Kings x.). The "house of Rechab" fled for protection into Jerusalem at the approach of Nebuchadrezzar (Jer. xxxv.), and Jeremiah promised them, as a reward of their adherence to the ordinance of Jehonadab, that they should never lack a man to represent them (as a priest) before Yahweh. Later Jewish tradition states that the Rechabites intermarried with the Levites.

RECHBERG-ROTHENLÖWEN, JOHANN BERNHARD, COUNT (1806–1899), Austrian statesman, was the second son of the Bavarian statesman Count Aloys von Rechberg-Rothenlöwen (1766–1849). Johann Bernhard was destined for the Bavarian public service, and he was educated at the universities of Strasbourg and Munich, but incurred the displeasure of King Louis I. by the part he played as second in a duel, and in 1828 transferred to the Austrian diplomatic service. After being attached to the embassies in Berlin, London and Brussels, he was appointed envoy at Stockholm (1841) and at Rio de Janiero (1843). Returning to Europe in 1847, on the outbreak of the revolution of 1848 in Vienna he accompanied and assisted Prince Metternich in his flight to England. In July 1848 he was appointed Austrian plenipotentiary in the German federal diet at Frankfort, and in 1851 became Austrian *internuncius* at Constantinople, and in 1853 Radetzky's civilian colleague in the government of Lombardo-Venetia. In 1855 he returned to Frankfort as Austrian representative and president of the federal diet. Here his constant disputes with Bismarck, at that time Prussian envoy at the diet, were much sharpened by Rechberg's choleric temper, and on one occasion nearly led to a duel. Bismarck, however, always expressed a high appreciation of his character and abilities. In May 1859, on the eve of the war with Italy, he was appointed Austrian minister of foreign affairs and minister president, surrendering the latter post to the archduke Rainer next year.

The five years during which Rechberg held the portfolio of foreign affairs covered the war with Italy and France, the insurrection in Poland, the attempted reform of the German Confederation through the Frankfort *Fürstentag*, and the Austro-Prussian war with Denmark. Their story is told elsewhere. (*See* EUROPE and AUSTRIA.) In the German question Rechberg's policy was one of compromise, and he generally advocated peaceful arrangement between Prussia and Austria as the indispensable preliminary to a reform of the Confederation. In the Schleswig-Holstein question he was, however, consistently outwitted by Bismarck, and on Oct. 27, 1864 Rechberg resigned. He received the Golden Fleece from the emperor as a sign of special favour. He had been made an hereditary member of the Upper House of the *Reichsrat* in 1861, and as late as 1879 continued occasionally to take part in debates. He died at his Kettenhof near Vienna on Feb. 26, 1899.

See the biography by Franz Ilwof in *Allgemeine Deutsche Biographie*, B. 53. *Nachträge* (Leipzig, 1907).

RECIDIVISM, a disposition or tendency to relapse into crime. While such a disposition may not be a matter of habit but the consequence of mental disorder or congenital defect, the term recidivist is, in criminology, usually employed interchangeably with "habitual offender" (*q.v.*).

RECIFE or **PERNAMBUCO,** a city and seaport of Brazil, capital of the State of Pernambuco, in 8° 3′ S. and 34° 55′ W., near the extreme eastern point of South America. Population (1920) 238,843. Recife is frequently called the "Venice of America"; it is at the mouths of the rivers Beberibe and Capibaribe which unite to form a small lagoon or bay inside the sea beach. In the angle between the two rivers is the delta island of Antonio Vaz. The city is built on the southern extremity of the sandy sea beach, on the island of Antonio Vaz, and on the mainland to the westward, the river channels being crossed by numerous bridges. With the exception of the hills on which Olinda is built about 5m. northward, the surrounding country is low and flat, the general elevation averaging 10 feet. As the tide rises about 6ft., the general level of the city and neighbouring coast, which is wet and swampy to the southward, is too low to be generally healthy. The climate is hot, although agreeably tempered by the south-east trade winds; the temperature ranges from an absolute minimum of 61° to an absolute maximum of 99°. The rainfall (1901 to 1919) is 74·8 inches. Federal, State and municipal governments, in co-operation with the Rockefeller Foundation (1919), the erection of modern hospitals, a new water system (1917) and the extension of sanitation, have improved health conditions. The death-rate has been reduced to about 34 per 1,000. Yellow fever and smallpox have been practically eradicated. Paving of old and narrow streets has advanced and in the newer parts of Recife wide modern avenues are extending. The three principal parishes of the city are known as São José do Recife, occupying the sandy peninsula or beach north of the outlet of the united rivers; Santo Antonio, on the island of Antonio Vaz, which was called Mauritia or Mauritzstad during the Dutch occupation; and Boa Vista, on the mainland to the westward, which is the most modern and the most rapidly growing part. The first is the oldest and most crowded section, and is now devoted chiefly to the commercial and financial interests of the port; here are the custom house, merchants' exchange (Praça do Commercio), shipping offices, banks and wholesale houses. Santo Antonio dates from the Dutch occupation. Prince Maurice of Nassau, when governor general, built here his private residence (Fribourg House) and made it his capital. Its business edifices and residences are largely Dutch architecture, with many storeys and steep roofs. The older part of Boa Vista dates from the 17th century. The older buildings are of the Portuguese type, usually plain, low and heavy, constructed of broken stone and mortar and plastered and coloured on the outside. Among new public buildings are fine municipal and State offices, a law college, a commercial museum, schools and theatres. New business buildings and private homes add to the city's attractiveness. Electric light and street car services have

extended further into the suburbs. Good roads are multiplying and the use of motor cars is growing.

The port of Recife is one of the most important of Brazil, on account of its proximity to Europe and its convenience for vessels passing around the east shoulder of the continent. It is the landing-place for one coastwise and two transatlantic cable lines. Its harbour consists of an outer and inner anchorage, the former an open roadstead, which are separated by a remarkable stone reef running parallel with the shore-line, leaving an inside passage 400 to 500ft. wide. The entrance to the inner anchorage, which has a depth of about 23ft., is opposite Ft. Brum in the northern part of the city, and is marked by a small Dutch fort (Picão) and a lighthouse at the northern extremity of the reef. This remarkable natural breakwater, which is about 50ft. wide on top and has been repaired with masonry in some places, covers a considerable part of the coast-line in this part of Brazil. It is not a coral reef, as is sometimes stated, but is a consolidated ancient beach, now as hard and firm as stone. Port construction, now well advanced, has already cost $20.000.000; additional construction is in progress, including a new light system (1925) and the deepening of the inner harbour. The exports include sugar, rum, cotton, lumber, hides, skins, rubber, wax, fibres, dyewoods, caucan, mandioca flour, pineapples and other fruits. The total commerce handled in a recent year amounted to 363,000 tons. More than 1,000m. of railways radiate to interior regions, providing outlet through Recife. Pernambuco is the principal sugar-producing State of Brazil, and Recife is therefore an important centre for this product. Its railway communications with the interior are good, and include the Sul de Pernambuco, Recife and São Francisco, Central de Pernambuco, and the Recife to Limoeiro lines, the first three now being under the management of the Great Western of Brazil Company. There are also suburban lines to Olinda and Caxangá, the latter providing communication with some of the prettiest suburbs about the city.

Recife was settled about 1535, when Duarte Coelho Pereira landed there to take possession of the captaincy granted him by the Portuguese crown. The site of Coelho's capital was Olinda, but Recife remained its port and did not become an independent villa (town) until 1710. Down to the close of the 18th century, when Rio de Janeiro became important, Recife was the second city of Brazil, and for a time its most important port. It was captured and plundered in 1595 by the English privateer James Lancaster. It was also captured by the Dutch in 1630 and remained in their possession till 1654, during which time the island of Antonio Vaz was occupied and the town greatly improved. At the end of the Dutch War the capital was removed from Olinda to Recife, where it has since remained.

RECIPROCATING ENGINE: *see* STEAM ENGINE.

RECIPROCITY, the condition or state of being reciprocal, *i.e.* where there is give and take, mutual influence, or correspondence between two parties, persons or things (Lat. *reciprocus,* returning back the same way, alternating, probably from *re* back and *pro* forward). In a more particular sense, reciprocity is a special arrangement between two nations under which the citizens of each obtain advantages or privileges in their trading relations with the other. This meaning of reciprocity, however, bears a different interpretation in European and in American usage. In the former, reciprocity between two nations usually means little more than the extension by one to the other of most favoured nation treatment, *i.e.* such advantages as it extends to any third country (*see* COMMERCIAL TREATIES). In the United States reciprocity is the term applied to the concessions or arrangements made between that country and another without reference to any third country. Thus in the United States there is a maximum and minimum tariff, the rates of the maximum tariff being enforced on the goods of those countries which have no reciprocity treaty with the United States, and the rates of the minimum on certain products of those countries which have by a reciprocity treaty given special advantages or concessions to certain products of the United States.

RECITATIVE: *see* MUSIC, section 5.

RECKLINGHAUSEN, a town in the Prussian province of Westphalia, 22 m. by rail N.W. of Dortmund. Pop. (1925) 114,813. The county of Recklinghausen belonged to the archbishopric of Cologne until 1803, when it passed to the duke of Arenberg. It was known as the West Recklinghausen. After 1815 the duke of Arenberg held it as a fief under Prussian sovereignty. In the neighbourhood of Recklinghausen are extensive coal-mines, iron and tin foundries and brick-works, and the industries embrace the manufacture of linen, beer, spirits, cement, soap and ammonia.

RECLAMATION OF LAND: *see* LAND RECLAMATION.

RECLUS, JEAN JACQUES ELISÉE (1830–1905), French geographer, was born at Sainte-Foy la Grande (Gironde), on March 15, 1830, the second son of a Protestant pastor. He was educated at the Protestant college of Montauban, and studied geography under Karl Ritter at the University of Berlin. Leaving France in December 1851, he spent six years (1852–57) visiting the British Isles, the United States, Central America, and Colombia. During the siege of Paris, Reclus shared in Nadar's aerostatic operations. He was taken prisoner on April 5, 1871, while serving in the National Guard, now in open revolt, and on Nov. 16 sentenced to transportation for life; but the sentence was commuted in Jan. 1872 to perpetual banishment. After a short visit to Italy, he settled at Clarens, in Switzerland, where he resumed his literary labours, and, after producing the *Histoire d'une montagne* (a companion to *Histoire d'un ruisseau*), wrote nearly the whole of his great work, *La Nouvelle Géographie universelle, la terre et les hommes,* 19 vols. (1875–94). This is a stupendous compilation, profusely illustrated with maps, plans and engravings, and was crowned with the gold medal of the Paris Geographical Society in 1892. An English edition appeared simultaneously, also in 19 vols., the first four by E. G. Ravenstein, the rest by A. H. Keane. Extreme accuracy and brilliant exposition form the leading characteristics of all Reclus's writings, which thus possess permanent literary and scientific value. In 1882 Reclus initiated the "Anti-Marriage Movement," in accordance with which he allowed his two daughters to marry without any civil or religious sanction. This resulted in government prosecutions, instituted in the High Court of Lyons, against the anarchists, members of the International Association, of which Reclus and Prince Kropotkin were designated as the two chief organizers. The prince was arrested and condemned to five years' imprisonment, but Reclus, being resident in Switzerland, escaped. In 1892 he became professor of comparative geography in the University of Brussels. Reclus died on July 4, 1905.

His works are: *Histoire d'un ruisseau* (1869); *La Terre: description des phénomènes de la vie du globe* (2 vols., 1867–1868); *Histoire d'une montagne* (1880); *La Nouvelle Geographie universelle, la terre et les hommes* (19 vols., 1875–1894); *L'Homme et la terre* (1905); and many contributions to scientific journals.

RECOGNIZANCE, a term of common law usually employed to describe an obligation of record, entered into before some court or magistrate duly authorized, whereby the party bound acknowledges that he owes a personal debt to the Crown, with a defeasance, *i.e.,* subject to a condition that the obligation to pay shall be avoided if he shall do some particular act—as if he shall appear at the assizes, keep the peace, or the like. Recognizances are now used almost solely with reference to criminal proceedings. The security given by a receiver appointed by the High Court is still in the form of a recognizance acknowledging a debt to named officers of the court, and securing it on the real and personal estate of the receiver.

There is a general jurisdiction on conviction of misdemeanour both at common law and by statute to put the offender under recognizances to keep the peace and (or) be of good behaviour in addition to or in substitution for other punishment. On refusal to enter into recognizances as above, the court may order imprisonment for the refusal, limited in cases within the Acts to 12 months, and in cases within the Act of 1879 to six months.

The recognizances above described may be described as a form of punishment or a judicial security for good conduct. Recognizances are, however, most used with reference to proceedings before conviction and judgment. In preliminary enquiries into indictable offences the enquiring justices take recognizances to

ensure the attendance of the accused if liberated during any adjournment, and on committal for trial take the recognizances of the accused (if allowed bail) to attend the court of trial and take his trial, and of the prosecutor and the witnesses for the prosecution or defence to attend and prosecute or give evidence. The recognizances taken are returnable under penalty to the court of trial, which orders their estreat (*q.v.*) in the event of breach of the conditions.

Similar powers as to the recognizances of persons prosecuted summarily are given by the Summary Jurisdiction Acts 1848 and 1879 as amended by the Criminal Justice Act 1925.

By the Land Charges Act 1925 a recognizance, whether obtained or entered into on behalf of the Crown or otherwise, does not operate as a charge on land or on any interest on land or on the unpaid purchase money for any land, unless a writ or order for the purpose of enforcing it is registered in the office of the Land Registry. This enactment is clearly applicable to receivers' recognizances; and on purchases of land search is made for registered recognizances and an official certificate can be obtained affirming or negativing the existence of a registered entry.

In the United States, the States allow by either common law or the statutes recognizances in much the same way as in England.

RECONNAISSANCE, a military term denoting the reconnoitring or examination of an enemy's position or movements. A topographical reconnaissance is a survey of a tract of country or route, comprising both a map and a report as to its advantages and disadvantages. All reconnoitring work of this character is done by officers with small patrols, escorts or assistants. Strategical reconnaissance was formerly carried out by cavalry formations or units down to squadrons, according to the scale of the force they were serving. But it has now been taken over almost entirely by air craft, which to their immensely greater speed and radius of reconnaissance add the advantage of being able to pass over the enemy's screening troops. Tactical reconnaissance falls to the lot of troops of all arms, whether in contact with the enemy or for self-protection. In this task lies now the main use of cavalry, infantry divisions being usually endowed with either a regiment or a squadron. A reconnaissance by a large force of all arms with the idea of provoking an enemy into showing his hand, if necessary by fighting, is called a reconnaissance in force.

RECORD. According to Sir Edward Coke a record was "a memorial and remembrance in rolls of parchment of the proceedings and acts of a court of justice." It was the perpetuation of the terms of a ratified transaction, whether between individuals, corporations or States. Its value was precise and utilitarian. The framers of the English Public Record Office Act of 1838, defined records as "all rolls, records, writs, books, proceedings, decrees, bills, warrants, accounts, papers and documents whatsoever of a public nature." That definition may still be accepted as adequate; indeed, its comprehensive vagueness is a virtue; but it has to be observed in qualification, that the documents which are not strictly speaking of a public nature are often included and classified with public archives: as, for instance, the many private letters which are to be found in the English State papers.

On the other hand, a great many documents of a public nature have passed into private possession. So lax were ideas as to the proper custody of official papers before the 19th century, that it was quite usual for a minister of State leaving office to take his correspondence with him. Thus, to cite one instance out of many, at Hatfield, Hertfordshire, the seat of the marquess of Salisbury, there is a mass of correspondence of Lord Burghley, Queen Elizabeth's famous Lord Treasurer, and of his son the first earl of Salisbury, secretary of State both to Elizabeth and her successor, which constitutes a body of State papers of greater value than the contemporary documents of similar character preserved in the Public Record Office. The importance of making accessible to students the historical wealth of private archives was recognized in England by the appointment of the Historical Manuscripts Commission and has been a great stimulus to the foundation of learned societies in all countries. The breaking-up of the old family collections, and their frequent emigration from the land of their provenance, due to the changed economic conditions of modern times, has rendered the work of such bodies more urgently necessary than ever.

Administration.—The respective merits of the centralization of records and the system under which they are kept in local or specialized repositories has been much discussed. Most European countries, the United States of America, the Dominion of Canada and the Union of South Africa, following the pioneer example of France, have preferred the second plan. Broadly speaking, each has a central repository wherein are kept records which concern the country as a whole, and also a series of provincial repositories, which may easily be of more importance to the historical student than the central repository.

The outstanding example of the policy of centralization is England and Wales.

By the Act of 1838 all separate collections in the country were brought together and placed under the charge of the Master of the Rolls, who was to appoint a deputy and a staff of assistant archivists to look after them and to define the terms on which they should be accessible to the public. Moreover the Act empowered the Crown to bring within its scope, at discretion, any groups of documents of a public nature which were not included in the original schedule. In 1854, under an order in council made two years earlier, this provision was applied to the contents of the old State Paper Office, which had existed, in one form or another, since the 16th century and constituted a very important branch of the national archives; and subsequently arrangements were made for the transference to the Public Record Office of the records of all government departments, with the exception of the India Office, so soon as they should cease to be needed for administrative purposes.

The collection thus garnered in the Record Office, London, falls into two divisions, the judicial records and the State papers, with which latter are included the records of the various departments into which the old secretaries' offices have become differentiated. Of the former, the two most important branches are the Chancery and the Exchequer.

Judicial Records.—The Chancellor formerly acted as the private secretary of the sovereign. To the records of the Chancery, therefore, belong the series of enrolled royal letters, the Patent and Close rolls, both of which began in the reign of King John. The formal difference between these two series is implied in their names: the letters patent were sent open, with the Great Seal attached, while the letters close were sent folded. On the patent rolls were entered grants of lands, offices and privileges whether to private persons or public bodies, creations of peerages, licenses for the election of bishops and restitutions of temporalities, presentations to ecclesiastical benefices, charters of incorporation to towns, pardons, etc. The earlier rolls also contain the records of diplomacy which were afterwards to find their place among the State papers, such as the powers and credentials granted to ambassadors, correspondence relating to negotiations with foreign States, and treaties. The contents of the letters close, which were addressed to individuals and are generally of a more personal nature than the letters patent, are of a very varied description, "such," to quote Sir Thomas Hardy, a former deputy-keeper, "as orders for the observance of treaties and truces, concerning aids, subsidies, tallages, restitutions of possessions, assignments of dower, and acceptances of homage; for the repairing, fortifying, and provisioning of castles; writs and mandates respecting the coin of the realm, the affairs of the royal household, and the payment of salaries and stipends; commitments, pardons, and deliveries of State prisoners, etc."; while "on the back of the rolls are summonses to and prorogations of parliaments, great councils, and convocations; writs of summons for the performance of military and naval services; copies of letters to foreign princes and states; proclamations; prohibitions; orders for regulating the coinage of the kingdom, and the sale of wine and other necessaries; for receiving knighthood, providing ships, raising and arraying forces, and furnishing provisions; for paying knights, citizens and burgesses for attendance in parliament; liveries and seizin of lands; enrol-

ments of private deeds, of awards of arbitrators and of various other documents."

It will thus be seen that the close rolls of which there are more than 20,000 are of immense importance for social as well as for political history. Besides these two great series, both of which are continued in the 20th century, there are the Charter rolls (1 John to 8 Henry VIII.) containing grants and confirmations of a more formal type than those enrolled on the Patent rolls; the Fine rolls (John to 23 Charles I.) recording moneys paid to the king for various grants, privileges and exemptions; and the Parliament Rolls (1 Edward III. to 49 Victoria) containing entries of the transactions in parliament, and various smaller series of a special character.

Of unenrolled Chancery documents may be mentioned the warrants which formed part of the process of issuing letters under the Great Seal, the inquisitions containing details of the holdings of deceased tenants-in-chief and, appertaining to the court in its judicial aspect, the Chancery proceedings, comprising bills and answers, affidavits and depositions, decrees and orders.

The Exchequer records, of which the oldest and most famous is Domesday Book (*q.v.*) may be most conveniently described according to the ancient divisions of the court, of which the principal were the Upper Exchequer or Exchequer of Audit and the Lower Exchequer or Exchequer of Receipts. The former was subdivided into the Treasurer's Remembrancer's Office and the King's Remembrancer's Office. To the first belong the Pipe rolls (*q.v.*), containing the first audit of the accounts of the sheriffs, the Foreign rolls on which were entered the preliminary audit of accounts other than the sheriffs', the Originalia rolls, containing extracts from Chancery rolls communicated to the Exchequer for information, and the Memoranda rolls, containing copies of correspondence and miscellaneous notes. The principal records of the King's Remembrancer's Office consist of vouchers and audited receipts of expenditure. There are also judicial records belonging to this department, comprising bills, answers, depositions, etc., as in the Chancery. The records of the Lower Exchequer consist of the Receipt and Issue rolls, in which, respectively, are entered the payments made to and by the Exchequer. A special subordinate court heard suits in which Jews were involved, and there is a separate series of plea rolls appertaining thereto; and after the Reformation, to meet the greatly increased business of the Exchequer resulting from the transference of Church lands to the Crown, new divisions were created. From that period date the records of the First Fruits and Tenths Office, including the Valor Ecclesiasticus, a survey of all the ecclesiastical benefices in England and Wales made in 1535, and also those of the court of Augmentations, which administered the property of the suppressed religious houses and the revenues of the Duchy of Cornwall and was merged in the Exchequer in the reign of Queen Mary: its records consist of the muniments of the monasteries, documents relating to their seizure and subsequent administration, and judicial proceedings.

Common Law Records.—The earliest common law records are the Curia Regis rolls (5 Richard I. to 56 Henry III.), which contain pleas heard in the courts both of King's Bench and of Common Pleas. From the beginning of the reign of Edward I. the records of the two courts are separate, the most important of those belonging to the King's Bench being the Coram Rege rolls, the Judgment rolls, containing suits between private persons, the Crown rolls, recording crown business, and the Assize rolls, containing the proceedings before justices in eyre, of assize, of oyer and terminer, etc. The early plea rolls of the Court of Common Pleas are called De Banco rolls; from 24 Henry VII. they were known as Common rolls, and in 25 Elizabeth a new series of Recovery rolls was commenced, in which, besides deeds and other instruments, were entered the recoveries forming part of the complicated legal process of fine and recovery by which, down to 1834, the transfer of land was effected. The Feet of Fines, which date from the reign of Richard I. and are arranged under counties, form another group of Common Pleas records.

State Papers.—As has already been noticed, many documents which are essentially State papers are to be found on the earlier Chancery rolls, and there is a series of Ancient Correspondence, running from the reign of Richard I. to that of Henry VII. and filling 61 volumes, which comes under that category. But the great series which was preserved in the State Paper Office established in 1578, and absorbed by the Public Record Office nearly three centuries later, begins with Henry VIII. From the time of Edward VI. they were divided into two classes, domestic and foreign, according to whether they appertained to the internal or the external affairs of the kingdom; and to them were subsequently added the State Papers Colonial. While, however, in the arrangement of documents adopted by the Record Office, the two former series have been kept separate from the subsequent records of the Home and Foreign Offices founded in 1782, the State Papers Colonial have been amalgamated with those of the Colonial Office. There are also separate series relating to Scotland and Ireland, and there are special calendars of papers relating to Border affairs from 1560 to 1603 and to the reign of Mary Queen of Scots and the subsequent regency (1547–88), and of Irish State Papers from 1509 to 1670. From the last-mentioned date onwards the papers of both countries are described in the Calendars of State Papers Domestic.

The Domestic series comprise royal and secretarial correspondence, both letters received (in-letters) and letters despatched (out-letters), whether in the form of loose drafts or of copies entered into bound volumes (Entry Books), warrants, dockets (abstracts of warrants), orders, commissions, petitions and a host of miscellaneous material, among which are to be found a number of collections of private correspondence. Those belonging to the Commonwealth period, when the affairs of the kingdom were administered almost entirely by committees, take on a special character. The State Papers Foreign, which from 1577 are arranged according to the foreign countries which they concern, consist in the main of correspondence between ambassadors and secretaries of State, treaties and treaty papers (records of negotiations), archives of British legations abroad and memorials and letters from foreign ministers in England.

Record Publications.—In 1800 a royal commission was appointed which was charged with the arrangement and publication of public records and the control of repositories. So far as arrangement and control were concerned practically nothing was done, but a number of calendars were published. The contractions of the original documents have not been expanded, no attempt has been made to identify names which may be spelt in a dozen different ways, they abound in inaccuracies of transcription and their indexes are utterly inadequate. The calendars prepared at the Public Record Office are a very different matter. Though it must still be many years before the collection, even excluding the modern departmental papers, has been completely described, great progress has been made with most of the more important series of records and some hundreds of volumes have already been issued. The tendency, moreover, has been towards a greater and greater completeness of presentation; so that the student, unless he wish to make an exact and verbatim transcript of a particular document, can work independently of the originals. Nor has attention been paid exclusively to records housed in the office itself. The series of *Letters and Papers of Henry VIII.* includes documents in the British Museum, at Oxford and Cambridge and elsewhere, and papers relating to English affairs in various foreign archives (Rome, Venice, Salamanca) have been calendared by delegates sent out for the purpose. Moreover, much valuable critical work has been done on the public records by unofficial learned bodies, such as the Pipe Roll Society and the Selden Society.

Records Commission of 1910.—In 1910, a royal commission was appointed to make exhaustive enquiry into the preservation of records. The reports of the commission, completed in 1929, were a condemnation of the policy of excessive centralization and an endorsement of that of the territorial administration pursued in France and elsewhere. So far, however—that is to say in 1928—no steps have been taken by the State to carry the recommendations of the commission into effect.

Not, by any means, that the local records of England, whether

municipal, parochial or ecclesiastical, have been universally neglected. Moreover, much has been done in the way of publication, whether of the records of a particular town or parish or by specialists in a particular kind of record, such as Dr. Charles Gross in his classic *Gild Merchant* or A. Ballard in his *British Borough Charters*, or by such bodies as the Parish Register Society or the various societies connected with particular counties. But all this activity has been the result of private enterprise and local patriotism: it has been neither controlled nor officially recognized by the State. Signs, however, are not wanting that the findings of the commission of 1910 will eventually bear fruit. By the Law of Property (Amendment) Act of 1924 Manorial documents were brought under the control of the Master of the Rolls, without whose consent such records, as valuable to the social historian as they are liable to dispersal, might not thenceforth be disposed of; and the Surrey County Council appointed a records committee which in 1928 published a volume of abstracts of civil and ecclesiastical records and another of manorial court rolls preserved in the county.

United States of America.—The federal records of the United States are kept in the Library of Congress at Washington, and each State has its own archives. These are independent of the national Government, and various systems of administration are in force. "There are departments of archives and history, divisions of archives in State libraries, State historical commissions and State historical societies charged with some of the functions of archivists" (Botha). The American Historical Society, with its archives commission and historical manuscripts commission, which, like the similarly named body in England, devotes itself to the exploration of private collections, has done admirable work. But American history begins long before America had a national entity, and the student must seek much of his material in Europe. His principal sources are the Colonial State Papers and the Journal of the Board of Trade and Plantations in the Public Record Office of London, but there are many others. Excellent guides have been compiled by Mr. Andrews of manuscripts relating to the United States in the Public Record Office, the British Museum, the libraries of Oxford and Cambridge, the House of Lords, and other repositories, but that there are still untapped sources is indicated by the recent discovery among the archives of Bristol of the Tolzey books, recording the names of 12,000 to 15,000 persons who emigrated, as "servants to the foreign plantations," to Virginia, Maryland and the West Indies in the third quarter of the 17th century.

Scotland, Ireland, and the Dominions.—The principal records of Scotland are kept in the General Register House at Edinburgh. They include the registers of the privy council and the rolls of the Exchequer and the Chancery. Other records of the Chancery remain in the custody of the court, and the Court of Teinds (tithes) also keeps its own records. There are also local records of great interest (*see* Murray, *Scottish Local Records*, 1927). The Reorganization of Offices (Scotland) Act (1928) abolished the office of Deputy Clerk Register, whose duties, with those of the Keepers of the Registers, of Sasines and of Deeds, were transferred to a Keeper of the Registers and Records of Scotland. For Ireland a Public Record Office was established in 1867 and to it were transferred the records of the various courts of law, wills proved in Ireland and certain financial records; the State Paper Office remaining a separate institution though under the control of the deputy-keeper. The most valuable Irish State Papers, however, numbering 500 volumes and ranging in date from the reign of Henry VIII. to 1771, are in London. On the other hand five important volumes containing correspondence and other papers of the early 17th century, discovered in Philadelphia in 1866 by Hepworth Dixon, the historian and traveller, and on his suggestion offered to the British Government, were, on the suggestion of Lord Romilly, at that time Master of the Rolls, presented to the Irish Record Office.

If the historian of Scotland or Ireland must seek for many of his sources of information in England, still more is this the case of the colonial historian. Nevertheless, the dominions have their own records also, and within recent years a good deal of attention has been paid to their administration. Both in South Africa and in Canada the policy of provincial repositories is favoured, the four members of the Union and the provinces of Canada having their own archives. Mr. C. Graham Botha, chief archivist for the Union of South Africa, after the War made a tour of inspection of the principal record offices of Europe and America and his report, published in Pretoria in 1921, is a very valuable survey of the conditions of archive administration throughout the civilized world. Canada has taken steps to augment its own records by the foundation of history societies in England and France for the discovery, preservation and publication of documents relating to its history in those countries.

The Continent of Europe.—In the care and disposal of records France was a pioneer. A carefully considered policy was laid down in 1789 and has ever since been adhered to. The national archives, divided into three sections, *historique, administrative et domaniale* and *legislative et judiciare* are kept in the Hôtel de Soubise in Paris. Each of the departments keeps its own records, consisting both of those of the old provincial governments and those of the post-revolutionary administrations; and these are under central control and arranged on a uniform system of classification. Beyond these are the municipal and communal archives and the *archives hospitalières*. The greater part of these records have been carefully inventoried; and besides a severely logical and consistent method of administration, France possesses in the *École de Chartes* an institution for the scientific study of records which has been imitated but never rivalled.

Most European countries, as already noted, have followed, with varying degrees of precision, the example of France. In Switzerland and Holland, for instance, there are separate repositories for each of the cantons and States, with central offices at Berne and The Hague respectively. The *Reichsarchiv* of Germany, which was taken over by the new Government in 1919, are kept at Potsdam and the States comprising the *Reich* each have their own archives, there being in Prussia, besides the chief collection at Berlin, no less than 16 provincial repositories. The municipal records of such towns as Frankfurt and Cologne are of great value. In Italy there are 17 repositories, under the control of the ministry of the interior, representing the ancient divisions of the country. The archives of the Vatican stand, of course, in a separate category. With regard to the publication of records the method adopted in Holland is particularly worthy of note. Early in the 20th century a *Commissie van Advies voors Rijks Geschiedkundige Publicatien* was set up, consisting of ten leading historical scholars who meet three or four times a year. Under the direction of this body a series of volumes has been published, the value of which is far from being confined to the Netherlands.

BIBLIOGRAPHY.—M. Livingstone, *Guide to the Public Records of Scotland* (1905); C. H. Van Tyne and W. G. Leland, *Guide to the Archives of the Government of the United States in Washington* (1907); Hubert Hall, *English Official Historical Documents* (1908); Charles Johnson, *The Public Record Office* (1918); F. C. Hearnshaw, *Municipal Records* (1918); A. Hamilton Thompson, *Parish History and Records* (1919); Robert Doré, *État des Inventaires et Répertoires des Archives Nationales, Départementales, Communales et Hospitalières de la France* (1919); Herbert Wood, *Guide to the Records deposited in the Public Record Office of Ireland* (1919); Hubert Hall, *Repertory of British Archives*, part I.: England (1920); C. Graham Botha, *Report of a visit to various archives centres in Europe, the United States of America, and Canada* (1921); Hilary Jenkinson, *Manual of Archive Administration* (1922); J. Maitland Thomson, *Public Records of Scotland* (1922); M. S. Giuseppi, *Guide to the Manuscripts preserved in the Public Record Office* (1923–24); Hubert Hall, *British Archives and the Sources for the History of the World War* (1925).
(F. B.)

RECORDER. The principal legal officer of an English city or borough having a court of quarter sessions. He must be a barrister of five years' standing, appointed by the Crown. The recorder holds, once in every quarter of a year, or oftener, if he thinks fit, a court of quarter sessions in and for the borough. He is sole judge of the court, "having cognizance of all crimes, offences, and matters cognizable by courts of quarter sessions for counties in England," except that he may not allow or levy any borough rate, or grant licences (s. 165). He is not eligible to serve in parliament for the borough, or to be an alderman or

councillor, or stipendiary magistrate for the borough, though he is eligible to serve in parliament except for the borough. He may be appointed recorder for two or more boroughs conjointly. Appeals from the city and borough justices, and under the Rating and Valuation Act, 1925, are to the recorder as sole judge.

The recorder of London is judge of the lord mayor's court, and one of the commissioners of the central criminal court. (*See* QUARTER SESSIONS, COURT OF.)

In the United States, most of the States have county recorders elected by the voters of the county. In some of the States, the duties of the recorder fall upon the clerk of one of the courts. In all of the States provision is made by Constitution or statutes for some official to have the duty of recording deeds and other legal instruments.

RECORDER, FIPPLE FLUTE or **ENGLISH FLUTE,** a mediaeval flute, blown by means of a whistle mouthpiece and held vertically in front of the performer like a clarinet. The recorder only survives now in the almost obsolete flageolet and in the so-called penny-whistle. It consisted of a wooden tube, which was at first cylindrical or nearly so, but became, as the instrument developed and improved, an inverted cone. Being very easy to play, the recorder enjoyed great popularity in all countries until the greater possibilities of the transverse flute turned the tide against it. The want of character which distinguishes the timbre of instruments of this type is due to the paucity of harmonic overtones represented.

RECTIFIER, as used in radio, consists of a device for the direct conversion of an alternating-current wave into a unidirectional wave.

RECTOR, a title given to the bearers of certain ecclesiastical and academical offices. In the Roman empire, after Constantine, the title *rector* was borne by governors of provinces subordinate to the prefects or exarchs. In the middle ages it was given to certain secular officials, *e.g.,* the podestas of some Italian towns, but more especially to the heads of the universities, the representatives and rulers of the *universitas magistrorum et scholarium,* elected usually for a very short time. After the humanistic movement of the Renaissance the style *rector* was also given to the chief masters of schools containing several classes, and in some parts of Germany (*e.g.,* Saxony, Württemberg) it is still thus used instead of the more modern title of *director.* Rector is also still the title of the heads of the Scottish universities (*Lord Rector*) and of the German universities (*Rector Magnificus*). *Rector* is the title of the heads of Exeter and Lincoln Colleges, Oxford. The heads of all Jesuit colleges are known as *rectors.*

As an ecclesiastical title *rector* was once loosely used for rulers of the Church generally, whether bishops, abbots or parish priests (*see* Du Cange, *Rectores ecclesiarum*), but the ecclesiastical title *rector* became ultimately confined in certain parts of Europe (Poland, Spain and notably England) to the office of a priest having a cure of souls.

RECUSANT (Lat. *recusare,* to refuse), the name given in the sixteenth and seventeenth centuries to persons, particularly to adherents of the Roman faith, who persisted in refusing to attend the services of the English Church, and became thereby liable to prosecution and penalties (*see* ROMAN CATHOLIC CHURCH: *English Law*).

RED BANK, a borough of Monmouth county, New Jersey, U.S.A., on an estuary called the Navesink river, 6 m. from the Atlantic ocean and 25 m. (in a bee line) S. of New York city. Pop. (1920) 9,251; 11,622 in 1930 by the Federal census. It is served by the Central of New Jersey and the New York and Long Branch railways, interurban trolleys, motor-bus lines and steamers to New York. It is a residential suburb, a summer resort and the trade centre of a rich farming region; and has fish and oyster industries, canneries, nurseries and various manufacturing plants. The name Red Bank was applied to this locality as early as 1734, and by 1780 there were several buildings within the limits of the present borough. In 1843 a Fourierist community, the North American phalanx, was established near by on 673 ac. of land with 112 members. It dissolved in 1855.

REDBREAST or **ROBIN,** a favourite among English birds because of its pleasing colour, its sagacity and fearlessness of man, and its song. In July and August the hedgerows of the southern counties of England are beset with redbreasts, each bird keeping its own distance from the next, on their way to cross the English Channel. A number of these redbreasts, as well as native birds, remain throughout the winter. On the Continent the migration is still more marked, and the redbreast is then caught in numbers for the table. The first sharp frost makes them change their habitation, and a heavy fall of snow drives them towards the homesteads for food. The nest is usually built of moss and dead leaves, with a lining of hair. In this are laid from five to seven white eggs, sprinkled or blotched with light red. Two or three broods are raised. On the Continent, the redbreast is, on the whole, a forest bird, not frequenting houses like the British form.

Although the female has a breast only a little duller than the male, the latter alone displays the red in courtship. After the young are reared fights take place between them and the adults for the possession of the territory for the winter. The robin, like most insectivorous birds, throws up the indigestible parts of its food in the form of pellets.

Besides the British islands, the redbreast (*Erithacus rubecula*) is generally dispersed over Europe, and is in winter found in the oases of the Sahara. In northern Persia it is replaced by a nearly allied form, *E. hyrcanus,* distinguishable by its more ruddy hues, while in northern China and Japan another species, *E. akahige,* is found, of which the sexes differ in plumage—the cock having a blackish band below his red breast and greyish-black flanks, while the hen resembles the British species—but both sexes have the tail chestnut red. The genus *Erithacus* belongs to the family *Turdidae* or thrushes (*q.v.*).

English colonists in distant lands have applied the common nickname of the redbreast to other birds. The ordinary "robin" of North America is a thrush (*see* ROBIN), and one of the blue-birds (*q.v.*) of the same continent, is in ordinary speech the blue "robin"; the Australian and Pacific "robins" have not all even the red breast; the Cape "robin" is *Cossophya caffra,* the Indian "robin" *Thamnobia* and the New Zealand "robin" *Miro.*

RED-BUD: *see* JUDAS-TREE.

REDCAR, a municipal borough in the north riding of Yorkshire, England, 8 m. N.E. of Middlesbrough on the L.N.E. railway. Pop. (1931) 20,159. It is situated on the north-east coast of Yorkshire, midway along the continuous stretch of sand beaches between the Tees estuary and Saltburn. It thus serves as a residential town and a holiday resort for the dense industrial population employed in Middlesbrough. During recent years, the population has grown so rapidly that the one time separate villages of Redcar and Coatham have coalesced into one compact town. Redcar is the youngest borough in Yorkshire, incorporation having been granted in Nov. 1922. The building of new houses goes on apace in the endeavour to accommodate the needs of the fast-growing population.

RED CROSS, the national and international agency whose primary purpose is to care for the sick, the wounded and prisoners in time of war. The development of the Red Cross movement, especially since 1919, has shown a world-wide tendency to regard the alleviation of human suffering, whatever its source, as falling within the purview of the Red Cross.

The Origins of the Movement.—The fundamental idea which has come to be associated with the Red Cross was first enunciated as the result of the publication by Henri Dunant, at Geneva, in 1862, of a booklet entitled *Un Souvenir de Solférino.* Dunant had witnessed appalling scenes of bloodshed during the war in Italy and his booklet gives a shocking account of the distress of the wounded left to perish on the battlefield for lack of medical assistance. He urged the necessity of constituting permanent societies for the aid of the wounded, with the purpose of forming detachments of volunteer helpers; and he went on to express the hope that he might live to see "the leaders of the military art of different nationalities agree upon some sacred international principle, sanctioned by convention, which, once signed and ratified, would serve as the basis for the creation of

societies for the aid of the wounded in the different European countries."

Dunant's appeal quickly found its echo. The *Société Genevoise d'Utilité Publique* had as president M. Gustave Moynier, who was greatly struck by the importance of the suggestions set forth in the *Souvenir de Solférino* and at his request Dunant attended a meeting of this society and explained his ideas before it. The members of the society thereupon nominated a commission with instructions to study the means of improving the position of the wounded in war. The original members of this commission, which was destined to become the *Comité International de la Croix-Rouge*, were: Gen. Dufour, commander-in-chief of the Swiss army, Gustave Moynier, Henri Dunant, Dr. Louis Appia and Dr. Théodore Maunoir.

Their first task was to draw up a draft agreement providing for the formation of national committees having as purpose to assist army medical services by creating voluntary aid corps. They further proceeded to summon an international meeting, which assembled at Geneva from Oct. 26 to 29, 1863. Thirty-six experts and Government delegates were present at the Palais de l'Athénée, and there were laid down the fundamental principles of the Red Cross.

The International committee was urged to continue the mission which it had assumed as guardian of the principles laid down in the Convention, and to pursue the formation of national societies in all countries for the purpose of developing the Red Cross movement and organizing aid for wounded soldiers and for the other victims of war.

The next step was to secure an international legal status for the movement which had thus been set on foot, ensuring the wounded men themselves, the personnel engaged in the care of the wounded and the medical supplies set aside for their use against attack, the whole being protected by a single recognized emblem. The difficulties were enormous, but they were successfully overcome thanks to the weight carried by the name of Gen. Dufour, the unwearying activity of Henri Dunant (who personally approached the authorities in a number of different countries), and the methodical organizing work of Gustave Moynier. Napoleon III. brought his personal influence to bear in favour of the scheme, and the International committee succeeded in inducing the Swiss Federal council to convoke in Geneva on Aug. 8, 1864, a diplomatic conference at which 26 Governments were represented. The outcome of this conference was the Geneva Convention, which laid down certain principles once and for all. The wounded were to be respected, military hospitals to be regarded as neutral; the personnel and material of the medical services were accorded protection; and the symbol of this protection was to be a white flag bearing a red cross—the flag which has now become the emblem of the Red Cross throughout the world. Almost all countries have now adhered to the Geneva Convention, which was revised and completed on July 6, 1906, by a new diplomatic conférence. The conferences held at The Hague in 1899 and 1907 extended to sea warfare the principles of the Geneva Convention of 1864 and the revised Convention of 1906.

THE INTERNATIONAL RED CROSS COMMITTEE (COMITÉ INTERNATIONAL DE LA CROIX-ROUGE)

The objects of the International Red Cross are regarded as being: To extend the Red Cross movement to all countries; to act as guardian of the basic Red Cross principles; to notify to existing societies the constitution of new Red Cross societies; to induce all civilized States to adhere to the Geneva Convention; to ensure the observance of the Convention, denouncing such violations of it as may occur; to urge Governments to pass legislation or issue army orders to prevent such violations; to create in time of war international agencies for the assistance of prisoners and other war victims; to visit prisoners' camps, afford prisoners of war comfort and consolation, and try to better their situation by use of all available influence; and in time of peace as well as in time of war, to act as a benevolent intermediary between Governments, peoples and nationalities, for the purpose of itself carrying out or making it possible for others to carry out the humanitarian task of relieving suffering arising out of war, sickness or disaster.

Work in War-time.—A few examples will serve to indicate the extent of the International Red Cross committee's activities. The formation of independent national Red Cross societies and the acceptance of the members of the Geneva Convention made rapid headway from the beginning. In 1870 an information agency was formed by the international committee at Basle for the benefit of French and German wounded or sick soldiers.

In 1912 during the Balkan War the committee constituted a similar agency at Belgrade. When the World War came, in 1914, there was constituted in Geneva an international agency for prisoners of war with a staff of 2,000 persons, mainly volunteers. The 17 different sections of this agency dealt with requests emanating from 30 belligerent countries. From 2,000 to 15,000 letters a day were handled, and the index of requests for information included before the end of the war over 5,000,000 cards. Thanks to this agency, thousands of missing men of different armies and navies were traced, assistance was forwarded to prisoners of war, regular visits were made to 500 different internment camps, and facilities were obtained for the evacuation of civilians from occupied districts, and for the repatriation or internment in neutral territory of the more severely wounded, of certain categories of sick prisoners and of medical personnel. The financial service of the international agency had transmitted to prisoners of war in cash up to Dec. 31, 1917, a sum of over £715,000.

As regards breaches of the Geneva Convention, frequent representations have been made to Governments by the international committee, concerning cases of hospitals being shelled, reprisals exercised, medical personnel or wounded improperly treated, medical stores belonging to Red Cross societies requisitioned, the Red Cross emblem abused, etc.

Post-war Activities.—At the end of hostilities the international committee, thanks to the generous aid given by the League of Nations, was able to organize arrangements for the repatriation of prisoners of war of all nationalities who remained in Russia and Siberia, and the return of Russian prisoners from the different countries of central Europe. The delegates of the committee were called upon to undertake representations to the Governments concerned, to form prisoners into convoys and check their identity, to look after their health, and to arrange for the movements of convoys between Moscow and the Baltic ports and between Vladivostok, Novorossisk and Trieste. Half a million prisoners were thus repatriated.

At a later date the delegates of the international committee were concerned with the exchange of Polish and German hostages in Upper Silesia, with the return of Bulgarian subjects interned in Greece and with the exchange of prisoners between Greece and Turkey.

In regard to health work, the representatives of the international committee in Galicia and Ukraine and in the Black sea region were instructed in 1918 to lend their assistance in combating the typhus epidemics then raging. In April 1918, the committee participated with the representatives of different countries in central and eastern Europe in founding a central study bureau for the combating of epidemics. Between 1921 and 1923, two medical missions were sent into the Ukraine to equip hospitals and supply food to famine sufferers. The committee's representatives in Poland were associated in the anti-epidemic campaign there and between 1919 and 1923 a number of sanatoria and dispensaries in the Black sea region were re-established and equipped by the committee.

In order to assist in the relief of the populations most heavily affected by the economic consequences of the war, the committee undertook the systematic co-ordination of relief activities in Austria and Hungary. On Aug. 15, 1921 the committee joined with the League of Red Cross societies (*see* p. 18) in summoning in Geneva an international conference comprising 80 representatives of governments, Red Cross societies and relief agencies, to organize relief for the famine stricken districts of Russia. A Russian relief committee was designated with Dr. Nansen as high commissioner, and the funds handled by this committee up to Jan. 1922, amounted to over £800,000. In 1923 the economic

position of the population in Germany and in the Ruhr was also investigated by delegates of the committee.

It was impossible to ignore the very special hardships to which children were exposed during the war and the years immediately following the conclusion of hostilities. and in order to facilitate the relief of children so situated the international committee participated in Jan. 1920 in founding the international Save the Children union, of which it became patron. The distribution of the relief funds handled by the union has been largely effected through the delegates of the international committee, and it is estimated that over £4,000,000 has been so distributed.

On numerous occasions the committee has been called upon to act in connection with civil war. Political prisoners arrested in the case of internal disorders in Hungary, Ireland, Posnania, Lithuania, the Ukraine and Montenegro have at various times been visited by representatives of the committee.

The refugee problem has also been one of the committee's principal preoccupations of recent years, when wars and revolutions have raised it in an acute form. The international committee pointed out at an early date the necessity of providing permanent homes for the thousands of Russian refugees who poured out of Russia into neighbouring countries. It was necessary that they should be transported to regions in which they could establish themselves without disturbing the balance of the economic life of the countries receiving them. The committee made representations on this subject to the League of Nations and a high commissariat was formed to handle the matter. In Europe and the Near East the executive work incurred was largely handled by the delegates of the committee; in particular direct assistance was rendered by the committee to Greek refugees from Asia Minor, to war victims in Anatolia and to Syrian refugees.

As regards the general problem of relief, the international committee gave its support from the outset to a plan conceived by Senator Ciraolo and supported by the League of Nations, for the constitution of an international federation for the mutual relief of disaster stricken populations. This organization—the International Relief union (*Union Internationale de Secours*)—is to be entrusted with organizing and co-ordinating general relief on an adequate scale for peoples suffering under disasters of an exceptional character. The statutes of the union, to which a number of Governments have already given their adhesion, provide that the International Red Cross committee and the League of Red Cross societies shall assume responsibility for the permanent central services of the union.

An important contribution to the technical documentation available regarding relief problems has been made by the foundation in 1923 of a review entitled *Matériaux pour l'étude des calamités*, which is published by the Geneva Geographical Society under the joint auspices of the international committee and the League of Red Cross societies.

The international committee has been frequently called upon to collaborate with the technical services of the League of Nations and the International Labour office. It has followed with great interest the question of medical personnel, which is so closely connected with the whole history and work of the Red Cross. It has also established close co-operative relations with the International Council of Nurses and with the world conferences called at regular intervals by that council.

In 1921 and 1925 general exhibitions of medical stores and supplies were organized at Geneva by the committee, with the participation of the army and navy medical services of various countries, national Red Cross societies and representatives of private firms. The purpose of these exhibitions was to draw attention to the international side of the question of medical stocks, and the advantage which could be derived from the adoption of certain measures of standardization which would facilitate the use of such stocks for the relief of the sick and wounded. In this connection, in accordance with a resolution of the 12th International Red Cross conference, the committee has founded in Geneva an international institute of medical material (*Institut International de matériel sanitaire*), including a permanent museum of exhibits forwarded from official sources and by national Red Cross societies. This unique collection enables students of these questions to study and compare the practices of the medical services of different countries. They include specimens of different types of stretchers and of contrivances for carrying and moving wounded men, as well as specimens of bandages, identity discs and wounded men's identity cards, together with charts, photographs, documents, etc. In this same connection the committee has formed an international commission for the standardization of medical material, the members of which have been designated by the army medical services of different countries. The commission has met at regular intervals since 1926 and has arranged competitions and experimented with different types of apparatus. The purpose of its work is to determine upon standard types of stretchers, racks, bandages, identity cards and Red Cross brassards.

In addition the international committee has undertaken the study of a number of questions of general humanitarian interest, such as chemical warfare, the position of non-combatants in enemy territory, the protection of air ambulances, the abuse of the Red Cross emblem, etc. The committee has been entrusted by the International conferences with the periodical distribution of Florence Nightingale medals, which are awarded to the most deserving nurses of all countries; and with the distribution of the interest accruing from the empress Shoken and the Augusta funds in favour of humanitarian enterprises and all activities concerned with Red Cross work.

The International Red Cross committee was formed at Geneva where it continues to have its headquarters. Its president from 1863 to 1910 was Gustave Moynier, founder of the committee. Moynier was succeeded by Gustave Ador (*q.v.*) who was succeeded on his death in 1928, by Max Huber (*q.v.*) judge and late president of the Permanent Court of International Justice. The committee is recruited by co-optation and under the terms of its by-laws, possesses juridical personality. The international committee provides the national societies with inspiration, and serves to maintain contact between them and to co-ordinate their activities. The principles upon which its activities are based remain as they have always been, absolute impartiality, complete independence (particularly from the political and confessional standpoint) and equality as between all members of the great Red Cross family. A link between the committee and the national societies is provided by a periodical publication, the *Bulletin International de la Croix-Rouge*, supplemented since 1919 by the *Revue Internationale de la Croix-Rouge*, which contains articles and information concerning the different aspects of the Red Cross movement. The international committee also publishes books, pamphlets, etc., dealing with Red Cross activities. (M. H.)

LEAGUE OF RED CROSS SOCIETIES

The League of Red Cross societies was formed in 1919 on the proposal of H. P. Davison, president of the War Council of the American Red Cross, by the Red Cross societies of France, Great Britain, Italy, Japan and the United States, for the purpose of developing and intensifying the humanitarian activities of the Red Cross in time of peace. By 1928 the league had grown to include 50 national Red Cross societies, and its statutes, revised in 1924 and again in 1927, define its objects as follows:

The objects of the league are to encourage and facilitate at all times Red Cross action for the relief of suffering humanity. It shall for this purpose:

1. Encourage and promote in every country, the establishment and development of a duly authorized voluntary national Red Cross organization working in accord with the principles of the Geneva Convention.

2. Collaborate with these organizations in the improvement of health, the prevention of disease and the mitigation of suffering.

3. Place within the reach of all peoples the benefits to be derived from present known facts and new contributions to science and medical knowledge and their application.

The league has a board of governors comprising one representative of each member society, and the board, when not in session, delegates its authority to an executive committee of ten members. The expenses of the league are met by the voluntary contributions of member societies, the greater part of the financial burden having thus far been carried by the American Red Cross. More

than 30 national societies, however, make annual grants towards the league's budget.

The international activities of the league are carried out under the direct supervision of the chairman of the board of governors or one of the three vice-chairmen, by an international secretariat whose headquarters, originally situated in Geneva, were transferred to Paris in 1922. It comprises in addition to the various branches of the secretary-general's office, technical divisions corresponding to the principal peacetime activities of Red Cross societies, viz., disaster relief; health (with special emphasis on popular health education and preventive activities); nursing; junior Red Cross; and emigration.

The foundation of the league preceded by a few weeks the signing of the covenant of the League of Nations, of which article 25 reads as follows:

> The members of the league agree to encourage and promote the establishment and co-operation of duly authorized voluntary national Red Cross organizations having as purposes the improvement of health, the prevention of disease and the mitigation of suffering throughout the world.

This confirmation in the Covenant of the central points in the league's programme was indicative of the widespread sentiment which lay behind the decision of the national Red Cross societies after the war to widen their horizon and to extend their activities to the relief of all forms of preventable suffering. The most immediate tangible result of this decision, and of the consequent activities of the League of Red Cross societies has been the extension of the Red Cross movement into a large number of countries to which it had not previously penetrated—in particular to the countries of the South American continent, where the association of the Red Cross with the idea of war had not found favour, but where the idea of a great international movement grouping together all the principal elements which seek to protect mankind against its natural enemies in time of peace, made an immediate appeal.

The league secretariat has actively co-operated in the organization of 23 national Red Cross societies in countries where no independent and duly recognized Red Cross societies existed prior to 1919.

Parallel with this increase in the number of societies existing has come an increase in the Red Cross membership all over the world. At the end of 1925 it could fairly be estimated that the total number of Red Cross members in the world (including junior members) amounted to over 17,000,000.

The functions of the league being essentially those of a clearing house, destined to enable the different national Red Cross societies to avail themselves of each other's experience, and to co-operate readily when need arises, special attention has been given by the secretariat to the problem of creating opportunities for frequent and regular contact between Red Cross representatives from different countries. Since 1922 a system of study visits has been inaugurated under which delegates from different societies desirous of studying some particular phase of Red Cross activity, successively visit the headquarters of the league in Paris and the headquarters of such national societies in Europe as can readily afford facilities for the study in which they are interested. This system is supplemented by regular visits to the headquarters of the national societies undertaken by officers of the secretariat. A still more important innovation has been the establishment of three series of "regional" conferences. The Red Cross societies of the Far East were brought together in conference for the first time in Bangkok in 1922 and again at Tokyo in 1926. The first regional conference for the societies of central and eastern Europe was held in Warsaw in 1923 and the second in Vienna two years later. Pan-American Red Cross conferences have met in Buenos Aires in 1923 and in Washington in 1926. These meetings have been found to facilitate the exchange of views between representatives of the Red Cross societies which are concerned with similar problems owing to the similarity of the geographic, economic and social conditions of their respective countries, besides making possible the organization of collective action in regard to such problems as in their nature transcend political boundaries.

Relief Work.—As regards the activities of the league in the various technical fields already referred to (relief, health, nursing, junior Red Cross and emigration), steady and satisfactory development has taken place. The important place occupied by relief questions in the league programme is to be attributed in a great measure to the decision taken in 1924 to create a special Relief division with responsibility for preparing the ground for the work of the International Relief union referred to above. Red Cross societies are finding themselves increasingly able to handle the disaster relief problems which arise in their respective countries, without foreign help; and this is to be attributed in a large measure to the technical advice and assistance furnished by the league. Nevertheless most of the outstanding natural disasters of recent years have involved an appeal for aid from abroad; and the necessary appeal has been issued, and the resultant relief activities co-ordinated by the league either on its own responsibility or in conjunction with the International Red Cross committee. Joint appeals were launched on the occasion of the Russian famine of 1921 and in connection with earthquakes in Persia, Japan and Central America. Floods in the Low Countries and elsewhere, and the critical situation created by the influx of refugees into Greece following on the exchange of populations between that country and Turkey, have also given occasion for the league's intervention in this field. Close relationship has of course been established with scientific and other organizations interested in different phases of relief problems, in order to make the equipment of the league secretariat in this field as complete as circumstances permit.

Health.—The variety of health activities upon which national Red Cross societies are now engaged is too wide to be recapitulated in a few lines. The Health section of the league secretariat has given special attention to the collection of health propaganda material, representative specimens of which it holds at the disposal of national societies. The loan collection of films in the league's possession is particularly well equipped as regards health films which are in constant demand. The commissions set up by the League of Nations to deal with health and child welfare problems include representatives of the League of Red Cross societies, which is also in close regular contact with other important international health organizations such as the *Office International d'Hygiène Publique*, the International Union against the Venereal Peril, etc. The International Union against Tuberculosis has entrusted its secretariat to the Health section of the league. Special reference may be made to the league's participation in the anti-epidemic campaign in eastern Europe in 1920–21 and to the movement in favour of creating more favourable health conditions for merchant seamen. The initiative taken by the league in this latter connection was due to representations made by the Norwegian Red Cross in 1924. A conference at Oslo in 1926, in which a number of maritime countries were represented, drew up concrete proposals in this regard and a standing committee is following developments and keeping interest alive. The International Union against Venereal Peril grew out of a somewhat similar initiative taken by the league in 1921 when conferences of specialists were called in Copenhagen, Prague and Paris, resulting in the formulation of a common basis for international anti-venereal work.

Nursing.—In the nursing field the league's most important contribution has been the establishment of an international nursing centre in London. Every year since 1920 one or more graduate nurses from each of 10 or 15 different countries has been enabled through this arrangement to follow a special course either in popular health nursing or in the work of nursing school administrators and teachers. The league has enjoyed in connection with these courses the collaboration of Bedford College for Women, where the courses are given, as well as that of the College of Nursing. The British Red Cross has given particularly helpful collaboration in this work and has presented to the league the lease of the house in London where the students are housed. The Ministry of Health and the Board of Education have also shown their interest in this almost unique experiment. The Red

Cross societies with which the league secretariat has been called upon to co-operate most closely in the development of their nursing activities include those of Albania, Colombia, Hungary and Rumania, in each of which countries Red Cross nursing schools have been inaugurated, with the help of direct assistance from the league.

Junior Red Cross.—The junior Red Cross is a relatively new departure, the origin of which is to be traced to the participation of children, during the war in 1914–1918, in the Red Cross work designated to relieve the suffering of wounded soldiers. This participation was first undertaken on an organized basis in Australia and Canada and subsequently developed on a gigantic scale by the American Red Cross when the United States entered the war. It was then observed that junior Red Cross membership constituted an ideal vehicle for the self-education of children along certain lines, notably in health and the civic idea in its fullest sense. Educationalists, especially in America, encouraged the Red Cross to develop this activity; and experiments undertaken partly by league delegates and partly by the delegates of the American Red Cross during the period when that society (in 1919–20) was conducting extensive relief operations throughout eastern Europe, sufficiently demonstrated that the appeal of the junior Red Cross idea is in no sense confined to Anglo-Saxon countries. The development of the junior Red Cross was consequently established as a definite plank in the league programme in 1922, when its purpose was defined as follows: "to inculcate in children the ideal of peace and the practice of service, especially in relation to the care of their own health and that of others, the understanding and acceptance of civic responsibility, and the cultivation and maintenance of a spirit of friendly helpfulness towards other children in all countries." By 1928 junior membership had become a recognized part of the organization of 40 different national Red Cross societies, and the number of junior Red Cross members in the world was estimated at 10,000,000.

Other Activities.—The last of the technical divisions of the league, the Emigration division, was constituted in 1925 at the instance of the Italian Red Cross, and is occupied with the collection of data regarding the particular dangers to health to which emigrants are exposed, and the degree in which Red Cross societies are in a position to assist them.

The League of Red Cross societies publishes a monthly review in French, English and Spanish entitled *The World's Health* in addition to a monthly *Information Bulletin* containing technical notes for Red Cross workers.

When the chairmanship of the board of governors of the league became vacant on the death, in 1922, of H. P. Davison, who had been the moving spirit in its foundation, John Barton Payne, chairman of the American Red Cross, succeeded him. Three vice-chairmanships were created in 1927 and the Cuban, German and Japanese members of the board of governors were nominated by the board to fill these posts. The office of director-general was entrusted, in 1919, to Lieut.-Gen. Sir David Henderson, and on his death, in 1921, to Sir Claude Hill, who resigned in 1926. The office of director-general was then abolished, and T. B. Kittredge assumed charge of the activities of the secretariat with the title of secretary-general. (P. D.)

THE NATIONAL RED CROSS SOCIETIES

The national Red Cross societies were originally constituted in almost all countries for the single purpose of supporting and assisting the Army and Navy medical services in time of war. As has already been shown, their sphere of action has since been very greatly widened. A national Red Cross society, in order to obtain official recognition, is required to fulfil the following conditions:

The Government of its country must have adhered to the Geneva Convention; the society must have been recognized as an auxiliary to the Army medical services; it must adopt the name and emblem of the Red Cross (except that in Mohammedan countries the Red Crescent, and in Persia, the symbol of the Red Lion and Sun, have been admitted); its activity must extend throughout the country and its dependencies; its membership must be open to all citizens of the country irrespective of sex, politics or religion; and, finally, it must undertake to maintain regular contact with the other national societies and with the International Red Cross committee of Geneva. No more than one national Red Cross society can be recognized in each country. Each national society is directed by a central committee and includes a suitable number of regional and local committees which assist the central committee and ensure co-operation from all sections of the country. In most cases, throughout the national organizations, there are general meetings once a year of delegates from each local branch.

National Red Cross societies are autonomous and independent within their own territory. The first national Red Cross societies came into existence in Europe immediately following the Geneva Conference of 1863, and the total number existing in the world to-day is more than 60. The list is as follows:

Albanian Red Cross (headquarters Tirana) founded in 1921.
American Red Cross (headquarters Washington) founded in 1866.
Argentine Red Cross (headquarters Buenos Aires) founded in 1880.
Austrian Red Cross (headquarters Vienna) founded in 1867.
Australian Red Cross (headquarters Melbourne) founded in 1914.
Belgian Red Cross (headquarters Brussels) founded in 1864.
(The Congo Red Cross, founded in 1924 as a branch of the Belgian society, works only in the Belgian Congo.)
Bolivian Red Cross (headquarters La Paz) founded in 1917.
Brazilian Red Cross (headquarters Rio de Janeiro) founded in 1908.
British Red Cross (headquarters London) founded in 1870.
(Independent Red Cross societies were constituted in each of the five great dominions. These societies were admitted as independent members of the League of Red Cross societies in 1919, but formal notification of the recognition of their independent status was only accorded by the international committee following the Imperial Conference of 1927. The necessary formalities in connection with the recognition of the Indian and New Zealand Red Cross societies are now in progress. The Australian, Canadian and South African societies were duly recognized in 1928.)
Bulgarian Red Cross (headquarters Sofia) founded in 1885.
Canadian Red Cross (headquarters Toronto) founded in 1896.
Chilian Red Cross (headquarters Santiago) founded in 1903.
Chinese Red Cross (headquarters Shanghai and Pekin) founded in 1904.
Colombian Red Cross (headquarters Bogotá) founded in 1915.
Costa Rican Red Cross (headquarters San José) founded in 1885.
Cuban Red Cross (headquarters Havana) founded in 1909.
Czechoslovak Red Cross (headquarters Prague) founded in 1919.
Danish Red Cross (headquarters Copenhagen) founded in 1876.
Dantzig Red Cross Society (headquarters Dantzig) founded in 1922.
Dominican Red Cross (headquarters Santo Domingo) founded in 1927.
Ecuadorian Red Cross (headquarters Quito) founded in 1923.
Estonian Red Cross (headquarters Reval) founded in 1919.
Egyptian Red Crescent (headquarters Cairo) founded in 1912.
Finnish Red Cross (headquarters Helsingfors) founded in 1920.
French Red Cross (headquarters Paris).
(Comprising three separate groups: Société Française de Secours aux blessés militaires [founded in 1864], Association des Dames Françaises [1879], Union des Femmes de France [1881].)
German Red Cross (headquarters Berlin), reorganized in 1921.
(Incorporated in the German Red Cross are the following societies which previously had a separate existence:
Baden Red Cross founded in 1866.
Bavarian Red Cross founded in 1868.
Hessian Red Cross founded in 1864.
Prussian Red Cross founded in 1864.
Saxon Red Cross founded in 1866.
Württemberg Red Cross founded in 1863.)
Greek Red Cross (headquarters Athens) founded in 1877.
Guatemalan Red Cross (headquarters Guatemala) founded in 1923.
Hungarian Red Cross (headquarters Budapest) founded in 1879.
Icelandic Red Cross (headquarters Reykjavik) founded in 1924.
Italian Red Cross (headquarters Rome) founded in 1864.
Japanese Red Cross (headquarters Tokyo) founded in 1877.
Latvian Red Cross (headquarters Riga) founded in 1918.
Lithuanian Red Cross (headquarters Kaunas) founded in 1918.
Luxemburg Red Cross (headquarters Luxemburg) founded in 1914.
Mexican Red Cross (headquarters Mexico) founded in 1907.
Netherlands Red Cross (headquarters The Hague) founded in 1867.
(The Red Cross of the Netherlands East Indies is a branch of the Netherlands Red Cross society, whose activities are confined to the Dutch islands of the East Indian archipelago. The society has, however, at the request of the Netherlands Red Cross, been admitted to independent membership in the League of Red Cross societies.)
Norwegian Red Cross (headquarters Oslo) founded in 1865.
Paraguayan Red Cross (headquarters Asunción) founded in 1919.
Peruvian Red Cross (headquarters Lima) founded in 1879.

Persian Red Lion and Sun (headquarters Teheran) founded in 1923.
Polish Red Cross (headquarters Warsaw) founded in 1919.
Portuguese Red Cross (headquarters Lisbon) founded in 1865.
Rumanian Red Cross (headquarters Bucharest) founded in 1876.
Serb-Croat and Slovene Red Cross (headquarters Belgrade) founded in 1876.
Salvadorian Red Cross (headquarters San Salvador) founded in 1885.
Siamese Red Cross (headquarters Bangkok) founded in 1893.
South African Red Cross (headquarters Johannesburg) founded in 1913.
Swedish Red Cross (headquarters Stockholm) founded in 1865.
Swiss Red Cross (headquarters Berne) founded in 1866.
Turkish Red Crescent (headquarters Angora) founded in 1868.
U.S.S.R., Alliance of Red Cross societies and Red Crescent societies of, (headquarters Moscow) founded in 1925.
(This alliance was recognized as succeeding to the rights and responsibilities of the Russian Red Cross which was eclipsed by the Russian revolution. It comprises the following constituent societies:
Armenian Red Cross [headquarters Erivan] founded in 1920.
Azerbaijan Red Crescent [headquarters Baku] founded in 1923.
Georgian Red Cross [headquarters Tiflis] founded in 1918.
Russian Red Cross [headquarters Moscow] founded in 1867, reorganized 1918.
White Russian Red Cross [headquarters Minsk] founded in 1921.
Turkmenistan Red Crescent [headquarters Poltoratzk] founded in 1926.
Ukrainian Red Cross [headquarters Kharkov] founded in 1918.
Uzbekistan Red Crescent [headquarters Samarkand] founded in 1925.)
Uruguayan Red Cross (headquarters Montevideo) founded in 1897.
Venezuelan Red Cross (headquarters Caracas) founded in 1895.

In the course of years, a few societies have dropped out of existence, others have revised their constitutions, and others again have federated into a single society, following political changes.

The membership of certain societies is very large. In 1927, the American Red Cross had three million senior and six million junior members; the Japanese Red Cross two and a half million seniors and a million juniors; adult members of the German Red Cross numbered 1,252,000; and the membership of the Red Cross societies of the British empire 500,000 persons of all ages.

War Work.—The discharge by national societies of their primary duty as auxiliaries to the Army medical service began very early. The first opportunity for the relief of the wounded by Red Cross societies occurred in the Dano-Prussian War of 1864. In the Austro-German War of 1866, the Franco-German War of 1870, the Russo-Japanese War of 1904 and the Balkan Wars of 1912, the Red Cross societies of the belligerent countries provided ambulances, hospitals and medical and nursing personnel to the combatant forces.

Successive Colonial wars also involved a number of national societies in the obligation of providing special personnel and equipment adapted for work in tropical climates. The World War naturally led to the organization of Red Cross activity on a tremendous scale. The American Red Cross, for example, mobilized 23,000 nurses, 55,000 nurses' aids and 6,000,000 voluntary helpers, and set up canteens, hospitals, etc., wherever American troops were engaged or in training. The British Red Cross, working in close collaboration with the Order of St. John of Jerusalem and the dominion societies, provided trained nurses, voluntary aid detachments, ambulances and hospitals behind the French front, in England and in Malta, as well as in Egypt, Palestine, Corfu and Mesopotamia. Motor ambulance convoys were organized by the British Red Cross for the evacuation of the wounded, in addition to ambulance trains and (in Mesopotamia) motor ambulance launches. Material and personnel were also provided by the society for hospital ships in the Channel, in the Mediterranean and elsewhere. Similar energy was shown by the Red Cross societies of the other belligerent countries, notably the French, German, Belgian, Italian, Austro-Hungarian, Russian, Serbian and Turkish societies. The Red Cross societies of neutral countries (Switzerland, Holland, Sweden, Denmark, Norway and Spain) were also active in providing assistance to prisoners of war, hospital facilities for serious cases of wounds and sickness, and food supplies for the populations of occupied territories. Some of the latter were also evacuated into neutral territory.

Post-war Work.—The extent of the work done by the national societies during the war naturally raised their prestige and gave them a recognized place in the affections of the public. The widening of the scope of Red Cross action was a natural result of this and the societies, following the cessation of hostilities, assumed fresh responsibilities which they have shown themselves able to discharge, thanks to their large membership, to the resources at their command, and to the reserves of material at their disposal. The present activities of Red Cross societies may be summarized as follows:—

(*a*) Activities aimed at relieving sufferings consequent on the war:

Training of disabled men (establishment of orthopaedic clinics and mechano-therapic institutes, provision of artificial limbs, convalescent homes and special workshops for the disabled).

Assistance to ex-service men, war widows and orphans.

Homes for the permanently disabled. (The Star and Garter Home, Richmond, founded and endowed with the assistance of the British Red Cross is an outstanding example.)

Assistance to the population of devastated regions. (The French Red Cross has established in the old battle area and in the liberated territories, dispensaries, child welfare centres, milk stations, and relief has been supplied to more than 3,000 French villages by the American Red Cross.)

During the famines and epidemics in central Europe in the five years immediately following the armistice, Red Cross societies supplied the countries affected with food and medical stores and sent in doctors and ambulance personnel. In a number of countries (particularly Belgium, Italy, Japan, the Netherlands and the United States) emergency relief work has been brought to a high state of perfection. The Red Cross societies of these countries have a very complete system for setting in motion at short notice relief detachments fully equipped with food, transport, tents and medical stores, for purposes of relief in case of earthquakes, fires, floods, etc.

(*b*) Main present activities:

Permanent Hospitals. National Red Cross societies in certain countries maintain general hospitals (such as the Japanese Red Cross hospital at Tokyo, the Netherlands Red Cross hospital at The Hague and the German Red Cross hospital at Cassel). They also maintain specialized institutions: Clinics for surgical cases, for children, for skin diseases, for affections of the ear, nose and throat, and for maternity cases. Nursing homes, homes for mental cases and hospitals for infectious diseases are also maintained by the Red Cross. Tuberculosis cases are treated in sanatoria, which have been built on suitable sites and provided with facilities for air and sun treatment. Instances of this work are to be found in the British empire, in France, Germany, Italy, the United States and the U.S.S.R. The Belgian Red Cross among others has set up a radium institute and provides facilities for radium treatment of cancer.

In countries liable to malaria and to tropical and epidemic diseases, special hospitals have been set up by the Red Cross. Thus the Italian Red Cross maintains malaria hospitals, the Georgian Red Cross at Tiflis an Institute of Tropical Medicine, the Ukrainian Red Cross typhus hospitals, the Chinese Red Cross at Shanghai a hospital for summer diseases. Leper asylums are also maintained by certain societies. In a number of cases, national Red Cross societies have assisted in the establishment of quarantine stations for travellers or emigrants.

Other societies again possess scientific research institutes and laboratories for the manufacture of serum in connection with hospitals. The Siamese Red Cross maintains a regular service for the administration of anti-snake bite serum.

Hospital social service has been organized by the Red Cross in Great Britain, France and the United States, including the organization of hospital libraries and the arrangement of lectures, concerts, theatricals and cinematograph displays for patients.

Dispensaries and Diagnosis.—Many examples might be quoted of arrangements made under Red Cross auspices for the examination and treatment of out-patients and the supply of medicine to indigent patients. In the far north, where distances are great, communications slow and medical assistance had hitherto been unobtainable, the Canadian and Finnish Red Cross societies have

established outposts with nurses in charge, where advice and treatment can be obtained. In many cities, ambulance stations have been established to deal with street accidents.

Mobile Hospitals and Ambulances.—Flying ambulances are of the utmost value in case of disasters or epidemics and such ambulances are maintained by many societies. The Italian Red Cross maintains complete mobile hospitals in tent form, including wards, pharmacies, operating theatres and accommodation for the personnel, and these hospitals are regularly used with their accompanying personnel in case of severe outbreaks of malaria or seismic disturbances. The large stocks of transport material employed by the different national societies during the war have been largely adapted to peace-time requirements; in particular, motor ambulances are freely used for the transport of emergency cases to hospital. The Czechoslovak Red Cross maintains a fully equipped hospital train of 27 coaches, where patients can obtain advice and treatment in out-of-the-way parts of the country. A hospital ship, the "Viking," has been equipped by the Norwegian Red Cross for the purpose of giving treatment to sick and injured sailors in the ports and fishing stations of the far north. Air ambulances for the rapid transport of serious cases have been adopted by the Italian, Siamese, Spanish, Swedish and other societies.

Training of Nurses and Auxiliary Personnel.—The training and enrolment of nurses and of personnel specialized in ambulance work, pharmaceutical and radiological work, etc., is one of the principal functions of the Red Cross societies. Corps of volunteers for use in emergency are organized, such as the British Voluntary Aid detachments, and nursing schools have been set up in connection with Red Cross hospitals by the French, Japanese, Norwegian, Swedish and other societies. Social service and public health nursing are also rapidly growing activities.

Constitution of Medical Stocks.—Stocks of transport and material (dressings, medicines, etc.) are constituted by most national societies as a reserve for use in time of disaster or in case of epidemic outbreaks.

Popular Health Instruction.—Red Cross societies are active in the preventive side of the public health campaign. Lectures are organized, pamphlets issued and exhibitions arranged as part of the campaigns against tuberculosis, cancer, venereal diseases and alcoholism. Home nursing and care of the sick and household sanitation are also taught under Red Cross auspices.

Child Welfare.—Child welfare is an important item on the Red Cross programme and efforts are made by all national societies to reduce infantile mortality and to afford increased protection to mothers and babies. For this purpose, child welfare centres, milk stations and crêches have been organized, school hygiene is emphasized, summer colonies are arranged and preventoria established. Some societies also provide orphanages and homes for deserted children.

Junior Red Cross.—Reference has already been made to this growing activity in connection with the programme of the League of Red Cross societies (*see* p. 20).

Co-operation with Other Social Agencies.—Besides collaborating with Government services, the national Red Cross societies are in constant contact with other humanitarian institutions, such as the Order of St. John of Jerusalem, the Sovereign Order of Malta, Nursing and Samaritan associations, Health and Medical societies, Social Service groups and organizations for assisting travellers and emigrants, etc.

The close relationship maintained between the central committees of the different national societies and the contact established between Red Cross members in different countries is resulting in continuously growing international co-operation in Red Cross work throughout the world. An interesting illustration is the agreement signed in 1924 between the Italian and the American Red Cross societies, by which it was agreed that American Red Cross members travelling in Italy, or Italian Red Cross members travelling in the United States, might count upon Red Cross assistance. The 12th International Red Cross conference in 1925, basing itself upon this precedent, expressed the hope that an international identity card might be established for the use of Red Cross members in any country, when abroad.

INTERNATIONAL RED CROSS CONFERENCES

International Red Cross conferences meet at regular intervals and include representatives of the Governments signatory to the Geneva Convention, together with representatives of national Red Cross societies and of the International committee of Geneva. The first of these conferences met in Paris, in 1867; the second in Berlin, in 1869; the third in Geneva, in 1884; the fourth at Karlsruhe, in 1887; the fifth in Rome, in 1892; the sixth in Vienna, in 1897; the seventh in St. Petersburg, in 1902; the eighth in London, in 1907; and the ninth in Washington, in 1912; the 10th, 11th and 12th international conferences, like the third, were held in Geneva, it being considered that after the World War, as after the war of 1870, advantage was to be derived from bringing representatives of the different Red Cross societies together in an atmosphere of perfect neutrality. Peace conditions having now resumed, the International Red Cross conferences will again meet each time in a different capital; the 13th international conference was convoked to meet at The Hague in Oct. 1928. These conferences provide the opportunity for the systematic development of the original Red Cross programme. The resolutions of the international conferences constitute the basis of the activities of the International Red Cross committee, and other matters dealt with have included the relations between national societies and their respective Governments, the activities of national societies in peace and war and the functions of the Red Cross in maritime warfare. Attention has also been given by the conferences to questions of personnel and material, hospitals, prisoners of war and the organization of disaster relief. Resolutions and recommendations have been drawn up regarding the position of non-combatants in enemy territory, chemical warfare, the reduction of the number of casualties reported "missing" in wartime, the protection of air ambulances against attack, the use of the Red Cross emblem, civil war, the limitation of war, and other questions. (E. CL.)

AMERICA

The American Red Cross was founded in 1881 under the name American Association of the Red Cross, and was incorporated in 1905 as The American National Red Cross. The president of the United States became its president, and the war department its auditor. Early in the World War the Red Cross offered through the State department the aid of its trained personnel and contributions of hospital supplies to every belligerent country. This offer was accepted by almost all belligerents. A public appeal was made for funds, and soon large quantities of hospital supplies and about 200 nurses were sent to England, Belgium, France, Germany, Austria, Serbia and Russia. Seventy-one physicians and surgeons were also sent, and a special sanitary commission went to Siberia to fight the typhus plague there. The value of relief supplies sent to Europe by the Red Cross before the United States entered the war was more than $1,500,000, of which about $350,000 worth went to Germany and Austria. In May 1917 after America's entry into the war, President Wilson appointed a special Red Cross war council under H. P. Davison to direct the activities of the organization during the war. A popular campaign for a special war fund realized $100,000,000 in a week. The service was reorganized and quickly expanded from 500,000 members in 500 chapters to over 16,000,000 members. A further week's drive in May 1918 realized $170,000,000, and the grand total, 1917–18, exceeded $400,000,000.

The American Red Cross recruited, organized and equipped hospitals and ambulance units, assisted in the care of the sick and wounded in emergencies, and provided nurses for the army and navy. It supplied comforts, clothing, medical supplies and surgical dressings, ran canteens, assisted the families of soldiers and sailors, photographed graves, etc. It supported 50 base hospital units, 40 overseas ambulance companies, over 23,000 trained nurses, a women's volunteer motor corps of 14,000 members, 92 convalescent homes in the training and embarkation camps, 130 canteens, 24 military hospitals and 12 convalescent hospitals in France, 33 canteens in Italy, 28 military hospitals and 82 canteens in Bel-

gium. The "civilian relief abroad" to the European populations was on a vast scale. $1,000,000 a month were spent on relief to French and Belgian refugees in France, including help to over 150 national and local French organizations. Over 30,000 tuberculosis patients were helped and a large children's welfare movement run. Substantial assistance was given in Russia; also in Belgium, Italy, Rumania, Serbia and Greece. The relief expenses included $28,978,000 in America, $57,207,000 in France, $63,841,000 elsewhere overseas. A total of 101,000 tons of relief supplies were sent overseas; 3,780 French and over 1,500 Italian hospitals assisted. The value of the relief articles produced by volunteer workers during the war was estimated at nearly $100,000,000. (G. A.)

At the close of the war a peace-time programme was inaugurated, continuing relief work in destitute European countries, providing aid for disabled veterans and ex-service men and enlarging the scope of the various Red Cross services. Outstanding in this programme has been the comprehensive development of a disaster relief service which makes possible an instant response to calls for help when fire, flood, storm or famine occurs. Not only has aid been given in hundreds of disasters in this country, with the Red Cross in complete charge of the relief, but financial aid has been given to scores of foreign countries suffering disasters which they were unable to handle alone. Authorization for this work is given in the congressional charter of 1905 which stipulates that the organization, in addition to furnishing volunteer aid to the sick and wounded of armies in the time of war, shall "continue and carry on a system of national and international relief in time of peace and to apply the same in mitigating the suffering caused by pestilence, famine, fire, floods and other great national calamities, and to devise and carry on measures for preventing the same." It is primarily for the purpose of maintaining an organization able to move instantly to the relief of disaster-stricken communities that the Red Cross keeps its executive machine well oiled and strengthened by a diversified and valuable programme in other fields during times when no great disaster is being suffered. These services include a public health nursing programme; instructions in first aid and life-saving; a nutrition service; the Junior Red Cross; volunteer nursing and war service. In times of national disaster the personnel of all of these divisions directs its attention to the relief of the sufferers.

A far-flung network of Red Cross chapters, numbering in 1928 more than 3,500 in the various States and insular possessions, is one of the organization's unique qualifications for disaster service. Most of these chapters maintain their own disaster committees and have at their finger-tips information as to buildings available for hospital use in emergencies, lists of supply sources and similar data. In the event of a disaster the nearest chapter goes immediately to the aid of the stricken community, wiring national headquarters in Washington or the branch offices in St. Louis and San Francisco what the extent of the damage is and whether national aid will be required. The quick response of the chapters not infrequently means the saving of hundreds of lives and the prevention of unnecessary suffering.

Outstanding among disasters in which the Red Cross has administered relief have been the northern Ohio tornado of 1924, the mid-western tornado of 1925, the Florida hurricane of 1926 and the Mississippi river valley flood of 1927. The greatest foreign disaster in which aid was given by the organization was the Japanese earthquake and fire which razed Tokyo and Yokohama in 1923. Sufferers in hundreds of other disasters were rehabilitated by the Red Cross.

The nursing service of the organization has an enrolment of approximately 45,000 women who serve as a reserve and source of supply for the army, navy, public health service, U.S. Veterans' bureau and for duty in emergencies. More than 27,000 of these are listed as active. Approximately 750 public health nurses are being supported entirely or in part by the Red Cross, working particularly in the crowded sections of large cities and in isolated rural and mountain sections. Under the direction of national headquarters the Red Cross has trained more than 134,000 men, women and youths in life-saving methods, thereby reducing drowning fatalities and reducing also the hazards of water sports. First aid instruction also is given, an average of more than 20,000 persons passing the rigid tests each year. A first aid instruction car is a valuable asset in disseminating information about the care of accident victims and is in continuous operation over the various railways systems of this country. The nutrition service gives instruction in dietetics to thousands.

The American Junior Red Cross, designed to promote a spirit of friendship and understanding among the children of all nations, has over 6,500,000 members in elementary and high schools throughout the United States and its insular and foreign possessions, is part of a movement world-wide in scope, and boasts a total of more than 10,000,000 members in 46 countries.

Volunteer workers for the Red Cross engage in the making of garments, surgical dressings, and braille for the blind, in bringing cheer to ex-service men in the hospitals through their hostess service, maintain motor corps for work in emergencies and furnish personnel for use in chapter offices, for service in disaster relief and similar enterprises. It has been estimated that approximately 90% of the total number of regular Red Cross workers serve as volunteers, without any compensation. The Red Cross is supported by the annual subscriptions of its members. The present membership is slightly more than 4,000,000. (D. Gr.)

Bibliography.—G. Moynier and L. Appia, *La guerre et la Charité* (Geneva, 1867); G. Moynier, *La Croix-Rouge, son Passé et son Avenir* (1882); P. Bogajewski, *La Croix-Rouge dans le développement du droit international* (1913); B. Bouvier, *Gustave Moynier,* Comité International de la Croix-Rouge (1918); *Actes du comité pendant la Guerre* (1918), *L'agence Internationale des Prisonniers de Guerre* (1919), *Le Comité International de la Croix-Rouge, ses Missions* (1923), *La Croix-Rouge Internationale* (1925), published by Le Comité International de la Croix-Rouge, Geneva; P. des Gouttes, "La Croix-Rouge Internationale avant, pendant et après la guerre mondiale," in *La Vie des Peuples* (1923); E. Borel, *L'Organisation internationale de la Croix-Rouge* (1925); League of Red Cross Societies, *League of Red Cross Societies, Origin, Activities and Purposes* (1927); J. H. Dunant, *Un Souvenir de Solférino,* Comité International, Geneva (1928); A. François, *Henri Dunant, sa vie et ses oeuvres,* Geneva (1928); O. Dorazil, *Mezinárodni Cervený Kriz v Historii* (La Croix-Rouge Internationale dans l'histoire mondiale); Documents publiés à l'occasion de la guerre par le Comité International (Geneva, 1905–20); *Compte rendu de la Conférence Internationale réunie à Genève en 1863, pour étudier les moyens de pourvoir à l'insuffisance des services sanitaires dans les Armées en campagne* (Geneva, 1863); *Comptes-rendus des Conférences internationales de la Croix-Rouge tenues à Paris* (1867), *Berlin* (1869), *Genève* (1884), *Carlsruhe* (1887), *Rome* (1892), *Vienne* (1897), *Saint Pétersbourg* (1902), *Londres* (1907), *Washington* (1912), *Genève* (1921, 1923, 1925); *Procs. of the First Oriental Red Cross Conference, Bangkok* (1922); *Conférence des Croix-Rouges de l'Europe Orientale, Varsovie* (1923); Reports of *Conférence Pan-Américaine, Buenos Ayres* (1923); *2ème Conférence des Croix-Rouges de l'Europe Orientale et Centrale, Vienne* (1925); *Annuaires internationaux des sociétés Nationales de la Croix-Rouge, Genève* (Comité International de la Croix-Rouge, 1925, 1926, 1927, 1928); *Rapport présenté à la 2ème Conférence Pan-Américaine, Washington* (1926); *Report of Proceedings of Second Conference of Oriental Red Cross Societies, Tokio* (1926); *Reports of General Council of the League of Red Cross Societies* (1920, 1922, 1924); *Report of Board of Governors of the League* (1927); *Reports by the Joint War Committee and the Joint War Finance Committee of the British Red Cross Society and the Order of St. John of Jerusalem in England,* on voluntary aid rendered to the sick and wounded at home and abroad and to British prisoners of war, 1914–1919 (1921); *Bulletin International des Sociétés de la Croix-Rouge* (Oct. 1869–Dec. 1918); *Revue Internationale des Sociétés de la Croix-Rouge* (1919–28); *The World's Health,* League of Red Cross Societies, monthly; *Announcement of International Courses in Public Health Nursing,* League of Red Cross Societies (1928).

RED-DEER (*Cervus elaphus*), the male of which, the stag, *par excellence,* reaches a height of 4ft. 6in. at the shoulder. The antlers are rounded, possessing bez-tines and in well-developed animals at least 12 points, the record number for a British wild specimen being 20, though an ancient Irish skull was found bearing 34 and a park specimen had 39. The tail is rather long and the coat is spotted in the young and occasionally even in the adult. The males, which alone bear antlers, often have a "mane" on the throat, and in the breeding season utter a roaring cry. There are numerous local races of the red-deer, which inhabit Europe, northern Africa, Asia Minor and north Persia; the species has been successfully introduced into New Zealand. Typically a

woodland animal, the red-deer in Britain is now confined to open mountain-sides in the highlands of Scotland, Exmoor and a few other localities, and to parks; as a result, there has been a decided decline in the size and condition of the Scottish animals, which cannot compare with those from the Continent. (*See* DEER.)

REDDITCH, a town in Worcestershire, England, situated near the Warwickshire border, 15½ m. S. of Birmingham by the L.M.S. railway. Pop. of urban district (1931) 19,280. It is the centre of a district producing needles and fish-hooks. There are also motor-engineering works.

REDESDALE, JOHN FREEMAN-MITFORD, BARON (1748–1830), English lawyer and politician, younger son of John Mitford (d. 1761) and brother of the historian William Mitford, was born in London on Aug. 18, 1748. Having become a barrister of the Inner Temple in 1777, he wrote *A Treatise on the Pleadings in Suits in the Court of Chancery by English Bill,* which has been reprinted several times. In 1788 Mitford became M.P. for Beeralston in Devon, and in 1791 he introduced the important bill for the relief of Roman Catholics, which was passed into law. In 1793 he became solicitor-general, becoming attorney-general six years later, when he sat for East Looe, in Cornwall. In Feb. 1801 he was chosen speaker of the House of Commons. A year later, he was appointed lord chancellor of Ireland with the title of Baron Redesdale. Being an outspoken opponent of Roman Catholic emancipation, Redesdale was unpopular in Ireland. In Feb. 1806 he was dismissed on the formation of the ministry of Fox and Grenville. Although Redesdale declined to return to official life, he was an active member of the House of Lords both on its political and its judicial sides. He died on Jan. 16, 1830.

See O. J. Burke, *History of the Lord Chancellors of Ireland* (Dublin, 1879); J. R. O'Flanagan, *Lives of the Lord Chancellors of Ireland* (1870); Sir J. Barrington, *Personal Sketches of His Own Times* (1869); Sir S. E. Brydges, *Autobiography* (1834); and C. Abbot, Lord Colchester, *Diary and Correspondence* (1861).

REDFERN: *see* SYDNEY.

RED INDIANS: *see* NORTH AMERICA: *Ethnology.*

RED JACKET (Sagoyewatha—"he who keeps them awake") (*c.* 1751–1830) was a Seneca Indian chief born near Geneva, N.Y., about 1751. He was an eloquent orator—whence his Indian name—and possessed considerable influence over his people. He fought for the British during the Revolution and because of his ability as a runner was a favourite among the officers, one of whom presented him with a heavily embroidered red coat. This made him conspicuous among his people and he was henceforth known as Red Jacket. He first appeared as a conspicuous figure when he made a notable speech in opposition to the treaty which was signed at Ft. Stanwix in 1784 by the United States and the Six Nations. In 1792 he went to Philadelphia, then the capital, to conclude a treaty of friendship with the United States, and President Washington presented him with a medal. Under his leadership the Senecas allied themselves with the Americans against the British in the War of 1812. Red Jacket understood the whites well and became more and more hostile to them as he realized their overwhelming power. "You are a kind-hearted people, seeking your own advantages," he said in one of his speeches. He tried to consolidate his people and preserve their ancient ways and rites, but by his stand only lost his leadership. He died in Seneca village, N.Y., on Jan. 20, 1830.

See J. Hubbard, *An Account of Sagoyewatha* (1886); Buffalo Historical Society, *Red Jacket* (1885).

REDLANDS, a city of San Bernardino county, California, U.S.A., 67 m. E. of Los Angeles, at the head of the fertile San Bernardino valley. It has an airport, and is served by the Pacific Electric, the Santa Fé and the Southern Pacific railways, and by motor-coach lines in all directions. Pop. 9,571 in 1920 (83% native white); 14,177 in 1930 by the Federal census. The city lies at an altitude of 1,356–1,850 ft., surrounded on three sides by peaks over 10,000 ft. high (Mounts San Jacinto, San Antonio or Old Baldy, San Bernardino and San Gorgonio), in the midst of the largest orange-growing district of the world. From 4,500 to 6,000 carloads of citrus fruit are packed and shipped from Redlands each season, and the canning of fruits is one of the city's chief industries. The University of Redlands (Baptist; opened in 1907) has an enrolment of 700. A settlement called Lugonia was established here in 1874, but the present city was founded in 1887, by New Englanders, and incorporated in 1888. In 1928 the assessed valuation of property was $15,744,778. It is governed by an elected board of trustees.

REDLICH, JOSEPH (1869–), Austrian historian and politician, was born in Göding, Moravia, on June 18, 1869. He studied jurisprudence and history in Vienna, travelled extensively, especially in England, and in 1901 published his first work, *Die englische Lokalverwaltung* (*Local Government in England,* 1904). He afterwards became Professor at Vienna University, and sat in the Austrian parliament till 1911 as deputy for his birthplace. Both in the Austrian parliament in Vienna and the Moravian diet he did much to further the idea of an understanding between the German and Czech races. In 1905 he published another study of English political life: *Recht und Technik des englischen Parlamentarismus* (1905), Eng. trans., *The Procedure of the House of Commons,* 3 vols. (1907), a standard work on the subject and indispensable to the student. During the World War he was politically active, and in 1918 was appointed minister of Finance in the Lammasch Cabinet. He then retired from active politics, to produce *Das oesterreichische Staats- und Rechtsproblem* (vol. 1 1920, vol. 2 1926), a history of Austrian domestic policy from 1848 onward. His other works include *Das Wesen der oesterreichischen Kommunalverfassung* (1910); *The Common Law and the Case Method in American University Law Schools* (1914); *Oesterreichische Regierung und Verwaltung im Weltkriege* (English and German, 1925) and a biography, *Franz Joseph von Oesterreich* (1928). Redlich's attitude was usually rather that of a student of political theory and practice than of a pure historian, and his works were apt to be too voluminous to be easily read; but they were founded on encyclopaedic knowledge, most carefully presented, and were exhaustive.

RED LODGE, a city of southern Montana, U.S.A., 10 m. from the Wyoming State line; the county seat of Carbon county. It is served by the Northern Pacific railway. Pop. (1920) 4,515 and was 3,026 in 1930. It is the centre of one of the principal coal-mining regions of the State, and there are also gold and silver mines in the vicinity. The Beartooth National Forest lies a few miles to the west.

REDMAYNE, SIR RICHARD AUGUSTINE STUDDERT (1865–), K.C.B. (1914), was born at Gateshead-upon-Tyne, on July 22, 1865, and educated privately and at the Durham College of Science, Newcastle. In 1883 he became undermanager at a colliery firm in Durham, and eight years later went to South Africa. On his return in 1893 he was appointed manager of the Seaton Delaval collieries, Northumberland (1893–1902). He then obtained an appointment at Birmingham university, as professor of mining. He acted as chairman on numerous Government committees on questions affecting the mines, and in 1908 was appointed chief inspector of mines, a post which he held until 1920. From 1916 he held also the post of assistant controller of coal mines. From 1918 to 1925 he was chairman and governor of the Imperial Mineral Resources bureau. He is the author of many official reports on mining, and one of the first authorities on the subject.

REDMOND, JOHN EDWARD (1856–1918), Irish politician, son of W. A. Redmond, M.P., was born at Ballytrent. He was educated at Trinity college, Dublin, and was called to the bar at Gray's Inn in 1886, and subsequently to the Irish bar, though he never practised. He was a clerk in the vote office of the House of Commons before he entered parliament in 1881 as member for New Ross. From 1885 to 1891 he represented North Wexford. As party whip he rendered great service to the Irish members by his thorough grasp of the procedure of the House. At the time of the rupture of the Irish party consequent on the Parnell scandals, Redmond was the most eloquent member of the minority who continued to recognize his leadership, and in 1891 he became the accredited leader of the Parnellites. In 1900 the two nationalist parties were amalgamated under his leadership. He contested Cork unsuccessfully in 1891, but was elected for Waterford, where he was re-elected in 1906. (For the political

events under his leadership of the Irish parliamentary party up to 1910. *see* IRELAND: *History;* ENGLISH HISTORY, etc.).

Redmond obtained for the first time a position of real power in parliament after the general election in Jan. 1910. Though he had amalgamated the two Irish Nationalist parties under his own lead in 1900. he had never hitherto been able, owing to the large Unionist majority of 1900 and the Liberal majority of 1906, to hold that balance of power in the House of Commons which had proved such a formidable weapon in the hands first of O'Connell and then of Parnell. But the reduction of the Liberal forces in Jan. 1910 made it impossible that Asquith's Government should long continue unless it found favour with Redmond.

The first use which he made of this new authority was to insist that Lloyd George's famous budget of 1909, on which the dissolution had turned, should be postponed till after the constitutional resolutions directed against the House of Lords—his one object being to remove the veto of the Upper House, which was the main barrier against Home Rule. This order of procedure was also demanded by the Labour party and by the Radicals; and the Government complied. But Redmond pressed further for an assurance that the royal prerogative would be at the prime minister's disposal to overbear any rejection by the Lords of the veto resolutions. He was impatient at the constitutional conference called in the summer at the beginning of King George's reign to endeavour to discover a solution by consent, and went to America to secure sympathy and funds. The conference having broken down, he conducted a strenuous campaign on behalf of the ministerial programme for the second general election of the year, in spite of a harassing movement on his flank by a small party of independent Nationalists under O'Brien and Healy, who accused him of having sold the Irish vote to the government.

When the result of the polling had confirmed Redmond in his tenure of the balance of parliamentary power, he forwarded the progress of the Parliament bill in 1911 by the steady vote of his party. In the autumn he was regularly consulted on the details of the forthcoming Home Rule bill, and when the bill was introduced, in April 1912, he procured its enthusiastic acceptance from a nationalist convention in Ireland. His speeches during its passage through parliament were, on the whole, moderate; he disclaimed separation but denounced any attempt to take Ulster out of the bill as a mutilation of Ireland. In token of the union of feeling between Nationalists and Liberals, he attended the meeting of the National Liberal Federation at Nottingham in Nov. 1912, and spoke for the first time on the same platform as Asquith. When the determined attitude of Ulster began to suggest to the Liberals the advisability of compromise, Redmond was very loth to agree, denouncing the Unionists and Ulster as engaged in "a gigantic game of bluff and blackmail." He insisted that Asquith's county option scheme was the extreme limit of concession. He was being pressed in Ireland by the rising power of Sinn Feiners and other extremists who had raised, in reply to Ulster, a great body of 100,000 nationalist volunteers, over whom Redmond only obtained control in June 1914 after a sharp struggle. Nevertheless he took part, at the end of July in the abortive Buckingham Palace Conference.

Then came the World War, and in the debate succeeding Sir E. Grey's famous declaration on Bank Holiday, Aug. 3, Redmond created a profound sensation by a speech in which he declared that the events of recent years had completely altered the Nationalist feeling towards Great Britain. The Government, he said, might withdraw its troops from Ireland, whose coasts would be defended by her own sons, Nationalist volunteers joining with Ulster volunteers in the task. This generous attitude was met by the decision of the Government to pass the Home Rule bill into law, suspending its operation till after the war. Redmond took an active part in promoting recruiting in Ireland, and stood on the platform in Dublin Mansion House on Sept. 25 by the side of the prime minister and the lord lieutenant. Unfortunately, his efforts were only moderately successful, but he refused Asquith's offer to join the first Coalition Government, and he successfully opposed all attempts to apply conscription to Ireland. It was a stunning blow to him when the smouldering dissatisfaction of southern Ireland broke out into a blaze in the Dublin rebellion of Easter 1916. He expressed in the House of Commons his detestation of the crime, and lent his assistance to the attempt which was made by the Government in the summer through Lloyd George to arrange an agreed settlement of the Irish question.

But the effort failed; Duke, a Unionist, was appointed chief secretary; and Redmond treated the whole transaction as a fresh outrage on Ireland, moving on Oct. 18 a resolution (which was, of course, rejected) charging ministers with maintaining a system of Government in that country inconsistent with the principles for which the Allies were fighting in Europe. Next year he threatened a return of his party to the old obstructionist opposition; but when in May 1917 Lloyd George, as prime minister, suggested an Irish convention to produce a scheme of self-government, Redmond agreed; and in the convention he played a conciliatory part. During its sittings, however, his health failed. He died of heart failure in London on March 6, 1918.

See I. G. Redmond Howard, *John Redmond* (1910); *Home Rule: Speeches of John Redmond, M.P.* edit. by R. Barry O'Brien (1919); S. Gwyn, *John Redmond's Last Years* (1919).

REDMOND, WILLIAM HOEY KEARNEY (1861–1917), younger brother of John Redmond (*q.v.*), intended, as a young man, to adopt the army as his profession, and in 1881 he was a lieutenant in the Co. Wexford militia battalion of the Royal Irish regiment. But he resigned his commission to take part in the Land League movement and was imprisoned as a "suspect" in Kilmainham. He was returned for Wexford borough in 1883, and sat in parliament, though for different constituencies, from that time till his death. He was of an ardent and ebullient temper, which resulted in his spending three months in Wexford gaol in 1888 for inciting, at an eviction, to resistance to the sheriff, and in many agitated scenes at different times in the House of Commons, where, however, he was personally very popular. Like his brother, in the Nationalist split he adhered to Parnell, and, also like his brother, on the outbreak of the World War he instantly recognized the duty of Ireland to fling herself into it on the side of the Allies. Though 53 years old, he joined at once the Irish division, receiving a commission in the Royal Irish regiment. He was promoted major for services at the front and mentioned in dispatches. In his intervals of service he made two thrilling speeches in the House of Commons, advocating conciliation, and a new start, between England and Ireland. He died of wounds in France on June 7, 1917.

See Memorial Volume, *Major William Redmond* (1917); W. H. K. Redmond, *Trench Pictures from France* (1917); T. P. O'Connor, *The Parnell Movement* (1886).

RED OAK, a city of south-western Iowa, U.S.A., 50 m. S.E. of Council Bluffs, on the Nishnabotna river, Federal highway 34, and the Burlington (railway) Route; the county seat of Montgomery county. Pop. 1930 Federal census 5,778. A large part of all the calendars used in the United States are made here. Stock-feeds, flour and iron are also important manufactures. The city was founded about 1855 and incorporated in 1869. It has a commission-manager form of government.

REDON, a town of western France, capital of an *arrondissement* in the department of Ille-et-Vilaine, 45 m. S. S.W. of Rennes by rail. Pop. (1926) 5,201. Redon grew up round a monastery founded in the 9th century. In the 14th century the abbot Jean de Tréal surrounded the town with walls, of which a portion remains. Redon stands on the right bank of the Vilaine, above the confluence of the Oust and the canal from Nantes to Brest. The church of St. Sauveur, a former abbey, has a square Romanesque central tower with rounded angles. A fine 14th century tower with a stone spire stands isolated from the church, from which it was separated by fire in 1782. The 13th century choir, with ambulatory and radiating chapels, is notable.

REDONDA, an island in the British West Indies. It is a dependency of Antigua, and lies 25 m. S.W. of it, in 25° 6′ N. and 61° 35′ W. Pop. (1901) 120. It is a rocky mountain, rising abruptly from the sea to a height of 1,000 ft., and has an area of ½ sq.m. About 7,000 tons of phosphate of alumina are exported

every year to the United States.

REDONDO BEACH, a city of Los Angeles county, California, U.S.A., on the Pacific ocean, 19 m. S.W. of Los Angeles and 10 m. W. of the Los Angeles and Long Beach harbour. It is served by the Pacific Electric, the Santa Fe and the Southern Pacific railways. Pop. 4,913 in 1920; and 9,347 in 1930 by the Federal census. In a natural amphitheatre facing the ocean the city slopes gently upward from its silvery crescent-shaped beach to an elevation of 250 ft., with Los Angeles and the San Gabriel mountains in the background. It is a pleasure and health resort, and a residential centre for workers in the adjacent oil-fields and industrial districts. The city owns a mile of the water front, including Moonstone Beach. There is a large indoor salt-water plunge (70 by 218 ft.). The city was incorporated in 1892.

REDPOLL, the name given to several birds of the finch family (*Fringillidae*), allied to the linnet (*q.v.*), and possessing a reddish head. The best known is the lesser redpoll (*Carduelis linaria*). The mealy redpoll is a subspecies with a more northern range, visiting England in the winter. The type ranges over the whole of the north temperate zone. There are three additional subspecies in America, but these rarely reach the United States.

RED RIVER, the name of two American rivers, one emptying into the Mississippi near its mouth, and the other emptying into Lake Winnipeg.

1. The Red river, sometimes called the Red River of Louisiana, is the southernmost of the large tributaries of the Mississippi. It rises in northern Texas, in the northern part of the High Plains, or Llano Estacado, flows east by south in Texas, between Texas and Oklahoma, and to Fulton, in south-western Arkansas, there turns south-east and continues in a general south-easterly direction through Louisiana to the bank of the Mississippi, where it discharges partly into the Mississippi and partly into the Atchafalaya. Its length is estimated at 1,200 m. or more; its drainage basin has an area of at least 90,000 sq.m.; and its discharge ranges from 3,500 cu.ft. to 180,000 cu.ft. per second. Its middle and lower course is laden with a reddish silt from which it takes its name. From an elevation on the High Plains of about 2,450 ft., the river plunges into a canyon which is about 60 m. long and has nearly perpendicular walls of sandstone and gypsum formation 500 to 800 ft. high. Immediately below the canyon the river spreads out over a broad and sandy bed and flows for about 500 m. through a semi-arid plain. It narrows on entering the alluvial bottom lands, through which it pursues a sluggish and meandering course for the last 600 m. A shifting channel, deposits of silt and fallen trees have always hindered navigation. In 1828 the trees which the river had felled formed the great "Red River raft" extending from Loggy Bayou, 65 m. below Shreveport, Louisiana, to Hurricane Bluffs, 27 m. above Shreveport. Congress began in that year to make appropriations for the removal of the raft, and by 1841 Henry M. Shreve had opened a channel. The river was neglected from 1857 to 1872 and another raft, 32 m. in length, formed above Shreveport. A channel was opened through this in 1872–73, and the complete removal of the obstruction a few years later so improved the drainage that a large tract of waste land was reclaimed. In its course through Louisiana the river has built up a flood-plain with silt deposits more rapidly than its tributaries, with the result that numerous lakes and bayous have been formed on either side, and Cypress has been so flooded that boats ply between Shreveport, Louisiana, and Jefferson, Texas, 66 m. apart. The main river is navigable for small draught boats from the mouth to Fulton, Ark., a distance of 508.6 m.; however, there is little commerce above the mouth of the Black.

During the Civil War, in March and April 1864, Major-General Nathaniel P. Banks conducted a combined military and naval expedition up the Red river in an attempt to open a Federal highway to Texas, but on April 8, the vanguard of his army was repulsed with heavy loss at Sabine Cross-Roads by the Confederates under Lieut.-Gen. Richard Taylor and the expedition was abandoned; the gunboats commanded by Rear Admiral D. D. Porter were held above Alexandria by the lowness of the river, but it was flooded by a hurriedly built dam, and they escaped.

See R. B. Marcy and G. B. McClellan, *Exploration of the Red River of Louisiana* (Washington, 1853), and the annual *Reports* of the Chief of Engineers of the U.S. Army.

2. The Red river, commonly called the Red River of the North, rises in the lake region of western Minnesota, not far from the headwaters of the Mississippi, flows north between Minnesota and North Dakota, continues northward through the Canadian province of Manitoba, and discharges into Lake Winnipeg. It has cut a gorge 20 to 50 ft. deep through clay deposits throughout the greater part of its course; it drains a region that is famous for the production of wheat; and much water-power has been developed on its tributaries.

RED RIVER SETTLEMENT, a Scottish colony founded in 1811 near the present city of Winnipeg by a philanthropic Scottish nobleman, Lord Selkirk, who at that time controlled the Hudson's Bay Company. Quarrels soon arose with the French and half-breed employees of the North-West Fur Company, and were fostered by its officials. On June 19 1816, in a fight between the rivals, Governor Semple of the Hudson Bay Company and 20 of his 27 attendants were killed, an affair known as the Battle of Seven Oaks. New settlers were sent by Selkirk, and founded the village of Kildonan, now part of Winnipeg. In 1821 the rival companies united, and in 1836 repurchased from Selkirk's heirs all rights to the territory. In 1821 and in 1835 two forts, known as Lower and Upper Fort Garry, were built to command the junction of the Red and Assiniboine rivers. The purchase in 1869 of the territorial rights of the company by the Dominion of Canada led to a rebellion, and the setting up of a provisional government under Louis Riel, which was dispersed by a force of British regulars under Colonel (later Lord) Wolseley.

BIBLIOGRAPHY.—*See* CANADA: *History;* also George Bryce, *Remarkable History of the Hudson's Bay Company* (1900).

REDRUTH, a market town in Cornwall, England, 17 m. E.N.E. of Penzance, on the G.W. railway. Pop. of urban district (1931) 9,904. It lies high, on the northward slope of the central elevation of the county, with bare rocky moors to the south. It is the chief tin-mining town in Cornwall, and the bulk of the population is engaged in the mines or at the numerous tin-streaming works. The parish church of St. Uny, of which only the tower is ancient (Perpendicular), stands outside the town to the west, at the foot of Carn Brea. On the summit of this hill, besides a small ancient castle, various prehistoric remains are traceable. A large quantity of the tin is sold by public auction at the mining exchange, the sales being known as tin-ticketings. There are manufactures of safety fuses, breweries, tanning, iron foundries and railway works, and near by are numerous stone quarries.

RED SEA, a narrow strip of water extending south-south-east from Suez to the Strait of Bab el Mandeb in a nearly straight line, and separating the coasts of Arabia from those of Egypt, Nubia and Abyssinia. Its total length is about 1,200 m., and its breadth varies from about 250 m. in the southern half to 130 m. in 27° 45′ N., where it divides into two parts, the Gulf of Suez and the Gulf of Aqaba, separated from each other by the peninsula of Sinai. Structurally, the Red sea is part of a great rift-valley system forming one of the most marked features of the earth's crust. The rift valley of the Jordan and the Dead sea is continued southward by the Wadi el Araba, and its submerged southern section gives the Gulf of Aqaba. This well marked north-north-east to south-south-west line meets the north-north-west to south-south-east line, already marked in the Gulf of Suez, and together they form, to the south, the main basin of the Red sea. The rift may be traced still farther southward among the great African lakes.

This great structural depression is probably of Tertiary age, being let down between two ancient Archaean blocks—Arabia and North Africa. Secondary and Tertiary deposits appear on both flanks in Egypt and Arabia, while Archaean material appears at the surface in many places on the Red sea coast. These extensive earth movements were accompanied by much volcanic activity, traces of which are still evident. A group of volcanic islands occurs in 14° N., and on Jebel Teir, farther north, a volcano has only recently become extinct. The margin of the Red sea

itself consists, on the Arabian side, of a strip of low plain backed by ranges of barren hills of coral and sand formation, and here and there by mountains of considerable height. The greater elevations are for the most part formed of limestones, except in the south, where they are largely volcanic. The coasts of the Gulf of Aqaba are steep, with numerous coral reefs on both sides. On the African side there are, in the north, wide stretches of desert plain, which towards the south rise to elevated tablelands, and ultimately to the mountains of Abyssinia. The shores of the Red sea are little indented; good harbours are almost wanting in the desert regions of the north, while in the south the chief inlets are at Massawa, and at Kamaran, almost directly opposite. Coral formations are abundant; immense reefs, both barrier and fringing, skirt both coasts, often enclosing wide channels between the reef and the land.

Depths.—The mean depth of the Red sea is 267 fathoms. The Gulf of Suez is shallow, and slopes regularly down to the northern extremity of the Red sea basin, which has a maximum depth of 640 fathoms, and then over a shoal of 60 fathoms goes down to 1,200 fathoms in 22° 7′ N. The Gulf of Aqaba is separated from the Red sea by a submarine bank only 70 fathoms from the surface, and in 28° 39′ N. and 34° 43′ E. it attains the depth of 700 fathoms. South of the 1,200-fathom depression a ridge rises to 500 fathoms in the latitude of Jeddah, and, south of this again, a similar depression goes down to 1,190 fathoms. Throughout this northern part, *i.e.*, to the banks of Suakin and Farsan in 20° N., the 100-fathom line keeps to a belt of coral reef close inshore, but in lower latitudes the shallow coral region, 300 m. long and 70 to 80 m. across, extends farther and farther seaward until, in the latitude of Hodeida, the deep channel (marked by the 100-fathom line) is only 20 m. broad, all the rest of the area being dangerous to navigation, even for small vessels. In the middle of the gradually narrowing channel three depressions are known to exist; soundings in two of these are: 1,209 fathoms in 20° N. and 890 fathoms in 16° N., a little to the north of Massawa. To the north-west of the volcanic island of Zebayir the depth is less than 500 fathoms; the bottom of the channel rises to the 100-fathom line at Hanish island (also volcanic), then shoals to 45 fathoms, and sinks again, in about the latitude of Mokha, in a narrow channel which curves westward round the island of Perim (depth 170 fathoms), to lose itself in the Indian ocean. This western channel is 16 m. wide in the Strait of Bab el Mandeb; the eastern channel of the strait is 2 m. broad and 16 fathoms deep. Estimates of the total area of the Red sea vary considerably, but it may be taken at 177,030 sq.st.m. approximately, and the volume at 53,700 cb.st.m. approximately.

Meteorology.—In the northern part, down to almost 19° N., the prevailing winds are north and north-west. The middle region, to 14°–16° N., has variable winds in an area of low barometric pressure, while in the southern Red sea south-east and east winds prevail. From June to August the north-west wind blows over the entire area; in September it retreats again as far as 16° N., south of which the winds are for a time variable. In the Gulf of Suez the westerly, or "Egyptian," wind occurs frequently during winter, sometimes blowing with violence, and generally accompanied by fog and clouds of dust. Strong north-north-east winds prevail in the Gulf of Aqaba during the greater part of the year; they are weakest in April and May, sometimes giving place at that season to southerly breezes. The high temperature and great relative humidity in summer, make it a difficult region for active life.

The mean annual temperature of the surface waters near the head is 77°; it rises to 80° in about 22° N., to 84° in 16° N., and drops again to 82° at the Strait of Bab el Mandeb. Daily variations of temperature are observable to a depth of over 50 fathoms. Temperature is, on the whole, higher near the Arabian than the Egyptian side, but it everywhere diminishes with increase of depth and latitude, down to 380 fathoms from the surface; below this depth a uniform constant temperature of 70·7° is observed throughout. In the Gulf of Suez temperature is relatively low, falling rapidly from south to north. The waters of the Gulf of Aqaba are warmer towards the Arabian than the Sinai coast; a uniform temperature of 70·2° is observed at all depths below 270 fathoms.

Salinity.—The salinity of the waters is relatively great, the highest reading being 41 per mille (Gulf of Suez), and the lowest 36·5 near Perim island. The distribution is, speaking generally, the opposite to that of temperature; salinity increases from the surface downwards, and from the south northwards, and it is greater towards the western than the eastern side. This statement holds good for the Gulf of Suez, in which the water is much salter than in the open sea; but in the Gulf of Aqaba the distribution is exceedingly uniform, nowhere differing much from an average of 40 per mille.

The movements of the waters are of great irregularity and complexity, rendering navigation difficult and dangerous. Two features stand out with special distinctness; the exchange of water between the Red sea and the Indian ocean, and the tidal streams of the Gulf of Suez. From the observations of salinity it is inferred that a surface current flows inwards to the Red sea in the eastern channel of the Strait of Bab el Mandeb, while a current of very salt water flows outward to the Indian ocean, through the western channel, at a depth of 50 to 100 fathoms from the surface. In the Gulfs of Suez and Aqaba, almost the only part of the Red sea in which tidal phenomena are well developed, a sharply-defined tidal circulation is found. Elsewhere, the surface movements at least are controlled by the prevailing winds, which give rise in places to complex "transverse" currents, and near the coast are modified by the channels enclosed by the coral reefs. During the prevalence of the north and north-west winds the surface level of the northern part is depressed by as much as 2 feet.

The Red sea was important in Egyptian maritime commerce at least as early as the 2nd millennium B.C. (*see* QOSEIR, EL) and it had associations with India early in the 1st millennium B.C. Under the Arabs the Red sea was an important highway of trade with connections to India, Persia and East Africa. This sea helped to keep Islam in touch with the thinkers of the East and with the glories of the ancient world during "the dark ages" in the West; with the revolutions in shipping and movement by sea that followed "the age of discovery" the Red sea seemed to retreat into the background; but with the cutting of the Suez canal (1869) and the shortening of the route to India, Australia and the East, the Red sea not only recovered its former importance but became one of the greatest commercial highways in the world.

BIBLIOGRAPHY.—A. Issel, *Morfologia e genesi del Mar Rosso. Saggio di Paleogeografia, Congresso Geogr. Ital.* (Florence, 1899); "Die Korallenriffe der Sinai-Halbinsel," *Abhandl. Math.-phys. Gesell. Wiss.*, vol. xiv. (Leipzig, 1888); *Meteorological Charts of the Red Sea* (Meteorological Office, 1895); *Report of the Voyage of the Russian Corvette "Vitiaz"* (1889); "Berichte der Commission für oceanographische Forschungen," 6th series, 1898, in vol. lxv. of the *Denkschriften der K.K. Akademie der Wissenschaften* (Vienna); also various notes and preliminary reports in the *Sitzungsberichte* of the Vienna Academy of Sciences; *Report of the Voyage of H.M.S. "Challenger,"* "Oceanic Circulation," p. 30; J. Hann, *Klimatologie*, vol. iii. p. 76 (1897).

REDSHANK, the name of a bird, *Tringa totanus*, so called from the colour of its long legs. In suitable localities it is abundant throughout the greater part of Europe and Asia, retiring southward for the winter, though a considerable number remain along the coasts of some of the more northern countries. The body of the redshank is as big as a snipe's, but its longer neck, wings and legs make it appear larger. Above, the general colour is greyish-drab, freckled with black, except the lower part of the back and a conspicuous band on each wing, which are white, while the flight-quills are black. The bird nests in inland localities as well as by the sea. The males in spring have a beautiful song-flight, rising and falling with quivering wings, and a striking courtship on the ground. They are very pugnacious, fights often continuing for over an hour. The redshank is very wary, and is disliked by shore gunners for giving the alarm to other species. The nest is generally concealed in a tuft of rushes or grass in the swamp whence the bird gets its sustenance, and contains four eggs of a warmly tinted brown with blackish spots or blotches.

The black, dusky or spotted redshank (*T. erythropus*) is a larger and less common bird, and in the greater part of Europe it only occurs on its passage to or from its breeding-grounds, which are south of the Arctic circle. The spot chosen for the nest is

nearly always in forests and at some distance from water. In breeding-dress the head, neck, shoulders and lower parts are black, the back and rump white, while the legs become crimson. At other times of the year the plumage is similar to that of the common redshank and the legs are of the same light orange-red.

REDSTART or **FIRETAIL** (*Phoenicurus phoenicurus*), a small bird which is a summer visitor to Europe, where it haunts gardens, orchards, and old buildings. Its habit of flirting its red tail, and the white forehead, black throat, and bay breast of the cock are distinguishing features; the hen is more plainly coloured; but the characteristic colouring and action of the tail pertain to her equally as to her mate. The nest is almost always placed in a hole of a tree or building, and contains from five to seven eggs of a delicate greenish blue, occasionally sprinkled with faint red spots. The young on assuming their feathers present a great resemblance to those of the redbreast (*q.v.*) at the same age; but the red tail, though of duller hue than in the adult, forms even at this early age an easy means of distinguishing them. The redstart breeds regularly in all the counties of England and Wales. It also reaches the extreme north of Scotland; but in Ireland it is very rare. It appears throughout the whole of Europe in summer, and is known to winter in the interior of Africa. Several very nearly allied forms occur in Asia; and one, *P. aurorea,* is found in Japan.

The black redstart (*P. ochrurus*) is darker than the preceding, with a more southerly range. Like the last, however, it winters in Africa. It often haunts the vicinity of houses. The males of the black redstart seem to be more than one year in acquiring their full plumage.

Allied to the redstarts are the bluethroats (*q.v.*). These groups belong to the subfamily *Turdinæ* of the thrushes. The American redstart (*Setophaga ruticilla*) belongs to the purely New World family *Mniotiltidae,* and ranges from Canada (in summer) to Bolivia, but is rare on the Pacific coast. The salmon of the breast, wings, and tail of the male are replaced by yellow in the female. The painted redstart (*S. picta*) has a deep red breast and belly. It inhabits the Mexican plateau, extending north to Arizona and New Mexico.

REDUCTION, in chemistry, metallurgy, etc., means the taking up of hydrogen or the giving up of oxygen, and hence also the taking up of elements which can replace hydrogen or the giving up of elements which can replace oxygen. It is, in fact, the converse of oxidation (*q.v.*).

RED WING, a city of Minnesota, U.S.A., on the Mississippi river, just below the mouth of the Cannon and near the head of Lake Pepin, 40 m. S.E. of Saint Paul; the county seat of Goodhue county. It is on Federal highway 61, and is served by the Chicago Great Western and the Chicago, Milwaukee, St. Paul and Pacific railways and by motor bus lines. Pop. (1920) 8,637, 9,629 in 1930 by Federal census. In 1695 Le Sueur established a post on Prairie island, 8 m. above Red Wing, and in 1727 René Boucher built a fort (abandoned in 1753) on the shore of Lake Pepin. A village of the Dakotas had long occupied the site of the city when in 1837 two Swiss missionaries visited it and established a mission which they maintained until 1846. In 1848 a second mission was established by the American Board. The city was platted in 1853 and chartered in 1857. Its name is a translation of the name of the Dakota chief who had settled his people here, and who is buried on the top of Barn Bluff.

REDWING, a species of thrush (*q.v.*), *Turdus musicus,* a winter visitor to the British Islands, arriving in autumn about the same time as the fieldfare (*q.v.*). It is very similar to the song-thrush, but with a white streak over the eye, and the sides of its body, inner wing-coverts and axillaries reddish-orange. The redwing breeds in colonies in woods in subarctic Europe and Asia to Lake Baikal. In winter it migrates as far south as North Africa and the Himalayas. Its song has often been praised, but is disappointing in comparison with that of the song-thrush or blackbird. In its winter quarters it often gives a peculiar inward song in early spring, while still in flocks. Its nest and eggs resemble those of the blackbird.

REDWOOD, SIR BOVERTON (1846–1919), British chemist, was born on April 26, 1846, and educated at University College school, London. He was trained as a pharmacist, but early specialised in the study of petroleum, becoming in 1869 secretary of the Petroleum Association and subsequently studying oil conditions at first hand in many parts of the world (1883–86). He served on several important Government commissions both before and during the World War. Founder of the Society of Petroleum Technologists, he became its first president 1913–14 and he was also a member of many other societies in pure and applied science. He was knighted in 1905, was made a baronet in 1911 and died in London on June 4, 1919. Redwood wrote some standard books on his subject, including *Petroleum,* 3 vol. (1913); and many articles and pamphlets.

REDWOOD (*Sequoia sempervirens*), a gigantic north-west American, coniferous tree, reaching a height of 340 feet. The allied *S. gigantea* of California (discovered in 1850 in the Sierra Nevada) is thicker but not so tall (320 ft.). Both are valuable timber trees. (*See* SEQUOIA.)

REDWOOD CITY, a town of California, U.S.A., on Redwood creek, 30 m. S. by E. of San Francisco; the county seat of San Mateo county. It is on Federal highway 101, and is served by the Southern Pacific railway. The population was 4,020 in 1920 and was 8,962 in 1930 by the Federal census. The town was settled about 1856 and incorporated in 1867.

REDWOOD HIGHWAY, an American highway 479 m. long commencing at San Francisco, Calif., and terminating at Grants Pass, Ore. About one-third is paved and most of the balance gravel. From Crescent City, Calif., to Eureka, the highway passes close to the Pacific coast, now high up on the cliffs and again down by the sea. It passes through 100 m. of ancient redwood forests 20 m. wide, whose trees are 200 and 300 ft. high, very straight, and as much as 30 ft. in diameter. South of Eureka the principal points touched are Fortuna, the Humbolt State Redwood park, Ukia and Santa Rosa.

RED WOODS, INSOLUBLE. Under this designation, sanderswood (*Pterocarpus santalinus,* Tropical Asia), barwood (*Baphia nitida,* West Coast of Africa) and camwood come into commerce. These closely resemble one another in tinctorial property, and contain colouring matters which are sparingly soluble in water. They may be applied to wool without the aid of a mordant, though in general the material is first dyed and a mordant, usually bichromate of potash, added to the dye-bath. The shade given with sanderswood and barwood is dull red brown, with camwood a more violet tint. Both sanderswood and barwood still find employment for "topping" indigoes, *i.e.,* the indigo-dyed woollen material is treated in a boiling bath with one or other of these dyewoods. Little is known of the chemical structure of the colouring matters of these dyewoods.

REED, JOSEPH (1741–1785), American politician, was born in Trenton, N.J., on Aug. 27, 1741. He graduated at Princeton in 1757, studied law in 1763–65 at the Middle Temple, London, and then practised in Trenton until his removal to Philadelphia in 1770. He was aide-de-camp and military secretary to Gen. Washington in 1775–76, and was adjutant general in 1776–77. In 1777–78 he was a delegate to the Continental Congress. From 1778 to 1781 he was president of the State executive council. During his administration the proprietary rights of the Penn family were abrogated (1779), and provision was made for the gradual abolition of slavery (1780). Reed was elected to Congress in 1784, but died in Philadelphia on March 5, 1785.

The Life and Correspondence of Joseph Reed (Philadelphia, 1874), by his grandson, William B. Reed, is based upon the family papers. It pictures Reed as an heroic patriot and statesman; George Bancroft, on the other hand, in the ninth volume (p. 229) of his *History* (1866) and in *Joseph Reed: an Historical Essay* (1867), pictures him as a trimmer of the most pronounced type. Bancroft withdrew his most specific charge in the 1876 edition of his *History,* in which, however, his tone towards Reed was unchanged.

His grandson, WILLIAM BRADFORD REED (1806–76), graduated at the Pennsylvania university in 1822. He was professor of American history in the University of Pennsylvania in 1850–56, United States minister to China in 1857–58, and in 1858 negotiated a treaty with China, proclaimed in 1860.

REED, THOMAS BRACKETT (1839–1902), American statesman, was born in Portland, Me., on Oct. 18, 1839. He graduated at Bowdoin college in 1860, and in 1865 was admitted to the bar. He was a member of the Maine House of Representatives in 1868–69 and of the State Senate in 1870, was attorney-general of the State in 1870–72, and was city solicitor of Portland in 1874–77. He was a Republican member of the National House of Representatives from 1877 until 1899, of which he was speaker in 1889–91 and in 1895–99. He was a "strong" speaker in his control of the proceedings, and he developed an organized committee system, making the majority of the committee on rules consist of the speaker and chairman of the committees on ways and means and on appropriations. The "Reed rules," drawn up by him, William McKinley and J. G. Cannon, were adopted on Feb. 14, 1890; they provided that every member must vote, unless pecuniarily interested in a measure, that members present and not voting may be counted for a quorum, and that no dilatory motion be entertained by the speaker. His parliamentary methods were bitterly attacked by his political enemies, who called him "Tsar Reed." His rules and methods of control of legislation were adopted by his successors in the speakership, and the power of the rules committee was greatly increased. After the war with Spain Reed broke with the administration on the issue of imperialism. He resigned his seat in 1899 and practised law in New York city. He died in Washington on Dec. 7, 1902. Reed was a remarkable personality, of whom many good stories were told, and opinions varied as to his conduct in the chair; but he was essentially a man of rugged honesty and power.

Reed's Rules were published as a parliamentary manual. He edited with others a *Library of Modern Eloquence* (1901). *See* the chapter on Reed in H. B. Fuller's *Speakers of the House* (Boston, 1909).

REED, WALTER (1851–1902), American bacteriologist, was born in Gloucester county, Va., on Sept. 13, 1851, and was educated at the University of Virginia and Bellevue Medical school (M.D., 1870). In 1874 he entered the medical corps of the U.S. army as assistant surgeon, with rank of lieutenant. In 1893 he was promoted to surgeon, with the rank of major, and made professor of bacteriology in the newly-organized Army Medical school. In 1898, when the Spanish American War opened, he was appointed chairman of a committee to investigate the causation and mode of propagation of typhoid fever, an epidemic of which had broken out among the soldiers. His *Report on the Origin and Spread of Typhoid Fever in U.S. Military Camps* (1904) revealed a number of points concerning the disease not before known, and emphasized others which had been little appreciated. In 1897 he and an associate proved the theory of Sanerelli—that the bacillus icteroides was the specific cause of yellow fever—erroneous. In 1899, when the disease was especially severe in Cuba, he was made chairman of a committee to investigate its cause and method of transmission. His observation of many cases led him to discount the then prevalent idea that the disease was transmitted by fomites in bedding, clothing, etc., of patients suffering from yellow fever, and to revive the discarded notion of Dr. Carlos Finley that the yellow fever parasite was carried only by mosquitoes. Since the disease was not taken by animals there was no method of proof except by experiment upon human beings. By a thorough set of experiments, in which some of Reed's coworkers sacrificed their lives for the cause, he proved to a sceptical world that the yellow fever parasite was carried only by the mosquito *Stegomyia fasciata* and that its bite caused the disease only under certain conditions. Possessed of this knowledge, American sanitary engineers eradicated the yellow fever from Cuba, and it has since been largely eliminated from civilized portions of the world. Reed died at Washington, D.C., on Nov. 23, 1902.

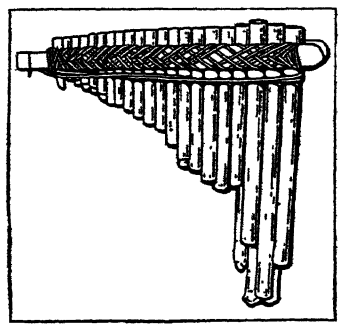
See H. A. Kelly, *Walter Reed and Yellow Fever* (1906), which contains a bibliography of Reed's publications; also P. De Kruif, *Microbe Hunters*, pp. 311–333 (1926).

REED, a term applied to several distinct species of large, water-loving grasses. The common or water-reed, *Phragmites communis* (also known as *Arundo phragmites*), occurs along the margins of lakes, fens, marshes and placid streams, not only throughout Great Britain and the United States, but widely distributed in Arctic and also in temperate regions. Another very important species is *Ammophila arenaria* (also known as *Psamma arenaria*), the sea-reed or marram-grass, a native of the sandy shores of Europe and north Africa. Both species have been of notable geological importance, the former binding the soil and so impeding denudation, and actually converting swamp into dry land, largely by the aid of its tall (5 to 10 ft.) close set stems. The latter species, of which the branching rootstocks may be traced 30 or even 40 ft., is of still greater importance in holding sand-dunes against the sea, and for this purpose has not only been long protected by law, but has been extensively planted on the coasts of Norfolk, Holland, Gascony, etc. Other reeds are *Calamagrostis* (various species), *Gynerium argenteum* (pampas grass), etc., also *Arundo Donax*, the largest European grass (6 to 12 ft. high), which is abundant in Europe. Reeds have been used from the earliest times in thatching and in other branches of construction, and also for arrows, the pipes of musical instruments, etc. Reed pens are still used in the East. Plants belonging to other orders occasionally share the name, especially the bur-reed (*Sparganium*) and the reed-mace (*Typha*), both belonging to the family Typhaceae. The bulrushes (*Scirpus*), belonging to the family Cyperaceae, are also to be distinguished.

REEDBUCK, a foxy-red South African antelope (*Cervicapra arundineum*) of medium size, with a bushy tail, a bare gland-patch behind the ear, and in the male short horns which bend forwards in a regular curve. There are several other species of the genus *Cervicapra* to which the name of reedbuck is also applied, one of these ranging as far north as Abyssinia, and another inhabiting west Africa.

REED INSTRUMENTS, a class of wind instruments in the tubes of which sound-waves are generated by the vibrations of a reed mouthpiece. Reed instruments fall into two great classes: (1) those blown directly by the breath of the performer, who is thus able to control more or less the character of the expression; (2) those in which the wind supply is obtained by mechanical devices, such as the bag of bagpipe instruments or the bellows of such keyboard instruments as the organ and harmonium.

Directly-blown reed instruments comprise the section of modern wind instruments known as the "wood wind," with the exception of flute and piccolo; and they are classified according to the kind of reed vibrator of which the mouthpiece is composed. There are three kinds of reed mouthpieces: (1) the single or beating reed; (2) the double reed; (3) the free reed, all of which perform the function of sound-producer. (For illustration *see* FREE REED VIBRATOR.) The reed used consists of a thin tongue or strip of reed, cane or some elastic material, thinned gradually to a delicate edge. It is adapted to the tube in such a manner that when it is at rest the opening at the mouthpiece end of the tube consists only of a very slight aperture or chink, which is periodically opened and closed by the pulsations of the reed when acted upon by the compressed breath of the player. This principle is common to all reed mouthpieces, and the difference in timbre is in a measure due to the manner in which the pulsations are brought about and the degree of elasticity permitted.



BY COURTESY OF THE METROPOLITAN MUSEUM OF ART

THE ANCIENT SYRINX OR PIPES OF PAN, CONSISTING OF TUBES OF VARYING LENGTHS, BOUND TOGETHER

The *single* or *beating reed* consists of a single blade bevelled at the edge and placed over a table or frame communicating with the main bore of the instrument, against which it beats, causing a series of pulsations. The single reed is common to all the members of the clarinet family, consisting, besides the clarinet, of the basset-horn or tenor, and of the bass and pedal clarinets; of the batyphone, an early bass clarinet, and of the saxophone. The ancient Greek aulos (*q.v.*) was also undoubtedly used with a beating

reed during some period of its history.

The *double reed* consists of two blades of reed or other suitable material tightly bound together by many turns of waxed silk, so that above the constriction the tube formed by the two blades has an oval section, while below, where it communicates with the main bore of the instrument, it is strictly cylindrical. The chink in this case is thus formed by two thin walls of reed of equal elasticity (*see* OBOE, BASSOON). The double reed is common to the members of the oboe family, consisting, besides the oboe, of the cor anglais or tenor, of the fagotto or bassoon, and of the contra fagotto or double bassoon; and it is also used in the sarrusophone family, instruments of brass but classed with the wood wind on account of the mouthpiece and fingering.

The *free reed* is not represented among members of the modern wood wind, and, as adapted to a directly-blown instrument, only finds application in the Chinese cheng, the prototype of the harmonium, and in the mouth-organ or harmonica.

The reed in wind instruments produces a peculiar tone quality to which it has given its name; it varies in the three different kinds of mouthpieces without losing its fundamental reedy timbre.

For reed instruments of the second class, viz., those indirectly blown by mechanical means, *see* under the names of the individual instruments—BAGPIPE, CONCERTINA, HARMONIUM, ORGAN, etc.

REEVE, a bailiff, steward or business agent; in early English history, one entrusted with administration of a division of a country; the chief magistrate of a town or district. The name survives in Canada for the president of a village or town council and in the United States, in composition, as port-reeve, town-reeve, etc.

REEVE, in ornithology, the female of the ruff (*q.v.*).

REEVES, JOHN SIMS (1818–1900), English vocalist, was born at Woolwich on Sept. 26, 1818, and received his musical education from his father, a musician in the Royal Artillery. He studied with Hobbs and T. Cooke, and, his voice having become a tenor, he appeared under Macready's management at Drury Lane (1841–43) in subordinate tenor parts in Purcell's *King Arthur, Der Freischütz,* and *Acis and Galatea.* Four years were spent in study on the Continent, under Bordogni in Paris and Mazzucato in Milan, and his *début* in Italian opera was made at Scala as Edgardo in *Lucia.* He reappeared in London in May 1847, and his career on the English operatic stage began at Drury Lane in Dec. 1847 in *Lucia,* under the conductorship of Hector Berlioz. At the Norwich Festival (1848) he made a great sensation in "The enemy said," from *Israel in Egypt.* He was recognized as the leading English tenor; and in Costa's *Eli* and *Naaman* the tenor parts were written for him. His first Handel Festival was that of 1857, and the effect of his wonderful declamation in the Crystal Palace was a main attraction of this and of many subsequent festivals. He died at Worthing on Oct. 25, 1900.

REEVES, WILLIAM PEMBER (1857–), New Zealand administrator, was born at Canterbury, New Zealand, on Feb. 10, 1857, and educated at Christchurch, N.Z. He read for the law and was called to the New Zealand bar, but eventually took up journalism, becoming editor of the *Canterbury Times* and the *Lyttelton Times.* In 1887 he entered parliament, and held office from 1891 to 1896 as minister of education. He has published several volumes on the history of New Zealand, and one volume of verse, and contributed to the 10th and to the present editions of the *Encyclopædia Britannica.*

RE-EXPORTS: *see* EXPORTS.

REFECTORY, the dining-hall of a monastery, convent, etc. There frequently was a sort of ambo, approached by steps, from which to read the *legenda sanctorum,* etc., during meals. The refectory was generally situated by the side of the south cloister, so as to be removed from the church but contiguous to the kitchen. The word is also sometimes applied to any large hall used for community meals, as in a college, school, etc.

REFEREE, a person to whom anything is referred; an arbitrator. The court of referees in England was a court to which the House of Commons committed the decision of all questions as to the right of petitioners to be heard in opposition to private bills. The court now consists of the chairman of ways and means, the deputy chairman and not less than seven other members of the House appointed by the Speaker, and its duty, as defined by a standing order, is to decide upon all petitions against private bills, or against provisional orders or provisional certificates, as to the rights of the petitioners to be heard upon such petitions. In the High Court of Justice, under the Judicature Act 1873, cases may be submitted to three official referees, for trial, enquiry and report, or assessment of damages. Enquiry and report may be directed in any case, trial only by consent of the parties, or in any matter requiring any prolonged examination of documents or accounts, or any investigation which cannot be tried in the ordinary way.

United States.—The term referee is commonly applied to persons to whom a court sends a cause or some question therein for determination or for the purpose of taking evidence and reporting upon the same. In this connection it is synonymous with such terms as auditor, commissioner, arbitrator, assessor, etc. In some states the term is applied to a master, who is appointed in equity suits pursuant to statute as distinguished from masters appointed pursuant to the old equity practice. *See* EQUITY.

REFERENDUM and **INITIATIVE,** two methods by which the wishes of the general body of electors in a constitutional state may be expressed with regard to proposed legislation. They are developed to the highest extent in Switzerland, and are best exemplified in the Swiss federal and cantonal constitutions. By these two methods the sovereign people in Switzerland (whether in the confederation or in one of its cantons) approve or reject the bills and resolutions agreed upon by the legislative authority (Referendum), or compel that authority to introduce bills on certain specified subjects (Initiative)—in other words, exercise the rights of the people as regards their elected representatives at times other than general elections. The *Referendum* means "that which is referred" to the sovereign people, and prevailed (up to 1848) in the federal diet, the members of which were bound by instructions, all matters outside which being taken "ad referendum." The *Initiative,* on the other hand, is the means by which the sovereign people can compel its elected representatives to take into consideration either some specified object or a draft bill relating thereto, the final result of the deliberations of the legislature being subject by a referendum vote to the approval or rejection of the people. These two institutions therefore enable the sovereign people to control the decisions of the legislature, without having recourse to a dissolution, or waiting for the expiration of its natural term of office.

Two forms of the Referendum should be carefully distinguished: the *facultative* or optional (brought into play only on the demand of a fixed number of citizens), and the *obligatory* or compulsory (which obtains in all cases that lie within its sphere as defined in the constitution). The Initiative exists only in the facultative form, being exercised when a certain number of citizens demand it. Both came into common use during the Liberal reaction in Switzerland after the Paris revolution of July 1830. In 1831 St. Gall first adopted the "facultative referendum" (then and for some time after called the "Veto"), and its example was followed by several cantons before 1848. The "obligatory referendum" appears first in 1852 and 1854 respectively in the Valais and the Grisons, when the older system was reformed, but in its modern form it was first adopted in 1863 by the canton of rural Basel. The Initiative was first adopted in 1845 by Vaud. In the case both of the facultative referendum and of the Initiative each canton fixes the number of citizens who have a right to exercise this power. The constitution of the Swiss confederation lags behind the constitutions of the cantons. Both institutions have since their adoption been freely and constantly used in connection with federal and cantonal proposals.

British Empire.—In *Australia* the referendum, which had been used only once before 1910, was used on several occasions during the ensuing 15 years. In 1910 itself a referendum authorised the transference of the debts of the various states to the Commonwealth Government. In 1916, and again in 1917, the vital question of extension to service abroad of the compulsory enlistment (which was already in use for home defence) was referred to the Commonwealth electorate and on each occasion rejected—in 1916 by 1,146,000 to 1,085,000 and in 1917 by 1,180,000 to 1,015,-

000. In 1911, 1913 and 1919, amendments to the Commonwealth Constitution of a Socialist tendency were all rejected. Similarly in the separate states of the Commonwealth, *e.g.*, Victoria, 1920, Queensland, 1923, and New South Wales, 1925, proposals in favour of prohibition were defeated by large majorities.

New Zealand used the machinery of the referendum in 1911, 1914, 1919, 1922, 1925 and 1928 in order to discover the will of her people respecting this same vexed question of prohibition. On each occasion prohibition was rejected, and at the last referendum in Nov. 1928 a large majority voted against prohibition.

Canada.—The referendum in the legislative sense has, when resorted to, been as a rule the result of special laws, and particularly on the question of prohibition. The suppression of the liquor traffic was thus carried out in Alberta, 1915, Manitoba, British Columbia and Saskatchewan in 1916, and Ontario in 1919. In 1920, however, British Columbia by means of a referendum, reversed its decision and adopted a system of government liquor control—an example subsequently followed by Manitoba, Saskatchewan, Alberta and Ontario. Under United States influence the referendum has been widely introduced into local government matters, more particularly as regards the submission of by-laws about money to the people, and in this restricted sense has operated successfully, though upon occasions it has proved difficult to induce any large number of voters to exercise the franchise.

Irish Free State.—The Irish Free State Constitution, 1922, requires a referendum to be taken on any measure passed by the Dail, if a demand is made by either one-fifth of the senate or one-twentieth of the electorate.

European Countries.—The Swedish Constitution, dating from 1809 and subsequently altered on several occasions, contains a provision for referring measures of importance to the opinion of the people. In 1922 a referendum on prohibition was taken in pursuance of this provision and owing to the action of the electorate in the large cities the proposal was defeated. Several Constitutions, framed since the World War, have incorporated the referendum as part of the machinery of government. The German Constitution of 1919 empowers the president to order a referendum when he sees fit, and provides it also as a means of escape from a conflict between *Reichstag* and *Reichsrat*. It was used on June 20, 1926, to decide the question as to whether or not property of the Hohenzollerns or other former ruling houses should be confiscated. Over 15,000,000 votes were cast for confiscation, but as less than half the total votes was polled, the proposal failed. The Constitutions of some of the constituent States of the *Reich* (such as Bavaria and Prussia), adopted since 1919, also contain provisions for the initiative and the referendum. (*See* GERMANY.)

The Estonian Constitution of 1920 uses it as a means of resolving a deadlock between the two houses of legislature. The rejection of a measure passed by the representative assembly involves the dissolution of the assembly and a general election within 75 days. Provisions for a referendum also occur in the Constitutions of Lithuania and Latvia.

The Austrian Constitution provides for a popular initiative demand for legislation when supported by 200,000 voters or by half the voters of three Provinces. This demand must be expressed in the form of a draft bill. Under this Constitution, every general alteration of the Constitution must be submitted to a referendum, and in certain circumstances, any partial alteration of the Constitution or any law may be referred to a popular vote. In the Constitution of the Czechoslovak republic, it is provided that the Government, if unanimous, may refer a bill rejected by the national assembly to a popular vote, but no such referendum was to be placed upon any government proposal to amend the Constitution.

The United States.—The legislative referendum was formally adopted by Arkansas and Colorado in 1910, by Arizona, California and New Mexico in 1911, by Nebraska, Idaho, Ohio and Washington in 1912, by Michigan in 1913, by Mississippi and North Dakota in 1914, by Maryland in 1915, and by Massachusetts in 1918. Its chief adherents still lie west of the Mississippi River, only five eastern states having adopted it, *i.e.*, Maine, Massachusetts, Maryland, Ohio and Michigan,—and 26 states have made no provision for direct legislation.

On the other hand the constitutional referendum, which contemplates only proposed amendments to the state constitutions, is in force in every state with the exception of New Hampshire and Delaware, and this is the form in which the referendum has been usually resorted to in recent years. The constitutional problems most persistently laid before the electors for decision were female suffrage and prohibition. As a result of referenda, the suffrage was given to women in some states, *e.g.*, Washington in 1910 and California in 1911, but refused in others, *e.g.*, Oklahoma in 1910 and South Dakota in 1911. The subject of prohibition was thrashed out over almost the entire United States by means of referenda, until the matter was removed from the cognizance of the state legislatures and electorates by the eighteenth (prohibition) amendment to the federal constitution. Apart from the wider state spheres of action, the referendum has been adopted in local government matters, particularly in the matter of money bylaws which in certain circumstances have to be submitted to the taxpayers for their approval, and also in connection with the adoption or otherwise of the commission and city manager systems of municipal government. In some of the States an analogous institution, the "Recall," enables the electors of a district to determine the office of a popularly elected judicial or administrative officer prior to the close of the term for which he was originally elected.

BIBLIOGRAPHY.—E. P. Oberholtzer, *The Referendum in America* (1900); A. V. Dicey, "The Referendum and Its Critics," *Quarterly Review*, vol. ccxii. (1910); W. F. Dodd, *Revision and Amendment of State Constitutions* (Baltimore, 1910); S. R. Honey, *The Referendum among the English* (1912); W. B. Munro, *The Initiative, Referendum and Recall* (1912); R. B. Wise, *The Making of the Australian Commonwealth* (1913); I. D. Barnett, *Operation of the Initiative, Referendum, etc., in Oregon* (1915); A. L. Lowell, *Governments and Parties in Continental Europe* (1918); Foreign Office Handbooks, No. 159. *Plebiscite and Referendum* (1920); E. Kimball, *State and Municipal Governments* of the U.S.A. (1922); H. L. McBain and L. Rogers, *The New Constitutions of Europe* (1922); J. S. L. Strachey, *The Referendum* (1924); *Select Constitutions of the World* (Dublin, 1922); B. Mirkine-Guelzevitch, *Les Constitutions de L'Europe Nouvelle* (1928); J. Delpech et J. Laferrière, *Les Constitutions Modernes* (1928).

REFLECTION. When waves of any kind travelling in one medium arrive at another in which their velocity is different, part of their energy is, in general, turned back into the first medium. This is termed reflection. If the surface of separation is smooth, *i.e.*, if the irregularities in it are small compared with the wave length of the incident disturbance, the reflection is *regular;* if the surface is rough each facet reflects the rays incident upon it in accordance with the laws of regular reflection (*see* LIGHT) and the reflection, as a whole is *irregular* or *diffuse*. Consider, for example, the reflection of light at smooth and ruffled water surfaces. From the ruffled surface rays enter the eye after reflection from suitably inclined facets distributed over a wide area on the surface and a diffuse band of light is seen, while from the smooth surface only those rays reflected at the requisite angle from a small area on the surface can reach the eye. In the first case the optical system of the eye focusses the water surface on the retina just as it does all other rough surfaces. In the latter the rays appear to come from a laterally inverted replica of the luminous source situated as far below the surface as the source itself is above, and it is this *image* which is then focussed on the retina. The diffusion of light by matt surfaces in general is an example of the same phenomenon differing only in the number and size of the facets which scatter the light.

Echoes and reverberations are caused by the reflection of sound (*q.v.*) and the "fading" of wireless signals (in part) by variations in the conditions under which the electromagnetic waves are reflected by the Heaviside layer in the upper atmosphere. (*See* WIRELESS TELEGRAPHY, THEORY OF.)

REFLECTORS. The light from most illuminants is distributed in a manner such that under most conditions it cannot be efficiently employed without the use of reflectors, or other media for re-directing the light into useful angles. Reflectors in common usage to-day not only control the direction of the light, but also

serve to shield the eyes from the brilliancy of the bare light source, and diffuse the light to produce a comfortable illumination. While all materials have to some degree the qualities of reflection, only a few can be used efficiently as accessories for primary light sources. Consideration of permanence, transmission, opacity, character of surface and reflection factor are necessary in determining the fitness of materials for use as reflectors.

The materials ordinarily used for reflectors are classed as (1) translucent, in which a part of the incident light is reflected and part transmitted or absorbed, and (2) opaque, in which part of the light is reflected and the rest absorbed; both types are necessary depending upon the character of the light distribution. The three types of light distribution from reflectors used for general interior illumination are classed as (1) direct, (2) semi-indirect and (3) indirect, a classification based upon the percentage of emitted light below or above the horizontal plane through the centre of the light source. Direct reflectors shed more than half of the emitted light below the horizontal; semi-indirect reflectors throw more than half above the horizontal with a small amount below; and indirect reflectors throw all of the light upward to the ceiling which reflects it downward.

The shape of the candle-power distribution curve of a reflector is within the control of the designer because of the diverse types of reflection characteristics available. Where very accurate control of the light is necessary, polished-metal, mirrored-glass, or prismatic-glass surfaces are usually employed. These media have a reflection characteristic similar to a mirror where the angle of reflection is equal to the angle of incidence. Automobile headlight reflectors, searchlight and floodlight projectors, and industrial high mounted luminaires are typical of the equipment requiring this type of reflector. An inconsiderable corrugation of surface of this type produces a slight diffusion of the light and yet permits of a very accurate control of the light distribution. Dull-finished metal surfaces, of which unpolished aluminium is typical, have some of the light-directing characteristics of the polished surface but more diffusion. This type of surface is commonly used for small local lighting reflectors and in some types of floodlights and spotlights. The inherent low cost, ease of manufacture and light weight make spun aluminium popular for many uses.

Rough or mat-finish reflecting surfaces permit of little or no actual control of light, since a beam of light striking a mat-finish surface will be reflected in all directions. Block magnesium carbonate is typical of several surfaces falling in the classification, although it lacks the necessary permanence, soils easily, and is difficult to clean. Porcelain enamelled metal combines the diffusing characteristics of mat-finish surfaces with some of the light control characteristics of gloss surfaces. Porcelain-enamelled reflectors are popular for industrial lighting purposes because of the ease of cleaning them when they get dirty. The cost is low because the metal shell can be formed by spinning, or in the press, and the porcelain enamel finish put on afterwards. Opal glass has the same general reflection characteristics as porcelain enamel and also transmits some light—a feature desirable for some locations. (*See* ILLUMINATING ENGINEERING; TELESCOPE; MIRROR; MICROSCOPE; LIGHT.)

(J. M. K.)

REFORMATION. This word, like "Catholic," is in itself a question-begging term; but both are adopted, if only under protest, in the general speech of the present day. By "Reformation," then, we mean that religious revolution of the 16th century which has divided western Christendom into two camps, the Catholic and the Protestant. This was in itself a very complex movement, due to a multiplicity of causes which may be grouped under four main headings; *moral, doctrinal, economic* and *political.*

Moral Causes.—These were the most important of all, for they lay at the very root. From St. Bernard at the beginning of the 12th century to Bishop Fox, who founded Corpus Christi college at Oxford in 1516, there is no generation from which we cannot choose orthodox and distinguished churchmen who urged the crying need for Church reform in language which might seem harsh from the pen of a modern Protestant. From Innocent III. in 1215 to Leo X. in 1512, nine great world-councils were held, with Church reform in the forefront of their programme; yet each in turn confessed the failure of its predecessors, and the Council of Trent (1545) testified to the impotence of them all.

The attempt to saddle the Black Death (1348–50) with this state of things is grossly unhistorical. Two of the greatest cardinals of the 13th century, St. Bonaventura (d. 1274) and Hugues de St. Cher (d. 1260) were among the most outspoken of all our witnesses against the clerical morals of their day. Even plainer is the testimony of another very distinguished bishop, Guillaume Durand, who was consulted for the Council of Vienne (1311). In his long memorial, he drew a terrible picture of the reigning and growing abuses, and concluded that the thing most needful was "a reformation in head and in members," that is, from the pope and his court downwards; and this became a watchword not only at succeeding councils, not only among outside critics, but sometimes of popes. It is acknowledged on all hands that the abuses emphasized at the council of 1215 were in many respects even more rampant in 1512, and that the discipline so often demanded was never realized until after the Council of Trent had completed its long work (1564).

The celibacy of the clergy had presented great and continual difficulties. (*See* CELIBACY.) Even so energetic a reformer as St. Anselm was practically compelled to abandon his design of separating the English clergy from their partners. A visitation of the diocese of Hereford in 1397 shows 52 concubinary clergy known to the bishop out of 281 parishes. Another of Lausanne diocese in 1416–17 shows, among 273 communities, more than 80 clergy known as concubinary. The Oxford chancellor Gascoigne (1450), a strong anti-Lollard, tells us that the bishop of St. Asaph of his day was earning 400 marks (the equivalent of something like £5,000 a year in modern money) from the licences for concubinage that he sold to his priests; and, though these figures are doubtless greatly exaggerated, yet Sir Thomas More does not deny that there was something of the same system in Ireland; and similar evidence comes to us from other parts of Europe.

It is rare to find any mediaeval author who, if he generalizes about monks, friars and nuns at all, fails to complain of the immoral example which they too frequently set.[1] St. Bernardino of Siena (d. 1444) tells us that "very many" men of his day had no belief in Heaven, and looked upon the Christian scriptures as merely interesting figments, because of the evil lives of cloisterers and other clergy. Pope Gregory X. had said the same at the council of Lyons (1274), and by about 1500 it had become a commonplace that the lives of the clergy were mainly responsible for the increase of heresy. And some of the most distinguished mediaeval witnesses, such as Cardinal Hugues de St. Cher (d. 1260) and St. Catharine of Siena (d. 1380) point out that clerical vices were naturally reflected and even exaggerated in the laity. Again, long before Luther's appearance, orthodox Catholics were emphasizing the abusive side of many Church ceremonies and practices; the sale of indulgences (*q.v.*), the multiplication of holy-days and the vice and riot which often marked these festivals; the abuse of the mass and of the consecrated oils for witchcraft; and the extent to which clerical immunities encouraged crimes. The laity of the later middle ages, with all their faults, were improving far more rapidly than the clergy; and this gave a proportionately increasing impetus to criticism.

Doctrine.—Here the clergy had once been supreme, and would probably have had little difficulty in maintaining their authority if they had kept unquestionable moral superiority. Few people are really interested in pushing theological enquiries very far, and, so long as men's conduct corresponds to their doctrine, the vast majority of mankind are willing to accept this at least as a working theory, and are under no temptation to question the speculative basis of practices which they approve. So long as there was no deep gulf between what the clergy actually were and what the people had a right to expect of them, free-thought was mainly limited to a few philosophers here and there, to a few weavers at their loom or cobblers at their bench, and to that dead weight of indifference, of resistance against idealism of any kind, which

[1] More than 100 orthodox witnesses are cited on pp 379–419 of G. G. Coulton's *Five Centuries of Religion,* Vol. II.

has prevailed in every generation among the masses who need to concentrate so much of their thoughts and their labour upon the elementary problems of daily bread. We have abundant proof that the majority of the mediaeval population were not actively religious; but for a long time the enthusiastic churchman had generally nothing worse to struggle with than inertia and complacent ignorance. About the year A.D. 1000, there came a revival comparable almost to that which we call the Renaissance. With this revival we also find signs of free-thought and religious friction; an ice-bound world was now thawing; therefore it moved less regularly and under less strict control than might have been desired. Many features of the then existing dogmatic scheme had been created less by profound philosophy than by popular feeling or by comparatively unreflecting impulses. All men, for instance, had gradually grown to assume that we must take that text "many are called, but few are chosen," in its most baldly literal sense. Even in the 13th century, and in a philosopher so remarkable for balance and moderation as St. Thomas Aquinas, we find that the "few" who shall be saved are directly contrasted with the "very many" who shall go to hell. His contemporary, the Franciscan Berthold of Regensburg, whom Roger Bacon singles out as the greatest preacher of the day, actually commits himself in one passage to a rough numerical calculation; only about one in 100,000 shall be saved; and few mediaeval theologians put it more favourably than one in 1,000.

Moreover, they exerted all their imagination and their rhetoric to impress upon their hearers the terrible significance of this separation between the sheep and the goats. All was to depend upon the last moment of life; and, even there, it must depend mainly upon the faith in which the sinner died. Berthold asks his hearers to imagine themselves writhing white-hot within a white-hot universe until the day of judgment, when the pains will be greatly increased. Let them imagine this continuing for as many years as all the hairs that have grown upon all the beasts in this world since the creation; and, even then, the sinner will be only at the beginning of his torments. Yet Berthold was one of the kindliest of men; if he defended the current dogma with this ferociously implacable logic, it was because he had inherited it as part of the deposit of faith, and because he now found himself faced by an opposition which no student of the Reformation can afford to ignore.

Heresy.—The first half of the 12th century had witnessed the rise of several powerful heretical sects, which even the eloquence and influence of men like St. Bernard could not extinguish, though the leaders could be taken and slain. All these sects were more or less antisacerdotal; and more than one held among its chief tenets that the personal unworthiness of the priest impairs or destroys the value of the sacrament which he administers, a doctrine to which some colour had been lent by the very methods taken to combat clerical concubinage by the great pope Gregory VII. (d. 1085).

Towards the end of the century, these popular and comparatively unlearned revolts were succeeded by others of very different intellectual weight. The Waldensians [1175] took their stand upon the Bible; this they read in the vernacular, and committed to memory with a diligence which, as even their persecutors complained, ought to have shamed the orthodox out of their ignorance.

About the same time, the complete works of Aristotle began to filter into the University of Paris through translations from the Arabic, and, a little later, through more accurate versions made by orthodox scholars. The Bible led the Waldensians to deny any essential distinction between clergy and laity; but they long persisted in regarding themselves as orthodox Catholics. The new Aristotle, and especially his Arabic translators and commentators, led a certain number of Paris teachers to adopt the teaching of Averroes (*q.v.*), and thus to deny such fundamental doctrines as the personality of God, the creation, and the immortality of the soul.

But stern measures of repression, first by bishops and clergy and then by the Inquisition (*q.v.*), prevented the general diffusion of these doctrines. In southern France, indeed, about 1200, it was complained that the heretics outnumbered the Catholics; but Innocent III. exterminated them in a merciless crusade; and the new orders of friars, instituted soon afterwards, did almost as much as the sword and the Inquisition to crush movements which were necessarily sporadic and disorganized, since there was no chance of bringing that side of university scholarship into quiet and steady co-operation with the less articulate impulses of the multitudes. Moreover, from the very first, there was naturally a good deal of base leaven in these revolts; and even the Waldensians, whose original tenets resembled modern Quakerism in a good many respects, were gradually compelled, under persecution, to make common cause with other rebels whom they had begun by opposing.

Orthodoxy.—Society as a mass was not ripe for revolution; the nonconformists had too little of a positive programme to substitute for that of the conformists. For the orthodox had gradually set themselves to systematize the theology which they had inherited. Peter Lombard, bishop of Paris (d. 1164) compiled his *Sentences, i.e.,* texts from the Bible and from the fathers, arranged with comments so as to present a fairly consistent foundation upon which most of later mediaeval theology was built. St. Thomas Aquinas (d. 1274) built up a powerful constructive plea for Christianity in his *Summa contra Gentiles* and a wonderfully complete synthesis of Christian tradition with Aristotelian philosophy in his *Summa totius Theologiae.*

From the mid 13th century onwards, there was a tendency in official circles to look upon the intellectual and social equilibrium as complete; philosophers were less concerned to advance than to hold the positions already gained and to strengthen the outworks from generation to generation. Roger Bacon, the slightly older contemporary of Aquinas, might indeed criticize this imposing philosophical structure in terms which almost anticipate Huxley; it rested (he said) upon a Bible misunderstood, and an Aristotle misunderstood, and upon an almost total neglect of the physical and mathematical sciences. But Bacon exaggerates so far as Aristotle is concerned; and he, like those few who thought with him, had no chance in face of the Inquisition; therefore, though a great deal of Averroism survived at the universities, and we have evidence throughout the later middle ages for groups of "intellectuals" who treated Christianity as an outworn superstition, it was improbable that these men would ever have led a revolt. The academic tendency was rather to evade serious issues under shelter of the theory of "double truth"; things (they said) might be theologically true even while they were philosophically false. Far more important was the gradual change of thought among the masses. These, as zealous teachers complained, had always looked too grossly for tangible and immediate results. Saints' images which refused to work expected miracles might be scorned or maltreated; the failure of St. Louis' crusade led common folk to say "nowadays, Mohammed is stronger than Christ." The Black Death inflicted a terrible shock, from which all vital things recovered rapidly, but which shook all mere conventions to their base; to that extent, it must certainly be counted among the hastening factors of the Reformation.

The popes, by their voluntary desertion of Rome for Avignon, did much to impair their prestige, especially in England, where they seemed necessarily partisans of France in the Hundred Years' War. This was expressed in popular rhymes: "The pope is a Frenchman now, but Jesus is English; let us see who will do most, Jesus or the pope!" Then came the Great Schism, with 39 years of struggle between rival popes upon whose claims, though historians are mostly in agreement, the Roman church has never pronounced so clearly and unequivocally as to render it a question settled for all time. Among contemporaries, St. Catharine of Siena was certain that Urban was true pope, and Clement a pretender. But the Spaniard, St. Vincent Ferrer, proves with every reinforcement of scholastic logic, not only that Clement is true pope, but that no man who, having heard the pleas in his favour, decides for Urban, can hope for heaven. The effect of this upon the masses can scarcely be exaggerated; it was the schism, perhaps, which lent its greatest force to the heresy of Wycliffe. For, at the same time, popular devotions and a popular theology were growing up under the wing of the Church,

yet in considerable independence of the priesthood.

Piers Plowman is only one of many books which show how pious and thoughtful folk, outside the hierarchy, were exercised by such problems as predestination, or the damnation of virtuous non-Christians, or the papal doctrine of indulgences (*q.v.*). The multiplication of books of popular piety in the last generations before the Reformation is enormous. For good or for evil, the people were beginning to outgrow clerical tutelage. Even in the foundation of schools and hospitals, the laity were beginning not only to pay their money, as they had done for long past, but to demand control of their own foundations. There was new life everywhere about 1500; but the gains were far more secular than sacerdotal.

Economic Causes.—During the later centuries of the middle ages, clerical possessions were enormous; churchmen owned a proportion which has been variously estimated at one-fifth or one-third of the whole landed property; yet they claimed to be free of taxation by the state. This naturally led to extreme friction; the preamble of Boniface VIII.'s celebrated bull *Clericis Laicos* (1296), in which he strongly asserted this claim for immunity, runs: "That the laity are bitterly hostile to the clergy is a matter of ancient tradition which is also plainly confirmed by the experience of modern times."

Equal friction arose from the farther claim, which had gradually grown up and was finally fixed by John XXII. (1316–34), that all Church benefices belong to the pope, who may appoint whom he will. This naturally led to a systematic trade in benefices at the Roman court: "Nothing is to be had at Rome without money," wrote Aeneas Silvius, the future pope Pius II. (1458–64). The popes took from each bishop half of his year's income (annates), and proportionately from abbots of great monasteries. Justice was sold in all the Church courts even more frequently than by secular judges; from at least the 12th century onwards, it was notorious that the archdeacons derived a large proportion of their income from bribes. These economic causes for reformation are most pithily summed up in the *Hundred Grievances of the German Nation,* laid before Adrian VI. (1522–23) by the German princes.

The Inquisition.—Moreover, the Inquisition itself, by its very constitution, had become a terrible economic burden. It had always paid its way by wholesale confiscations; even "reconciled" heretics must lose their goods. Therefore, when heresy had been nearly stamped out among rich and conspicuous folk, and the few that remained were such as had procured some sort of illegal protection, then (as we are frankly told by the Inquisitor Eymeric, writing about 1350) princes ceased to take an interest in the Inquisition, and it languished for want of funds.

In the later middle ages, the Inquisition directed much of its energies to the suppression of witchcraft; for an enormous number of heathen customs still survived, especially among the peasantry, who formed the overwhelming majority of the population. Many peasants, said Berthold of Regensburg (1250), and especially many peasant women, cannot take any step in life without having recourse to witchcraft. Therefore, easy though it was to raise an outcry against some unpopular individual, any general enforcement of severe measures against witchcraft must have been extremely unpopular. The enormous multiplication of witch-hunts during the 15th century—for on this side Joan of Arc's fate is quite typical—was both symptom and cause of a deep gulf between the ignorant multitude and the theology of leaders like Aquinas. "Every Inquisitor whom [the Church] commissioned to suppress witchcraft was an active missionary who scattered the seeds of the belief ever more widely" (Lea). A bull of Innocent VIII. in 1484 had the practical effect that thenceforward to question the reality of witchcraft was to question the utterance of the vicar of Christ, "Thus the Inquisition in its decrepitude had a temporary resumption of activity" (Lea). Here again, however, we are to some extent anticipating; for the Inquisition was not only an economic but also a political force.

But, before quitting the economic factors, we must remember that they brought as much weakness as strength into the Reformation movement. It is evident that an economically irreproachable Church would have been as impregnable as the earliest Christian society had been; but it is equally true that the purity of reform was very early tainted by greed; so that, when force was used on both sides, there was little or no moral difference between a defensive commercialized hierarchy and an aggressive squirearchy eager for plunder.

Political Causes.—The political factor, though by itself it might never have led to actual revolt, came in at the last stage with decisive effect. It was the struggle with Protestantism which evolved the half-way principle of *cuius regio, eius religio;* "the ruler's choice determines the established religion of his territory"; and this in turn has led to our modern toleration of all creeds. But the mediaeval ideal had been one empire with one religion; and the actual conditions cannot be better described than in the words of the jurist-historian F. W. Maitland (*Canon Law in the Ch. of England,* p. 100), "We could frame no acceptable definition of a State which would not comprehend the [mediaeval] Church. What has it not that a State should have? It has laws, law-givers, law-courts, lawyers. It uses physical force to compel men to obey the laws. It keeps prisons. In the 13th century, though with squeamish phrases, it pronounced sentence of death. It is no voluntary society; if people are not born into it they are baptized into it when they cannot help themselves. If they attempt to leave they are guilty of *crimen laesae maiestatis,* and are likely to be burned. It is supported by involuntary contributions, by tithe and by tax. And, it may be added, it claims to override, all the world over, the power of the secular State."

Much of this power came to the Church by a process as legitimate as that which could be claimed by most of the civil Governments. The Church had consciously modelled her organization on that of the Roman empire; and she survived when the empire went to wreck. At first there was no question of serious rivalry with the earthly state. Gregory I., in face of an imperial edict or law which he might have been excused for interpreting as a trespass upon Church privileges, had no doubt about his duty of publishing the edict as he was commanded, even while he protested against it; "What am I," he wrote to the imperial council, "but dust and a worm? . . . a man set under authority."

It was only by degrees, and not without many reactions, even under Charles's weak successors, that the popes reached a position which rendered possible the claims of Gregory VII., a man of commanding genius and rare courage. Starting from Augustine's theory of the City of God, founded by Christ, in its contrast with the earthly city, founded by Cain, Gregory insists that the papal power of binding and loosing places him above all earthly sovereigns. It enables him to annul all oaths made contrary to God's will (of which the pope is interpreter) and to absolve all subjects from allegiance to an emperor whom the pope has deposed. Innocent III. (d. 1216) reasserted these claims both in theory and in practice; and at the death of the Emperor Frederick II. in 1250 the long struggle between papacy and empire was virtually decided in favour of the former.

National Spirit.—Yet the papacy now found a more formidable rival in the growing spirit of nationalism, which, no less than imperialism, must necessarily find itself in conflict with a non-national authority claiming moral dictatorship, and therefore political dominion, over the whole western world. It has sometimes been asserted that nationalism was unknown to the middle ages; that the one Church, with one Latin tongue for all educated Europe, effaced merely national divisions. This, however, is a very superficial view. In proportion as the heterogeneous mediaeval populations consolidated into nations, they developed also the consciousness of nationality; divisions became fewer than in the dark ages, but deeper; we may say that the papacy and the Latin tongue had scarcely more to do with the ending of the Hundred Years' War than with its outbreak; and Marsilius of Padua (1324) was on unassailable historical ground when he asserted that popes had very frequently been the authors of European wars.

France was the greatest nation in the 14th century; therefore she was nationally one of the most self-conscious; and it is she who came into directest conflict with the papacy. Boniface VIII.

(d. 1302) attempted to forbid taxation of the clergy by the State; again, he claimed that "all law is enclosed in the casket of the pope's breast." In his bull *Unam Sanctam*, he proclaimed to the world: "We declare that all human beings are subject to the pontiff of Rome; and we assert, define and pronounce this tenet to be essential and necessary to salvation." This attitude led to a conflict with Philippe-le-Bel of France, in which Boniface was humbled; this, again was a prelude to the transference from Rome to Avignon, where the popes in fact, though not in pretension, became virtually subjects of the French king. Even in England, where it might be argued that the clergy themselves were becoming more papalist than ever, and where Archbishop Arundel could proclaim that it was heresy to dispute any papal decretal (1408), yet king and parliament were putting very definite limits to papal control by their Statutes of Provisors and of Praemunire. Other sovereigns presently protected themselves by similar measures.

Publicists.—For, meanwhile, in the first half of the 14th century, publicists like Marsilius of Padua and William of Ockham (*see* OCCAM) enunciated theories which probably represented what a good many thinkers had long since been saying confidentially to each other in universities like Paris, and in great self-governing cities like Padua. For Marsilius and Ockham, the Bible is the great rule of life for Christendom; the supreme power resides in a council of the whole Church, to which Ockham, apparently, was ready to admit women, and which may judge the pope. Indeed, Ockham is ready to conceive a Christendom without the pope; true, there are certain functions which it would be difficult to arrange otherwise, but the papacy is not essential to the Church of Christ. These speculations formed a fitting prelude to the conciliar epoch (1414–57) during which, mainly at Constance (*q.v.*) and Basel, the Church attempted to put definite constitutional limits to papal autocracy. Both councils decreed, and compelled popes practically to admit, that a general council may judge and depose even a supreme pontiff, and that the pope cannot legislate without conciliar approval.

It is true that the constitutionalists here, as in the England of 1642, over-reached themselves, and the later mediaeval papacy profited by a reaction which rendered it despotic again within the Church. But the laity never forgot; and temporal princes grew more and more accustomed to maintain their own interests in open conflict with the pope.

Two factors contributed farther to this political independence. The monastic reforms decreed by the councils of Constance and Basel, in so far as they were carried out at all, owed much of their success to the secular authorities; in this field, at any rate, it became increasingly plain that the Church was not likely to reform herself merely from within. Again, the later mediaeval popes were predominantly politicians. The papacy had become an Italian principate; the pontiffs constantly involved themselves in those civil wars which made Italy a "hostelry of pain" (Dante); and they showed no less selfishness and duplicity than the princes with whom they were contending. They were ready to go any lengths to secure a little more authority or a few more square miles of territory; as when Clement V. (1309) decreed that the resisting Venetians should be sold into slavery, and Gregory XI. and Sixtus IV. decreed the same for the Florentines and Julius II. for both Florence and Bologna. The bull by which Nicholas V. (1442) encouraged Portugal to what became the organized trade in negro slaves did not immediately show these disastrous results; but when, in 1538, Paul III. decreed slavery against all Englishmen who should dare to support Henry VIII. against the pope, nobody was deceived as to the selfishness of this political move. (For evidence on these points *see* articles SLAVERY and INQUISITION; also T. Brecht, *Kirche und Sklaverei*, p. 156.) A quarrel with this spiritual autocrat, however moral or religious might be the original cause of difference, became *ipso facto* a political quarrel. Therefore, in 1500, any spark might have kindled a general conflagration.

Martin Luther.—This spark, when it came, was in fact moral and religious; but it at once kindled the mass of inflammable politico-economic material. The pope was working his indulgences to an excess which strained loyalty to the breaking-point. Berthold of Regensburg, long ago [1250], had complained that "many thousands" went to hell because they thought themselves to have bought absolution from these "penny-preachers." Gascoigne, the great Oxford chancellor [1450], wrote even more strongly, in proportion to the growing evil: "Sinners say nowadays 'I care not how many or what evils I do in God's sight; for I can easily and quickly get plenary remission of all guilt and penalty by an absolution and indulgence granted me by the pope, whose written grant I have bought for 4d or 6d, or have won as a stake for a game of tennis.' " (*Lib. Veritatum*, p. 86; full translation in G. G. Coulton, *Social Life in Britain*, p. 204.)

Then, in 1517, the rupture came. A scandalous archbishop of Mainz promised Leo X. 10,000 ducats as a bribe for permission to hold three archbishoprics at the same time. This money was to be paid in part from the sums which here, as everywhere else, were being raised by the sale of indulgences for the building of St. Peter's at Rome. An Augustinian friar and university professor of Wittenberg, Martin Luther, expressed the general indignation by drafting 95 theses on the indulgence system, on which he challenged dispute with all comers.

We may say "the general indignation," for Germany was thoroughly prepared for this revolt. She had many flourishing cities, and a high general level of education for that time; the printing press had long been active; several editions of the vernacular Bible had been published, and very many little books of popular piety. The Greek and Latin classics were being studied busily, and in a far less pagan spirit than in Italy. The Inquisition, again, was comparatively inoperative in Germany; there was little chance of its nipping any doctrine in the bud before it had time to gain popular support. And, lastly, the weakness of the central Government was favourable to Luther; it was the patronage of a few local princes that sheltered his movement in its first stages.

GERMANY

The political complications were here very great; the empire contained more than 300 separate states, small and great, which often rendered little more than nominal obedience to the emperor. Luther was first summoned to Rome and then commanded to present himself before the papal legate at Augsburg (Oct. 1518). Finding that the legate practically demanded submission without discussion, Luther published his account of the interview as an appeal to the German people (*Acta Augustana*). Leo X. then sent an envoy, Miltitz, who was so tactful that a reconciliation might conceivably have been effected but for the Leipzig disputation on the papal primacy and supremacy (June 1519), to which Luther was challenged by the Dominican friar Johann Eck. Luther, in his months of preparation for this debate, discovered how many forgeries there were among the documents which seemed to tell most against him; and Eck, by driving him to the admission that not all the tenets of the Hussite heretics were wrong, widened the breach still farther. The younger university teachers were now on Luther's side; and, encouraged by the growing approbation of all classes among the laity, he began to appeal unhesitatingly and unceasingly through the pulpit and the press.

In three great treatises (1520) he took up a position from which he never after retreated on any essential point. For he had a positive programme; a national Church, free from papal interference; inspection of monasteries; limitation of holy-days and pilgrimages, and marriage for the priesthood as the best remedy for the standing disgrace of concubinage.

Leo X. met this programme with a bull (*Exsurge Domine*, June 1520) in which he condemned 41 propositions attributed to Luther. One of these is all the more significant because the condemnation was repeated in other papal letters: Luther had said "It is against the will of the [Holy] Spirit that heretics should be burned." The pope condemns even the least harmful of these 41 propositions as "scandalous or offensive to pious ears or calculated to lead simple minds astray": those who hold or preach any of them are henceforward excommunicate and liable, unless they repent, to all the pains and penalties of heresy. This bull was entrusted to Luther's enemy Eck; but it overshot the mark. Universities and bishops would not or dared not publish it, and

Luther received encouragement from many quarters.

He was now excommunicate, and his writings were solemnly burned; he retaliated by burning the papal decretals with equal publicity. Luther had great virtues and great faults; but at this crisis even his faults had a value for the world; for his courage and self-assertion precipitated the crystallization of a thousand thoughts and impulses with which society had gradually become saturated, but which had remained in solution until now.

This Church quarrel now became the most burning question in all German politics. The young Emperor Charles V. was crowned in Oct. 1520, and fixed January for his first Diet, at Worms. He had followed the fight, and was determined to uphold the traditions of his ancestors. The princes insisted that Luther should not be placed under the ban of the empire without being heard in his defence; he was therefore summoned under a safe conduct. He decided to go, "even though there were as many devils at Worms as tiles on the house-roofs." Nearly 2,000 people came out from the city to welcome him. He was brought before the Diet (April 17) and asked whether he would retract his books and their contents; he requested a day to consider his answer. His reply on the 18th was clear and decided: "The duty that I owe to my Germany will not allow me to recant." Pressed still farther: "It is impossible for me to recant unless I am proved to be in the wrong by the testimony of Scripture or by evident reasoning." Pressed farther again, while the torches began burning down to their sockets, as to the infallibility of general councils (the infallibility of the pope was not yet a necessary article of faith) he replied that these had sometimes erred by contradicting Holy Scripture, and he could prove it. At this, the emperor made a sign to break up the meeting.

The Credo of Charles.—Next day Charles read to the diet his own profession of faith; he stressed the authority not of popes but of councils; and upon that he was firm; here is a single friar now setting up his private judgment against 1,000 years of Catholicism, and "I have therefore resolved to stake upon this cause all my kingdoms and lordships, my friends, my body and my blood, my life and my soul." He called upon the diet to help him in this crusade; but "many turned paler than death." For the antagonism was here clearly stated; Luther was ready to stake all upon his own personal convictions, and the emperor upon his own loyalty to tradition. Here, then, was the clear parting of the ways. Both sides relied, fundamentally, upon the Bible. St. Thomas Aquinas had been as convinced as any later Protestant theologian that the Bible was inerrant not only in its spiritual teaching but even on matters of historical fact.

Authority and Judgment.—The real question which had gradually grown up during the Christian centuries, and which had now come to a point, was not as to the infallibility of the Bible but as to the methods of interpretation: was the book sufficient in itself, with no light beyond God's grace and the earnest searcher's conscience, or could it be rightly interpreted only in the light of ancient tradition, and by certain divinely-constituted teachers who, whenever they met in solemn conclave, were inerrant? Luther, in asserting that general councils had sometimes contradicted the Bible, had thrown down the gauntlet; at that point the emperor had naturally dissolved the assembly but only to take up the gauntlet solemnly next day; if the princes then turned pale, it was because they saw war imminent, and knew neither where it would end nor even (in most cases) on which side they must range themselves. To many, it seemed impossible to accept the existing constitution of Church and society as sacrosanct, to the extent of condemning all radical reform as sacrilegious, and all radical reformers as faggots for the stake.

Yet, on the other hand, they saw how intimately this treatment of nonconformity as heresy, this distrust of free discussion, and these methods of physical coercion, had grown into the whole social fabric, and therefore how great was the fear lest the edifice should collapse if once a friar were allowed to publish his own biblical interpretations against those of the councils, and to persuade the community that the burning of heretics is against the will of the Holy Spirit. Therefore, in the struggle that now follows, all other questions, however important in themselves, are subordinate to this one fundamental antithesis between authority and private judgment. Did the princes desire a world in which the deposit of faith might safely be entrusted to the reason and religious feeling and good sense of the majority, or must physical force be held over men's heads everywhere and always as a menace, and be very frequently employed in fact? Were most men so firmly assured of the fundamentals that all contrary pleas of a small minority might be mainly left to work out their own confusion (as in More's *Utopia*) or was orthodox assurance so wavering that the centre of gravity might shift under the shock of a friar's contradictions, and the Church might turn upside down, and the State with it? The risk was plainly enormous; here was Luther, willing to take that risk for himself and for the world; but few of the politicians could have faced the crisis without serious misgivings.

The Wartburg.—No compromise between Luther and the emperor was now possible; on the 26th, it was announced that his safe-conduct would expire in 21 days. He left Worms; but he was seized by the advice and with the connivance of the elector of Saxony, and carried off to the elector's castle of the Wartburg near Eisenach. The emperor signed Luther's condemnation as a pestilent heretic (May 26); but his secretary wrote to a friend in Spain: "I am persuaded this is not the end, but the beginning. . . . Since [the Emperor's edict], Luther's books are sold with impunity at every step and corner of the streets and market places."

Luther spent nearly ten months in hiding at the castle of the Wartburg, his "Patmos," as he afterwards called it. Here his pen was unceasingly busy with controversial pamphlets and his translation of the New Testament. But his body suffered from want of exercise, and his mind from natural doubts; could so many past generations and so many estimable contemporaries have been wrong, while he, the mere friar, was right as against them all? Might he not be dragging thousands down to hell with himself? Yet his convictions constantly returned more strongly than ever; and, by a natural reaction, he felt increasing confidence in his divine commission; to doubt of this, or to remain treacherously silent, would be to incur damnation. The gulf between authority and private judgment was thenceforward too wide to be bridged; and Luther emerged from the Wartburg as a determined revolutionary. Yet he was a conservative revolutionary; and this it was which brought him out of his retirement.

His doctrines had been spreading widely; the statistics of the German press are most eloquent here; in 1517 only 37 vernacular books were printed; in 1518 there were 71, and by 1523 the number had risen to 498, of which 180 were by Luther himself. For here was a population which, far beyond all others in Europe, had already been gaining a certain familiarity with the Bible in the vernacular. Fourteen editions in High German, and four in Low German, had appeared before 1518; and, though these editions were doubtless limited and therefore expensive, yet they must have done something to permeate popular thought. Most of the great cities were becoming Lutheran; the new doctrines spread, naturally enough, in Luther's own religious order (the Austin Friars) and in his University of Wittenberg.

Here, in fact, things went too fast. One of the Wittenberg professors, Andrew Bodenstein (Carlstadt), pushed matters to extremes; he lectured and preached and wrote against almost all the traditional ceremonies.

Momentum.—At the same time, and only 60 miles away, the populous weaving centre of Zwickau was in still greater religious commotion; three of the Zwickau enthusiasts came to Wittenberg, and Carlstadt persuaded the magistrates to publish an epoch-making ordinance, which practically transferred the whole direction of Church affairs to the laity, who at the same time undertook the poor relief and the moral discipline of the city. Carlstadt went even farther, and started an iconoclastic crusade. Luther's friend and colleague Melanchthon (*q.v.*) disapproved strongly, but could do nothing. The elector also was seriously troubled; other princes were taking the Wittenberg disturbances as a text for armed intervention; and Luther risked his own personal safety to return and restore order. He preached at Wittenberg on eight

successive days: "I will preach reform. I will talk about it. I will write about it, but I will not use force or compulsion with any one. . . . The word will drop into one heart to-day, and to-morrow into another, and so will work that each will forsake the mass."

A new pope came to the throne in 1522, Adrian VI., a pious man sincerely anxious for reform. At the diet of the empire held at Nuremberg (1522–3) his nuncio pressed that serious measures should be taken against Luther, since Charles V.'s decree, however decisively worded, was practically a dead letter. The members of the diet answered by presenting a list of 100 grievances against the Church; the nuncio reported to the pope that "among a thousand men scarcely one could be found untainted by Lutheran teaching." Then Adrian died suddenly, and was succeeded by Clement VII., a Medici by birth and by nature interested less in reform than in papal prestige. His legate, Campeggio, though a most dexterous diplomatist, could effect very little. The Diet of Speyer (1524) began to plan a Church council for Germany, which would have separated from Rome and anticipated England in the formation of a national Church.

The Peasants' War.—It is from this moment that we must date "the beginning of the separation of Germany into two opposite camps of Protestant and Roman Catholic, although the real parting of the ways actually occurred after the Peasants' War" (T. M. Lindsay). That war, though precipitated by the Lutheran revolt, was essentially a mere continuation of the struggles described above. Luther's message was democratic; his language displayed the defects of his qualities; its extraordinary force and directness constantly tempted him into exaggeration, and added fuel to the social discontent which had smouldered for generations side by side with anti-clericalism.

Seven years after Luther's attack on the indulgence system, the peasants' revolt broke suddenly out (June 1524). It began on the upper Rhine, encouraged doubtless by the successful assertion of freedom by the Swiss. In a few weeks the conflagration spread as far north as the Harz, and eastward to Tirol and Styria; cities, knights, and even princes made terms with the insurgents or joined their ranks. But the want of efficient leadership and discipline soon made itself felt; other princes and knights, with trained soldiers at their back, beat the insurgents in one battle after another, and the main revolt was subdued before the end of 1525, leaving the peasants in a worse plight than before, though the Tirolese held out longer and gained real concessions. Luther at first had sympathized with the insurgents and protested against harsh measures; he even risked his life by going among them and preaching peace and moderation.

But soon their excesses angered and dismayed him; his tract *Against the murdering, thieving hordes of peasants* breathed fire and slaughter. Its pitiless tone may be explained, though never excused, by the disastrous reaction of this social revolt upon Luther's own revolution; the more so, since the rebels had in nearly all cases claimed religious sanctions for the movement. It was thenceforth evident that the Reformation was bound to emphasize political and social differences. Hitherto it might have been called a national movement in Germany, but henceforward it was a party-question in every sense of the word.

A Religion of State.—The story is complicated by the multiplicity and kaleidoscopic changes of these 300 German States, and especially by the confusion between the two Saxonys. Catholicism and Protestantism were exposed to all the gusts of party politics. In Luther himself the prophet often gave way to the politician; and he, who in 1525 had at first insisted that the peasants must be met not with blows but with reasons, was soon ready to call upon secular princes to draw the sword against all enemies of the Reformation. He had begun by insisting on responsibility to God alone; but now with most of the Reformers, he ended by subordinating Church to State. In July 1525, a league of Catholic princes was being formed to quench the Reformation in blood; in October, the landgrave Philip of Hesse began to frame a defensive league of Protestant princes. This support could be bought only by abandoning absolute freedom of private judgment and by allowing many ecclesiastical endowments to be secularized. In order to avoid offending the landgrave, Luther, Melanchthon and Bucer agreed in allowing him to commit bigamy; a concession which may be paralleled by a few similar licences from popes, but which, coming from these Reformers, justly scandalized the public more than the papal actions. On both sides, Catholic and Protestant, self-interest now played a very great part.

The ups and downs may be very briefly summarized. The Diet of Augsburg (Dec. 1525) did little. That of Speyer (June 1526) refused to execute the edict of Worms, and procured the decision that each prince should so act in matters of faith as to be able to answer for his conduct to God and the emperor. This gave the Reformers a most valuable breathing space, but the Catholic States were presently provoked into organizing persecution against heretical subjects; the emperor, having now made up his private quarrel with the pope, was determined to fight the innovators, and a diet at Speyer (1529) altered the tolerant decree of 1526. Six princes and 14 cities read a solemn protest at the diet against this vote; and the action of this small minority gave to the party that name of Protestant by which it has ever since been known.

Schmalkalden.—For the Diet of Augsburg (June 1530) Melanchthon drew up a confession, which minimized the differences between Lutherans and Catholics, and exaggerated those which separated Luther from the more radical Swiss reformer Zwingli. The emperor granted a respite till April 15, 1531. By that date, eight princes and 11 cities had formed at Schmalkalden a defensive league for six years. The emperor, more and more hampered by the Turkish peril, finally granted the Peace of Nuremberg (July 1532) which guaranteed the Protestants from molestation until the next general council of the Church. But Clement VII. was in no haste to call such a council; he feared the emperor's encroachments scarcely less than Luther's heresy; and, meanwhile, Protestantism gained much ground, though in Switzerland it had received a check in the death of Zwingli. When at last the general council, in spite of dissensions among the orthodox, seemed imminent, the Protestant princes refused to attend it; they renewed the Schmalkaldic League (1537) and were joined by fresh allies. The emperor formed a counter-league (Nuremberg, 1538) and war seemed imminent, when a compromise was arranged at the Diet of Frankfort (1539).

A series of conferences, from 1540 onwards, produced no real agreement. In 1544 the Peace of Nuremberg was formally prolonged for another five years; but the continual spread of Protestantism, not always without a violence equal to that which their enemies were prepared to exercise, precipitated a struggle. The long-delayed council of the Church had at last met (Trent, 1542); but the Protestants refused to attend it. The emperor declared war; the Protestants were beaten at Mühlberg (1547), and promised to send representatives to Trent, but were freed from that undertaking by Catholic dissensions. At the Diet of Augsburg (1548), Charles drew up on his own responsibility a sort of compromise, the *Interim;* and in 1551 the Protestants sent representatives to Trent.

But the Interim was naturally unpopular on both sides; and, next year, Maurice of Saxony took advantage of the emperor's twofold embarrassments with France and Turkey to turn suddenly against him; he almost succeeded in taking him prisoner. Charles, foreseeing defeat and shrinking from the humiliation, soon transferred to his brother Ferdinand of Austria the direction of German affairs (1554). Maurice was killed in the moment of victory at Sievershausen; John Frederick of Saxony died soon afterwards; but Protestantism was too deeply rooted to be shaken.

"Cuius regio, eius religio."—While the Diet of Augsburg was hesitating to grant religious peace, a rival assembly at Naumburg was attended by more princes than the diet itself, and decided to abide by the confession of Augsburg (1555). (*See* AUGSBURG, CONFESSION OF.) The diet, after many struggles, agreed to one of those compromises which leave seeds for future war. It consecrated the principle *cuius regio, eius religio;* each prince might choose for himself between Catholicism and Protestantism; his subjects must submit to that choice unless they preferred to emigrate. We must here end the story of the Reformation in Germany. The mere fact that Catholicism had been compelled, over and over again, to negotiate with Protestantism on something

like equal terms, was a death-blow to the mediaeval conception of the Church. Now, by this Peace of Augsburg, Protestantism was actually legalized for about half the population of Germany; and this proportion has since maintained itself with little alteration.

SWITZERLAND

Switzerland had broken loose from the empire in 1499; and here was plenty of fuel for Luther's spark. Ulrich Zwingli (b. 1484) was ordained priest in 1506 and soon distinguished himself as an opponent of moral abuses both in the Church and among the laity. In 1518 he succeeded in expelling the indulgence-seller of St. Peter's from the canton of Schwyz; and was promoted to the great minster of Zürich. Here his learning and zeal, aided by the strongly democratic tendencies of this city of Zürich, made him into a combination of prophet, priest and politician. The burghers of Zürich had long exercised a disciplinary control over their clergy which was far from usual; and here also was an important printing press. Zwingli, in his campaign against the wholesale enlistment of young Switzers as mercenaries for foreign countries, was bold enough to preach also "that it is no sin to eat flesh on a fast day, though it is a great sin to sell human flesh for slaughter." This brought him into conflict with the bishop of his diocese (Constance). In 1522, by a custom general among the Swiss clergy, he contracted a connection with the widow of a citizen, and joined with ten other priests in a petition to the bishop against the law of celibacy, on the ground that this was commonly broken in Switzerland. In April 1524 he married her publicly, in defiance of the Church.

Meanwhile the magistrates had arranged a public disputation between orthodox and innovators (Jan. 1523). More than 600 clergy and representative laity attended, and the magistrates decided in Zwingli's favour. In consequence of a second disputation in the autumn, all church pictures and images were abolished; presently the monasteries were disendowed, and their funds devoted to schools and the poor. The neighbouring canton of Lucerne sent to warn Zürich against its heresies; threats were added, and Zürich began to prepare for war. In 1525 a new form of liturgy was prescribed, severely puritanical; and in 1529 the Catholic worship was forbidden.

Division.—Meanwhile the revolt spread to other cantons. At a disputation at Baden (May 1526), which Zwingli refused to attend, 82 clerical representatives voted for the conservative side, as against 20 reformers. Yet the movement went rapidly forward, in spite of Zwingli's quarrel with the more conservative Luther, and of the set-back which followed here, as in Germany, upon the Peasants' Revolt. The forest cantons, with their comparatively primitive and scattered peasantry, were naturally on the conservative side; they had formed an anti-heretical league (April 1524); and in Zwingli the prophet became more and more overshadowed by the politician. Between 1527 and 1530 Zürich succeeded in creating a league of the greater Protestant towns, to which the five forest cantons replied by a "Christian Union" (April 1529). Each party was ready to ally itself with the foreigner; Zürich with France, the Union with Austria. The Swiss confederacy was thus broken up into two opposing camps. The Catholics were unable to accept the full principle of mutual tolerance; and Zürich also was aggressive and intolerant. The two armies faced each other at Kappel, but peace was patched up (June 1529). This was only a truce; they met again at Kappel, where Zwingli was defeated and slain (1531). The peace now made granted to each canton the choice of its own religion, and did much also to protect minorities. The country soon settled into much the same division which still obtains: Catholicism reigned mainly in the mountains and Protestantism in the more fertile lands and in the great cities.

Geneva.—Geneva (not yet in Switzerland) deserves separate mention: it owed everything to its neutral position and to the personality of John Calvin (*q.v.*). The Genevese had lived for centuries under a prince-bishop, though with a good deal of democracy in their civic constitution; thus State and Church were more closely interwoven here than in most other cities.

In 1530 the city rebelled against its bishop; in 1534 it entered into a contract for joint citizenship with Protestant Berne; in 1536 it formally committed itself to Protestantism, and two months later Calvin settled in the city. He was a man of precociously wide and exact scholarship, bred in the law, and touched with inspiration from Erasmus and Luther at the age of 24 (1533).

Calvin's "Institution."—Next year he fled from France; in 1535 he was at Basel, where he wrote in Latin his *Institution of Christian Religion,* which he afterwards turned into French. This epoch-making book has often been misrepresented. Calvin's insistence upon the torments of hell is merely the orthodox mediaeval doctrine, in a far milder form than we find it (for instance) in St. Bernardino of Siena. His insistence upon predestination does not go far beyond St. Thomas Aquinas, whose actual words are often softened down by his modern exponents. The great value of Calvin's book was that it gave a clear and logical structure to a hitherto formless and disorganized Protestant thought, much as St. Thomas and his fellows had constructed a logical synthesis from the heterogeneous mass of Catholic traditions.

In July of 1536 Calvin passed through Geneva, where the reformer Guillaume Farel persuaded him to stay. He introduced into the city, now an independent republic, a discipline which, like his *Institution,* may easily be misunderstood. His supervision of morals and expenses and amusements was no new thing; there is practically no detail in that field which had not been insisted upon by orthodox mediaeval theologians for centuries past, and written in town statute-books, and sometimes even enforced in practice. Here, Calvin's innovation was to substitute stern regularity for impulse and caprice. For the matter was now in the hands of business men; the bishop having been driven out, this enforcement of discipline devolved upon the town council as wielders both of ecclesiastical and of secular authority.

And behind that was another revival from the past. Anxious as Calvin was to revert to the Christianity of the earliest days, and finding as he did in the Lord's Supper the central Christian rite, he insisted on the rejection of unworthy communicants. This regulation proved too stringent for many others besides the "libertines"; and Calvin, with his two chief colleagues, was banished in 1538. The city recalled him in 1541, and he obeyed, most unwillingly, for the sake of what he regarded as a great public work. His *Ecclesiastical Ordinances* and his institution of the *Consistory,* became in one sense the parents of Presbyterianism (*q.v.*). The discipline which had always been advocated was now actually enforced; and nonconformists were punished, sometimes even to the death; the world will never forget how this rebel Calvin burned the Unitarian Servetus. But he saw that a Protestant ministry could never hold its ground without solid learning; therefore he wrote a catechism which should teach even children to give reasons for their faith; moreover, he founded a grammar-school and an academy which attracted able men from all lands, and which sent missionaries out in all directions.

FRANCE

In France, as in Switzerland, the germ of the Reformation is pre-Lutheran. The concordat of 1516 had put the French Church practically under royal authority; the Renaissance (*q.v.*) was rapidly sapping mediaeval conventions; and one very remarkable man devoted himself with equal enthusiasm to religious reform and to learning. This was Jacques Lefèvre (Faber Stapulensis), who in 1512, at the age of about 55, published a Latin translation of the Pauline epistles, with a commentary which roughly anticipated Luther's theory of grace and his denial of transubstantiation. In 1524 Lefèvre revised a French translation of the New Testament, as a foretaste of the whole Bible. He was now under the protection of his old pupil Briçonnet, bishop of Meaux, who had set his heart on the reformation of morals and religion within that diocese. With the help of other pupils, such as Guillaume Farel, Lefèvre created a whole school of students and evangelical preachers.

Meanwhile Luther's doctrines were spreading in France and had been formally condemned (1521); and in 1523 the bishop of

Meaux found himself obliged to fulminate against Luther by name, and against certain doctrines held by Farel and other extremists. Then the *parlement* took strong measures against the innovators: Lefèvre's Testament was burned, while he and his friends found safety in flight. Heresy spread rapidly, and Francis I. favoured or punished it according to the changes of the political weathercock. At the end of 1533 he decreed instant burning against any man convicted by two witnesses of being a Lutheran; but the next January he signed a secret treaty with the Protestant princes of Germany.

Then the excesses of the wilder reformers, who placarded Paris with an offensive broadside against the mass and the priests, caused a natural reaction among the people and at court. In two months, nearly 200 heretics were in the Paris prisons, and eight had been burned. When Lefèvre died (1536) "partly from the timidity of the leaders and partly from the rashness of the rank and file, the first or Evangelical phase of Protestantism in France had failed to bring about a reform of the Church" (A. A. Tilley in *Camb. Mod. Hist.*, vol. II.).

In that same year Calvin published his *Institution*, with which the second, or Calvinistic, phase began. The book supplied the Protestants with a clear and detailed theory of religion; on the other hand, it involved a considerable recoil from two most important principles: it set definite limits both to free enquiry and to individualism. Thenceforward French reformers shared the strength and the weakness of institutionalism. More truly in France than in any other great country, Geneva now became "the Protestant Rome."

The Waldensians.—After a lull, persecution became more severe again (1538–40). The theological faculty of Paris drew up 26 articles of faith in answer to the *Institution*, which Calvin had now published in French, and which was solemnly burned in 1544; meanwhile, many Calvinists were burned here and there. In 1530, the Waldensians (Vaudois) who had survived from mediaeval persecutions in a group of 30 remote mountain villages along the Durance, affiliated themselves to the Lutherans; therefore in 1545, after varying negotiations, an army was sent against them without warning; 22 villages were burned and 3,000 men, women and children were killed.

A still deeper impression was made by the *auto-da-fé* of Meaux (1546) because this was a solemn and judicial act. Sixty persons were here arrested for the crime of having celebrated the Lord's Supper in Protestant fashion; all but ten were punished; 14 were tortured and burned. Even this did not drive the new doctrines altogether underground; other executions took place elsewhere; but meanwhile missionaries and pedlars were secretly preaching and distributing forbidden pamphlets in every province except far-off Brittany. After ten years of this, Francis I. died, and Henry II. sharpened the persecution, by creating an anti-heretical committee of the *parlement* of Paris, which became known as the *chambre ardente*. This condemned at least 100 persons to death in 3 years; and the provincial *parlements* followed suit.

Yet Protestantism still grew; and in 1555 it began to organize itself; churches were founded on the model which Calvin had framed for Strassburg, and in 1559 a General Synod met, representing from 40 to 50 churches. The Government now procured papal approbation for an Inquisition after the Spanish model; but the Paris *parlement* was not prepared to go so far. Meanwhile the new doctrines were taken up by some of the higher nobility; they thus acquired the advantage and the disadvantage of becoming both fashionable and political. The execution of a distinguished member of the *parlement*, Anne du Bourg, for merely protesting against persecution (1559), could be described by an eyewitness as "doing more harm to the Catholic Church than 100 ministers could have done." But the "tumult of Amboise," next year, redressed the balance. The Government, during the boyhood of Francis II., had fallen into the hands of the Guise family; and a number of Protestant nobles conspired at Amboise to arrest and imprison these unpopular rulers. The plot failed and brought natural discredit upon the religious cause.

A Political Party.—Protestantism was now becoming almost as definitely a political party in France as Catholicism; therefore, a council was held at Poissy, virtually representing the whole nation, to find a *modus vivendi* on the basis of mutual toleration. The Protestants were represented by 12 ministers and 20 laymen; the Catholics by six cardinals and 64 prelates or doctors; the king presided, with the queen mother and princes of the blood. The conference failed to effect a compromise between irreconcilable doctrines; but it was followed by an edict granting liberty of conscience within certain definite limitations. This, however, without fully satisfying the Protestants, was enough to exasperate the Catholics.

In March 1562, the former were holding a religious service in a barn at Vassy, in spite of the edict which forbade their worship in any walled town. The duke of Guise, passing through the town, sent his men to expel them. They resisted, and the soldiers stormed the barn, killing 63 of the worshippers and wounding 100 or more. The example of this "massacre of Vassy" was followed in many other places; henceforward the Wars of Religion begin, and we can no longer treat the French Reformation as a purely spiritual movement. The massacre of St. Bartholomew was a natural sequel to the tumult of Amboise and the massacre of Vassy. But, before quitting this subject, we must note that the "Presbyterian" constitution owes even more, directly, to the French Protestants than to any other source. Their "confession of faith" and their "book of discipline," though founded essentially upon Calvin, have more directly influenced the Dutch, Scottish and American churches, than Calvin's own constitution at Geneva.

THE NETHERLANDS

When we have thus followed the German, Swiss and French Reformations, we find little that is new in other Continental countries. The Netherlands were well prepared for Protestantism by their busy civic life, their early welcome of the printing-press, their vernacular translation of the Bible (1477), and the educational work of the *Brethren of the Common Life* or *Common Lot* (*q.v.; see* also GROOT, GERHARD). Luther's writings were welcomed at once; and the Bible was frequently printed in Dutch, Flemish and French between 1513 and 1531.

Charles V. began with public burnings of Lutheran books *en masse*, and then established the Inquisition (1522). Burnings for heresy began early; but the emperor's edicts, though severe and frequently repeated, were difficult to enforce in face of the growing opposition. Special severity and peculiar tortures were reserved for the Anabaptists, who were intercepted and slaughtered in large numbers even when they attempted to emigrate. At last, in 1534, they were provoked to strike back, but with the natural result of severer persecution. Under Philip II., political and religious oppression were intertwined. When, in 1565, he insisted on the publication of the decrees of the Council of Trent, not in the pope's name but in his own, Holland and Brabant protested against this as an infringement of their constitutional liberties. Next year, a confederacy of nobles and leading citizens pledged themselves to resist the Inquisition, and adopted the nickname of *Gueux* (*q.v.*) which the courtiers had fastened upon them.

In July, Philip promised to withdraw the Inquisition and grant such tolerance as his conscience would permit; but the secret archives of Simancas show that he wrote simultaneously to the pope and explained this promise as a mere ruse to gain time. At that point, a series of iconoclastic outrages by the Protestant mob gave a legitimate handle to the Catholics. The duke of Alva was then made vicegerent by Philip II.; he proclaimed heresy as high treason and inaugurated a reign of terror (1567); from that time forth the struggle became political; religious discussion was merged in civil war.

DENMARK AND SWEDEN

In Scandinavia the revolution was comparatively bloodless. King Christian II. of Denmark imported a Lutheran preacher in 1519, and would have welcomed Luther himself; he published new codes of law which no pope could approve. But he became unpopular, fled from his kingdom in 1523, and was reconciled to the

pope in 1529. Meanwhile Frederick I., proclaimed as his successor, made peace with the clergy; but Lutheran doctrines still spread; and, Frederick believing himself to have been tricked by the pope in the matter of the archbishopric of Lund, was confirmed in his own growing inclinations towards Protestantism.

His son Christian and his son-in-law Albert of Brandenburg had already declared themselves and in 1527 Frederick met the solemn remonstrances of the bishops with the reply that faith is free, and that each man must follow his own conscience. In 1530, 21 Lutheran preachers, accused of heresy, offered to dispute publicly in Danish against the accusing bishops, who, however, refused to discuss religious questions in the vernacular. Frederick's son Christian III., in 1536, abolished the bishops' authority, seized their possessions, and imported a disciple of Luther, Bugenhagen, as his chief ecclesiastical adviser. Much of the ancient ritual was preserved; and, though there was inevitable friction between the two parties, this systematic and authoritative change of official religion avoided civil war, and brought Denmark higher in commerce and in learning than she had ever stood before. Frederick and Christian made corresponding changes in their subject lands of Norway and Iceland; but here the ancient abuses had been less crying; the people were less ready for change; so that the revolution thus forced upon them from above caused perhaps as much evil as that which it professed to remedy.

In Sweden also the royal initiative secured a bloodless change. Gustavus Vasa (1523–60) had made the acquaintance of Lutheran preachers before his accession; and political necessities led him to look towards disendowment of the Church. A public disputation in the king's palace (1524) went in favour of the reformers; between 1526 and 1541 the whole Bible was published in the vernacular; and men could henceforth judge better for themselves between the rival claims. The diet of 1527 decided in favour of Lutheranism and disendowment. The next king showed some preference for Calvinism; and John III. (1568–92) proposed reunion with Rome. John's son had adopted Catholicism; therefore the people resolved to secure themselves before his formal accession. A synod of lay folk and clergy was held at Uppsala; it decided to accept the bible as the supreme authority, adopted the Augsburg confession, and restored Luther's catechism as the foundation of all religious teaching.

ITALY AND SPAIN

In Southern Europe, in Italy and Spain, Protestantism enjoyed no princely protection of any importance, nor (perhaps on that account) did it ever spread far enough to gain a hold upon the people. Here, as elsewhere, orthodox reformers constantly fell under suspicion because orthodoxy and radical reform were so difficult to reconcile in practice. The celebrated *Counsel for Amendment of the Church,* drawn up in 1537 by a papal commission of cardinals and other distinguished theologians, insisted that dispensations from Church law should not be so frequent, and should never be given for money. Yet one of these same cardinals, Caraffa, when raised to the papacy as Paul IV., condemned the document in 1559 to his Index of Prohibited Books, while three of the other cardinals (Sadoleto, Contarini and Pole) fell under suspicion of unorthodoxy in later years. Many Italian reformers were thus driven over the line; others protested their loyalty to the last.

The Triumph of Orthodoxy.—The Inquisition, in both countries, was a deciding factor. Into Italy it was reintroduced in 1542 by Cardinal Caraffa, who, when raised to the papacy, worked it with increasing severity. Although Naples and Venice refused to grant it full powers, yet, even there, it was strong enough to prevent any real organization of Protestantism; while in the principalities of Ferrara, Modena and elsewhere heresy was always struck down before it could mature; at Modena 14 persons were burned in the single year 1568. Many fled abroad; in Switzerland there grew up a considerable Italian community; some of these, persecuted by Calvin for their extreme radicalism, fled into Poland and contributed to the spread of Unitarianism.

In Spain, orthodoxy triumphed still more easily. Cardinal Ximenes (d. 1517) had, by the most drastic disciplinary action, raised the Spanish clergy far above the general European level of morals and learning: consequently there was a strong party which could accuse even Erasmus of wild exaggeration in his attack upon Church abuses; distinguished men were condemned for favouring "Erasmic" propositions. Secret communities of Protestants gradually formed at Seville (where we are told of nearly 1,000 members) and at Valladolid. But two *autos da fé* (1559–60) burned 24 men and women at Seville; two others (1559) burned 27 at Valladolid; there were other sporadic executions, and the Spanish non-conformists, like the Italian, could find safety only in flight. In Portugal, where the Inquisition was even more rigorous, we can scarcely guess what might have been the result if anything like private judgment had been possible for the people; what actually happened was that the country produced very few Protestants.

GREAT BRITAIN AND IRELAND

The English story is peculiar in one most important particular. In its beginnings, the Reformation was strongly political, yet not anti-Catholic; Henry VIII.'s ideal was "the papacy without the pope."

Here, as in Germany, the ground was well prepared. Lollardy had been driven underground; but it was still very far from complete extinction. The clergy were, on the whole, unpopular, especially in London. The bishop of London wrote to Wolsey in 1515: "Assured am I, if my chancellor be tried by any [jury of] 12 men in London, they be so maliciously set in favour of heretical pravity that they will cast and condemn any cleric, though he were as innocent as Abel." And Charles V.'s envoy, Chapuys, reported to his master from London in 1529: "Nearly all the people here hate the priests." Here, therefore, as in many other parts of Europe, the mediaeval concordat between Church and State was already breaking down.

And here also the Renaissance had already begun to undermine the old fabric. In 1516, More told Erasmus that the *Epistolae Obscurorum Virorum,* a bitter satire upon the monks and the traditional philosophy, was "read everywhere" in England. Erasmus's own writings had enjoyed great popularity; and Colet, dean of St. Paul's, supported the new learning against tradition with a boldness which naturally started other men upon still bolder courses; moreover, More's *Utopia,* published in 1516, was almost as revolutionary on the theological as on the social and political side. All religions are tolerated in Utopia, and almost all religious discussion. For in this country "nothing is seen or heard in the churches, but that which seemeth to agree indifferently with them all. If there be a distinct kind of sacrifice peculiar to any several sect, that they execute at home in their own houses." Wider knowledge of the universe was beginning to break down that mediaeval condemnation of all non-Christians to hell; and this breakdown must, sooner or later, involve a break with yet other mediaeval tenets.

The "Defender of the Faith."—Therefore, when Luther came forward, his works found an early welcome in England; and in 1521 Henry wrote a Latin treatise against the heresiarch which earned him from the pope the solemn title of "Defender of the Faith." Heretical books were burned in St. Paul's churchyard, and four heretics were burned in the diocese of Lincoln, while 50 more abjured their creed. But Lutheran groups began to form at the two universities, especially at Cambridge; which produced eight leaders of the new movement. Here, in 1525, the prior of the Austin Friars, Dr. Barnes, preached a sermon which caused his prosecution for heresy; he was compelled to abjure at St. Paul's, in company with four German merchants. But, a year later, the king was planning a divorce and remarriage, since it was politically necessary for him to have a definite heir to the throne.

This has often been represented as a mere piece of sensuality; but the facts speak plainly to the contrary. There was nothing to prevent Henry, if he had wished it, from keeping a harem like those of his contemporary Francis I. in France and his successor Charles II. in England. Moreover, before the question of Catharine's divorce came up, Henry was already taking very strong measures in another direction; he heaped honours upon his one

known illegitimate son, Henry Fitzroy, and planned, with the advice of his council, the proclamation of this six-year-old boy as heir to the throne. But the plan broke down and Henry's attachment to Anne Boleyn now contributed to suggest the other expedient of a divorce from Catharine. (In the strict technical sense it was not a *divorce*, but a *decree of nullity*; however, the briefer term was very commonly used then, as since.)

This complicated story may be reduced to a few simple issues. In the minds of all the principal actors except Catharine, the problem was mainly or wholly political. The king needed a male heir; he and his counsellors augured disaster to the kingdom from a female or a disputed succession. So also with Rome; Clement VII. himself was long in making up his mind as to the Catharine case; and, most significant of all, he actually suggested in 1530 that the problem might be solved without divorce, by allowing Henry two wives at once. (A. F. Pollard, *Henry VIII.* [1905], p. 207.) Even if, as some of Henry's advisers suggested, this was merely a diplomatic feint, it is no less significant in this present connection. Henry had thought of the proposal seriously at an earlier stage, and based it upon Old Testament precedents. As Pollard points out, Eugenius IV. had actually granted similar licence to Henry IV. of Castile, for similar political reasons, in 1437. For the pope's real difficulty was not in the moral problem of the Boleyn marriage but in the political problem of the divorce, since Catharine was aunt to the most powerful sovereign in Europe, and the one from whom Clement had most to fear personally. Therefore the pope evaded all definite decisions, shifting in response to the shifting political situation, for three years (1527–29), when at last he transferred the case to Rome.

Then, at Cranmer's advice, Henry appealed to the universities, and, apart from Oxford and Cambridge, eight of the greatest in Europe decided for him (Paris, Orléans, Bourges, Toulouse, Bologna, Ferrara, Pavia and Padua). However much we may discount these verdicts by royal pressure and other evidence which suggests bribery by both parties, yet on the whole "these opinions must stand for the general opinion of the learned, unless the divines of France and Italy were more generally venal than is commonly supposed" (H. M. Gwatkin).

Supreme Head.—Already in 1529 Henry had begun to permit the circulation of anti-papal German pamphlets as a threat to the pope; and had even allowed his envoy to hint at further Lutheran developments. Next year, the bishop of Norwich complained of the impossibility of destroying heretical books so long as many folk believed the king to favour them. But at that very moment Henry was taking public measures against heresy, burning Tyndale's New Testament, and forbidding all English Bibles until a version should be made "by great, learned and Catholic persons." This last (as More confessed about the same time) was a great desideratum; yet no such orthodox version was made, or even attempted until long after England had broken finally with Rome (1582–1609).

Already, in 1529, Henry had begun an attack upon the clergy, probably upon the advice of his new minister, the adventurer Thomas Cromwell. Taking advantage of their notorious unpopularity, Henry considerably curtailed the clerical exactions of which lay folk were complaining, and restricted the evils of plurality and non-residence. It was made a penal offense to evade this statute by seeking dispensation from Rome.

Next year, came a still plainer step. Henry, under form of law and without real justice, condemned the clergy of England for having allowed the papal legate to set up his court in England, in violation of the Statute of Praemunire. He extorted not only an enormous fine, but also an acknowledgment in the convocation of Canterbury that the king is "only and supreme lord [of the clergy], and, as far as the law of Christ allows, even supreme head." But this weapon rested in its sheath until the parliament of 1532.

In this parliament, by means which cannot be palliated except on the plea that they were usual in the politics of that day, and that his adversaries were not more scrupulous, Henry first forced convocation, the parliament of the clergy, to accept three articles which definitely submitted Church to State in England. He then procured from parliament a statute abolishing "annates," one of the most lucrative sources of papal revenue from England: this, however, he held in his hand at first only as a menace to Rome, until he had procured papal bulls of approval for the election of Cranmer as archbishop of Canterbury. Next, he procured a statute declaring the king supreme head of Church and State, and forbidding all appeals to Rome. Then, by a capitulation even more humiliating than the previous "submission of the clergy," convocation, at Henry's demand, declared the nullity of Catharine's marriage. There was a mock-trial of the case at Dunstable, and Henry, who had already secretly married Anne Boleyn, was now free to make her his queen. How he then succeeded in defying papal excommunication, and in preventing any papal crusade being launched against him by the Catholic princes of Europe, is a purely political story. Before parliament dissolved, it passed a statute forbidding all further payments of any kind to "the bishop of Rome," and "an act for the submission of the clergy to the king's majesty."

The rest of Henry's reign was spent in ruthless warfare against heretics who believed in mediaeval Catholicism less than he did, and against others who believed more than he. His "six articles" of 1539 rehearsed nearly all the main points of the mediaeval creed; to deny transubstantiation was made heresy, and therefore punishable with burning; to deny any of the other five was felony. Consequently the king was burning heretics on the one hand, while on the other he was enforcing obedience to the royal supremacy by beheading Fisher and More.

The Monasteries.—Three causes led him to strike at the monasteries. They were pro-papal, wealthy, and not popular enough to find many defenders. Among the few points of importance upon which historians on both sides are agreed, are two which concern us here: that the monasteries necessarily considered their own cause bound up with the pope's and that one of the most remarkable features of Henry's despotic reign is the absence of organized or determined resistance on the part of the clergy, whether cloistered or not. Henry was extravagant; he wanted money; and here was a comparatively easy prey. Everywhere else in Europe, the civil authority had already been obliged to interfere in the cause of monastic reform.

The articles of reform for English monasteries, which Cromwell issued by Henry's orders, do not deserve the blame which has sometimes been cast upon them. Not only the majority of them, but the most important, were taken straight from the Benedictine rule or from the decrees of popes and other orthodox reformers in the past. When, for instance, Cromwell prescribes "that no monk, or brother of this monastery, by any means go forth of the precinct of the same," he is here only summarizing the plain prohibition in chapter 66 of St. Benedict's rule. When, again, he goes on to command that "women, of what state or condition soever they be, be utterly excluded," this is one of the most time-honoured and frequently repeated of monastic statutes. The only real novelties in this Cromwellian document are the command to accept and preach royal supremacy, and the freedom given to subject monks to complain against superiors who neglect or contravene any of this long list of injunctions.

But Cromwell's visitation of the monasteries is open to far more serious criticism. He chose base agents, who did their work in a base and hasty fashion. It is quite possible that they invented much of their evidence; yet we have irrefragable orthodox testimony to the fact that this unfavourable evidence did not violate probability. The spoils of the monasteries were devoted partly to public purposes, but mainly to pay Henry's courtiers: here England compares very unfavourably with Scotland and some of the German states, where the money went in a large measure to education. Yet, apart from all this which must be said against Henry's unjust and wasteful methods, his dissolution of the monasteries is justified by the experience of other European countries, all of whom, sooner or later, have been compelled to do the same. In Italy and Spain, where Protestantism has been virtually non-existent; in France, where Louis XIV. drove out thousands of Huguenots, and the pastor François Rochette was condemned and hanged in 1761 for exercising his pastoral office; in Austria, where

the small minority of Protestants was either driven into exile or submitted to the same leaden, crushing tyranny which England exercised over the Irish Catholics; in all these countries there has been a wholesale dissolution and disendowment.

The Tudor monasteries were probably in much the same state as that Oxford which Gibbon describes in his autobiography: and, if the universities of Gibbon's day had been entrenched behind all sorts of extra-legal privileges; if the students had been as numerous as the Tudor Religious were; and if they had successfully resisted, for at least three centuries, all serious efforts for reform, then we can hardly doubt that they also would have been disestablished and disendowed before now. The dissolution was one of many causes for a rising in Lincolnshire, and for the "Pilgrimage of Grace," in the north, where the people were poorest and least educated, and the monasteries would most be missed. Henry here showed himself a perfidious negotiator and took a very cruel vengeance; but his cause had been supported by many of the higher nobility; and he had no difficulty in getting the shire levies of the south to march against the northern rebels (1536).

Edward VI.—Under Edward VI. religious changes came far more rapidly. Henry VIII. had ended by not only permitting but enjoining the popular study of the vernacular Bible (1536–38) and, though the permission was limited in 1543 to the higher classes of society, yet even this implied a freedom of private judgment quite incompatible with mediaeval tradition, and gave an enormous, if not intentional, impetus to Protestantism. Politics, however, played almost more part in the Reformation under Edward VI. than under his father. Reformers were dominant on the council of regency which Henry had appointed; Edward's two tutors, Cheke and Cox, had both been reformers. Under the protector Somerset the chantries were suppressed and confiscated; many of them had also been scholastic foundations in a small way; and thus, though mediaeval England had never possessed an educational system in the modern sense, Edward VI. did far more harm to the schools than he atoned for by a few foundations of his own (1545).

Then, in 1548, came deliberate iconoclasm. The party which looked upon images as a hindrance to true religion was stronger now than those who found them edifying, and much regrettable violence was exercised; yet, when we take a wide view, we find that the orthodox Catholic Montalembert is right in pointing out that a larger proportion of mediaeval Gothic architecture has survived in England than in France. Edward VI. introduced an English liturgy and a Protestant confession of faith in 42 articles (since reduced to 39); and he permitted marriage to the clergy.

A Return to Rome.—His early death put the Catholic Mary upon the throne, while the country in general was still halting between the rival creeds. She communicated immediately with Rome; Cardinal Pole was sent as papal legate; and both houses of parliament answered affirmatively to Mary's question whether they would return to papal obedience. They next rescinded all the anti-papal legislation of Henry VIII. and Edward VI., and revived the statutes against heresy. Mary was now free for all violent measures.

She had promised, and perhaps intended, leniency; but here was a death-struggle between two incompatible ideals, and, in an age when scarcely anybody believed in toleration, Mary had only one choice. She executed 210 Protestants in her last three years; and, at her death, this rate was rather rising than falling. This was fatal; her very first victim, John Rogers, had been so heartily cheered by the London crowd "that he seemed to be going to his marriage," so wrote the French ambassador to his master. This sympathy, strong from the first, grew in proportion as the queen's desperate efforts intensified. Moreover, a new generation was growing up which was far more widely educated than its ancestors; and this was especially noteworthy with the women.

Elizabeth.—The country welcomed Elizabeth; and, though she was not tolerant in the modern sense, she and her ministers carried through one of the most successful compromises in history, the "Reformation settlement." Elizabeth herself would possibly have preferred a moderate form of non-papal Catholicism, though one of her earliest acts was very significant; she forbade the bishop who said mass in her presence to elevate the Host, and went out of the chapel when he disobeyed. Many of her subjects were convinced and determined Catholics. But she recognized that Protestantism had come to stay; and she so managed that it should have far more freedom than in any Catholic land, while the Catholics, on the other hand, had as much liberty as the Protestant nonconformists.

Death was the legal penalty for obstinate refusal to take the oath of royal supremacy; but in fact no Catholic who refrained from political plots needed to fear more than a shilling fine for each refusal to attend Sunday service, until after the pope had excommunicated her and decreed her deposition. Scarcely one-fiftieth of the Marian clergy were deprived of their livings for refusing the oath. Therefore the nation settled down rapidly; and the result was a more rapid national advance in learning, in literature and in commerce than at any period since the Conquest. One set of figures may be quoted as typical of the rest. The religious quarrels told very heavily upon the universities. The number of degrees fell sadly at Oxford under Henry VIII., and rose again under Mary to the mediaeval average; at Cambridge, however, they fell under Mary. From 1555 to 1558 they averaged only 28 a year; but in 1570 they had risen to 170, and in 1583 to 277, or three times the mediaeval average.

Scotland and Ireland.—The Scottish Reformation went on side by side with the English; each assisted the other. John Knox and Elizabeth were far from complete agreement; but they had sufficient sense and self-control to work together. This religious Concordat went far to obliterate ancient enmities; "Knox included in his liturgy a prayer that there might nevermore be war between Scotland and England; and that prayer has been fulfilled" (F. W. Maitland in *Camb. Mod. Hist.*, vol. II.). In 1560 the Scottish parliament did what the English had done a year before; mass and papal authority were formally rejected. Knox's *Book of Discipline*, founded mainly on Calvin's *Institution* and on the organization already adopted by French Protestantism, fixed Scotland in "presbyterianism."

The democratic character of the Scottish Reformation, and Knox's own zeal for education, go far to explain the subsequent love of learning and the high level of general education in Scotland; though the greed of the barons frustrated the hope of endowing a whole system of schools and colleges from confiscated Church property.

England's treatment of Ireland is a black page in Reformation history. The country was conquered, and the conquerors dealt with it after the brutal fashion of that time. Few Catholics lost their lives for religion pure and simple, as apart from political revolts; but a series of unjust penal statutes were enacted, and these, although seldom enforced in their full theoretical strictness, were relaxed far too slowly in the face of advancing civilization; therefore, instead of weakening, they have only strengthened the attachment of the Irish to their religion.

GENERAL RESULTS

It has sometimes been argued that the present religious equilibrium, or something better, might have been obtained without revolution. But this contention seems scarcely reconcilable either with previous or with subsequent history.

We have seen how long this revolution had been brewing. It would be difficult to find any institution which has been so severely criticized by so many of its most devoted adherents, through so many centuries, as the mediaeval Church. At the very beginning of the 12th century, St. Bernard had emphasized weaknesses which, if not remedied, must necessarily bring disaster; yet orthodox churchmen of 1500 frequently quote St. Bernard's actual words as exactly applicable to the Church of their own day. Some scandals had been abated; but others were even more rampant. Such improvements as had taken place were mainly due to pressure from the laity; and friction between clergy and their flocks seemed increasing rather than decreasing.

Subsequent history, again, seems to point even more decisively in this same direction. We have seen that the real question at issue was that of private judgment. Nearly all reformers had

two fundamental points in common with the orthodox; they wanted to save souls and they believed in the inerrancy of the Bible. But on one fundamental point they differed; is the Bible to be interpreted by the individual for his own soul's sake, or by the Church for the individual's soul's sake? The reformers acted on the former principle; and this opened the floodgates for the rest; so, although the full claim of private judgment was not the basis on which the reformers consciously took their stand, yet it was implicit in their original theories and in their original actions.

Private Judgment.—Between authority and private judgment, no agreement seems possible except the agreement to differ; yet even that was essentially impossible under the mediaeval régime. To differ publicly from any solemn pronouncement of the Church was a crime; obstinately to differ was a capital crime. Therefore no orthodox mediaeval churchman could grant to others the right of nonconformity, or could really escape from the responsibility (however much he might personally shrink from it) of denouncing and punishing all dissenters. Yet, by 1500 at least, it was becoming quite obvious that considerable numbers of Christians were trusting more to private judgment, confessedly or implicity, than to the traditional teaching of their priests.

The Inquisition had driven the nonconformists underground for nearly three centuries, very much as early Christianity had been driven underground for nearly three centuries by imperial persecution; but it was now emerging with irresistible force. The pope could not now do what Constantine had done in 324, reversing at a single stroke the policy of his predecessors. To Constantine, this religious question had been only one of many debatable issues, and he may even have looked upon it as one of the least important of his political problems; therefore, a reversal at that point need not in the least imply reversal of the whole imperial machine. To the pope, on the other hand, this question of private judgment was absolutely fundamental.

Moreover, even the strongest of popes was always far more at the mercy of his predecessors' traditional policy, of his court and of his officials, than a strong emperor. The pope had no means of coming to terms with Protestantism but by accepting the basic tenet of Protestantism; the Protestants, again, could have come to terms only by abandoning a tenet which, implicitly at least, was absolutely necessary to their position. And the fact that, after a century of strife, Christendom was, and has since remained, pretty equally divided between these two irreconcilable principles, would seem to prove that no human ingenuity could have kept the parties permanently within one single fold.

And, indeed, this division of parties seems to have worked more than any other factor towards that tolerance which is one of the greatest gains of modern civilization. The general mass of European society had improved greatly, in many important respects, between 1100 and 1500; but in this one matter of toleration there had been painful and continual retrogression. The Reformers, again, at their earliest stage, were compelled to plead for impunity; but, once in power, they proved as untrue to this principle as the Christian Church had proved when the emperors raised it from a persecuted minority to a persecuting majority.

Mutual Toleration.—Lord Acton, in one of his most plain-spoken essays, has insisted on the wickedness of this *volte-face*, and has pointed out that the innovators Luther and Calvin lacked that palliation which may be pleaded for persecutors who had persecuted in defence of tradition. But, whether we agree or disagree with him in condemning the individual persecuting Protestant more severely than the individual Catholic, the fact remains that the principle of private judgment is logically inseparable from the principle of toleration, and that no institution can survive, in the face of a powerful enemy, if it acts in public and systematic and continual violation of its own fundamental principle. There is a painful truth in the contention that both sides have learned toleration only under outside pressure; yet that pressure itself has resulted from the assertion of a principle irreconcilable with mediaeval theory and practice.

Private judgment brought half of Europe into conflict with the traditions of centuries; the resultant wars were indecisive; it became evident that neither side could exterminate the other; thenceforward both were obliged to seek some way of living together in the same world. The one party has never granted the individual's right to interpret Scripture otherwise than it was interpreted by the mediaeval hierarchy. Even Protestantism, for many generations, did not advance from the claim for individual interpretation of the Bible to the wider modern claim of rejecting, when necessary, some things that are plainly written in the Bible. But Catholics and Protestants and men of many other creeds live together nowadays in far less discord than that which often reigned in the middle ages among professing Catholics.

The Reformation thus becomes one of the most remarkable episodes in world-history, whether we regard it in bulk or in detail. It is rich in striking incidents and in display of human character, both on the Catholic and on the Protestant side; we may find here the loftiest heroism and the lowest depths of turpitude. It exemplifies all the problems of daily life, magnified in proportion to the greatness of the issues here involved. And from the heat of this conflict between two irreconcilable ideals one principle has slowly emerged, theoretically repudiated by one side and too often violated by the other in practice, yet finally victorious through the mere force of circumstances; the principle of religious toleration. The experience of centuries has now suggested that the main differences which separate many minds from the teaching of the mediaeval Church are rooted in human nature itself; and that, however near the two parties may draw to each other in the distant future, no such *modus vivendi* was possible in 1517.

BIBLIOGRAPHY.—L. v. Ranke, *History of the Reformation in Germany*, trans. S. Austin (1845); C. Beard, *The Reformation in Relation to Modern Thought* (1883, republished 1927); F. v. Bezold, *Geschichte der deutschen Reformation* (1890); J. Janssen, *History of the German People at the Close of the Middle Ages*, 17 vols., tr. M. A. Mitchell and A. M. Christie (1896–1910); E. Armstrong, *Charles V.* (1902); J. Gairdner, *History of the English Church in the 16th Century* (1902); *Cambridge Modern History*, vol. ii. (1903); A. F. Pollard, *Henry VIII.* (1905); H. A. L. Fisher, *History of England 1485–1547* (1906); T. M. Lindsay, *History of the Reformation* (1907); A. O. Meyer, *England and the Catholic Church under Elizabeth*, tr. J. R. McKee (1916); H. M. Gwatkin, *Church and State in England* (1917); R. H. Tawney, *Religion and the Rise of Capitalism* (1926). (G. G. C.)

REFORMATORY SCHOOL, an institution for the vocational training of juvenile offenders. In Great Britain this means offenders over 12 and under 16 years of age, who have been convicted of offences which, in the case of adults, would be punishable by penal servitude or imprisonment. The period of committal to a reformatory school is for not less than three years and not more than five years, and not beyond the age of 19. The schools are supported in the main from public funds, are regulated by the Children Act, 1908, and are supervised by the home secretary. The departmental committee on young offenders recommended, in March 1927, the substitution of 17 for 16 as the upper limit of age at the time of committal to a reformatory school and the abolition of the distinction between these schools and industrial schools (*q.v.*). *See* also BORSTAL SYSTEM. (X.)

THE UNITED STATES

The reformatory system of the United States, as distinguished from the penitentiary or prison system, may be considered under two heads: (*a*) reform schools and industrial schools for youths under 16 or 18 committed for violations of the criminal law or for the want of proper guardianship, and (*b*) reformatories for adolescents between the ages of 16 or 18 and 30 convicted of criminal acts. The former is an outgrowth of the houses of refuge, which developed in the early part of the 19th century, under private and charitable organizations.

Beginning with the last quarter of the 19th century, a number of States established industrial schools or State homes for the correction and training of their delinquent youths. The reformatory for older adolescents had its birth in the United States in 1869, when the New York State legislature enacted legislation and appropriated funds to build the New York State Reformatory at Elmira. The Elmira reformatory system of academic and trade training is still regarded as the best of its kind in the United States. Almost every State has at least one reformatory. In

practically all cases the system of discipline, training and release established at Elmira has been more or less followed. The indeterminate sentence is an integral part of the American reformatory system. Beginning with 1925 there has been a decided trend towards specialized vocational training in connection with the educational work of all American reformatories. In the most progressive reformatories the academic and vocational training is being carefully guided by psychological and psychiatric work in the clinics of the institutions. This has led to marked improvement in the classification and training of prisoners. It is significant that more and more the clinical studies are being used as a basis for determining fitness for release.

The U.S. Government opened its first Federal reformatory for adolescent male offenders in March 1926, at Chillicothe, O. In 1927 the first Federal Industrial Institution for Women was opened at Alderson, W.Va. Prior to this time, Federal offenders of all types over 16 years were received at the Federal penitentiaries. The Federal Government follows the practice of boarding many of its offenders in State reformatories and county workhouses.

BIBLIOGRAPHY.—F. H. Wines, *Punishment and Reformation* (1895); C. R. Henderson, *Modern Prison System* (1903); Z. R. Brockway, *Fifty Years of Prison Service* (1912); B. G. Lewis, *The Offender* (1917); *Annual Reports* of the American Prison Association; O. F. Lewis, *The Development of American Prisons and Prison Customs* (1922); *Journal of Prison Discipline and Philanthropy*, vol. i.; H. H. Low, *Juvenile Courts in the United States* (1927). (C. DE.)

REFORMED CHURCHES, a name theoretically applicable to all the churches sprung from the Reformation: but historically applied to those Protestant bodies who followed Calvin, as distinguished from the Lutheran or Evangelical communities of Germany.

REFORMED CHURCH IN AMERICA, a church founded by the colonists from the Netherlands, the first settlers of New York and New Jersey. Generally known from the beginning in New Amsterdam until now as the Dutch Reformed Church, it was incorporated as the Reformed Protestant Dutch Church in 1819. This official title was changed to the Reformed Church in America in 1867. Its oldest organization is the church on Manhattan island, known as the Collegiate church of New York city, organized in 1628, the oldest Protestant church in the Middle States and probably the oldest Protestant church of settled ministry and continuous service in the United States. The first minister was Jonas Michaelius, who associated with himself Peter Minuit, director of the colony, and Jan Huygens, elders, and Sebastian Janz Krol, deacon, as the first consistory. The second church (1642) was built at Ft. Orange, now Albany; its first minister was Johannes Megapolensis, who also was missionary to the Indians. Other churches of this early time were (1654–60) Flatbush, Flatlands, Bushwick, Gravesend and Brooklyn; (1659) Kingston; (1660) Harlem; (1660) Bergen. The passing of New Netherland from Dutch to English rule in 1664 retarded Dutch colonization and increase of the churches. Growth was constant, however, as the population spread through the surrounding regions. The work of Guliam Bertholf was especially notable from 1693 to 1724 in preaching, administering the sacraments and assisting organization in New Jersey. Theodorus Jacobus Frelinghuysen, who came from Holland in 1719, gave the Church remarkable service as leader in its spiritual life and in uniting the scattered churches into a denomination.

During the middle of the 18th century the life and progress of the Church were much affected by three questions under discussion, dividing for the time the ministers and churches into two parties: whether the ministers for the Church must be educated in theology in the Netherlands, as was insisted upon up to this time, occasioning great scarcity of ministers; whether the Dutch language ought to be the exclusive language in the pulpit; whether the churches should continue under the authority, active from the beginning, of the Church in the Netherlands. The two parties were known as the coetus and the conferentie, the one favouring, the other opposing, the changes discussed. In 1764 Archibald Laidlie was installed as one of the ministers of the New York city church to preach in the English language. In 1766 a charter was secured, and in 1770 a second charter, for Queen's college, now Rutgers university at New Brunswick, N.J., with provision for a chair of divinity. In 1771 John H. Livingston, graduate of Yale and, in theology, of Utrecht, coming to the New York church as one of its ministers, proposed a Plan of Union which united the two parties and, with the consent of the Church abroad, laid the foundations for independent Church government in the United States. In the Revolutionary War at this time the ministers and people of the Church were quite wholly on the patriot side. Among the ministers especially notable in the service of the new nation was Jacob Rutsen Hardenbergh, first president of Queen's college. Dr. Livingston became the Church's first professor of theology in 1784, the divinity work at Queen's not having been established, and thus began what is now the New Brunswick seminary, the oldest theological seminary in the country.

From this time the Church's growth was not at all confined to people of the Dutch blood, or to places of early Dutch settlement. It extended somewhat westward with the moving population. The greatest increase in its numbers and strength in the mid-west, however, has been through the coming since 1847 of many Dutch people, in protest against conditions in the State Church of Holland, to establish themselves in Michigan, Wisconsin, Iowa and the Dakotas. Their two chief centres are Holland, Michigan, where they have Hope college and Western seminary, and Pella, Ia., where they have Central college. In foreign mission fields the work of the Church has been distinguished from the early part of the 19th century; pioneer work in India, China, Japan and Arabia continued as a denominational enterprise.

The Church is of the Calvinistic faith and government. It has a formal constitution, the Plan of Union (1771) being followed by adoption in 1792 of the Articles of Dort (1619) with explanatory articles, these merged into the constitution of 1833, revised in 1874 and 1916. Its doctrinal standards are the Belgic Confession, the Heidelberg Catechism and the Canons of the Synod of Dort. Its government is presbyterial with four assemblies or judicatories, the consistory (minister, elders and deacons), the classis, the particular synod and the general synod. The organization of the local Church differs from that of the Presbyterian Church in that the elders and deacons, the consistory, are the trustees. It has a very complete liturgy, the use of some of it being required, the Church being described as semi-liturgical.

The reports of 1927 show with the general synod, the particular synods of New York, New Brunswick, Albany, Chicago and Iowa, 40 classes, 741 churches, 808 ministers and 151,281 members, contributions for missions and benevolence $1,182,268, and for congregational purposes $3,905,956.

BIBLIOGRAPHY.—C. E. Corwin, *Manual of the Reformed Church in America* (1922); W. Heyns, *Expositions of Reformed Doctrine* (1926); W. Van Eyck, *Landmarks of the Reformed Fathers* (1922).

REFORMED CHURCH IN THE UNITED STATES, a German Calvinistic Church in America, commonly called the German Reformed Church. It traces its origin to Switzerland, France and Germany and especially to the great German immigration of the 17th century to Pennsylvania where the Reformed element was estimated in 1730 to be more than half the whole number of Germans in the colony. In 1709 more than 2,000 Palatines emigrated to New York with their pastor, Johann Friedrich Hager. Other early pastors (1710–40) were Rev. Samuel Guldin, Johann Philip Boehm, George Michael Weiss, Johann Heinrich Goetschius, Johann Conrad Wirtz and Johann Bartholomaeus Rieger. Michael Schlatter (1716–90), sent to America by the Synod (Dutch Reformed) of Holland, immediately convened Boehm, Weiss and Rieger in Philadelphia, and with them planned a Coetus, which first met in 1747. Many churches and pastors were independent of the Coetus, within which there were two parties. Of the Pietists of the second class, one of the leaders was Philip William Otterbein whose system of class-meetings was the basis of a secession from which grew the United Brethren in Christ (*q.v.*), organized in 1800. During the Revolutionary War the Pennsylvania members of the church were mostly attached to the American cause; but in New York and in the South there were many German Loyalists.

The Coetus actually assumed the power of ordination in 1772 and formally in 1791. In 1792 a Synodical Constitution was prepared; and in 1793 the Coetus of Pennsylvania became the Synod of the German Reformed Church in the United States. (The word "German" was dropped from the official name in 1869 by action of the General Synod.) This first Synod met in Lancaster and adopted its own constitution, thus becoming independent of Holland. Its churches numbered 178, and there were about 15,000 communicants. The strongest churches were those of Philadelphia, Lancaster and Germantown in Pennsylvania, and Frederick in Maryland. By 1825, 13 Reformed ministers were settled west of the Alleghenies. The Synod in 1819 divided itself into eight Classes. The Synod of Ohio was organized in 1824.

Franklin college was founded with much outside help, notably that of Benjamin Franklin, at Lancaster, Pa. in 1787. In 1825 the church opened a theological seminary at Carlisle, Pa. (now at Lancaster, Pa.) and later an academy which in 1836 became Marshall college at Mercersburg where the Mercersburg theology was founded. The seminary was removed in 1871 from Mercersburg to Lancaster, whither the college had gone in 1853 to form, with Franklin college, Franklin and Marshall college. The Synod of Ohio founded a theological school and Heidelberg university at Tiffin, O., in 1850. The General Synod of the church was organized in 1863 as the highest judicatory following the tercentenary celebration of the Heidelberg Catechism, the recognized doctrinal standard of the Reformed Church, published in Germany in 1563.

After a long controversy over a liturgy (connected in part with the Mercersburg movement) a Directory of Worship was adopted in 1887 and revised in 1926. The work of the Reformed Church is directed through five boards created by and responsible to the General Synod. Since 1926 the General Synod has functioned in the interim between its triennial meetings through an executive committee of 20 representative ministers and elders. In 1928 there were seven District Synods meeting annually in the fall. These include 60 classes which meet annually in the spring of the year.

The statistical reports for 1928 reported 1,744 congregations with a communicant membership of 356,093; 1,336 ministers; 39 licentiates; 312 students for the ministry; 347,256 Sunday-school scholars; total contributions for congregational purposes $5,574,547; $1,586,974 for benevolence, and church property and parsonages valued at $48,255,581.

BIBLIOGRAPHY.—J. I. Good, *History of the Reformed Church in the United States, 1725–1792* (1899); J. H. Dubbs, *Historical Manual* (1902); and sketch in vol. viii. of the American Church History Series (New York, 1895); *The Forward Movement Handbook* (1920); and *Minutes of General Synod* (1926). (J. R. S.)

REFORMED EPISCOPAL CHURCH, a Protestant community in the United States of America, dating from December 1873. The influence of the Tractarian movement began to be felt at an early date in the Episcopal Church of the United States, and the ordination of Arthur Carey in New York, July 1843, a clergyman who denied that there was any difference in points of faith between the Anglican and the Roman Churches and considered the Reformation an unjustifiable act, brought into relief the antagonism between the evangelical Protestant clergy and those who sympathized with the position of Carey. The struggle went on for a generation and with increasing bitterness. The climax was reached when George D. Cummins (1822–1876), assistant bishop of Kentucky, was angrily attacked for officiating at the united communion service held at the meeting of the Sixth General Conference of the Evangelical Alliance in New York, October 1873. This prelate resigned his charge in the Episcopal Church on November 11th, and a month later, with seven other clergymen and a score of laymen, constituted the Reformed Episcopal Church, and consecrated Charles E. Cheney (b. 1836), rector of Christ Church, Chicago, to be bishop.

The Church recognizes no "orders" of ministry; the Episcopate is an office, not an order, the bishop being the chief presbyter, *primus inter pares*. *See* also ENGLAND, CHURCH OF.

REFORM MOVEMENT, the name given in history to that movement towards parliamentary electoral reform, active in England between 1769 and 1832, and in France between 1832 and 1848. Different as the two movements were in character, time (the principal phase of the English struggle was over in 1832, when the movement in France was, strictly, only beginning) and result (the ultimate desideratum of manhood suffrage was achieved in France in 1848 and in England only in 1918), the march of events in either country had a profound effect upon the movement in the other. The following article sketches the course of the movement in the two countries. (X.)

THE MOVEMENT IN ENGLAND

The ultimate, if long delayed, success of "reform," embodied in the great act of 1832 was due to an unanalysable blend of political theory and the logic of concrete fact. The political, social and economic structure of Great Britain had, in short, been revolutionized between 1780 and 1830 before the revolution was expressed in a decisive formative statute. The act of 1832 did not so much impose the new system of an ardent minority on an unprepared country as it translated into the organization of self-government the appropriate machinery for achieving what a majority had already accepted as inevitable.

The System in 1714.—The system of representation existing in 1714 was, like every other major organ of the national life, the deposit of a prolonged historic development of at least eight centuries. The House of Commons in 1714 consisted of 558 members, of whom 513 represented England and Wales and 45 represented Scotland. Ireland (with 100 members) was not included until the Act of Union of 1800, which abolished the separate Irish legislature. The Scottish representation had only been introduced in 1707 by the Act of Union. Of the 513 English representatives 94 represented counties, 415 boroughs, and four the two universities of Oxford and Cambridge; 30 members represented Scottish counties and 15 Scottish boroughs. The English franchises for the counties, and the boroughs differed fundamentally. The county franchise, with trifling exceptions, was based on a 40s. freehold, assessed to the land tax. The borough franchise was amazingly varied and defied reduction to a single principle. Four groups can broadly be distinguished: (i.) The "Scot and lot" and "pot walloper" boroughs, where the voters, roughly, were residents rated to Church and poor rate; (ii.) the boroughs where every freeman, *i.e.*, enjoying the freedom of the borough, had a vote; (iii.) the burgage-boroughs with the franchise attaching to a certain holding or burgage, and (iv.) the corporation-boroughs, where a close corporation was the privileged electoral organ.

The county franchise dated back to 1430. The borough franchise was the haphazard result of five centuries of piecemeal development. The electoral map of 1714 emphasized the enormous preponderance of voting power in the borough representatives. The distribution of the boroughs roughly represented the distribution of population at the end of the 16th century. But by 1650 this distribution had altered, and since then had been altering rapidly, even before the radical redistribution and growth caused by the "Industrial Revolution" (*q.v.*). The "Reform of Parliament" embodied in "The Instrument of Government" of the Cromwellian period (1654), demonstrated very clearly by its redistribution the admitted hiatus between the existing system and the actual facts. The elaborate analyses made by the "Reformers" of the 18th century revealed these bewildering anomalies. Apart from the contradictions of the borough franchise, which allowed a vote in one borough that was denied in another, custom degenerating into caprice, or avowed manipulation, the distribution of seats resulted in the most astonishing paradoxes. Cornwall, for example, paying 16 out of 513 parts of the land-tax, returned 42 members (two county, 40 borough members); Lancashire, paying ten times as much, returned 14 (two county and 12 borough members). The City of London returned four, as did, also, the united boroughs of Weymouth and Melcombe Regis, with neither landed nor economic interests. In Yorkshire, York city and 13 boroughs, with a total of 7,000 voters, returned 28, while the county, with a total of 16,000 voters, returned two members.

The disabilities imposed by law severely restricted both the electors and the elected. Apart from women, children, lunatics, paupers or convicted criminals, the Nonconformists, the Roman

Catholics, the Quakers, the Jews and agnostics could neither vote nor be elected. In the counties neither leaseholders nor copyholders, however wealthy, could vote. Prosperous cities such as Birmingham or Manchester, which had come into existence since 1600, had no representation, while Old Sarum with seven, or Dunwich, half under the sea, with 14 voters, returned respectively two members apiece. Even in 1714 it was abundantly clear that members of parliament did not represent their constituencies, and that the constituencies still more did not represent the nation. It was estimated in 1793 that, with a population of some eight and a half millions, 257 members (*i.e.*, a majority of the House of Commons) were returned by 11,075 electors; that in 51 constituencies there were less than 50 voters, and that 130 boroughs had less than 300 electors apiece; and that whereas 92 county members were returned by 130,000 voters, 84,000 electors in the boroughs had 421 representatives. "The rotten boroughs," *i.e.*, those which were completely under the control of the Crown or a patron, were admittedly the most indefensible parts of this parody of principles and facts.

The Society of the Friends of the People undertook, in 1793, to prove that the lords of the Treasury, 71 peers and 82 commoners could together nominate 306 out of 558 members, *i.e.*, make a decisive majority. The influence of the Crown, *i.e.*, of the Government—through the patronage of the navy, army, Church, judiciary, civil and colonial services—was enormous, and secured the steady voting support in the Commons without which no administration considered itself safe or even possible. In 1770 there were 192 place-holders in the Commons. "Vested interests" in the whole system, indeed, were so strong and deeply-rooted that nothing short of a complete organic change in the social and economic structure could compel a House of Commons to accept "reform" which meant the extirpation of a half of those who sat in it, with the lucrative possibilities that membership offered. It follows from this brief summary that the would-be "reformer" of the 18th century, with so large and easy a target to attack, but which covered such a variety of interests, had really to prove that the "system" resulted in bad government, and that in the major issues of the national life the welfare of the unrepresented was more important than the welfare of the minority and was being continually sacrificed to it. Before the political theory of Locke, Blackstone and Burke could be dissolved a new political theory had to be created and absorbed. The Reform movement had by 1830 produced such a new theory, with a re-interpretation both of the ends and methods of popular government and civil society under a limited monarchy—but it was not until 1790 when Whiggism had been dissolved once and for all by the corrosive acids of the Industrial and French Revolutions that the school of Godwin, Priestley and Price, above all of Adam Smith and Bentham, had captured the best minds alike of the old gentry and the new individualists. In 1832 a true revolution was accomplished with less bloodshed and disturbance than "the glorious revolution" of 1688, and as in 1688 so in 1832, the monarchy entered on a new lease of life, influence and prestige.

The First Phase (1714–65).—In the Walpole and Bolingbroke era (1714–40) "reform" was the cry of the broken and discredited Tories or the schismatic Whigs, who denounced the corruption by which they asserted Walpole maintained his power, or who demanded the repeal of the Septennial Act and a return of the Triennial Act, or even to the annual parliaments of a "golden middle-age." The agitation, which had no support outside Westminster, had no effect on the general acquiescence in parliaments with a legal duration of seven years, and resulted only in a very limited Place bill, disfranchising a few hundreds of place-men. The elder Pitt gave a new life and a new power to the Reform movement, due to his prestige, his disinterestedness, the splendour of his achievements, and his criticism of effete or flabby government. But Pitt was neither a consistent political thinker nor a practical and constructive administrator, capable of creating and leading a party with a coherent and thought-out programme of internal reform. He accepted the Whig view that "representation was not of persons but of property," and that "the share of national burdens (*i.e.*, taxation of *property*) should decide the weight it ought to have in the political balance." He accepted "the rotten boroughs" (for one of which he had sat) as "the natural infirmity of the Constitution." "Amputation might be death." Pitt's sole remedy for "the corruption of the people and the ambition of the Crown" was to add a third member to the county representation, "the purest part of the system," and to revert to triennial parliaments. Neither of these remedies was seriously pressed, though they became a traditional formula for the Chathamite and Rockingham Whigs.

Cartwright, 1763–80.—John Wilkes, demagogue and the popular hero of the struggle against general warrants, for the rights of the electors in the Middlesex election and for the right to report debates in parliament, with John Cartwright, the brother of the inventor of the power-loom, were, in 1776, the joint but independent "fathers" of the real Reform movement, *i.e.*, a demand not merely to eliminate the rotten elements, but by an extension of the franchise and a redistribution of seats to secure "a just and equal representation of the people." Wilkes and Cartwright pinned reform down to these points—disfranchisement, enfranchisement and redistribution—on the basis of two democratic principles, that government was for the good of the governed and that rich and poor alike had equal rights and an equal interest in determining laws and government affecting their lives, fortunes and happiness. The Reform Act of 1832 was thus foreshadowed in embryo in 1776, the year of the Declaration of American Independence, of Adam Smith's *Wealth of Nations*, and Bentham's *Fragment on Government*. Cartwright, also, by founding *The Society of the Supporters of the Bill of Rights* was the parent of a new political method, the organized league for propaganda, education and consolidation of a group with a defined and agreed programme. Radicalism, in short, as a theory of political life and a constructive political machine, was born in 1776. Cartwright's society was the fruitful mother of many leagues, societies and federations down to the Free Trade League of 1837, the "Birmingham Caucus" of 1878, and the party organizations of to-day.

The Whigs and Economic Reform.—The Whigs, under the influence of Dowdeswell and of Burke, would have none of either Wilkes' and Cartwright's principles, or of "demagogic" methods. The genius of Burke, reverencing the Constitution as almost a Divine gift to a chosen people, dreading organic change as the betrayal of a mighty heritage, and already, in 1780, scenting in the political theory of the American rebels and of the English Radicals the Jacobinical poison which the French Revolution was to let loose, saw in "economic reform" the supreme remedy for purging a sound organism afflicted by a temporary but paralysing disease in the corrupting influence of the Crown. The Yorkshire Association and the famous Yorkshire Petition of 1780 were methods borrowed from the Radicals, but "the economic reform" for which they pressed kept clear of the Radical demand for organic reconstruction of the representative system. Burke and the Rockingham Whigs succeeded in disfranchising contractors and revenue officers, in abolishing sinecures and in reducing places and a swollen pension list, but in accomplishing this valuable result they had shot their bolt. They had not attempted to deal either with the legal disabilities which excluded whole classes from representation, or with the rotten boroughs which were far more demoralizing and far-reaching in their control of parliament than the "corrupt influence" of the Crown.

The Younger Pitt (1780–1785).—The mantle of Chatham fell, and the hopes of Radicalism concentrated on Chatham's son, the younger Pitt, who, in 1781, moved for "a Committee to enquire into the Present State of the Representation" and was defeated only by 20 votes—the best division the Reformers had between 1780 and 1831. As prime minister, in 1785, Pitt endeavoured to introduce a Reform bill, his intention being to disfranchise 36 rotten boroughs, establish a fund of £1,000,000 for compensating the owners of borough "property," and assign the 72 seats set free by the disfranchised 36 boroughs to the counties, London, Westminster and the chief unrepresented towns. "Leave to introduce" was, however, refused by a majority of 79 votes. Henceforward Pitt was lost to the Reform movement. It was his first and his

last effort as a constructive Reformer and the French Revolution shortly converted him into an obstinate antagonist to all or any change.

The Fourth Phase (1785–1807).—The movement really gained in the long run by this set-back. Had Pitt's milk-and-water proposals been carried the old system would have been given a new lease of existence. Pitt, equally with Burke, accepted the inherited past, and his acceptance of the rotten boroughs as a form of property, the disfranchisement of which required compensation, was rightly rejected as immoral and indefensible on any theory of national representation, by the Reformers of 1831. The Whigs had never really believed in reform, and it now became the monopoly of the "doctrinaire Radicals." For seven years the stars in their courses fought for Radicalism. The American War had given an immense stimulus to political thinking and a new school of political philosophy came into existence; the Industrial Revolution was steadily sapping the bases of 18th century society and of the economic fabric. In 1788 the centenary of 1688 was celebrated by the ardent Radicals and the young minds of the country outside politics. In 1789 the outbreak of the French Revolution galvanized all these currents into enthusiastic activity, and The London Revolution Society—the leading organization of the Reformers, of which Price and Godwin were vigorous members—entered into direct connection with the National Assembly in France and the Constitutional Revolutionists in Paris.

Fox, who hailed the French Revolution with joy, professed to be a Reformer, but he was in reality too deeply saturated with the old Whiggism to accept with conviction the new Radicalism. The real leaders in parliament were the young Charles Grey (the Earl Grey who carried the Reform Act in 1832) and Erskine. But all the ardent aspirations of 1789–91 were doomed to disastrous extinction, for which four main causes were responsible. First, the September massacres, the execution of Louis XVI. and Marie Antoinette, and the Reign of Terror not only paralyzed the moderate Reformers with a chill of disillusionment, but sent a series of waves of panic through Great Britain. Reform was promptly identified with revolution on the French model. Secondly, once Great Britain was at war with France (1793), reform was regarded as sedition and treason. Even the mildest critic of existing institutions was denounced as a Jacobin and a traitor. Thirdly, the opposition to reform found in Burke a thinker of genius whose "Reflections on the French Revolution" became the Bible, not only of Toryism, but of three-fourths of thinking or unthinking England. To Burke the new democratic philosophy of Price, Goodwin and Paine, even of Bentham and Mackintosh, was anathema, and the "Rights of Man" were exposed as the pseudo-scientific basis of a creed which would logically end in the downfall of the monarchy, a Jacobin Reign of Terror and a military dictatorship on the French model. The extremists on the Left of the Reform movement, with the bravado that extremists enjoy, were powerful allies of reaction. For 15 years Great Britain lived in the hurricane of a European convulsion, and Wyndham's phrases as to the folly "of repairing your house in the hurricane season," for all its shallowness, correctly summed up the mood of three-fourths of Great Britain, shown in the "loyalist" riots at Birmingham, Manchester and other industrial centres. Fourthly, the irreparable breach between Burke and Fox not only split the parliamentary opposition but drove one-half of the Whigs into coalition with Pitt and the Tory Party.

The war at first was popular; prosecutions for sedition followed, and the judiciary, especially in Scotland, where a great awakening of political activity had followed the French Revolution, were ready to strain the law of treason and to lay it down from the Bench that all criticism of existing institutions was calculated to bring the Government into contempt, and was, therefore, seditious treason. The proposal to hold at Edinburgh a British convention for the discussion of reform whetted the panic of the Government and the convention was dissolved. The trials and condemnation of "the Scottish martyrs," such as Tytler, Stewart, Callender, Muir, Palmer, Margarot, Gerrald, Watt and Downie, and, in England, of Frend, Frost, Eaton and Winterbotham, make a soiled page in the history of British law. Thanks to Erskine's splendid advocacy, the acquittal of Hardy and Horne Tooke brought some sanity into the supercharged atmosphere of indiscriminate terror and proscription. But until 1799 liberty of opinion ceased to exist in Great Britain, and in this valley of black shadows the numerous political societies, the chief of which were *The London Corresponding Society* and the *Society of United Scotsmen*, withered at the roots and were easily and finally suppressed by governmental action (1794–98). There would have been general and resentful astonishment could the memorial to "the Scottish Martyrs," on the Calton hill, at Edinburgh, erected by public subscription have been foreseen in 1800. Muir's "blasphemous" prediction that "the cause would ultimately prevail" was accepted as a platitude by a reformed and grateful Great Britain in 1844.

It "prevailed" for three reasons. First, the existing system of parliamentary representation provided its own condemnation when men could once more use their eyes, unblurred by panic and warfever. Secondly, every five years of the changes made by "the Industrial Revolution" threw up a new and unrepresented population, creating a new wealth which paid three-fourths of the taxes but, under the old system, was not "property" with any political rights. Thirdly, the real Reformers retained their faith, and the new and abhorred creed of "democracy" was being hammered out by powerful minds, and could be proved to have a better scientific basis for the theory of a reborn, civilized and progressive society than the philosophy of Burke. To the England of 1807 and onwards the old Whig creed of 1688 was not to be regarded as a climax and a terminus, but simply a stage in an inexhaustible development.

The Fifth Phase (1807–1815).—A new point of departure was made in 1807. The Westminster election of that year brought Sir Francis Burdett, a wealthy and ardent Reformer, into the House of Commons to be the fearless and effective champion of the new Radicalism. The indefatigable Cartwright, who lived until 1824 and saw the dawn of the new day, was ready to join with Cobbett, "orator Hunt," Bentham, the stubborn and aristocratic Whig, Coke of Holkam, the "King of Norfolk," of whose respectability and place in the great gentry there could be no doubt. Reform had, in fact, its increasing adherents alike in the peerage, the intelligentsia and "the people." It only needed now two further acquisitions—the conversion of the official Whig Opposition and a first-rate organizer. The latter was found in Francis Place, the tailor of Charing Cross, whose career and gifts make a fascinating chapter in the history of British politics. Place, if any man, was the "organizer of victory." The conversion of the Whigs, led by Grey (who had succeeded to the earldom in 1807) was accomplished in 1820, when Lord Russell definitely associated the Whig party with the cause. Russell was ably supported by Brougham, and even more effectively by the aristocratic Radical, Lambton (later Lord Durham of the "Durham report"). Cartwright, in 1823, predicted that reform would "come suddenly." He did not live to see the passing of the Nonconformist Emancipation Act in 1828, of Roman Catholic emancipation by a Tory minister in 1829, or the triumphant passage of the Reform Act of 1832, nine years after his prediction. It was, indeed, in the irony of history that the French Revolution of 1789 should have shattered "the cause," and that a second revolution in France in 1830 should convert Great Britain to enthusiastic support of the Whig Reform bill of 1831.

BIBLIOGRAPHY.—The reform movement is treated in all the general histories and text books, notably by W. E. H. Lecky, *A History of England in the Eighteenth century* (1878–90; new ed., 7 vols., 1892). The best special books are: E. and A. G. Porritt, *The Unreformed House of Commons. Parliamentary Representation before 1832*, 2 vols. (1903); G. S. Veitch, *The Genesis of Parliamentary Reform* (1913); J. R. M. Butler, *The Passing of the Great Reform Bill* (1914). *See* also T. E. May, Baron Farnborough, *The Constitutional History of England since the Accession of George the Third; 1760–1860*, 2 vols. (1861; edit. and cont. to 1911 by F. Holland, 3 vols., 1912); W. R. Anson, *The Law and Custom of the Constitution*, vol. i., "Parliament" (1886–92; 5th ed. by M. L. Gwyer, 1922). Of the numerous biographies, *see* particularly: G. Wallas, *The Life of Francis Place* (1918); and G. M. Trevelyan, *Lord Grey of the Reform Bill: being the life of Charles, second Earl Grey* (1920). (C. G. Ro.)

THE MOVEMENT IN FRANCE

If the political history of France be compared with that of England, it will be seen that the political system of both countries underwent similar changes, and arrived at approximately the same result—the main features of which were a responsible ministry and popular suffrage.

The political organization which was created both in France and in England was based on three essential elements: (1) an elected assembly capable of imposing an effective limitation on the power of the monarch; (2) a council of ministers subject to the control of the assembly; (3) an electorate capable of maintaining the control of the nation over the assembly. Three things were thus necessary in order to establish responsible government: the arbitrary power of the king must be restricted by an assembly independent of the court; the assembly must obtain effective control of the Government by transforming the king's ministers into agents for carrying out the will of the assembly; and the electoral system must be such as to ensure that the members of the assembly were representative of the will of the people.

In France the power of the king was so great that the people, who possessed no institutions through which they could exercise their action, were unable to impose any limitation on his authority. At a period when Great Britain already had a government responsible to an elected parliament, France had no political assembly, no franchise, and no check on the arbitrary power of ministers. The latter were simply the instruments through which the king exercised his personal authority.

It was impossible to modify this system, as had been done in England, by introducing successive improvements in the method of government, because there was no machinery in France through which control could be exercised. The change was made, without transition, by revolution; the old system of government was destroyed, and a new one had to be improvised. In devising a new system of government in this way it was of course necessary to proceed according to a general plan and to apply uniform rules of a legal and abstract character, whereas the British constitution was rather in the nature of a body of customs built up by a series of historical precedents. The difference in the method followed in the two countries has generally been attributed to a difference of national temperament, the Englishman being more phlegmatic, conservative and practical, and the Frenchman more passionate, revolutionary and fond of abstract ideas. It may however be more naturally explained by the different conditions under which the transformation of the political system was effected in the two countries. England already possessed an elected parliament which tended by gradual development to establish its control over the ministry; all that the English had to do was to reform their archaic electoral system. The French nation had to improvise an entire political system, and could only do so by the application of general rules.

The Revolution.—The French Revolution was initiated by the action of the royal Government itself in calling a meeting of the States General for the purpose of voting money. The meeting of the States General was not however, like the English parliament, an institution with the force of tradition behind it. The meeting called in 1789 under the old name of the States General was in reality a new assembly, summoned by a procedure created expressly for it.

Thus the question of the electoral system, which was the last to be settled in England, was in France the one which arose earliest. The system adopted was uniform for the whole country, and thus more logical than that of England. Voting was by secret ballot and by absolute majority. As the Government had extended the right to vote to all tax-payers, including the very numerous peasant class, the election of the deputies of the Third Estate was carried out by indirect suffrage. A system of indirect suffrage of two degrees, with a secret ballot and absolute majority, was applied to all elections of legislative bodies throughout the Revolution period.

The assembly, converted into a "National Assembly," declared that it would not separate until it had given France a Constitution; the royal power was thus limited by an elected body representing the nation as a whole. After the fall of Louis XVI. it became necessary to vest all powers in a single body, which was given the name of the Convention, a term borrowed from the United States. When the Convention desired to restore a regular political order conforming to the doctrine of the separation of powers, all that it could do was to replace the king by an executive Directory.

The third question, that of the qualifications and functions of ministers, had been settled under the pressure of practical necessities in 1789, when it had had to be decided whether ministers might also be members of the Assembly. The Constituent Assembly had been apprehensive of the influence which ministers might exercise over the legislative body; it feared the ambition of one of its members, Mirabeau. Ministers, as members of the executive, were therefore forbidden to be at the same time members of the Legislative Assembly; and this made it impossible to establish a system of responsible government in France.

The Restoration.—The institutions created by the Revolution were abolished by Napoleon, who reduced assemblies, elections and ministers to the position of instruments through which the absolute authority of the emperor was exercised. At the Restoration, however, a fresh attempt was made to create an organized political system. Louis XVIII. accepted the limitation of the royal power by a constitution and its control by an assembly. The three questions which had had to be considered in 1789 thus arose again in 1814; this time they were settled on lines directly copied from Great Britain.

Under the imperial regime there had been two chambers; Louis XVIII. maintained them under different names. The senate became a hereditary chamber of peers; the Legislative Assembly became the chamber of deputies, and the king had power to dissolve it, as in England. The chamber adopted a number of the practices of the British parliament, such as the King's speech, the voting of the Address, and the procedure for voting on ways and means.

The method of selecting ministers was not regulated by the Charter of 1814, just as there were no formal rules on the subject in England. Ministers were responsible, but only in the case of action contrary to the constitution, when they were liable to a procedure copied from the English system of impeachment. Thus France did not yet enjoy responsible government in the sense in which the term is understood in English-speaking countries at the present day. Louis XVIII. however generally followed the practice of forming the ministry in agreement with the majority of the chamber, and when Charles X., in 1829, appointed ministers who were definitely unpopular, the majority made an official protest, the "address of the 221," in which it enunciated the theory of responsible government.

The dispute led to an insurrection in Paris, and the Revolution of 1830 was the result. The new king, Louis Philippe, formally recognized the sovereign rights of the nation, and accordingly did not contest the principle of the responsibility of ministers to the Chamber. France thus adopted the principle of the political responsibility of ministers, according to which a minister is obliged to resign as soon as he is in disagreement with the elected Chamber.

"The Reform Movement."—The electoral system in France had been a constant subject of party controversy from 1814 onwards. The practice of holding elections had been introduced as a new departure in 1789; it was not a long-standing tradition as it was in England, and it had not struck deep root in the political life of the nation. The Charter of 1814, which was hastily drafted, only contained a single provision dealing with the electoral system; no one was entitled to vote unless he paid not less than 300 francs in direct taxes. This represented a much more limited franchise than that in force in England, and the result was to deprive the elections of their popular character.

It was not until later that legislation was adopted fixing the minimum tax payment constituting the electoral qualification and the procedure for elections. The act of 1831, which was passed after the Revolution, merely lowered the electoral qualification from 300 to 200 francs. This resulted in increasing the number

of electors from 87,000 to 166,000; a maximum of 249,000 was reached in 1847.

One section of opinion in France regarded this reform as insufficient, since the large majority of citizens were still excluded from political life. Demands for the extension of the franchise were therefore put forward. At the time when in England the reform movement which had been initiated 60 years earlier was at last achieving success in the Reform Acts of 1832, agitation for the same object in France was only beginning. It is to the movement of 1832–48 that the term "reform" is applied in France.

Neither in France nor in England were the supporters of an extended franchise able to agree on the scope of the desired reform. Universal suffrage, which had been advocated in England as early as 1780, was not at first proposed in France except by a few isolated republicans. The *Société des Droits de l'Homme,* an association consisting mainly of young Parisian students and workmen, referred to universal suffrage in its manifesto of 1833 as an instrument for bringing about social revolution and improving the position of the proletariat; this attitude corresponded to that of the English Chartists.

The supporters of a less radical measure of reform put forward their demand for an extended franchise in the form of petitions to parliament, as had been done in England. The movement did not attain real political importance until 1838, when the National Guard of Paris, in which nearly the whole of the lower middle class population was enrolled, organized a petition asking that all members of the National Guard should be given the right to vote. A committee of deputies was formed to direct operations in the provinces; public manifestations were arranged, in which the National Guards marched in procession to greet the deputy with cries of "Vive la Réforme." The same cry was raised on June 14, 1840 at a review of the National Guard by Louis Philippe. The petition obtained about 240,000 signatures.

The opposition accused the Government of corrupting those deputies who were in the Government service by promises of promotion, and the electors by granting them personal favours. As a remedy for the "corruption" of deputies it demanded "parliamentary reform," *i.e.,* that civil servants should be forbidden to sit in the chamber. As a remedy for "electoral corruption" it demanded "electoral reform." These were the terms which had been employed in England in the time of George III.

Universal suffrage was at no time demanded by more than a very small minority, much less numerous than the Chartists in England. Almost its only champion in the chamber was the lawyer Ledru-Rollin, who founded a journal entitled *La Réforme* in 1843. Ledru-Rollin represented political reform as a necessary condition for social reform. *La Réforme* did not however have a circulation of more than 2,000.

The campaign for reform was carried on in the chamber principally by the party which was opposed to the dynasty. For some years the question formed the subject of debates which led to no practical result. Guizot, the virtual head of the ministry, always replied that the introduction of reform measures was inexpedient. Louis Philippe himself took part in the dispute. "There will be no reform," he said in Jan. 1848; "I will not have it. If the Chamber of Deputies votes for it, I have the Chamber of Peers to reject it. Even if the Chamber of Peers adopted it, I have my veto."

The restrictions imposed on the press by the legislation of 1835 made it difficult for the opposition to state its views in the newspapers. A means of expression was found in the organization of a series of public dinners by opposition deputies and journalists; some 70 such dinners were held in 1847 and 1848, and toasts were drunk in honour of Reform. The Government, by prohibiting a public dinner in Paris, provoked the revolt which led to the Paris insurrection of Feb. 23 and the overthrow of the monarchy. The provisional Government, composed of deputies representing the small republican minority, at once introduced universal male suffrage. Thus electoral reform, which was only begun in England after half a century of agitation, was consummated in France in a few days in its most radical form. (C. Se.)

Bibliography.—F. V. A. Aulard, *Histoire politique de la Révolution française* (1901), Eng. trans. B. Miall, *The French Revolution, a political history* (1910); *Histoire de la France contemporaine* (ed. E. Lavisse, vols. i. to v., 1920–22), with bibliography.

REFRACTION. When waves of any kind travelling in one medium enter another, in which their velocity is different, their direction is, in general, changed; the rays, *i.e.,* the lines perpendicular to the wave surfaces (in isotropic media) along which the energy travels, being bent or refracted at their point of incidence on the second medium. The change in direction is such that the sine of the angle formed by the incident ray and the normal to the surface of separation bears the same ratio to the sine of the angle formed by the refracted ray and this normal, as the velocity of the waves in the first medium to their velocity in the second. This ratio, known as the refractive index, may depend on the frequency of the wave vibrations. If such be the case, each frequency in the incident disturbance gives rise to a separate refracted ray—a phenomenon known as Dispersion. (*See* Light.)

Mirage is due to the refraction of light by layers of air of gradually varying temperature and density. A similar variation, due to convection currents, is responsible for the flickering appearance seen, *e.g.,* above asphalt and sand on a hot day, and also for the twinkling of the stars. (*See* Star.) The refraction of rays of light entering the earth's atmosphere from heavenly bodies is known as Astronomical Refraction; it has the effect of making such bodies appear higher above the horizon than they really are. (*See* Astronomy, *Spherical.*)

REFRIGERATION AND ICE MANUFACTURE. Refrigeration is understood to mean the process of securing a temperature below that of the atmosphere by the use of some mechanical device. It has three main divisions: Cold storage and food preservation (packing plants, etc.), ice making and air conditioning and cooling. The extent of these applications is extending rapidly and in addition special processes requiring refrigeration —as in the chemical industries—are being developed so that refrigeration is becoming increasingly important.

THEORY OF REFRIGERATION

The most general method of securing mechanical refrigeration is to use a reversed heat engine whereby heat is absorbed at the lower temperature and is rejected at the upper temperature with a direct acting engine or an electric motor, providing the external work required to make the cycle possible. If the Carnot heat cycle (*see* Internal Combustion Engine) is used for the production of power the reversed Carnot cycle is the one employed in the refrigerating cycle. Such a reversed cycle cannot have a greater efficiency than the direct cycle.

According to the second law of thermodynamics (*q.v.*) the efficiency of the cycle is independent of the kind of working medium used, and is dependent only on the temperature limits. If it were possible to operate according to the Carnot cycle one refrigerant would be as efficient as any other but as all practical refrigerating cycles deviate from the Carnot it will be seen later that such is not the case exactly. This deviation is mainly on account of the use of a throttle valve in order to reduce the pressure of the liquid before it enters the evaporating coils instead of an expansion motor as would be required in the reversed Carnot cycle to provide the necessary adiabatic expansion.

Heat Cycles.—Heat engine cycles can be shown graphically in a number of ways. The *P–I* (Pressure-Thermal Potential) diagram, shown in fig. 1, is the simplest and most useful diagram for representing the refrigerating cycle. The value of I is given by the expression $I=U+Apv$, where U is the energy, p the pressure, v the volume, $A=1\div 778$; therefore $di=du+Apdv+Avdp$, but $dq=du+Apdv$; therefore $di=dq+Avdp$, so that for a constant pressure process $di=dq$ or $i_1-i_2={}_1Q_2$. From the last equation it is clear that in a constant pressure process the heat absorbed is equal to the difference in the value of i at the beginning and the end of the process.

The Refrigerating Cycle.—In refrigeration the volatile liquid is permitted to pass into evaporating coils under reduced pressure and there it boils, absorbing heat from the commodities to be

cooled. The liquid at the condenser pressure is indicated by the point *a* in fig. 1 and the line *ab* is the drop of pressure in the pressure reducing (the so-called expansion) valve. Such a throttling process is one of constant *I* and is shown by a vertical line on the diagram. If an expansion cylinder had been used, the dotted line ab_1 would have indicated the process and this being reversible in the thermodynamic sense, the cycle would be more

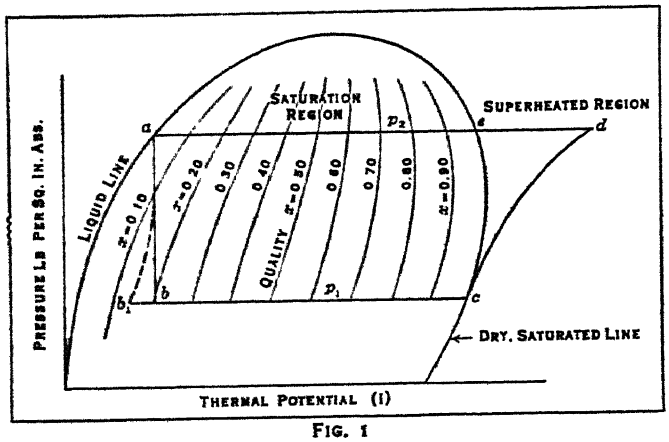


FIG. 1

efficient than the one having the expansion valve. The point *b* represents the condition of the working medium with the reduced pressure, and with the temperature corresponding to the pressure obtainable from suitable thermodynamic tables. Fig. 1 shows that the point *b* corresponds to a point having 21% vapour, or (in other words) 21% of the liquid is evaporated in cooling the liquid refrigerant from the temperature at *a* to that at *b*.

Useful refrigeration is shown by the evaporation line *bc*, during which time the heat absorbed by the refrigerant per pound is $i_c - i_b = i_c - i_a$. The point *c* represents the gas leaving the evaporator coils and entering the compressor. The compressor process is shown by the line *cd* and the work of compression per one pound of the refrigerant is given by the value of $i_d - i_c$. Finally the constant pressure line *da* represents the heat lost by the compressed gas first in the removal of the superheat *de* and then the latent heat of liquefaction *ea*. The heat absorbed by the condensing water per one pound of the refrigerant is $i_d - i_a$.

As stated, the useful refrigeration per pound of refrigerant is given by the expression $i_c - i_a$. In the United States the ton of refrigeration is defined as the absorption of 200 B.T.U. per minute. The ton of refrigeration in Great Britain is given as the absorption of one kilogram calorie per second which is larger than the United States unit by 18·8 per cent. Using the United States definition the piston displacement per ton of refrigerant per minute theoretically is

$\frac{200}{i_c - i_a} V''$ where V'' is the volume of 1 lb. of dry, saturated refrigerant at the pressure p_1.

Allowance, however must be made for the volumetric efficiency which may be as small as 50% or less under extreme conditions. This is a factor to account for the superheat in the suction gas occasioned by the absorption of heat from the cylinder walls, piston head, etc. An idea of the extent of this loss can be seen in Table I.

The preceding equation can be corrected for volumetric efficiency as follows:

$\frac{200}{i_c - i_a} \frac{V''}{E_r \times E_v}$ where E_r = the volumetric efficiency due to the effect of the cylinder walls, etc.
E_v = volumetric efficiency due to clearance.

The work done by compression, per ton of refrigeration, is

$\frac{n}{n-1} p_1 V_1 \left[1 - \left(\frac{p_2}{p_1}\right)\right]^{\frac{n-1}{n}} \frac{200}{i_c - i_a}$

where $n = 1{\cdot}28$ for ammonia and carbon dioxide, p_1 is the suction pressure in lb. per sq.ft. and V_1 is the volume of 1 lb. of dry saturated vapour at the pressure p_1.

Also referring to the figure the value $i_d - i_c$ = the work performed in the entire cycle in compressing the pound of gas. The work of compression, per ton of refrigeration, is also

$$200 \frac{i_d - i_c}{i_c - i_a} \text{ B.T.U. per minute} = 4.713 \frac{i_d - i_c}{i_c - i_a} \text{ i. hp.}$$

The formula for the work of compression and horse power should be increased by an amount $\frac{1}{E_r}$ to account for the effect of volumetric efficiency. Clearance has been found to have little effect on the *i.* hp. and is usually neglected in power calculations.

TABLE I. *Horse-power per Ton of Refrigeration (Ammonia)*

Condenser pressure lb. gauge	Suction pressure lb. gauge					
	5	10	15	20	25	30
145 . . .	2·02	1·69	1·40	1·26	1·11	0·99
155 . . .	2·11	1·76	1·48	1·38	1·19	1·05
165 . . .	2·21	1·85	1·57	1·41	1·25	1·13
175 . . .	2·34	1·94	1·65	1·48	1·34	1·18
185 . . .	2·48	2·03	1·75	1·57	1·40	1·27
195 . . .	2·55	2·14	1·84	1·67	1·48	1·33
205 . . .	2·69	2·24	1·91	1·75	1·55	1·40

Volumetric Efficiency of Ammonia Compressors

Condenser pressure, lb. gauge		Suction pressure lb. per sq.in. gauge				
		0	10	20	30	40
120 . .	A	0·77	0·83	0·87	0·89	0·91
	B	0·60	0·70	0·77	0·81	0·84
	C	0·52	0·65	0·72	0·77	0·80
160 . .	A	0·74	0·80	0·83	0·86	0·88
	B	0·54	0·65	0·72	0·76	0·80
	C	0·44	0·58	0·66	0·72	0·75
200 . .	A	0·71	0·77	0·81	0·84	0·86
	B	0·49	0·61	0·68	0·72	0·75
	C	0·37	0·52	0·62	0·67	0·71

A, No clearance. B, 4% clearance. C, 6% clearance.

The water required for condensing purposes may be calculated as follows:

The heat absorbed theoretically by the condensing water per ton of refrigeration per minute is

$$\frac{200}{i_c - i_a}(i_d - i_a) = 200 \frac{i_d - i_a}{i_c - i_a}$$

and allowing for volumetric efficiency, this formula becomes

$$\frac{200}{E_r} \frac{i_d - i_a}{i_c - i_a}$$

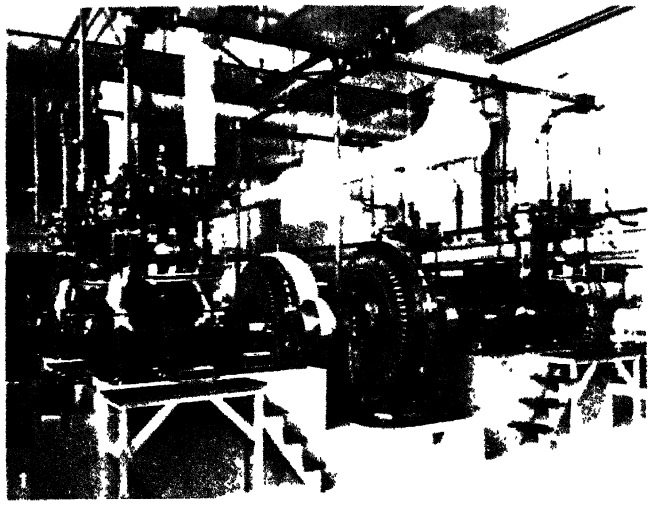
If the water rises in temperature 10° F, then the number of gallons of condensing water will be per ton of refrigeration, per minute,

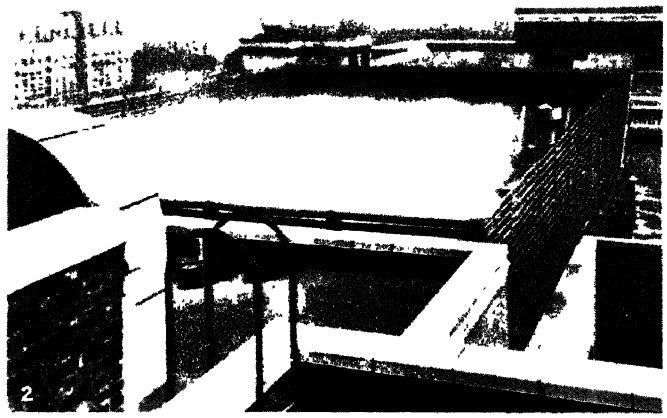
$\frac{200}{8.33 \times 10 \times E_r} \left(\frac{i_d - i_a}{i_c - i_a}\right)$ where 1 gal. weighs 8.33 lb.

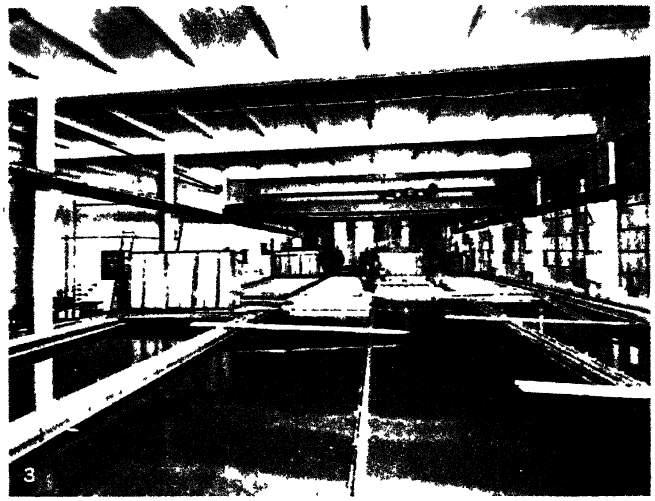
REFRIGERANTS

Although the second law of thermodynamics (*q.v.*) states that equal efficiency can be obtained with all refrigerants operating between the same temperature limits, yet this is not strictly true in practice. However, the power required of the compressor per unit of refrigeration is not the only important factor in the choice of a suitable working medium, but the pressures encountered, the piston displacement per ton of refrigeration, the effect of the refrigerant on animal and vegetable life and on commodities, its dangerousness due to possible explosions and its corrosive action on the metals of the system, all have to be considered. By a system of elimination, ammonia, carbon dioxide and sulphur dioxide are the only refrigerants used to any extent. Hydrocarbons are proposed, but are not used. Ethyl and methyl chloride are used to some degree but have not come into great use, except for special purposes. Air, water vapour and mixtures of two different volatile liquids have been proposed but are not used for

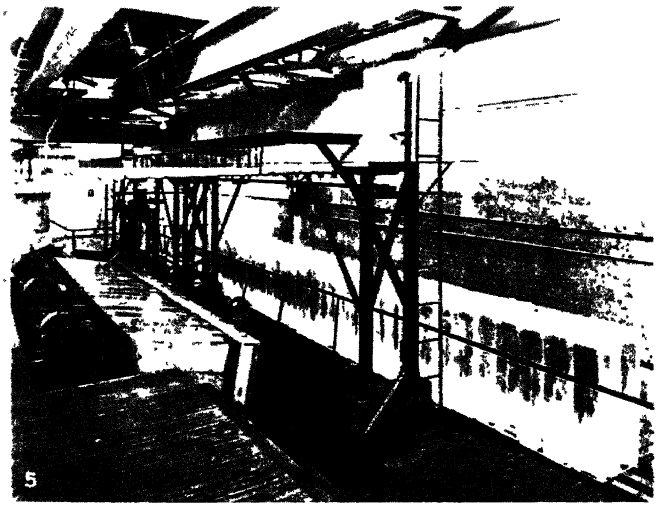
REFRIGERATION AND ICE MANUFACTURE













BY COURTESY OF THE YORK ICE MACHINERY CORPORATION

PROCESS OF ICE MAKING

1. Ammonia compressor of the horizontal duplex type. Two compressors are coupled to a single synchronous motor between them
2. "Spray pond" for cooling water for ammonia condenser purpose. It is surrounded with louvers to conserve the supply
3. Freezing tank filled with brine. Ammonia pipes absorb heat from the brine and lower the temperature. A group of cans filled with water are placed in the tank and their contents frozen to a solid
4. Can-filling apparatus. A group of cans are conveyed to the freezing tank by means of the crane above the cans
5. Cans are emptied and the blocks of ice are transferred to storage by means of a conveyor
6. Ice storage room showing the blocks stacked by tiering machines in the foreground. Ammonia pipes in ceiling keep moderate temperature to prevent ice from melting

obvious reasons. One design of centrifugal compressor makes use of dichloroethylene with condenser sub-atmospheric pressures.

TABLE II.—*Characteristics of Various Refrigerants*
From Macintire's Handbook of Mechanical Refrigeration

Refrigerant	Thermal potential of the vapour at 5° F	Thermal potential of the liquid at 86° F	Net refrigeration per pound	Specific volume	Piston displacement theoretically per ton of refrigeration per minute	Suction pressure lb. per sq. in.	Condenser pressure lb. per sq. in.	Piston displacement, CO_2 as unity
Ammonia (NH_3) .	613·3	138·9	474·4	8·15	3·44	34·3	169·2	3·82
Carbon dioxide (CO_2) .	101·0	44·0	57·0	0·256	0·898	332	1,050	1·0
Sulphur dioxide (SO_2)	183·5	42·1	141·4	6·42	9·08	11·8	66·45	10·1
Ethyl chloride (C_2H_5Cl)	163·5	21·0	142·5	16·10	22·59	4·5	27·2	25·14
Methyl chloride (CH_3Cl)	170·42	20·64	149·8	4·68	6·25	21·0	95·5	6·95
Butane (C_4H_{10})	172·0	48·5	123·5	10·0	16·16	8·2	41·6	17·9
Propane (C_3H_8) .	172·0	51·0	121·0	2·48	4·10	41·9	155·3	4·57

Ammonia.—In nearly all general refrigeration (*i.e.*, cold storage, ice making) ammonia is used as the refrigerant. Ammonia has nominal pressures, requires only a nominal piston displacement per ton of refrigeration, as shown in Table II., and is as economical in power requirements as any of the refrigerants in use. However, it does react with copper and composition if moisture is present and it is explosive with certain limited mixtures of air. Ammonia fumes in moderate amounts are extremely dangerous to animal and vegetable life. In consequence special attention has to be given to maintaining a tight system both as a safety precaution and to save the charge of the refrigerant.

Carbon Dioxide.—Carbon dioxide is almost an ideal refrigerant. It is non-explosive, inert like nitrogen in its effect on animal life and is not undesirably active chemically. However, working pressures are high, being from 900 to 1,200 lb. per sq.in in the condenser and from 300 to 500 lb. in the evaporation coils. It has a very low critical temperature (88°), and in consequence the gas cannot be condensed in the condenser when using condenser water of 85° or more. The heat content of the liquid is large in proportion to the latent heat of vaporization and the net refrigeration per pound of carbon dioxide is small. It follows from this fact that the power required to compress carbon dioxide in the practical cycle is greater than for ammonia under identical temperature limits. Carbon dioxide is superior to ammonia for condensing water of 70° or less, and for low temperature refrigeration. Partially because it is a safe refrigerant, it is frequently used in theatre refrigeration and in marine work.

Sulphur Dioxide.—Sulphur dioxide is used to some extent in general refrigeration in Great Britain and on the Continent in capacities as large as 100 tons, but in the United States sulphur dioxide is confined mostly to the fractional tonnage compressors. In household machines it is especially successful, as the condenser pressure is less than 100 lb. per sq.in., even with the air-cooled condenser which is required in this kind of work. The gas is non-explosive, but is dangerous to animal life. It does not react with steel or copper if it is anhydrous, but acts with both if any water is present.

Methyl Chloride.—Methyl and ethyl chloride may be used to advantage as refrigerants. The main objection to their use is the difficulty in detecting leaks, a matter which in the case of the fractional tonnage compressor particularly is a very serious fault. In other respects these refrigerants have decided advantages over sulphur dioxide as they are harmless in moderate amounts in the air and are not "corrosive."

Air.—Air was one of the first refrigerants to be used successfully, being the working medium of the Bell-Coleman compressor. In the case of a perfect gas the energy is a function of the temperature only and therefore in order to get a drop of temperature an expansion cylinder must be used in place of the expansion valve. In this way a certain percentage of the work of compression can be returned to the shaft, but such a machine has been found to be inefficient and hard to keep in good operating condition.

Mixtures of several substances have been attempted with no good results. Leaks cause a variation in the relative percentage of the mixture, the result being a complete lack in uniformity in the properties of the substance.

The Compressor.—The refrigerating compressor is a reversed heat engine and is used to increase the pressure of the gas in order that liquefaction may be obtained with condensing water at or near the temperature of the atmosphere. The object of the compressor is to perform the work as efficiently as possible and to use in consequence as little power for the purpose as is practical. The gas from the evaporating coils should enter the cylinder of the compressor during the suction stroke with as little drop of pressure as is practical and there should be a minimum excess pressure developed over that due to the surface tension of the liquid in the condenser during liquefaction. Attempts have been made to reduce the amount of "wire-drawing" (*see* THERMODYNAMICS) to a minimum by the use of valves permitting a large net opening for the flow of the gas by providing large straight ports and connections to the evaporator and the condenser. As the mechanically operated suction valve is only used in a few cases and the mechanically operated discharge valve is never used it is also essential that both the suction and discharge valves should be of light weight. This requirement is even more important because of the desire in late years to increase the rotative speed from 40 to 60 r.p.m. of 20 years ago to 400, 500 and even 600 r.p.m. to be found even now in the smaller sizes. The result has been the adoption of the plate and ribbon valves, the light weight poppet valve for the discharge and the so-called balanced poppet valve in the piston of certain vertical single acting compressors.

With the increase in rotative speed has come the necessity of a positive system of lubrication, following somewhat the method employed in automotive design. The smaller single acting enclosed compressors are splash lubricated except those of high speed which have a force feed to the several bearings. The larger sizes have a filter in addition and by means of bulls-eyes there is an indication of the amount of oil going to these important bearings.

Clearance.—The amount of clearance in a refrigerating compressor is important from the point of view of the capacity of the machine but not from that of the horse-power required to perform the work of compression. Certain types of valves make it impractical to design the machine with small clearances, and the result is that little attempt is made to restrict the clearance except where this is easily accomplished. Where clearance has to be used the resultant loss of capacity may be offset readily by the addition of ½ in. or more to the cylinder bore. Recently the use of clearance pockets has become popular whereby the opening up to the cylinder of one or more clearance volumes has been permitted. These volumes may be added to the clearance at will by the opening of one or more valves on the head end of the cylinder, thereby making it possible to adjust the capacity of the compressor to the load on the machine, an ability which would not be possible with constant speed drives as is the case in oil engine, and certain electric motor connections.

Number of cylinders.—In the United States the number of cylinders connected together on the same crank shaft has seldom been more than two, although three cylinders are to be found in the case of large vertical single acting enclosed crankcase compressors which are designed for special purposes, and in some small machines. In Great Britain four cylinders are common, as the capacity can be increased readily by the addition of cylinders, and this method appears to be preferred to that of the increase of the bore.

The Absorption Machine was more important about 1913 than in 1929. This refrigeration machine requires the direct application of heat instead of mechanical work in order to increase the pressure of the gas to a point where liquefaction may occur in the condenser. The heat necessary for this action may be due to the burning of gas or it may be obtained from high pressure or exhaust steam. In the United States the absorption machine is used where exhaust steam is plentifully available and also in the small fractional tonnage units.

The principle of the action of the absorption machine is that a solution of ammonia and water is used in a still or generator where heat is applied. The action of the heat is to drive out some of the gas from the solution under a pressure corresponding to the condenser pressure, and the gas is condensed, in the condenser, and passes to the evaporator in the same manner as is the case in the compressor system. However, the gas from the evaporator has to be returned as a solution, or strong aqua, to the generator. This is done by sending the weak aqua, which is at the lower part of the generator, to the absorber having cooled it previously, and there bringing it into intimate contact with the gas from the evaporator. The resulting strong aqua occupies very little volume in comparison with that of the gas from the evaporating coils, and may be pumped by means of a strong aqua pump into the generator.

The advantages of the absorption machine are the use of exhaust steam at very low cost. It is used in the United States in packing plants, oil refineries and in some hotels where a combination of the steam-driven compressor and the absorption machine works out economically at times. The absorption machine will also take a low temperature of evaporation without difficulty because the volume of the strong aqua from the absorber is not affected by the evaporator pressure in any way. However, these advantages had lost their importance by 1928 because of the economical advantage of stage compression.

The Intermittent Absorption Machine.—The absorption machine described above has one moving part, the so-called strong aqua pump. In order to eliminate all moving parts the machine may be modified in such a way that it then will operate intermittently. In the intermittent absorption machine the still or generator is also used as an absorber. During the period when heat is applied to the generator the ammonia gas is distilled off to the condenser to be condensed and finally stored in a liquid receiver. When the required amount of liquid has been accumulated the steam or gas is shut off from the generator, cooling water is turned on and the expansion valve opens. As liquid passes into the evaporating coils refrigeration is accomplished and the gas proceeds to the generator now acting as an absorber, and is kept cool by the water-cooling coils. The intermittent absorption machine has less surface than the regular absorption machine as it eliminates the absorber, the exchanger and the weak aqua cooler as well as the strong aqua pump. It cannot, however, give continuous refrigeration. The machine operates automatically.

The Platen-Munters Absorption Machine.—This is another type of machine built to eliminate the strong aqua pump (*see* fig. 2). The outstanding features are the elimination of the expansion valve by a device whereby the pressure in the system is made constant throughout the cycle and the addition of a charge of an inert gas, usually hydrogen, in the evaporating coils and the absorber. As the pressure in the absorber and the generator is the same, a force sufficient to overcome only the frictional resistance of the pipes is required. This unbalanced force is obtained by means of the difference in weights of two columns, one (the strong aqua) connected with the heating coils, and therefore of less density, and the other with the cooler and more dense weak aqua. The action of the hydrogen in the system is very interesting. The boiling temperature of the ammonia in the evaporating coils is dependent on the pressure exerted by the ammonia which in turn is determined by the proportionate amount of hydrogen present. The underlying principle is that of partial pressures by which the hydrogen is charged into the evaporating coils and the absorber in such an amount as will limit the ammonia pressure to 30 or 45 lb. per sq.in. Recently other absorbents for the gaseous refrigerants have been developed, one of which is silica gel. Such absorbers are solid materials composed of a large number of minute air cells, capable of absorbing sulphur dioxide as well as ammonia.

Fittings.—The working medium, or refrigerant, is contained in refrigeration in a closed system and is used continuously. It is dear enough to make it desirable to keep leaks down to the

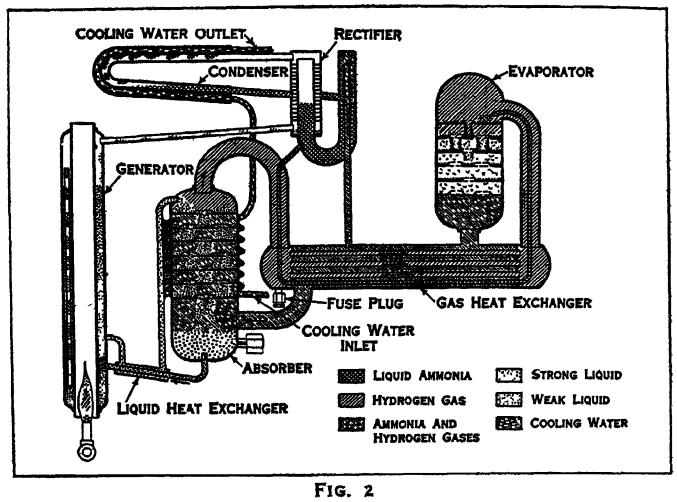


FIG. 2

lowest point possible and, with ammonia, dangerous enough so that execessive leaks are to be carefully avoided. The result is that the design of the system has the prevention of even nominal leaks as a first consideration. In consequence the pipe fittings are made specially strong, and are either of dense, air furnace, cast iron or are drop forgings. The screw joint is made up with litharge and glycerine or a soldered joint is made up by tinning the screw threads. With drop forgings the fitting may be welded to the pipe, and this has been found especially advantageous in the case of carbonic systems.

The piping may be either steel or wrought iron and usually of standard weight. The pipe is usually lap-welded in sizes 2 in. or over and butt welded in smaller sizes.

Condensers.—Design has undergone considerable advancement since 1918. At first safety dictated the use of pipe condensers, arranged in stands of 30 or more pipes high and with pipes 20 ft. long, but the height of the stands has been gradually decreased until now the usual number is 12 pipes. In these pipe condensers the gas from the compressor enters at one end of the condenser, and the refrigerant is condensed during its passage through the 200 or more feet of pipe composing the condenser. Attempts to achieve counter-flow of the ammonia and the condensing water and more control in the velocity of the water have resulted in the following types of condensers: the submerged, the common atmospheric, the double pipe and the flooded designs. The more recent designs are the shell and tube single pass and the shell and tube multi-pass condensers. In the multi-pass type the water fills the tube whereas in the vertical shell and tube condenser the water is made to flow as a film on the inside of the tubes.

Research on heat transfer in ammonia condensers has developed so that there is no advantage in the counter-flow principle, whereas it is highly desirable to remove the liquid condensate as quickly as possible from the condensing surfaces. It has been found impossible to subcool the liquid unless the liquid is free of its own vapour and so the elaborate attempts to achieve the counter-flow arrangement are not worth the trouble. On the other hand the ordinary condenser has 50% of all liquefaction occurring in a small portion of the condenser where the condensing water enters the condenser. This part of the condenser is the upper 3 ft. of the shell and tube and the lower two pipes of the double pipe condenser.

Use of Brine: Direct Expansion.—There does not appear to be any definite rule in regard to the use of brine or direct expansion. The use of direct expansion means a lesser cost of

operation inasmuch as the suction pressure required will be less when cooling brine in order that the latter may be used to cool air, or other substances to be refrigerated than when the evaporating coils are used directly for the desired cooling. Such a double cooling means that more horse-power per ton of useful refrigeration is required than with direct expansion. However, brine makes it possible to have considerable flexibility and more safety. A brine spray may be used for cooling air, or brine storage may be utilized for the purpose of storing up refrigeration to be used to carry the load during a "peak" or during the intermittent operation of the refrigerating machine. The meat-packing organizations use brine in the majority of cases, whereas cold storage plants frequently use direct expansion if the system is self contained. District cooling plants, as found in certain localities in large cities, prefer brine because of the reduced danger due to leaks, loss of refrigerant and excessive pressure drop in the long suction lines.

The kind of brine is confined to calcium and sodium chloride, and the former is used where temperatures of 10° F or lower are required, because of the ability of calcium chloride to take low temperatures without freezing. The corrosive action of brine with respect to metals is a very moot point. As a rule there is little tendency for "corrosion" if the brine has a specific gravity of 1·2 and is kept neutral or slightly alkaline. The use of mixtures of several salts is very unwise as this tends to corrosion. It has been found also that any brine which is unstable in character and tends to become acid will be bound to cause excessive "corrosion." The best means of preventing corrosion in the open or closed brine systems is to use sodium dichromate in sufficient quantities to make the brine slightly alkaline. Zinc dust may be used to advantage in open calcium chloride brine circuits.

The Automatic Refrigerating Machine.—The small refrigerating machine has to be automatic in every sense of the word. In order to do this the machine must be thermostatically controlled so as to start and stop with a slight change of the temperature of the commodity to be refrigerated. The automatic controls which are required in order to have a successful automatic refrigerating machine of the compressor type are: (1) a suitable thermostat, (2) a means of controlling the evaporating pressure, (3) a condensing water control, if the water cooled condenser is used, (4) an excess pressure shut-off.

The thermostat (*q.v.*) is usually of the metallic coil or the volatile liquid bulb and bellows type. In either case a change of temperature causes a motion of a contact point or of the arm of a lever sufficient to cause the make or break of an electric circuit. The latter may be direct on the motor line or it may operate a relay switch. The evaporating pressure is controlled either by means of a float valve, operated either on the condenser pressure or the suction pressure side of the system or by means of a pressure reducing (expansion) valve. The expansion valve is of the needle valve principle, using a spring loaded diaphragm. Variation of the suction pressure may be obtained by a manual control of the tension of the spring. The water pressure control may be from the principle of the temperature of the water leaving the condenser which acts on a bellows filled with a volatile liquid or on the principle of a spring loaded diaphragm subjected to the condenser pressure. Finally the excess pressure shut off is another loaded diaphragm so connected as to break the electric circuit should the pressure become greater than the safety limit.

Household Refrigerating Machine.—The household refrigerating machine is simply an adaptation of the automatic principles just enumerated. The refrigerating machine is very nearly always a reciprocating compressor with either one or two cylinders. The use of the absorption machine with either electric or gas heat has been advocated but has not been adopted by the public to any extent. When the latter is used it is intermittent in action except in the case of the machine using an inert gas in the evaporator side in order to overcome the necessity of the use of an expansion valve.

The household machine uses sulphur dioxide nearly always as the refrigerant. (*See* REFRIGERATORS, HOUSEHOLD.)

Heat Transfer.—The subject of heat transfer is of the greatest importance in refrigerating industries. In cold storage plants it is necessary at times to install a thickness of 8 in. or more of corkboard on the walls, ceilings and floors. The best insulation for cold temperatures is one that is water-proof, that has a low value for the coefficient of heat transmission and is easily erected in place. The low value for the heat transmission is obtained by means of small air cells in the structure as is found in cork, wood and vegetable products, mineral wool and hair felt. The insulating property of the material is obtained from the effect of the air cells which are so small as to prevent convection currents, and so the statement is frequently made that the material which has the greatest number of air cells has the greatest value as an insulator. However, in refrigeration, the tendency is to absorb moisture from the air and to have it collect on the coldest surface. Therefore the material must be made waterproof if it is not so naturally. Saw-dust, shavings and materials of a compressed vegetable nature like corn stalks, sugar cane stalks, straw, etc., are suitable as heat insulators providing they are waterproofed. As this is not practical in a number of cases except by the use of waterproof paper such construction is not used in the best installations.

Formula for Heat Transfer.—If the value k of the coefficient of heat transfer is known in B.T.U. per square foot per one degree difference of temperature per hour then the total heat transfer per hour is found by $Q=Akt_m$ where Q is the total heat transfer in B.T.U. per hour, A is the area of the surface in square feet and t_m is the temperature difference on the two sides of the surface. The coefficient of heat transfer (k) must be found by experiment and certain of these are given in Table III. If a built up structure is used, composed of several thicknesses of material then the formula usually employed is:

$$k=\frac{1}{\frac{1}{F_1}+\frac{1}{F_2}+\frac{T_1}{C_1}+\frac{T_2}{C_2}}$$

where T is the thickness of each material in inches and C is the coefficient of conductivity in B.T.U. per 1 inch thick.

TABLE III.—*Coefficients Based on Heat Transmission Tests (B.T.U. per Hour)*

(From Bulletin 102, Eng. Experiment Station, University of Illinois, by Willard and Lichtz)

Material	C per 1 in. thickness per square foot per 1° F	F Still air per 1° F
Brick wall (mortar bond and dry conditions)	4·00 (5·00)	1·40
Concrete, 1–2–4 mixture	8·30	1·30
Wood (fir, one surface finished)	1·00	1·40
Corkboard	0·32	1·25
Magnesia board	0·50	1·45
Glass (actual glass 91·4% of total area)	2·06	1·5 to 2·00
2 in. tile, ½ in. plaster on both surfaces	1·00	1·10
4 in. tile, ½ in. plaster on both surfaces	0·60	1·10
6 in. tile, ½ in. plaster on both surfaces	0·47	1·10
2 in. tile, plastered as above and roofing covered	0·84	1·25
Asbestos board	0·50	1·60
Sheet asbestos	0·30	1·40
Double glass, ½ in. air space (glass 69·3% of total area)	1·50**‡	2·00
Roofing*	5·30‡	1·25
Air space†	1·00–1·70‡	..
Mortar	8·0	0·93
Shavings	0·42	..

*Calculated from values of C for 2 in. tile with and without roofing. $\left(\frac{1}{C}=\frac{1}{C_1}+\frac{1}{C_2}\right)$

†*See* "Air Spaces."

**Per square foot of actual glass set in wood frame but based on total heat transmitted.

‡For thickness and construction stated, not per 1 in. of thickness.

It has been found that the surface film offers a high resistance to the transmission of heat and in the formula the values F_1 and F_2 refer to this surface resistance. For outside weather conditions it is usual to consider the value of F_2 as equal to $\frac{1}{3}F_1$.

The coefficient of heat transfer (k) for refrigeration piping is

Material	Conductivity, B.T.U. per square foot per degree difference of temperature per hour	Density	Nature of material
Air	0·167	..	Horizontal layer heated from above
Colorax	0·221	0·064	Fluffy, finely-divided mineral material
Hair felt	0·246	0·27	Hair felt between layers building paper
Keystone hair	0·271	0·30	..
Pure wool	0·242	0·107	Firmly packed
Pure wool	0·242	0·102	Firmly packed
Pure wool	0·262	0·061	Loosely packed
Pure wool	0·292	0·039	Very loosely packed
Cotton wool	0·292	0·100	Firmly packed
Insulite	0·296	0·19	Pressed wood pulp
Corkboard (pure)	0·317	0·18	..
Granulated cork	0·34	0·160	..
Eelgrass	0·321	0·25	Inclosed in burlap
Flaxlinum	0·329	0·18	Vegetable fibres, firm and flexible
Fibrofelt	0·329	0·18	Vegetable fibres
Balsa wood	0·346	0·12	Very light and soft
Rock cork	0·346	0·33	Pressed rock wool with binder, rigid
Waterproof lith	0·409	0·27	Rock wool, vegetable binder, not flexed
Pulp board	0·433	..	Stiff pasteboard
Air cell, ½ in.	0·446	0·14	Corrugated asbestos paper enclosing air spaces
Air cell, 1 in.	0·479	0·14	
Asbestos paper	0·491	0·50	Firm but easily broken
Infusorial earth	0·579	0·69	(Block)
Fire felt (sheets)	0·596	0·42	Asbestos sheets coated with cement, rigid
Fire felt, roll	0·637	0·68	Soft, flexible asbestos
3 ply Regal roofing	0·696	0·88	Flexible tar roofing
Asbestos mill board	0·847	0·97	Pressed asbestos, fairly firm, easily broken
Cypress	0·657	0·46	..
White pine	0·792	0·50	..
Virginia pine	0·957	0·55	..
Oak	1·000	0·61	..
Hard maple	1·125	0·71	..
Asbestos wood	2·710	1·97	Asbestos and cement

TABLE IV.—*Values for the Coefficient of Heat Transfer for Piping* (B.T.U. per sq. ft. per degree difference of temperature per hour)

	B.T.U.
Can ice making piping	
Old style feed, non-flooded	12 to 15
Flooded	20 to 40
Ammonia condensers	
Submerged	30 to 40
Atmospheric, gas entering at the top	60 to 65
Atmospheric, drip or bleeder	125 to 200
Flooded	125 to 150
Shell and tube	150 to 300
Double pipe	150 to 250
Baudalot coolers, counter-flow, atmospheric type	
Milk coolers	75
Cream coolers	60
Oil coolers	10
Water coolers for direct expansion	60
Water coolers for flooded	80
Brine coolers	
Shell and tube	90 to 100
Double pipe	150 to 300
Cooling coils	
Brine to unagitated air	2 to 2¼
Direct expansion	1½ to 2
Water cooler, shell and coil	15 to 25
Liquid ammonia cooler, shell and coil accumulator	45
Air dehydrator	
Shell and coil (brine in coil) 1st coil	5·0
Shell and coil (brine in coil) 2nd coil	3·0
Double pipe	6 to 7
Superheat remover, shell and tube	15 to 25

extremely important, but is known to a slight degree only. The reason for this is that a large number of values are obtainable unless exactly the same conditions exist in each case. The value of k is influenced to a very large degree by the effect of stagnant films of fluids adjacent to both surfaces, to the kind of material, the kind of fluid on either side of the metal, the amount of scale or dirt on the surfaces and particularly on the velocity of flow of the fluids receiving or giving up heat to the metal. In calculating piping the best that can be done, then, is to give average values for k or a range of values which can be obtained by altering the conditions either by the velocity of the water, brine or other fluid past the heat transfer surface, the mean temperature difference on the two sides of the surface or by cleaning the surface. Table IV. gives values usually accepted in good practice. The surface of the piping is usually taken as the outside surface, except for ammonia condensers where the surface is taken as that adjacent to the refrigerant.

Methods of Cooling.—Mechanical refrigeration as is understood at the present time means the absorption of heat by a volatile liquid in consequence of which the liquid boils. The usual method of procedure is to use direct expansion piping whereby the liquid boils in the pipes situated in the rooms to be cooled, or by first cooling brine and then by circulating the brine through the piping. The arrangement of the piping may be along the walls or under the ceiling one example of which is shown in fig. 3. In cold storage refrigeration natural air circulation is resorted to almost entirely, in which case the velocity of the air in contact with the pipes is very low thereby resulting in a low value of the coefficient of heat transfer.

In some exceptional cases a bunker room is installed. Such an arrangement of piping, which may be in an ante-room, a corridor or in a separate room, is the suitable nesting of the piping in an enclosure whereby the air may be forced past the piping and into the room. The bunker system requires, then, a forced circulation of the air. The advantages are in being able to use less pipe and in being able to keep the refrigerant out of the room if such a matter is an asset. The disadvantages are in having to provide power for circulation and in the difficulty in cleaning the piping should frostation accumulate.

At times there is an advantage in having a hold-over arrangement of tanks, as shown in the figure as 8 in. tubes. By this

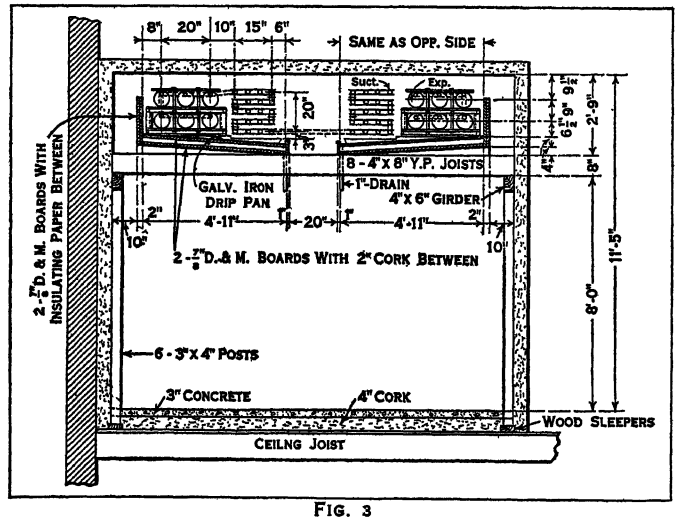


FIG. 3

scheme the brine in the tubes is cooled during the day time operation of the refrigerating machine and this cold brine will assist in holding the temperature by absorbing the heat generated by the effect of heat leakage, chemical action of the various commodities, etc.

When brine is used the method of cooling is by the use of the multi-pass shell and tube brine cooler. Such an apparatus has the brine inside the tubes, which are usually 2 in. in diameter and it is designed for 2, 4, 6 or 8 passes of the brine. The ammonia is inside the shell and its boiling action is similar to that of the

horizontal return tubular boiler in the generation of steam. The gas-releasing surface and the gas volume are sufficient to prevent the liquid returning through the suction pipe line to the compressor. Besides the shell and tube brine cooler the shell and coil and the double pipe designs are used for carbon dioxide installations and the double pipe for ammonia. In the case of carbon dioxide the unit pressure is so great that the refrigerant is kept inside the pipes.

APPLICATIONS OF REFRIGERATION

Refrigeration has developed from its application in the brewery industry and more or less academic uses in other directions to a very important economic position. The ice-making industry is now ninth in the amount of invested capital in the United States. Without it natural ice would be a luxury in all except those localities exposed to severe winter conditions, and modern meat packing, the supply of fresh fruit and vegetables out of season, marine refrigeration and modern industry, where a depressed temperature and air conditioning are required, would each be an impossibility. Some details of a few of these applications are described below.

Cold Storage.—Cold storage is one of the essential uses of mechanical refrigeration. By its means the season for fruits and vegetables is increased from a few weeks to from four to six months. Eggs may be kept from the period of great plenty in the early spring until fall if necessary, whereas the modern meat packer could not exist without refrigeration. In the latter case the animals are slaughtered under hygienic conditions and the meat is promptly chilled or frozen. Conditions of handling and holding the carcasses are as ideal as possible and shipment may be made in refrigerator cars to the retail trade. The space in the United States cooled mechanically to 40° F or lower for all kinds of cold storage work, exclusive of the packing house, is estimated at 700,000,000 cu.ft., with an estimated invested capital of $200,000,000.

Some indication as to how this may affect the modern city may be obtained from the statistics for New York city, where the following car loads of perishables are consumed each week: Dairy products 200; milk 2,200; meat 750; live stock 600; poultry 300; fruit 850; vegetables 1,750; sea food 50; totalling 6,700 car loads. The usual practice in regard to the temperatures, specific heats and tolerances will be seen by consulting the following table.

TABLE V.—*Composition and Specific Heat of Food Products and Storage Temperatures*

Product	Temperature carried	Composition, per cent		Specific heat above freezing	Specific heat below freezing	Latent heat of freezing
		Water	Solids			
Lean beef	30	72·00	28·00	·77	·41	104
Fat pork	30	39·00	61·00	·51	·30	56
Eggs	30	70·00	30·00	·76	·40	101
Potatoes	34	74·00	26·00	·80	·42	107
Cabbage	33	91·00	9·00	·93	·48	131
Carrots	33	83·00	17·00	·87	·45	120
Cream	33	59·25	30·75	·68	·38	85
Milk	35	87·50	12·50	·90	·47	126
Oysters	35	80·38	19·62	·84	·44	116
Whitefish	15	78·00	22·00	·82	·43	112
Chickens	28	73·70	26·30	·80	·42	106
Ice	28	100·00	0·00	1·00	·504	144

The Packing Plant.—The total refrigerated space in the packing plants of the United States in 1921 amounted to 258,549,000 cu.ft., which included 443 plants, of which 15,400,000 cu.ft. were held at 10° F or lower, 18,300,000 cu.ft. held at temperatures ranging from 11° to 29° F and 200,000,000 cu.ft. held at temperatures ranging from 30° to 44°. According to the U.S. Government reports 63,415,000 animals were slaughtered in 1920 under Government inspection including 7,600,000 cattle, 3,800,000 calves, 13,000,000 sheep and lambs and 39,000,000 hogs. Not less than 80% of these require refrigeration for a short time at least although the average time is between one and two months, and

Approximate Cold Storage Temperatures

Article	Temperature, degrees F	Article	Temperature, degrees F
Apples	30	Honey	45
Asparagus	33	Hops	32
Bananas	55	Huckleberries, frozen	20
Beans, fresh	32	Ice	28
Beans, dried	45	Ice cream, short carry	15
Beef, fresh, short carry	35	Lemons, short carry	50
Beef, fresh, long carry	30	Lemons, long carry	38
Beef, dried	40	Lambs	32
Beer, in barrels	32	Lard	40
Beer, in bottles	45	Livers	20
Berries, fresh, short carry	40	Maple syrup and sugar	45
Buckwheat flour	42	Meats canned	40
Butter	14	Meats, salt, after curing	43
Butterine	20	Milk, short carry	35
Cabbage	33	Nursery stock	30
Cantaloups, short carry	40	Nuts in shell	40
Cantaloups, long carry	33	Oatmeal	42
Carrots	33	Oils	45
Celery	32	Oleomargarine	20
Cheese, long carry	35	Onions	32
Chestnuts	34	Oranges, short carry	50
Chocolate dipping room	65	Oranges, long carry	34
Cider	32	Oxtails	30
Cigars	42	Oysters in shell	43
Corn, dried	45	Oysters in tubs	35
Cornmeal	42	Parsnips	32
Cranberries	33	Peaches, short carry	50
Cream, short carry	33	Pears	33
Cucumbers	38	Peas, dried	45
Currants, short carry	32	Plums	32
Dates	55	Potatoes	34
Eggs	30	Poultry, dressed, iced	30
Figs	55	Poultry, short carry	28
Fish, not frozen, short carry	28	Poultry, after frozen	10
Fish, fresh water, frozen	18	Poultry to freeze	0
Fish, salt water, not frozen	15	Raisins	55
Fish, to freeze	5	Ribs, not brined	20
Fish, dried	40	Salt meat curing room	32
Flowers, cut	36	Sardines, canned	40
Fruits, canned	40	Sauerkraut	38
Fruits, dried	40	Sausage casings	20
Furs	28	Scallops, after frozen	16
Game, short carry	28	Sheep	32
Game, after frozen	10	Shoulders, not brined	20
Game, to freeze	0	Sugar	45
Ginger ale	36	Syrup	45
Grapes	36	Tenderloins	33
Hams, not brined	20	Tobacco	42
Hogs	30	Tomatoes, ripe	42
		Watermelons, short carry	40
		Wheat flour	42
		Wines	50
		Woollens	28

Cold Storage Practice

Temperature of storage, degrees F	Humidity, per cent	Allowances
..	.	1 bbl. = 31½ gal. of 231 cu.in. each
..	..	1 bushel = 1·245 cu.ft. = 2,150·4 cu.in.
35	80 to 90	1 bbl. potatoes = 5 cu.ft. = 180 lb. = 2½ bu.
32 to 34	70 to 80	1 box cheese = 60 lb. = 2 cu.ft.
30 to 31	75	1 case eggs = 30 doz. = 50—70 lb. = 2¼ cu.ft. = 12×13×25
2 or lower	70	1 tub butter = 63 lb. = 1½ or 2 cu.ft. (piles not over 6 ft.)
30 to 35	85	1 bbl. apples = 150 lb., 5 cu.ft. = 2½ bu.
34	80 to 90	1 crate celery = 10 cu.ft. = 140 lb. = 24×24×30 in. (8 ft. high)
34	80 to 90	1 bbl. vegetables = 5 cu.ft., piles 5 ft. high
35	80	1 box oranges (packed on end) = 4 cu.ft., 70 lb. = boxes 15×15×30

Aisles—Allow ⅓ for eggs, celery and oranges
Allow ⅕ for potatoes and vegetables
Allow ¼ for mutton, pork, poultry (4 ft. high)
Specific gravity of boned beef = 1,073 = 67·2 lb. per cu.ft.

the average time between slaughtering and the consumption of the meat is less than two months. A very small amount (5%) of the meat is frozen and is held in freezer storage.

Method of Cooling.—The method of chilling meats just received from the killing floor is not standard. As a rule the loft system is used, this upper portion being separated from the storage room below by means of a false ceiling. When brine is used it may be passed through pipe coils, or it may be made to come into actual contact with the air in the form of a finely divided spray, using a nozzle similar to that used in the washing and conditioning of air. By this means an intimate mixture of air and brine is obtained inasmuch as the air has to pass through a curtain of finely divided brine. The air in the room is kept in constant circulation by the flow of the brine and the temperatures of the air in the different parts of the room are almost uniform. Where head room does not permit the use of a spray loft, the brine tube or brine box system may be used to advantage. In these cases the brine spray is confined to a limited space and the air has a forced circulation on account of the action of the sprays. Table VI. shows some statistics in regard to existing plants. Storage space may be piped in the usual manner.

Marine Refrigeration.—Marine refrigeration has four kinds of refrigeration equipment: (1) Fruit carriers require forced circulation of cool air with some fresh air, (2) Frozen meats which require no air circulation but do require good insulation and a storage temperature of from 12° to 15° F, (3) Chilled meats require a heavy piping ratio with the pipes located under the ceilings. The temperature of the cold storage rooms must be controlled within a small temperature variation, (4) Where general cargoes are carried the frozen meats may be carried in the lower holds.

TABLE VI.—*Wholesale Meat Markets*

	Refrigeration Data					
	Horse-power	Tons	Cubic feet	Kw. hours per year	Kw. hours per year per cubic foot	Cooler temperature, degrees F
1. Philadelphia, Pa.	15	8	22,980	25,728	1·12	..
2. Philadelphia, Pa.	10	6	15,732	30,448	1·93	..
3. Philadelphia, Pa.	25	15	21,384	42,636	2·00	..
4. Chicago, Ill.	30	12½	23,190	30,456	1·31	20
5. Chicago, Ill.	10	7	7,690	14,880	1·93	20
6. Pittsburgh, Pa.	50	20	94,000	159,250	1·69	30
Packers						
7. Chicago, Ill.	30	15	4,340	6,000	1·38	36
8. Pittsburgh, Pa.	30	15	39,680	76,292	1·93	36
9. Pittsburgh, Pa.	30	15	37,450	171,144	4·61	40 (2 comp.)
10. New Orleans, La.	30	15	54,500	51,372	0·944	35
	5	2	1,440	7,580	5·27	40
	65	20	94,000	139,225	1·47	33
Provisions						
11. New York, N.Y.	15	8	10,505	23,412	2·24	36
12. New York, N.Y.	10	4	38,880	25,783	0·665	38 (makes ice)
13. Chicago, Ill.	15	8	8,820	12,204	1·38	41
Retail Meat						
14. Philadelphia, Pa.	15	8	3,000	9,949	3·3	35
15. New Orleans, La.	7	2	1,490	4,600	3·1	..
16. Chicago, Ill.	15	8	4,629	26,808	5·8	36
17. Chicago, Ill.	5	2	1,706	3,408	2·0	43
18. Philadelphia, Pa.	7½	4	2,500	11,099	4·45	..
Fur Storage						
19. Brooklyn, N.Y.	39¼	20	56,775	19,760	0·35	30
20. New York, N.Y.	7½	4	5,722	1,931	0·34	20
21. New York, N.Y.	15	10	33,120	23,000	0·70	16
22. New York, N.Y.	30	15	40,500	27,321	0·67	32

District Cooling.—Large cities which have segregated cold storage warehouses, commission merchants and retail markets find it convenient to have a central cold storage company which will supply refrigeration under contract. Of these the Quincy Market and Cold Storage Warehouse Company of Boston, Mass. and the Merchants Refrigerating Company of New York are the best known. The former started under the direct expansion system but as the company expanded a change was made to brine, and in 1927 there were 1,400 separate services with 1,500 tons of refrigeration of connected load, exclusive of the warehouse service. The Merchants Refrigerating Company has brine at 0° F and carries 400 services varying from 200 to 15,000 cu.ft. of cold storage of which 35% is freezer and 65% is cooler space at from 31° to 35°.

The piping, where brine is used, can be full weight steel or wrought iron pipe usually completely welded between man-holes. Expansion joints must be provided every 500 ft. at a maximum, located at man-holes, and they may be of the slip joint, the corrugated or of the U type. The pipe must be placed below the frost line, usually from 3 to 7 ft. below the surface.

Ice Making.—The manufactured ice industry of the United States is one that was estimated in 1924 to comprise an investment of $1,000,000,000. Its importance has developed because of the hot summer conditions in the United States and because of the uncertainty and the cost of transportation of natural ice. Although the fractional tonnage compressor had removed a large number of the larger ice customers and the household refrigerating machines have caused a loss of thousands of residential customers, yet the manufactured ice industry has shown an increase of output of about 10% yearly. The natural ice trade was almost negligible in 1928 except in certain regions where ice is cut for car icing or similar purposes.

There have been numerous methods of freezing manufactured ice but the only method now installed in the United States is the "can system." In the "can system" the water to be frozen is placed in galvanized iron cans which are lowered into a brine at a temperature of from 14° to 17° F. The water in the cans may be either distilled water or drinking (so-called *raw*) water. One of the peculiarities of the American requirements is that the ice must be transparent. With distilled water it is very easy to get a crystal ice, but raw water cannot be made transparent without agitation and water softening because of the air in solution as well as the bicarbonates and other solids in solution in the water.

Distilled Water Ice.—In the case of the steam driven compressor the condensate is available, after elaborate reboiling and filtering, for the filling of the ice cans. Such ice is called distilled water ice and it makes a crystal cake of ice without difficulty. However a steam plant must be used thus meaning the installation of suitable steam boilers, engines and condensers. The economy of the steam engine would not be an important factor because enough distilled water must be obtained to fill the cans unless a multiple effect evaporator is used in addition to the steam engine. This uneconomical use of power, however, does not compare favourably with other designs as for example the oil engine or the electric motor driven compressor using raw water in the cans.

Raw Water Ice.—The difficulty with raw water ice, as has been mentioned, is in the treatment of the water to be frozen. The problem is not a difficult one if the water is rain water and in some localities even the non-thermal deep wells are not objectionable, whereas in other localities as for example in Indiana, Illinois, Iowa, etc., the number of grains of bicarbonates, sulphates, etc., may be as high as 30 to 40 per gallon. As such water is frozen the solids in solution become more and more concentrated until finally some of these are precipitated. In addition there is the air in solution which of itself would cause an opaque ice should freezing be carried out without using some method to prevent the air bubbles from settling on the freezing surface and freezing into the ice.

One of the first concerns of the ice manufacturer is that of water purification and softening. The requirements of first quality ice are clearness, firmness and freedom from discoloration. One of

the best methods of securing this is by the use of the lime-soda ash filter (the water being cold of necessity), followed by a sand filter and an alum coagulator Softening with lime removes the bicarbonates effectively. It is not necessary to remove all the permanent hardness provided that the magnesium which always tends to cause whiteness in the ice is removed. As a general statement if the sum of the sulphates, chlorides and nitrates does not exceed 20 grains per gallon the water may be purified for ice making, if the number of grains range from 20 to 40 per gallon the results are doubtful but if they exceed 40 grains the water will be found to be unsatisfactory for ice making. Up to 12 grains per gallon of solids consisting of sulphates, chlorides, nitrates and sodium carbonates the so-called low pressure air agitation system will give good results whereas if the high pressure air system of air agitation is used the solids may be increased to 20 grains and as good results can be obtained as with 12 grains and low pressure agitation.

Air Agitation.—By low pressure air agitation is meant that air under about 3 lb. per square inch is supplied by means of a small seamless brass drop pipe to the water in the cans which are usually of the 300 or the 400 lb. size and have a cross section of 11 by 22 inches. The amount of air delivered to the can is about 0·5 cu.ft. of free air per minute which is supplied at about 12 in. from the bottom of the can. The drop pipes may be removed towards the last of the freezing process or they may be frozen into the cake of ice in which case they are thawed out by means of a steam needle. In the latter case the tube is perforated with small holes at several points in order that agitation of the core water may continue after the end of the tube is frozen up by the formation of ice at the bottom of the can.

If the tube is soldered into the corner of the can or along the side by crimping the can enough to permit the tube to be soldered flush with the side of the can then the air tube becomes an integral part of the can. In such a case the air has to be dehydrated for otherwise the moisture in the air will freeze and will prevent all agitation. The dehydration is achieved by means of precooling the air under a pressure of about 25 lb. gauge if the air is supplied to the cans at 15 lb. per square inch and 0·2 cu.ft. of free air is supplied per minute per can. For cooling the air usually a brine spray or brine coil is employed, the brine used being taken from the ice tank.

Harvesting.—The American practice is to lift, dump and fill with water a number of cans at a time. This number may be 5, 6, 10 or even 30 cans, in which case a can basket is used for holding the cans securely at all times.

Cooling the Brine.—The brine in the tanks may be cooled by having direct expansion piping in the brine between the cans, or by the use of brine coolers. The old form of direct expansion piping was very inefficient because of the disregard of the principles of heat transfer. Improvements have been made of recent years by reducing the length of the coils so as to permit the gas formed by evaporation of the refrigerant to return quickly to the compressor, by the use of the flooded system whereby the coils are kept much more full of liquid refrigerant and by the use of an accumulator or other device to precool the liquid from the condenser to the temperature of evaporation before the liquid enters the evaporating coils. The accumulator acts also as a liquid trap to prevent liquid returning with the suction gas to the compressor.

Cooling of Air.—One of the great applications of refrigeration is that of air conditioning and cooling. In industries a uniform relative humidity of 60% is frequently called for, combined with a dry bulb temperature of 65° or 70° F. In the case of theatres the main purpose is to make the auditorium *feel* cool. This is done best by reducing the relative humidity and at the same time cooling the air some 5° or possibly 10°. In the theatre a certain amount of air must be supplied per person; this amount being from 25 to 30 cu.ft. per minute per person. The air may be recirculated in part and the remainder may be fresh air depending on the local laws or conditions, but in either case all the air must pass through a water spray chamber before it enters into the room to be ventilated.

Milk and Ice Cream.—Milk, after being pasteurized, must be cooled from about 140° F to 70° with water and then to 40° by means of brine. The cooling of the milk should be accomplished as promptly as possible and the method has been to use the Baudolet cooler with the brine inside the pipes and the milk flowing on the outside. In ice-cream (*q.v.*) making refrigeration is used both in the freezers and in the so-called sharp freezers which are held at about 0° F. The freezers are power-driven and they may be cooled by means of brine or by direct expansion piping. (*See* also FOOD PRESERVATION; HEATING AND VENTILATION; AIR CONDITIONING; THERMODYNAMICS.) (H. J. MAC.)

BIBLIOGRAPHY.—P. Neff, *Bibliography of American Literature relating to refrigeration with synopsis of papers and reports* (4 vols., 1916–22), compiled under direction of the Amer. Assoc. of Ice and Refrigeration; L. O. Bercaw, "Refrigeration and Cold Storage" (U.S. Dept. of Agri., *Bibliographical Contributions No. 10*, 1925); M. W. Arrowood, *Refrigeration, a Practical Treatise* (1913); M. Cooper, *Practical Cold Storage* (2nd ed., 1914); G. W. Daniels, *Refrigeration in the Chemical Industry* (1925); A. M. Greene, *The Elements of Refrigeration* (1916); E. Hausbrand, *Evaporating, Condensing and Cooling Apparatus* (1916); H. J. Macintire, *Handbook of Mechanical Refrigeration* (1928), and *The Principles of Mechanical Refrigeration* (1928); W. H. Motz, *Principles of Refrigeration* (1926); *Power's Practical Refrigeration* (2nd ed., 1928); B. H. Springett, *Cold Storage and Ice-making* (1921); H. Williams, *Mechanical Refrigeration* (1924).

REFRIGERATORS (HOUSEHOLD). These appliances may be classed in two groups: (1) those depending on natural or artificial ice as the cooling or freezing medium and (2) those fitted with a heat extracting apparatus.

In the first group are the small ice boxes or chests, low in first cost and having wood or metal cases. The cheapest of these have very little insulation and make no particular claim to efficiency. The more expensive models are better insulated and are usually lined with vitreous porcelain. Melting ice in a well insulated box, having one-third or one-half of its capacity devoted to ice storage, can maintain a temperature of from 42° to 55° Fahrenheit at low cost.

In the second group are the various types of household refrigerators depending on some internal heat extracting equipment.

The two principal methods of artificially reducing temperature are known as the compressor system and the absorption system.

In the United States the compressor system is the one in general favour for household use. Refrigerators using this system have a small electric motor, usually of one-quarter horse power, which drives the compressor. The compressor is placed (1) under the refrigerator cabinet or (2) anywhere within 50 ft. of it, provided there is a fall from the cabinet to the compressor.

When it is desired to begin refrigeration, the electric motor is switched on, and the compressor commences the cycle of operation. The refrigerant in the cooling coils, owing to the warmer temperature in the box, vaporizes and in doing so extracts heat from its surroundings. The refrigerant, having absorbed the heat, leaves the cabinet and passes through a copper tube to the compressor or pressure pump, the action of which, in conjunction with the cooling or condenser coil, converts it back to a liquid. The heat is automatically released and the liquid refrigerant is then re-admitted to the cooling coil so extracting more heat and repeating the process.

The most widely used refrigerant is sulphur dioxide (SO_2) because it is a stable gas, is non-toxic, non-inflammable, and as a refrigerant has many advantages over other gases as it admits of low pressure operation. Other refrigerants used are ethyl chloride, ammonia, carbon dioxide and methyl chloride.

One of the principal advantages of the compressor type of household electric refrigerator is that the automatic control of the electric motor can be set to produce the temperature desired. When the temperature in the refrigerator rises slightly above the set temperature, the motor automatically starts. When the temperature in the box drops below this point, the motor stops. In the "gas" refrigeration or absorption system the temperature may also be easily controlled; usually by a thermostat (*q.v.*).

There are two types of cooling controls in general use. One type operates with an expansion valve and is called the "dry system." The other type, in which a relatively large amount of

liquid refrigerant is retained in the evaporator, is the "flooded" system.

In these systems the gas passing through the coils is cooled by a fan attached to the motor. This method of cooling has been found to be sufficiently efficient for boxes up to 50 cubic feet capacity.

In America and Europe, a widely used method of obtaining refrigeration is an apparatus which does not require the use of motors or pumps. In this apparatus, heat is applied to a boiler containing a solution of ammonia in water, the ammonia being expelled from solution in gaseous form and then condensed to liquid by external cooling air or water. The liquid ammonia enters an evaporator located in the cabinet and there evaporates to reduce temperature. The now gaseous ammonia passes into the absorber, where it meets the water coming from the boiler, and the ammonia is absorbed again by the water, which is returned to the boiler.

The necessary difference in pressure of ammonia in the boiler-condenser part of the system and the evaporator-absorber part is provided by the use of hydrogen, which automatically circulates because of the difference in weight of two gas columns. The ammonia solution in the absorber is pumped back into the boiler through a pipe constantly heated.

The advantages of this type of absorption machine are that it can be operated by electrical, gas or oil heating. (*See* REFRIGERATION AND ICE MANUFACTURE.) (G. E. W. C.)

REFUGEES AND THE EXCHANGE OF POPULATIONS. In the early history of European civilization wars and conquests were often followed or accompanied by considerable movements of population. Sometimes the two went necessarily together, because the motive for war was the desire for richer lands on which the conquerors wished to live; sometimes the movement of population resulted from the ferocity of the invaders who drove whole populations away from the countries which they had inhabited.

REFUGEE MOVEMENTS

Temporary.—For a long period this feature of warfare disappeared, but with the World War of 1914 it once more recurred. The events of 1914–18 caused greater movements of population from one place to another than there had been for centuries before. In some cases, it is true, these movements, though large, were only temporary. For example, although the Belgian refugees who fled from the German invaders in 1914 were very numerous, and although practically all of them remained away from their homes until the end of 1918, they did not attempt to create a new life or to establish new homes outside their native land; their migration was only temporary, like that of the refugees who fled from the invaded provinces of France, Italy and Rumania, and to a smaller extent from all the territories occupied by enemy troops during the war.

Permanent.—But in other cases, great masses of refugees who left their homes when the tide of war swept over them had little prospect of ever returning or of recreating their previous life there. This has been the situation of a considerable proportion of the inhabitants of the Balkan peninsula. In that unhappy region of the world, where the population of large areas is mixed in race, great masses of people were obliged, either by fear of the invading armies or by the hostility of their immediate neighbours, to fly from the places where for centuries they and their forefathers had lived, and once they had left their homes the Governments of the countries which they had abandoned made it plain that they would not allow them to return, or would only allow them to return on conditions which the refugees considered altogether unacceptable. Faced, therefore, with prolonged, if not permanent exile, the refugees were forced to try to build up a new life in the countries to which they had fled. This happened in one case as the result, not of international, but of civil war. The struggle of 1917 to 1919 between the White and Red armies in Russia led to the emigration of one and a half million Russians who in the first instance sought refuge in the countries bordering on Russia, but subsequently, thanks to the action of the League of Nations, were for the most part enabled to settle more or less permanently in 45 countries throughout the world. In yet other cases the movement of population took place, not as the direct result of military action during a war, but in consequence of the terms of the treaties made when the war ended. But whether they came about under the terms of these so-called "exchange of population" treaties, or whether they were due to the compulsory or spontaneous flight of terror-stricken minorities while hostilities were still going on, these movements of population were due directly to the war. They all presented a number of common features, while collectively they created great economic, social and political problems for the exhausted Governments of Europe. Before indicating what has been done to deal with this problem it is necessary to say a few words about its extent.

MOVEMENTS—VARIOUS COUNTRIES

Excluding such temporary movements as those of the Belgians, the emigrations of war refugees of different nationalities were roughly as follows:—

1. **Russians.**—Between 1917 and 1920 nearly one and a half million political refugees from Russia were thrown upon the charity of Europe. Some of these refugees were prisoners taken by the Germans and Austrians during the war, who refused to return to Russia. A great number were members of the defeated armies of Koltchak, Wrangel, Denikin and others. Many of the refugees were women and children who fled from the Bolshevist revolution. In the earlier days of their exile they were dispersed as follows: Germany 300,000, Poland 400,000, France 400,000, Constantinople 100,000, Yugoslavia 50,000, Bulgaria 30,000, Czechoslovakia 26,000, Rumania and Greece 50,000, Baltic States 100,000. In addition a large number, at least 100,000, fled eastwards into China.

2. **Greeks.**—As the result of warlike operations there fled into Greece between 1915 and 1922 1,250,000 Greek refugees from Asia Minor and eastern Thrace and 50,000 from Bulgaria. In addition there came under treaties for the exchange of population from Bulgaria a further 50,000; from Asia Minor approximately 100,000.

3. **Armenians.**—From the year 1915 onwards there were expelled from their dwellings in Asia Minor some hundreds of thousands of Armenians. Great numbers of them perished in their wanderings in the mountains; some thousands succeeded in making journeys on foot as far as Mesopotamia; others sought protection in the Russian empire. In 1921 the independent Armenian republic of Erivan, with an Armenian population of 800,000, adopted the Soviet régime and became part of the Federated Union of Socialist Soviet Republics. To its original population, 300,000 to 400,000 additional refugees from Turkish Armenia were shortly added, and in spite of their great suffering, they were absorbed with remarkable rapidity into the economic system of the country. It is further estimated that more than 300,000 other Armenians are scattered more or less in destitution over Russia and the Near East, particularly Bulgaria and Greece. In 1921 100,000 fled to Syria, many of whom have now become Syrian subjects in the territory under French mandate; more than 60,000 fled in the following year to Greece, 35,000 to Bulgaria and 20,000 to 30,000 more fled to the Republic of Erivan.

4. **Bulgars.**—From 1918 onwards a large number of minorities of Bulgarian or quasi-Bulgarian race and language fled from their homes in the Dobrudja, in Macedonia and in eastern and western Thrace. It is calculated by the Bulgarian Government that their total number amounts to almost half a million. In addition, about 75,000 Bulgars have voluntarily emigrated to Bulgaria from Greece under the terms of the Greco-Bulgarian Exchange of Populations Treaty.

5. **Turks.**—Approximately 50,000 Turks fled from eastern Thrace and Smyrna when these territories were occupied by Greek forces in 1919, but returned to their homes in 1922. In addition approximately 350,000 to 400,000 Turks were moved from Greece (most of them from Macedonia, Crete and western Thrace) to Asia Minor under the terms of the Exchange of Populations Treaty made at Lausanne in 1923.

EFFECTS OF REFUGEE MOVEMENTS

Broadly speaking, the general features of these movements of population may be summarized as follows:—

The great emigration of Russian political refugees was, in the first instance, regarded as an almost unmixed evil both for Europe and for the refugees themselves. Their great suffering was not, in the early stages, compensated by any considerable political or economic gain. This is not equally true, however, of the movement of population in the Balkans and in the Near East. These movements have at least done a great deal towards the effective unmixing of the populations in these areas. The mixture of populations has led to so much political trouble in modern times that this unmixing process must be regarded as a very considerable advantage.

Further, in certain countries the influx of refugees, while at first it appeared to be a disaster, is in the long run proving to be a source of strength. This is particularly true of Greece, where, thanks to arrangements which will be mentioned shortly, the refugees were absorbed very quickly into the economic system of the country, where they have immensely increased the agricultural production and have imported industries hitherto unknown. There is no doubt that they have thus much improved the political position of Greece by giving it a homogeneous and vigorous new population and by increasing the economic wealth of the nation as a whole. It appears probable that the same result will in due course happen in Bulgaria, though there the process has been much slower, as the refugees showed less inclination to accept their exile as definitive and to settle down in new homes, than those who went from Asia Minor to Greece.

Another result of general importance which has followed the movement of population caused by the war is that Asia Minor has been left almost exclusively to the Turks. Hitherto inhabited by a very mixed population, including elements which continued the traditions of the ancient civilization of Byzantium, there are now few of these elements left. Furthermore it should be noted that the Russian emigration, which, as already stated, was regarded as an unmixed evil for the refugees and for the countries offering them hospitality, is, under the guidance of the League of Nations and the International Labour Office, beginning, in certain countries, especially France, to constitute an important reconstructive economic factor.

These changes, whether they be good or evil, have only come about at the cost of terrible suffering to all the individuals concerned. This is true even of those who have been moved under treaties of exchange though of course their sufferings have been much less than those who fled before invaders. It is the personal aspects of refugee movements which generally dominate the minds of people when they consider refugee questions; and no doubt these personal aspects are of supreme importance, not only on account of the claim of the refugees to the humanitarian sympathy of every civilized man and woman, but also because it is the personal problems of individual refugees, which, when they are taken collectively, make up the economic problems which their movements cause. And the economic problems brought upon the Governments of Europe by refugee movements since the war have been of great importance. In many countries they have seriously over-flooded the labour market, and in a number of centres the arrival of vast masses of strangers, wholly destitute and unable to find employment, threw a great burden on the financial resources of the States to which they came, whose Governments, unwilling to see them die of starvation, were literally obliged to furnish them with doles from their national funds. This part of the problem is, however, much affected by the so-called Treaties for the Exchange of Population, on which, therefore, it is necessary to say a word.

Treaties of Exchange.—Under these treaties, the most important of which are the Greco-Turkish and the Greco-Bulgarian, impartial committees, consisting of one representative from each Government and two or three impartial experts appointed by the League of Nations, supervise or actually carry out the transportation of the persons moved from one country to the other, value their property, keep an exact record of it and establish their claim for this value against the Government of the country to which they go. These treaties of exchange have worked with varying success. So far as the Greco-Turkish Treaty is concerned, its principal and most necessary effect was to make room in Greece, by the removal of 350,000 Turks, for a great part of the incoming flood of refugees, who found in the evacuated Turkish properties fields and houses ready for their use. Without this treaty of exchange, and without a refugee settlement loan floated under the auspices of the League, the absorption of the Greek refugees into productive employment in their motherland could never have been done. On the other hand, the fate of the Turks transported under the treaty from Greece into Turkey and in the absence of such a loan, appears to have been less happy. Official information cannot be had, but it is obvious that the arrival of 350,000 refugees in a country whose total population does not exceed five millions, must necessarily impose a heavy burden on its resources already straitened by many years of war.

Of the Greco-Bulgarian treaty of exchange, it is enough to say that while the working of its machinery has been slow, it has already laid the foundation for an unmixing of the population in Greek Macedonia and in parts of Bulgaria, which in the long run, though at the cost of great personal suffering, is likely to lead to satisfactory results.

WORK OF THE LEAGUE OF NATIONS

The other personal and economic problems which have been raised by the refugee movements above described have been dealt with partly by individual Governments and partly by the League of Nations. To take the Russians first, many Governments throughout Europe accorded them particular privileges and gave them much State help, estimated at £2,000,000 per annum—in particular Yugoslavia, Czechoslovakia and Bulgaria deserve mention. The League of Nations and the International Labour Office also played a considerable part through the action of the delegations established in Constantinople and in the Baltic States, Rumania, China, Bulgaria, Greece, Serbia, Germany, Poland, France and other countries, in breaking up the most disastrous congestions of refugees in places where no employment could be found, for example, in Constantinople and Greece, in placing some hundreds of thousands in employment in no fewer than 50 different countries; in securing for the refugees in many countries legal protection, freedom of movement in search of employment and a new form of so-called "League of Nations Passport" which has secured the recognition of over 50 Governments, under which they were enabled to travel from one country to another; and even in securing for a small number who desired it, repatriation to their native land. Under the auspices and with the help of these League offices, large movements of Russian refugees were carried out to France, where some thousands have been settled as tenant farmers and in industry, to the United States, to Canada, to South America and to other countries where employment could be found.

For the Greek refugees the League has done still more. Through its machinery a loan of £12,000,000 for their settlement in agricultural and other employment was obtained, and under the international control of a League commission this settlement has been carried out with remarkable success. On June 12, 1926, the Council of the League of Nations announced their intention of recommending a loan of £2,250,000 to the Bulgarian Government to assist the settlement of the Bulgar refugees. The conditions for administration and security were similar to those laid down in the case of the Greek refugee loan.

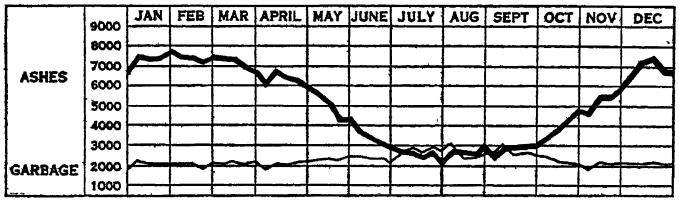
For the Armenians the same passport privileges and legal protection were obtained through the machinery of the League as had previously been obtained for the Russians. Their dispersal from places where they were concentrated in too great numbers, for example, from Greece, was also assisted by the agents of the League. This assistance took the form of an appeal for funds for the establishment of a national home in the Caucasus, and of the creation in co-operation with the mandatory Power and the International Labour Office of a series of agricultural colonies and urban settlements in Syria to relieve the congestion of the refugee

camps in Beirut, Alexandretta and Aleppo.

The effect of this League of Nations action is likely to be cumulative, and considerable as are its short period results in mitigating the sufferings of the refugees and in helping to solve the economic problems caused to the Governments concerned, its long period results are likely to be more important still. By the various kinds of action which it has undertaken, the League has helped to remove centres of disaffection and discontent; it has helped to build up the prosperity of different portions of the world; and it has helped to raise, by the distribution and settlement of industrious and highly educated refugees, the standards of civilization in various portions of the globe. It is, therefore, possible to say that, as the result of the generosity of a number of Governments and of their enlightened co-operation through the machinery of the League, the ultimate results of the refugee movements will be better than even the most optimistic could have ventured to expect.

See League of Nations Official *Journal*, 3rd year, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 11 and 12; 4th year, Nos. 1, 2, 3, 4, 6, 7, 8, 10 and 11; 5th year, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12; 6th year, Nos. 2, 3, 4, 7, 10 and 11; 7th year, Nos. 2, 4, 7, 10, 11 and 12; 8th year, Nos. 2, 4, 5, 6, 7, 10 and 11; 9th year, Nos. 3, 4, 6, 7 and 8. (F. NA.)

REFUSE DISPOSAL, the general term employed in the United States to denote the solid wastes of a community, including garbage, rubbish, ashes and miscellaneous wastes. (For British practice *see* DESTRUCTORS.) Garbage may be defined as the waste matter resulting from the preparation, cooking and consumption of food. Rubbish is the miscellaneous material discarded by a community as being no longer of use or value. It includes paper, rags, old clothing, broken furniture and numerous other articles. The term ashes, as generally used, refers only to the residue resulting from the operation of heating plants in homes and small business establishments or offices. In the average city (there are wide differences in various cities) of the United States, garbage comprises about 13% by weight and 18% by volume of all refuse; rubbish amounts to only 7% by weight, but to 25% by volume; ashes form approximately 80% by weight and 57% by volume of the total. Garbage weighs from 1,000 to 1,200 lb. per cubic yard, the weight varying with the season, temperature, rainfall and other factors. Of the total weight of garbage, from 60 to 65% is moisture while the combustible matter amounts to 15 or 20%. A pound of dry garbage contains about 8,500 heat units and about 60 lb. of grease per ton can be extracted from raw garbage. Rubbish differs from garbage, which is unstable and subject to rapid decomposition, in that it breaks down slowly and relatively without objection; it has considerable fuel value, the volatile mat-



FROM HARDENBURGH, "PUBLIC WORKS"

GRAPH SHOWING VARIATION IN REFUSE TOTALS IN TORONTO, 1926
The heavy line indicates the loads of ashes removed, light line, the loads of garbage removed

er ranging from 40 to 70% of the total. Ashes collected from residences and small business establishments also have some fuel value.

Quantity of Waste.—Where the collection service is good, the average daily amount of garbage collected ranges from 0·5 to 0·75 lb. per person. The amount of garbage appears to be increasing, and data collected from a number of cities where careful and reliable records have been kept showed that in 1927 the average production was over 200 lb. per person per year, compared to previous figures ranging from 150 to 175 pounds. The daily production varies somewhat with the season. In the Southern States, watermelon rinds form a large part of the garbage during the late summer months. The amount of rubbish collected ranges from 0 to 175 lb. per person per year, averaging about 75 pounds. The collections of rubbish remain fairly uniform throughout the year, increasing slightly during the spring and fall months. Ashes, in the Northern cities, compose a large part of the refuse collected, but where climatic conditions are milder, the amount may become unimportant. Street sweepings, night soil, manure, dead animals and other wastes vary in amount according to local conditions and local regulations governing their collection. However, the collection and disposal of these wastes are not, in most cities, func-



BY COURTESY OF THE LINK BELT CO.

LINK-BELT CRAWLER LOADER CLEANING UP SNOW IN PHILADELPHIA
It is capable of loading a 5-ton truck in a little over a minute

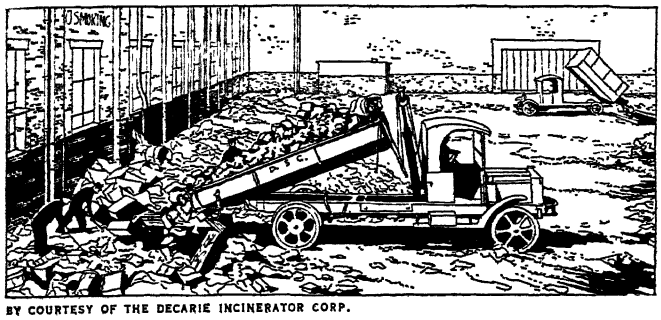
tions of the general refuse collection organization, but are performed by special departments. Therefore, they will not be considered here. The total amount of refuse collected per person per year ordinarily amounts to 1,200 to 1,700 lb. but because of the many factors influencing collection, the amounts reported by typical cities range from 800 to 2,500 pounds.

Collection of Wastes.—The collection of waste is generally considered to include both the actual gathering of the garbage, rubbish and ashes, and their subsequent transportation to the point of disposal. The methods of collection vary; in *separate* collection, garbage is collected separately and apart from the other wastes which may or may not be collected together; in *mixed* collection, garbage, rubbish and ashes are collected at one time and from one receptacle. Separate collection of garbage is the general practice in the United States. A survey of 190 representative cities showed that garbage was collected separately from ashes and rubbish in 139 of them, while 51 cities collected mixed refuse. The practice of separate collection is based upon either utilization of the garbage, as in feeding to swine or reduction, or on cheaper disposal of the less objectionable components of the wastes. In many cities, rubbish and ashes, which comprise the great bulk of the refuse, may be dumped or used for filling within the city limits, while garbage disposal must be accomplished at some distant point. In such cases, the saving in hauling and handling costs may be much more than the extra cost occasioned by separate collection.

Where garbage is collected separately, it is the usual practice to collect it three times a week in the summer and twice a week in the winter, though nearly 20% of the cities make daily collections of garbage in the summer. Mixed refuse may be collected less frequently and at longer intervals because decomposition is slower and the usual practice is to make two collections a week. Ashes and rubbish are collected weekly or at longer intervals. Most of the large cities collect refuse by municipal employees.

Satisfactory collection and handling of refuse is impossible without proper receptacles for the storage of waste materials, and most cities have regulations covering the size, material of con-

struction and quality of garbage receptacles. They are usually required to be watertight, of impervious materials and to have a tight cover. The usual capacity is 9 to 15 gallons. Few cities require any special receptacle for rubbish or ashes, but generally provide that the former be tied in bundles, or placed in boxes or barrels; ashes should be placed in non-combustible, covered containers. Receptacles may be placed at the back door, at the alley



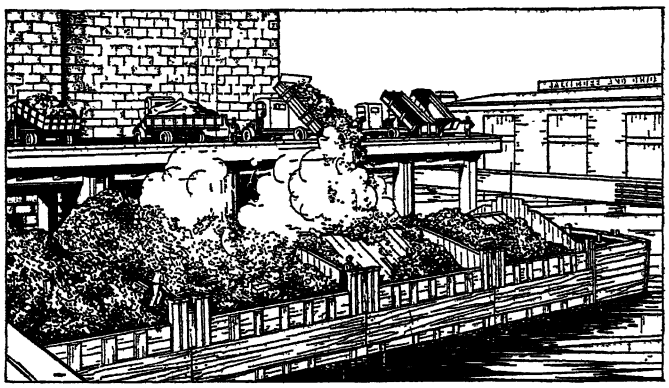
BY COURTESY OF THE DECARIE INCINERATOR CORP.

CHARGING FLOOR OF ONE OF NEW YORK CITY'S CENTRAL GARBAGE DUMPS, WHERE GARBAGE, MIXED WITH DRY REFUSE, IS DUMPED DIRECTLY INTO THE FURNACE

line or at the curb line. It costs more to collect from the back door, but it is the usual practice in the United States. Reports from 190 cities showed that 115 collected from the back door, 51 from the curb and 24 from either place.

Collection Equipment.—The employment of motor trucks in refuse collection is increasing and about one-half of the cities of the United States use motor equipment, though on house-to-house work in residential sections, where the amount collected from each house is small, horse-drawn equipment may operate more cheaply. For garbage collection, the 2-yd. body mounted on a 1 or 1½-ton chassis is probably the most popular, though larger bodies mounted on 2 and 3-ton chassis are used in many places. In ash and refuse collection 3- to 5-ton trucks are more economical.

Disposal.—Many methods of refuse disposal are in use in the United States, probably due to the differing conditions existing. The methods in use include dumping on land and in water, filling, ploughing under, burial, feeding to hogs, incineration, reduction, sorting and utilization. Garbage from cities is relatively rich in food values. If these values can be reclaimed, the net cost of disposal may be reduced. In addition to the food value of the garbage, the facilities for the cheap and ready disposal of rubbish and



BY COURTESY OF THE CITY OF N.Y. DEPT. OF STREET CLEANING

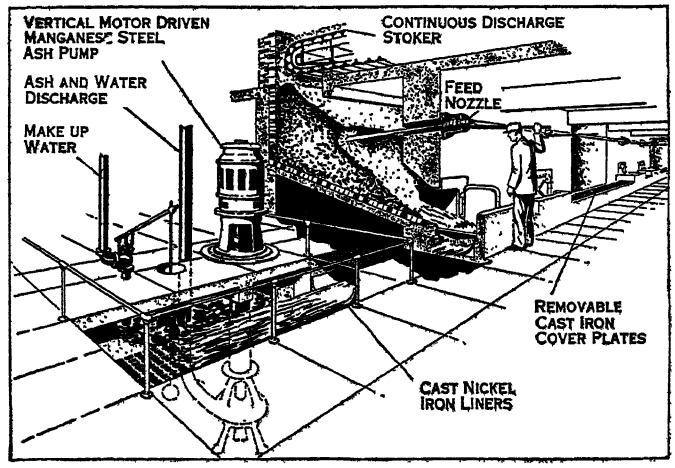
LOADING GARBAGE WHICH CANNOT BE BURNED ON SCOWS TO BE TAKEN 20 MILES OUT IN THE OCEAN AND DUMPED

ashes and the availability of easily accessible sites for incinerators will be factors in the choice of the method to be used.

Disposal of refuse by filling low places and reclaiming marshes and swamp lands is quite common among the smaller cities; in larger places sites for dumps are rarely available except at a considerable distance, and the longer haul thus necessitated increases the cost. Garbage cannot be dumped satisfactorily, unless extreme precautions are taken, and disposal in this manner is rare, except in cases of emergency. For satisfactory disposal by dumping, garbage must be treated with a deodorant or disinfectant, spread out in thin layers, and covered immediately with earth, ashes or other inorganic material. Ashes make good filling material and are used in many cities for making fills. Rubbish is frequently dumped, but because of the time required for the fill to compact, and the miscellaneous material composing rubbish, it is not as generally satisfactory. Dumps are almost certain to catch fire, resulting in objectionable fumes. To obviate this, many cities burn the combustible matter as it comes to the dump. Paper is usually collected, baled and sold. Picking over the materials on the dump is quite a general custom and usually affords the city some revenue.

Sorting.—While in most cities, sorting is done mainly on the dumps, as previously mentioned, a more systematic procedure is employed in a number of places. A belt conveyor, upon which the refuse is dumped, and beside which a number of pickers stand, is the usual arrangement. Each picker takes from the moving belt one or more types of material from the refuse. Among the more valuable materials salvaged are paper, glass, bottles, metals, rags and tin cans. While the revenue from this work is frequently considerable, few cities have found it to be sufficient to pay for the labour and overhead of the plant.

Burial.—Few cities dispose of their garbage by burial. In case of the breakdown of other methods of disposal, burial is sometimes employed as a temporary measure. The usual practice is to place the garbage in trenches about 2 ft. deep and 4 to 6 ft. wide, the garbage being deposited in layers from 12 to 18 in. deep. Before covering, the garbage should be sprayed liberally with disinfectant



BY COURTESY OF THE ALLEN SHERMAN HOFF CO.

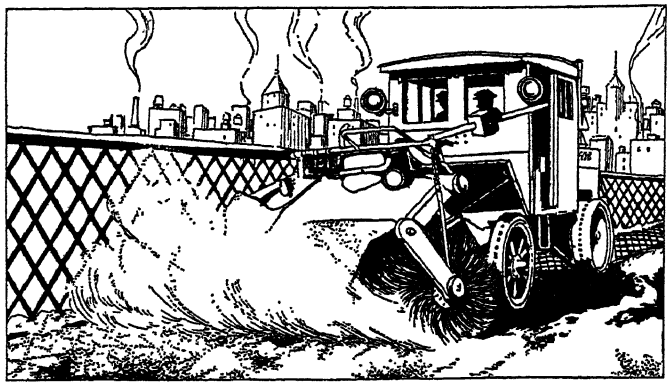
HYDRO JET SYSTEM OF REFUSE DISPOSAL, SHOWING VARIOUS PARTS

or crude oil. A cover of 12 to 18 in. of earth appears to give best results. For winter disposal, the trenches must be dug before the ground freezes, and covering can be done in early spring. Sandy, well-drained soil is most suitable, and where conditions are favourable, the land can be reused in 3 to 5 years. Ploughing under of garbage is a little used method. The cover secured is very thin, and men with hoes must follow the plough to cover particles not turned under.

Feeding to Swine.—The U.S. Department of Agriculture estimates that the garbage of more than 8,000,000 people is fed to hogs. A survey of 200 cities by *Public Works* showed that 39% of them fed all or part of their garbage to hogs. It is estimated that 50 lb. of garbage will produce 1 lb. of pork. Based on a live market price of 10 cents a pound for pork, garbage is therefore worth $4 per ton, from which must be deducted the costs of labour and hauling, interest and depreciation on equipment, and other items. While some of the food value in the garbage is utilized, in very few cases is the return sufficient to pay for both collection and disposal, though the revenue received may reduce materially these costs.

For utilization of the garbage by hog feeding, frequent collection is necessary. In the summer, collections should be made at least three times a week. Careful separation of the garbage is necessary, since its value as a food depends upon the care with which rubbish, glass, crockery, soap and other harmful materials are excluded. It is always difficult to find a suitable situation for a

farm, as there is always objection to its establishment in settled areas; as a result an isolated place usually must be chosen, with a resultant long and costly haul. Dry and well-drained sites, preferably with sandy or gravelled soil, and with plenty of water, are almost a necessity. Hogs should be fed on platforms, which should be of impervious materials, and so arranged as to reduce spillage and waste. The refuse remaining from the feeding, which,

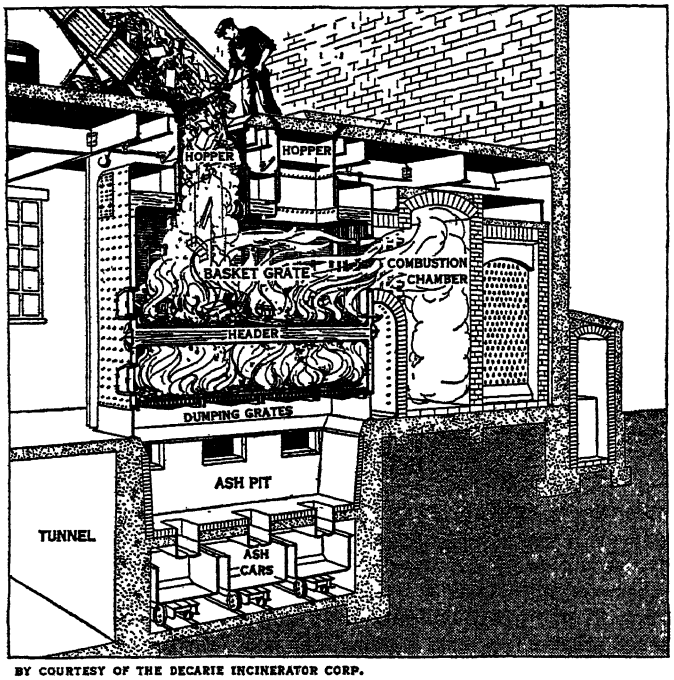


BY COURTESY OF THE CITY OF N.Y. DEPT. OF STREET CLEANING

A SWEEPER AT WORK CLEANING THE WILLIAMSBURG BRIDGE OF SNOW

with the droppings from the pigs, amounts to 40 to 50% of the original volume of the garbage, must be removed daily. Disposal of this waste is difficult; composting, burial and incineration have been used in various places with some success. Cooking of the garbage is not desirable, as the hogs are less able to choose the materials most suited to them. Hogs fed on garbage are liable to suffer from cholera, and immunization is necessary to prevent loss.

Incineration.—The complete destruction by fire of all wastes in specially constructed furnaces called incinerators has several advantages. It permits the collection of mixed refuse, thereby



BY COURTESY OF THE DECARIE INCINERATOR CORP.

A SECTION OF A GARBAGE DESTRUCTOR SHOWING DIFFERENT PARTS

reducing the complexity and difficulty of the collection service; incinerators frequently can be situated near the centres of the largest sources of production of waste, thus reducing the length of haul and the cost; the possibility of having several plants placed at suitable locations throughout the city permits still greater reduction in haul and provides insurance against complete interruption of all disposal facilities. Some slight revenue is occasionally available from steam and from clinker, but this is unimportant. In the United States incineration is employed for the disposal of mixed refuse and of garbage alone. The mixed refuse will normally burn without added fuel, but when garbage is burned, some additional fuel must be supplied. When garbage alone, or very wet refuse is to be burned, a drying hearth is provided upon which the garbage or wet refuse is placed. The flames from the burning material on the grate pass over this material, drying it.

Either natural or forced draft may be employed in operation, but, unless the refuse is unusually heavy and compact, natural draft is sufficient, the air being supplied to the furnace pre-heated to a temperature of about 400° F. The furnace is commonly mechanically charged.

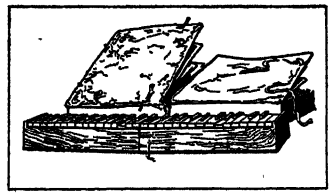
Both high and low temperature incinerators are used, local conditions usually dictating the choice of type. With the high temperature plants in which the interior of the furnace is maintained at 1,600 to 2,000° F, odours are effectively destroyed; low temperature plants operate at 1,250 to 1,400° F, which does not always prevent the emission of odours. The high temperature plant, therefore, is especially suited for use in closely built up sections where discharge of odours cannot be permitted. Low temperature plants do not emit odours at all times, but may do so when the fire is cooled below the safety point. In 1927 about 40 cities in the United States installed incinerators, and this method is increasing.

Reduction.—Some of the fats and food values in garbage may be recovered by the reduction process. The products of reduction are grease and tankage. The grease, which is of low grade, is used in making soap, candles and similar products, while tankage forms a base or filler for fertilizer. Reduction is applicable only to garbage and dead animals, and other wastes must be collected and disposed of separately. Because of the costly and complicated equipment required for this process, the necessity for skilled operation, and the large overhead costs, reduction is not commercially feasible for cities having a population less than about 100,000.

There are two general processes of reduction, the *drying method* and the *cooking method*. Though the latter process is higher in first cost and operating cost, more grease is recovered and the by-products are in somewhat better condition. The yield of grease ranges from 2 to 3% of the original weight of the garbage, while from 150 to 225 lb. of tankage per ton are produced. The value of the grease varies with the market; tankage value is determined by its content of ammonia, potash and bone phosphate of lime, which carry the same values as in commercial fertilizers. To be commercially saleable, tankage must not contain more than 10% of moisture.

In the cooking method, the garbage is cooked in digester tanks for five or six hours, and then pressed. The grease that rises to the top is skimmed off and the solid matter dried and percolated with a solvent to remove the remaining grease. In the drying process, the garbage is crushed or ground and passed through driers, then being percolated to remove the grease. Odours are troublesome in both methods, but are perhaps less difficult to control in the cooking method. Washing with a fine spray of water, burning and treating with chlorine gas are among the methods employed to destroy odours, but none of these has been fully effective. Care and cleanliness in operation are important factors.

Solid and liquid wastes also result from these processes. The former consist largely of the rubbish sorted from the garbage, and are usually buried or burned. The liquid wastes include floor washings, waste liquors and drainings. They may be discharged into the sewer system or treated in an individual plant. Because of the likelihood of odours, reduction plants, like hog farms, must be situated in thinly settled areas, usually far from the city limits. This requirement of situation necessitates long hauls, which often materially increase the cost of disposal. (W. A. H.)



BIBLE REGAL, A SMALL PORTABLE ORGAN WHICH FOLDS UP LIKE A BOOK

REGAL, a small late-mediaeval portable organ, furnished with beating-reeds and having two bellows like a positive organ; also in Germany the name given to the reed-stops (beating-reeds) of a large organ, and more especially the "vox humana" stop. During the 16th and 17th cen-

turies the regal was a very great favourite, and although, owing to the civil wars and the ravages of time, very few specimens now remain, the instruments are often mentioned in old wills and inventories.

REGALIA: *see* JEWELS, CROWN; CORONATION.

REGENCE STYLE, in architecture and the decorative arts, a name sometimes given to a style transitional between the classic grandeur of the Louis XIV. work and the freely imaginative rococo of the developed Louis XV. period; so called from the fact that from 1715 to 1723 France was under the regency of Philip, duke of Orleans. (*See* LOUIS STYLES.)

REGENERATION IN ANIMALS. Like every substance, the tissues of our body are subject to wear and tear. They would soon be useless if there were no possibility of repair. The skin would rub off, the nails grind down, the hair split and fall, the muscles and nerves be worn out by fatigue. As it is, these tissues are incessantly growing but in such unobtrusive ways that we do not think much about the matter and take this physiological regeneration for granted, without inquiring into its causes. It is only in certain cases, when our skin peels off in sheets or when we trim our hair after the fashion and cut our nails, not worn enough by contact, that we become aware of this growth. In some animals the skin is periodically shed in one piece. In such creatures, for instance crayfish and snakes, growth of the whole body continues as long as these moults or ecdyses occur. Here the connection between physiological repair and growth is distinctly seen. Not only the damage done to our body by use, but also accidental injuries are made good by natural means. If we cut our finger, it will soon heal, the damaged cells being replaced by new ones. Torn-off nails may also regrow, an example of accidental regeneration in man, which exceeds mere wound healing. The loss of a whole limb, on the other hand, is irreparable by regeneration in human beings but not in other animal types. If a newt loses a leg or tail it will grow again. Even heads can be regenerated by some creatures, which are able to survive the accidental loss of the anterior part of their bodies.

Popular Belief.—Long before modern times the possibility of cut-off parts being regenerated fascinated the imagination of mankind. In Greek mythology the Hydra serpent, eventually slain by Hercules, was supposed to be able to grow two heads instead of each one cut off. Possibly this myth is founded upon the fact that not infrequently two-headed snakes are found in nature. Now, although snakes are neither able to survive the severing of the head from the trunk nor to regenerate it, the hypothesis is well substantiated that these monstrosities owe their origin to a process of splitting and regeneration in the embryo. Be this as it may, the name of the mythological serpent "Hydra" was later given to certain freshwater animalcules, when they were detected in the time of the first microscopes. The plant-like aspect of these hydras suggested experiments on multiplying them from cuttings much as gardeners do with certain plants. These animals behaved like plants, each piece growing into a perfect specimen. Moreover, when split at the anterior end they proved true to their name and regenerated two heads from one piece. The occurrence of accidental regeneration was in some cases well known in ancient Greece. The *Sauroktonos* represents a youth in the characteristic position occupied by boys in Greece and Italy even to-day, when trying to catch lizards with a grass noose. This statue shows that from olden times the ways of lizards were known to their persecutors, and the easy breakage of the lizard's tail and regenerating individuals with tails in different stages of repair must have been observed. More than two centuries ago a scientist travelling in Portugal recorded that many lizards lose their tails in this way and suggested that the not infrequent duplicities and triplicities of tails in that country might be of regenerative origin, due to complicated wounds; a suggestion since verified by various experiments. Popular belief in the regenerative powers of the indigenous animals has not always proved reliable. In some parts of Italy the custom of eating the hind legs of frogs has led to the barbarous procedure of removing the legs from the living animals and returning the latter to the pond on the assumption that the legs will be regenerated. This erroneous idea seems to have arisen from the occasional observation of frogs with much smaller hind feet than usual. But extensive experimental work has shown that such individuals only arise when the legs are removed in the tadpole; legs removed after metamorphosis are never replaced. Another fallacy is the belief of Spanish fishermen that male fiddler-crabs robbed of the big claw they carry on one side grow a small one in its place, while the one on the other side enlarges correspondingly. In reality, the big claw, if lost, is replaced as such, the small one not changing its character. We shall see later on that in other Crustacea such transposition of chelae really occurs but only in special circumstances. Before experimental methods were applied, biological science made the same mistake in the case of the lobster, transposition of the chelae being inferred to occur in the adult on account of stages found in nature showing a different degree of development in the claws. But recent experiment has proved that such reversal only occurs after removal of a claw in young stages: operations on the adult lead to a direct regeneration of the type of chela removed. Although the regeneration of claws in crustaceans was known to the ancient philosophers, experimental evidence was not obtained before the above-mentioned researches on microscopical animals led to methodical experiments with larger forms.

Theory of Selection.—Positive evidence of the regeneration of parts easily lost and therefore often found in nature as miniature structures was obtained by simple experiment. Unfortunately, before extensive research in this direction had been carried out the interest of biologists passed to the theory of evolution. Starting with the idea that useful characters would be preserved by natural selection, it was held that all characters now observed in animals were due to this agency. It was cited, as proof of this thesis, that species much exposed to the attacks of enemies and easily injured readily regenerated lost parts. Some authors tried to establish that regeneration was restricted to these cases. They observed that birds with beaks liable to get injured in use, *e.g.*, parrots and woodpeckers in pecking hard material, storks and fighting-cocks in their mating combats, were able to regenerate the injured beak. On the other hand, from a single instance of an old goose which was not able to restore the broken-off tip of its bill, it was rashly inferred that beaks like those of water-fowl, used only for handling soft substances, lacked the power of regeneration. This conclusion has not been borne out by subsequent experiments on young geese and ducks, which can regenerate the proper form of the bill when the tip is cut off. It has further been shown that homologous parts of the jaw of lizards regenerate, although in contrast to the tail they are strongly fixed to the body and scarcely ever injured. Other instances of correlation between liability to injury and capacity of regeneration have been sought in amphibians. We have already mentioned that common newts are capable of regenerating their legs. This capacity has been ascribed to the intervention of their foes. Now in some caves certain blind forms of tailed amphibians are to be found without any rapacious animals being present which would be able to prey upon them. Although former experiments had shown that the power of regeneration is possessed by this cave-dwelling *Proteus*, their inability to restore lost members has been upheld on the plea that they are not found in nature with regenerated legs or tails. But repetition of the experiments has proved their validity; and the reason for the absence of regenerates in nature is the low temperature of the caves and their proneness to infection, when the amputation has not been made under sterile conditions. If the theory of the acquisition of regenerative capacities by natural selection were correct, one would infer that rudimentary organs, whose regeneration would be of no value to their bearer, would have lost this potency. But here again the fact that hermit crabs regenerate their rudimentary abdominal legs contradicts the theory. Nevertheless, the fascination of this view is so strong that it repeatedly crops up and is tested anew. Whereas the external gills of newts are exposed to injury, the internal gills of frog-tadpoles are well protected; experiments have recently been carried out in expectation that they would prove devoid of regenerative capacity. The experimenter was disappointed by the

prompt restoration of the excised gill-filaments. Many organs being internal in all animals were supposed not to regenerate: the lungs, for instance. The first experiments on their excision in newts being negative, this has been taken as corroborative evidence. Later research on a larger scale has shown that partially extirpated lungs of salamanders and many other internal organs regenerate, provided that a small piece of the tissue is left in place. The continued discrepancy between facts and expectation made it necessary to look for some other explanation of the distribution of regenerative faculties than natural selection.

Distribution.—For the last 30 years we have witnessed a vast accumulation of experimental evidence in biology and have at last obtained enough facts on regeneration and non-regeneration in animals for a general summary. Beginning with the simplest forms, the protozoans, representing a single cell of protoplasm including one or more nuclei, we find them capable of restoring their form not only after their anterior or posterior half has been cut off, but also when they are cut into small pieces, the only condition being that each piece contains a bit of nucleus. Proceeding to the multicellular types the hydras are able to develop new individuals from cuttings, and many of the coelenterates, the group to which the hydras belong, behave in this way. Nevertheless, there are certain restrictions as to the parts that are able to restore the animal as a whole. Passing this by for the moment, the next two groups in the scale of the animal world, the echinoderms and the worms, comprise species still capable of multiplication by fission, the several parts completing themselves by regeneration. As examples, the starfish *Linkia,* which regenerates from a piece of one arm, and the freshwater worms *Lubriculus, Nais* and *Stenostomum* may be cited. Many of the ascidians, too, are capable of complete regeneration. All other types show a great restriction in this regard, yet in the molluscs, arthropods and lower vertebrates the appendages and sense-organs can as a rule be restored, if not lost at a late stage in life. Thus the arms of squids, the eye-bearing tentacles of snails, the legs of spiders, all the appendages of crustacea and insects and the limbs of fish and amphibians grow again after injury. In the reptiles, further restrictions occur, the regeneration of the tail and jaw being the only ones of importance. Broken-off legs are never replaced by new ones, although examples have been found in nature with a tail-like appendage arising from the stump of a leg. In warm-blooded vertebrates amputated tails or limbs are incapable of producing more than a short conical projection. The most achieved in the way of remodelling in mammals has been found in the tail of rodents, *e.g.,* dormice, the broken vertebra growing to form a tip which by a tuft of hair simulates the normal tail-end. From this brief summary three conclusions can be drawn: first that with ascent in the scale of animal types, regenerative capacities are more and more curtailed; secondly, that regeneration is an original and general faculty of living matter, becoming lost by secondary complications in the course of evolution; and thirdly that natural selection has been impotent even to maintain the power of restoring lost parts shown by low types. Therefore, correlation of regenerative faculty with the probability of loss or the survival of the fittest must prove futile. Would not the possibility of replacing lost legs be of as much value to birds and mammals as to crustaceans and newts? Can we conjecture why regeneration has been thrown overboard in the highest classes of animals? For answer, we must turn to the conditions under which the replacement of losses is possible in genera more or less gifted in this respect. The mode of growth or physiological regeneration varies in different creatures. Some types, on periodically shedding their skin, replace not only this outward covering but renew all the internal tissues too, with the exception of some cells which have lost the power to divide. Others, on the contrary, retain the great bulk of old tissue, as many of these have undergone a transformation inhibiting their further reproduction. Crustaceans, spiders and insects belong to the first, amphibians and reptiles to the second group. The former escape from the old shell or skin in a limp condition; the latter keep the skeleton, tendons and other internal parts through their moult. The higher the grade of ossification the more stable the system remains and the less it is wont to undergo renewal in physiological regeneration. Now the power of accidental regeneration wanes with increasing ossification, indicating once more its correlation with the physiological processes of growth. There appears thus to be an advantage for the rigidity of the body to be maintained through the moults even at the cost of losing the regenerative power by the incorporation of stable elements. We know, indeed, the time of moulting to be a critical one. Even the mere change of skin in the cold-blooded vertebrates and the moult of feathers in the birds is of much inconvenience, these animals being then much more sensitive to external factors. It is therefore reasonable to suppose that in mammals the method of continuous repair has been evolved to avoid the disadvantage of moulting and that the nearly total loss of regenerative power has been the price. It may also have been of advantage to warm-blooded animals to economize growth material by not changing it completely at short intervals, as they expend energy not only in their movements and growth, but also in the maintenance of their body-heat.

Memory.—Another great advantage, the most far-reaching of all, has been gained by the stabilization of the nervous ganglionic cells, which cease to divide in the mammalian brain comparatively soon after birth, thus guaranteeing a stable substratum for the preservation of memory. In several instances we have been able to prove this by experiment. Infusorians fed with carmine refuse to take the grains of this substance after a short time. But as soon as the animal has split into two new cells, this memory is lost, carmine again being taken. Certain predatory grasshoppers may be taught to take food at a selected place of their cage, but between two moults they forget what they have learnt before, probably because some ganglion-cells are renewed, as seen by histological examination. The same behaviour has been observed in amphibian larvae, when they metamorphose. This raises the question as to what influence age and stage of development may have on regeneration. If our assumption be correct, that accidental regeneration is directly connected with physiological regeneration and growth, we should expect most regeneration at those stages during which physiological processes and increase of size are at their height.

Age and Size.—The rapidity of substantial change and growth decreasing with age, young animals ought to regenerate better than old ones. This conclusion is borne out by all the facts and experiments at our disposal, as long as the removed parts are strictly comparable. From this general statement it follows that higher organisms devoid of a certain faculty to restore parts of their body in a developed state may possess this faculty in their youth. The frog is unable to replace a limb, whereas it is able to regenerate the same member as a young tadpole. The most striking example of this kind is offered by the insects, which never regenerate limbs as imagos, but do so as long as they are in the larval state. Here, with the last moult to the definitive form, growth ceases. Examples have been brought forward in which seemingly the young stages show less regenerative capacity than older ones. If the tailed larva of the tunicates be cut in two, regeneration will not take place in both pieces, whereas the metamorphosed animal may be cut in two and regenerate from both pieces. But then the cut passing transversely through the middle does not separate homologous halves in larva and imago. Again, in the starfish the developed creature restores all missing parts when cut in two, whilst the pluteus stage is incapable of regrowing its skeletal arms. Here, too, there is no homology whatsoever between the so-called pluteus arms and the rays of the developed starfish. These latter arise from a new rudiment at one side of the larva during metamorphosis. Since it is difficult to compare the regenerative capacity of larval and imaginal stages, it is necessary to restrict our research to such periods of animal life, during which growth is yet proceeding, but no change in differentiation occurs, when seeking strictly comparable quantitative data of regeneration. Such material afforded by tadpoles, by newts in their larval or in their metamorphosed state, and by crustaceans, has been treated statistically as to the increments of size in the regenerating tails, legs and claws respectively in equal periods. The increase in the size of the regenerating member is first only

small, rising in time more and more, then again falling off and subsiding to the growth-rate of the normal member, as soon as the normal size has been attained by the regenerate. This rise and fall is mainly due to the increase of regenerating material, which multiplies from a small bud, but later on lessens its rate of multiplication. If we do not take the absolute mass that has been added to the miniature regenerating member, but calculate the coefficient by which we have to multiply the size at a given time to get its size at the next, this relative value is highest when the regenerating bud begins to differentiate, and falls off first quickly, then more slowly as time goes on. The curve of regeneration is inversely proportional to the time. We may picture growth as a stream losing energy as it flows on, but on the whole not showing a great fall from one point to the next. If, on the contrary, a part of the river-bed is dug out, so that its steepness is increased, the rapidity of flow will rise at the commencement of this section, then slow off and regain its natural rate, when it reaches a normal level. If this comparison is true, we must conclude that, everything else being equal, the rapidity of regeneration ought to be greater if the cutting has been done nearer to the body than if it has been carried out further towards the tip. Now this has been observed over and over again. Unacquainted with these statements, some authors have postulated a direct correlation between distance of cut surface from the regenerating body and the quickness of regeneration, on the plea that it would be easier for the animal to repair a small injury than a big one. But this latter thesis is not in accordance with experiment, for regeneration after the amputation of several limbs is not only as rapid as that of a single limb but actually proceeds even more rapidly. There is, of course, a limit above which regeneration slackens or ceases, when the injury has been so severe that the reserves of bodily growth are not able to fill the gaps. The explanation for the increasing velocity of regeneration with increasing losses may be found in the decrease of the mass which has to be continuously overhauled by physiological repair. The less the old parts require of this process, the more material will be available for newly growing structures. It is perhaps in this connection possible to account for some observations of increasing velocity of reconstruction with repetition of the same operation. The posterior end of the worm *Amphiglena* is provided with branched gills. If these are cut off, new ones make their appearance. If these in turn are removed, they will be replaced in a shorter time, and so on, more quickly every time they have been lost. As the old tissue at the cut surface is also remoulded, less of this work will have to be done when the succeeding cuts pass through more and more rejuvenated tissue.

Function.—But there is yet another way of looking at these facts. What influence has function on morphological repair? In certain cases there is little doubt of the positive influence function may have on the quicker attainment of the normal form. When the tail of a newt is cut off by an oblique operation a bud will first grow at right angles to the cut surface, thus giving a crooked appearance. This abnormality will be adjusted quicker if the newt is allowed to swim about actively, than otherwise. The tentacles of digging forms of actinians are, after loss, not regenerated in their whole length if the animals are prevented from burrowing. In these cases it is clear that function modifies the muscles in the same way as it does during every exertion. On the other hand, the first stages of regenerating organs are often incapable of functioning. Antennae, claws and legs of crustaceans are, as regrowing buds, inclosed in a chitinous sack, thus being prevented from moving or even receiving external stimulation. Nor does function apply, when the head of a flatworm has been removed and new eyes develop in a tissue that has not before acted as a light-receiving organ.

Nerves.—Although these facts seem to prove conclusively that function cannot create form, but only strengthen the growing part, we have yet to consider the possibility that the nerves connecting a new growth with their centres pass stimuli of differentiation as they do other commands to the periphery. It has been and is still held by some biologists that there are valid proofs of such a dependence of regenerating organs on a special nerve or ganglion which normally innervates the structure which has to be restored. The stalk-eyed crustaceans have a ganglionic swelling of the eye-nerve inside the stalk. If the stalk is removed or the ganglion extracted and the eye itself taken away, no regeneration of the eye will make its appearance in adult specimens, although these will go on moulting. In place of the eye a feeler-like structure begins to grow, developing into a form most like that of the first normal antenna. This can be interpreted as a formative influence exerted by the antennal nerve on the bud in the cases where connection is made between the antennal ganglionic centre and the feeler-like structure. But this is very rare; generally no such relation appears. Moreover, the nerve grows from the regenerating structure centripetally and the outgrowth could therefore only receive the stimulation of the antennal centre through nervous contact after completion of the feeler. In young stages eyes grow even after removal of the whole stalk, and here a formative stimulus could only be supposed to act in the same way as in older animals if we suppose the optic ganglion to regenerate first and then to transmit the determining influence distally. In short, a somewhat similar replacement of one organ by another in regeneration has been shown to depend on the removal of a particular joint including a sense organ: the antenna of the stick-insects reappears as such if it is removed distally to the second joint. But if this, too, bearing the so-called Johnston's organ, has been taken away, the regrowth will resemble the first leg of the animal. This will happen even in individuals operated on immediately after leaving the egg-shell. In other insects only late stages restore a foot-like structure in such cases, whereas larvae operated on early will restore the antenna itself after total extirpation. In mantids the foot-like structure can be identified as a leg of the first pair by the broad femur and toothed tibia as compared with the slender, smooth appearance of the other two pairs. Besides the optic ganglion in crustaceans and Johnston's organ in insects, other nervous structures seem to be necessary for the growth of specialized parts; some forms of Nemertine worms do not regenerate if the brain has been removed, some flatworms do not grow new eyes before the cephalic ganglion has been restored. But in closely related species or even races there is no such restriction to be observed. Many experiments have been conducted to ascertain the rôle played by the nervous system in the regrowth of the newt's limbs. It has now been conclusively proved that a special nerve-centre or nerve-path is not necessary, but that some sympathetic nerves must reach the cut surface before differentiation of the bud begins. By deviating such a nerve the growth of a limb can be induced even in wounds made near the hind-leg but not including it. When the same nerve is made to innervate a cut in the tail it will induce an additional tail to grow. This seems to prove that the nerve does not induce a special form which is, on the contrary, inherent in the different regions of the body. Could we not suppose that this same explanation covers the above-mentioned facts concerning invertebrate animals?

Autotomy.—Whereas function cannot well have given rise to regeneration, a body of facts points towards its having induced special adaptations on the part of its owners. Some appendages are easily broken, for instance the lizard's tail. This apparently serves as a means of escape. As the reptiles, to which lizards belong, are believed to descend from amphibia-like ancestors which do not, as far as we can tell, include forms with easily-lost tails, although they are sure to have regenerated their legs as the living amphibians do, the power of easy breakage must have been acquired during evolution. The rupture of the lizard's tail is effected at preformed planes in every single vertebra, not between vertebrae. It is governed by nervous impulse inducing violent contraction of muscles which constrict and snap the vertebra. The regenerating tail does not replace the lost part of this or any other vertebra, a continuous cartilaginous rod running through it. It may be added that regeneration can also take place if a part of this new tail without preformed planes of breakage is removed or the original tail is cut off between two vertebrae, another proof of the priority of the regenerative faculty and its independence of easy loss. Similar adaptations are also presented by the legs of crayfish and some insects. Generally a furrow runs

round the second joint and furnishes the same ability of snapping as the preformed plane of the lizard's tail. In both cases, on seizure near the distal end of the appendage being felt, the animal struggles to get away, and the pull together with the reflex action suffices to get rid of the encumbrance. The constriction of the wound serves at the same time to prevent bleeding and is therefore of use for retaining the resources of restoration; moreover, regeneration can begin earlier and proceed quicker and more regularly than from irregular profusely bleeding wounds. But, on the other hand, the mechanism of this *autotomy* (self-amputation) may close the wound so thoroughly by telescoping one joint into the other that no regenerating bud can pierce its way. Thus, in grasshoppers and crickets, the hind legs are easily lost but do not regenerate after autotomy, whereas the two front pair of legs regenerate though incapable of autotomy. But if the whole hind-leg, including the first two joints, be excised, thus obviating the telescopic action, a miniature appendage makes its appearance. This proves that the regenerative faculty of the hind-legs is not really lost. In the stick insect all three pairs of legs are adapted for autotomy and regenerate not only from the preformed snapping plane, but also distal or proximal to it. It seems possible to prevent regeneration, at least in the middle leg, by removing it through a plain vertical cut, which is quickly covered over by chitinous plates smothering the underlying tissue that could otherwise grow out into the bud of the leg. Thus regeneration is always primarily present, secondary adaptations either modifying or preventing it from taking place. Autotomy serves merely its first purpose of allowing the animal to escape its foe, but is unable to restore the lost member. The adaptation might thus appear to be not worth while, as the mutilated insect, permanently encumbered in its movements, would be at a disadvantage and unable to propagate the species. Some examples show that deposition of eggs may occur shortly after the mutilation, for instance when fully-developed grasshoppers have lost a hind leg. Regeneration cannot set in, as no insect regenerates members after its metamorphosis. For the purpose of propagation all that is necessary is escape from the instant peril. In some worms autotomy directly serves the purpose of disseminating the genital products. At certain times of the year millions of pieces from the Palolo worms rise to the surface of the southern Pacific and reproduce their kind. In certain squids, a specially adapted arm of the male, the so-called hectocotylus, is detached and carries the male products to their destination. Autotomy may also lead to asexual reproduction; thus in actinians, flatworms, starfish and annelid-worms pieces give rise to new animals by regeneration. Often rudiments of structures to be renewed in the posterior piece may be seen before severance from the anterior as in the fission of infusorians.

Gonads.—What becomes of the bodies of worms which have shed the segments bearing the reproductive cells or gonads? Formerly, the theory of Weismann was widely accepted, *i.e.*, that the body of the animal was only an excrescence of the germ-cell not capable of influencing the new generation of germ-cells, descending in direct lineage from a part of the old germ-cell set apart from the beginning of differentiation and alone able to reproduce whole new individuals. After loss of all gonads the animal should then not be able to produce new germ-cells or complete individuals. But experiments on various creatures have proved beyond doubt that new germ-cells may arise and that a part of the body may in certain cases regenerate segments with gonads after total removal of the whole region that bore them before. Thus in hydrozoans, cutting off the head region inclusive of the gonads will not prevent new ones from growing. Flatworms cut into small pieces not only remodel their form but replace the gonads too. The sea-cucumber extrudes its intestine, including the ovaries, when left in stale water; on regaining normal environment everything is regenerated. When the arms of starfish are cut off, the new bud will enclose new gonads too, which do not seem to originate from the old ones situated in the remaining intact arms. Some annulate worms will, after amputation of the anterior body-region carrying ovaries and testes, grow a few segments which bear these gonads of both sexes. Curiously enough, in these regenerated anterior segments gonads and accessory sexual organs are regenerated in excess of the normal number, those of both sexes frequently appearing in the same segment, although they normally should be located in different segments. *Ctenodrilus* and *Rhynchelmis* are examples of this kind, whereas European earthworms are not known to regenerate the reproductive region. The cause of this is not apparent, especially as an Indian species seems to possess this higher regenerative faculty. In the crustaceans we know of some special cases in which the gonad degenerates when the crab is infected by the parasite *Sacculina*. (*See* SEX.) When this latter is removed from an infected male spider-crab, *Inachus*, a new gonad regenerates, but of a hermaphrodite or female type, producing eggs. In hermit crabs, *Eupagurus*, this transformation appears even without removal of the parasite. Artificial castration has not succeeded in crustaceans. No appearance of new gonads has been observed in insects. The primordial germ-cells may be sucked off from the eggs of Chrysomelid beetles in early stages, as they are then protruding at the posterior end of the embryo. Even after such an early operation as this the beetles remain sterile for life. The same has been observed in crickets, castrated as young larvae, and butterflies, the young caterpillars of which have been similarly treated. In molluscs only regeneration of the hectocotylus arm (*see* above) seems to have been observed, and here the germ-cells are carried into it from the gonad, which is not affected by the shedding of the arm. Some tunicates regrow from very small pieces, becoming sexually ripe in absence of their former reproductive glands, *e.g.*, *Clavellina*. Only a short while ago the vertebrates were thought totally incapable of replacing lost gonads. Castration and spaying has been practised so widely in many of our domestic animals and birds without fertility ever having appeared that it was held quite safe to perform experiments on the influence of a foster mother on the characteristics of the young by implantation of an alien ovary. Only when results after such transplantations in hens appeared, which, in contradiction to all other cases, seemed to prove an influence of the foster mother on the colour of her stepchildren, the suspicion arose that these chickens had, after all, been derived from eggs of her own. New tests revealed the fact that in these experiments new germ-cells had arisen from the host's tissue. But as the possibility could not be excluded that some part of the gonad had not really been totally eradicated by the operation, this alternative to the regeneration of an ovary was still left open. A better material presented itself in the mouse, the ovary of which is enclosed with the tube of the uterus in a pouch. Here the removal of the ovary is complete, if the whole pouch is taken away. It was a surprise to most biologists that experiments of this kind yielded positive results, putting the feasibility of the regeneration of ovaries even in mammals beyond doubt.

Morphallaxis.—Whereas germ-cells are the only ones in the higher classes of animals to reproduce the whole form anew, low forms are able to restore themselves entirely from small fragments. Protista may regenerate from parts 1-64th or less of their normal bulk, freshwater worms from a piece 500 times smaller than the whole body. But the reproductive cells are in many cases even less in volume compared with the entire animal. In many of the small pieces organs for ingesting food are altogether lacking, so that the restoration of form must proceed without receiving nourishment from the exterior. When the resources of the body are too small, it will not be possible for the animal to mobilize enough substance for growing regeneration buds at all the cut surfaces. Then the old tissue is remodelled to form most of the new body, which is laid down on a reduced scale in normal proportions. This phenomenon has been termed morphallaxis. It has been mostly studied in flatworms which afford a good opportunity for the gradual reappearance of the normal proportions and the shifting of structures from a peripheral position in the cut piece towards its normal place in the remodelled worm. The eyes and the pharynx are especially noticeable. In one kind of planarian a row of small eyes runs along the anterior margin not extending backward beyond the pharynx. When a piece of this animal, including the marginal eyes, has been cut off, the posterior eyes degenerate, thus ridding this part of its differentiation and making

room for the pharynx and tail to develop.

Cell-size and Number.—The size of the single cells does not vary much with the size of the planarian. In regeneration and morphallaxis the size of cells is retained too. Thus the flatworm remodelled on a small scale is not composed of smaller cells in the same number as before, but of fewer cells. We see how the different organs from the old piece have to be overhauled that they may be composed of fewer cells, if the proportionate number in the various structures is to be regained. In other animals, for instance the rotifers, the number of cells remains constant after the embryo has hatched. Here regeneration can only set in, when a part of a cell is removed. Artificially, this has been achieved by cutting away some rays of the "wheel," from which the rotifers take their name. If, on the contrary, whole cells are killed or only the nucleus of a single cell, then the structure to which these cells ought to give rise will never develop. Where now do the cells come from which in planarians, hydras, and other forms with great regenerative faculties are necessary to complete the individual? Several possibilities have to be taken into account. Either differentiated cells may undergo dedifferentiation, or those not yet differentiated migrate to the places of need; lastly, special cells may be in store for the purposes of restoring the lost parts. It is probable that all three methods are practised in nature, but by far the commonest method seems to be the one mentioned second of so-called interstitial or indifferent cells widely spread through the body offering a plastic material for every kind of regeneration. These cells are derived from layers of tissue which, since the development of the embryo, have not undergone any special alteration or served for other purposes than connecting different regions of the body. This raw material does not contain special rudiments for the organ it is to build up, but may be used at any point needed. Even the faculty to start the structure wanted does not reside in the undifferentiated cells; the regeneration bud must have its destination stamped on it by differentiated cells lying proximally to the cut surface. The proof of this fact has been given by the experiment of grafting regenerating buds to different parts of the body. When the buds are very young, taken shortly after regeneration has begun, they will differentiate not in relation to the place from which they were taken, but in relation to that where they are grafted. In a flatworm a bud taken from anywhere will form a head if it has been transplanted to the head-region, the regenerating bud of the hind-leg of a salamander grafted in place of an amputated fore-leg will grow into a fore-leg; even the tail-bud of a newt removed to a site near the fore-leg will grow out in the form of this leg. But all this is changed if buds a little older are taken as grafts. Then, be the bud attached to any place whatsoever, and it will yet give rise to the form it would have attained if left where it had originated.

Orientation.—Applying the technique of grafting to animals (*see* GRAFTING IN ANIMALS) it has been possible to test experimentally whether a structure already determined to form a special organ can be influenced by the place to which it has been transplanted, in regard to its orientation. If regenerating limbs are simply left growing, nobody would expect them to be oriented differently from the original limb they are replacing, therefore no special interest attaches to the fact that the regenerates always are in accord with the whole animal in respect to their orientation. But when young regenerating buds were first grafted without their fate being known, the question arose if a regulation would set in to give the bud the proper orientation towards the host independently of the way in which it had been artificially oriented to the host's stump. The answer seemed to be in the affirmative, when it was found that not only the orientation but also the differentiation itself conformed to the place where the graft had been attached. Only when older buds yielded the result already mentioned, was the observation made that with the determination to form a special organ the orientation had also been stamped on them. When, for instance, an old regenerating bud is taken from a newt's limb it will develop a dorsal surface looking ventrally if it has been grafted upsidedown; such a limb will, of course, be of no use to its bearer. Any sort of oblique and twisted limb can thus be produced by transplanting at different angles of rotation. The direction of growth always remains restricted to the long axis which runs proximodistally along the member. It remains restricted, but it need not proceed in the original direction. If a bud, already determined as to the sort of differentiation it is to undergo, be taken from a regenerating limb, its tip be cut off and this new cut surface adapted to the stump of the host's limb, it is of course prevented from growing in the right direction by the contact of the stump. Its free surface now grows in an opposite direction and something occurs that could be taken for a regulation: the differentiation proceeds as if the body were dictating the wanted orientation. Yet this is only apparent. One need only to change the dorso-ventral orientation, together with the reversion of the bud, to find the lack of influence on the part of the body as a whole, for no regulation towards the normal position will assert itself regarding the limb's back and palm. Further insight is given by experiments in which regenerating buds are not severed at their base but amputated together with a portion of old tissue. In grafting, this latter tissue is fixed to the host-stump and regeneration always proceeds along the lines originally laid down by the orientation of the old portion of tissue. Not only does this apply to cases in which the regenerating bud was old at the time of grafting, but also to young buds. These must then be determined by the orientation inherent in the old tissue immediately adjoining the regenerating cells, no influence from the body of the host coming into play. Moreover, it is not necessary that any regenerating bud be present at the time of transplantation for the same result to appear. When a portion of a newt's limb is grafted in a reversed position, so that the originally distal cut surface becomes proximal, outgrowth of all distal joints of the member will occur at the free surface, which before the amputation had been in contact with the proximal part of the limb. Here again, since the superfluous leg is only orientated by the direction of its original outgrowth and free end, we see that there is no regulation exerted by the body itself. If we want then to arrive at an explanation of the phenomena in reversed grafts, it is necessary to take into account the faculties residing in the parts and set free, when opportunity arises, of growing in the opposite direction by the exposure of cut surfaces. Not all parts are able to keep living when they have been totally separated from the animal, so that in many cases it is necessary to resort to grafting for keeping the parts alive long enough to watch their behaviour in regeneration. In these cases it is often difficult to decide if a given result has been influenced by the host or if the graft has exclusively used its inherent faculties.

Heteromorphosis.—On the other hand, animals which may be cut into several parts transversely to the length of the body without dying, afford the opportunity of observing structures growing from cut surfaces in a reversed direction. Let a flatworm be cut into three pieces, the head-end with the eyes, the body to where it narrows in to the tail, and the tail. Then the middle piece will regenerate a head with eyes at its anterior, and a tail at its posterior cut surface. The head-piece will not regenerate a tail posteriorly but a second head will appear directed backwards. Similarly, the tail will grow no head anteriorly but develop a second tail. This example of the flatworm shows conclusively that the faculty of producing a structure opposite in direction to that of normal growth is inherent in the head-piece and in the tail-piece independently of the organism as a whole, for the latter is not present in the experiment. Similar results have been obtained with hydroids and also with annelid worms.

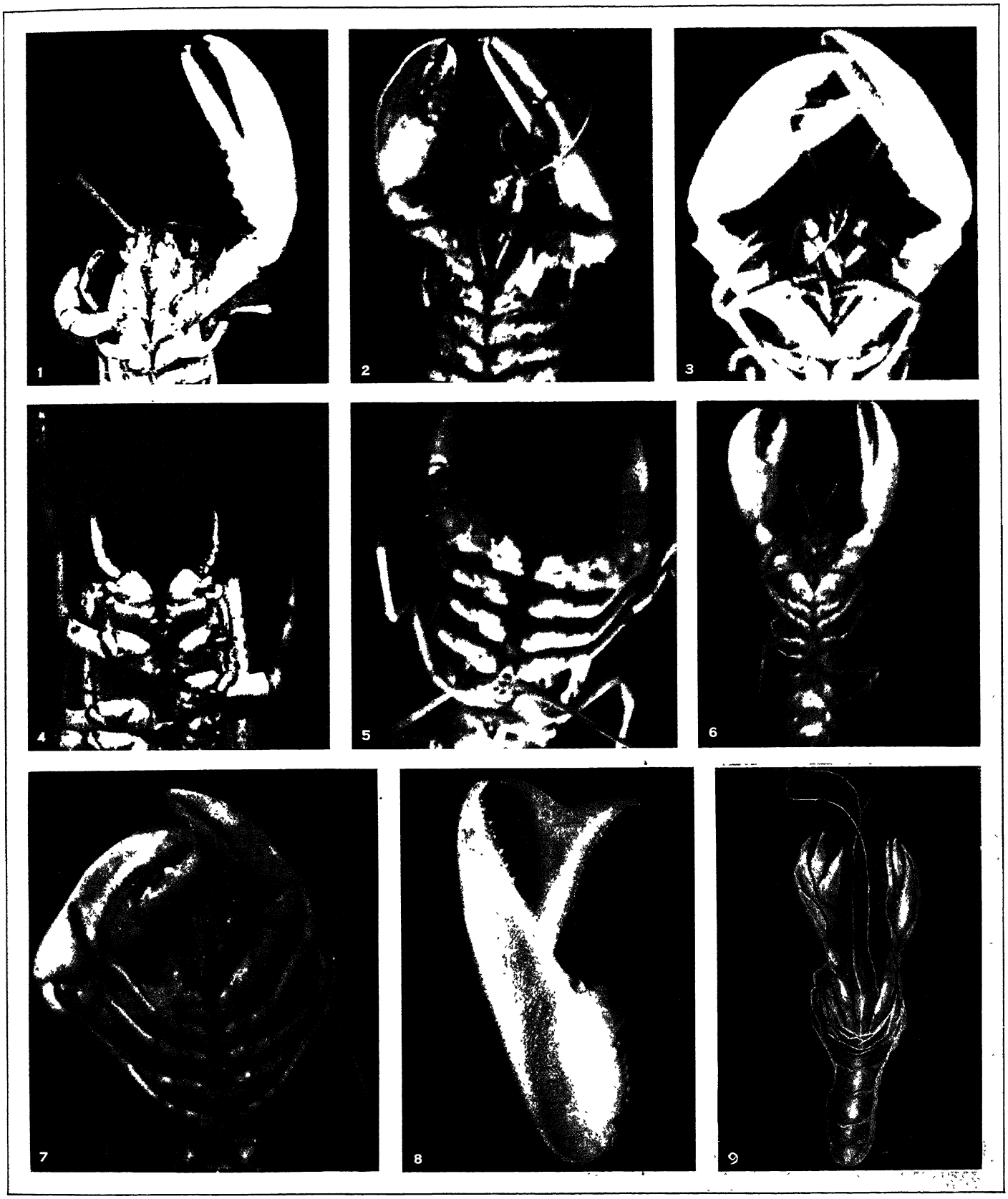
The regrowth of tissue, which does not exhibit the form of the missing part but substitutes another familiar form of the same species instead, is termed heteromorphic regeneration (*see* HETEROMORPHOSIS); reproduction of the opposite body-end is called axial heteromorphosis. When a transverse cut is made near the eyes of a flatworm without totally severing the head from the body, the latter may remain attached to the trunk by a small connection, the borders of the wound gaping. From each of its free surfaces a bud of regeneration will arise. The one from the anterior margin of the trunk will of course develop a head looking in the same direction as the old one. But the bud from the posterior margin of the head behaves as if it were arising from a

piece totally severed from the body, developing into a head pointing in the opposite direction to the other two. By taking a triangular piece out of the body-side near the eye, the tip of the triangle reaching in to the middle line, the two cuts will again try to produce heads. These will grow at right angles to the edges of the wound, but not having room enough they will impede each other in their development and more or less coalesce.

Triplicity.—We are now in a position to give a more satisfactory interpretation of monstrosities which consist of the triplication of parts and conform to Bateson's rule—viz., that the three components lie in the same plane, the middle one being the mirror-image of the other two. Such triplications have not only been found in lower animals but also in arthropods and vertebrates. Generally, they affect in these types not the long axis of the body but lateral appendages. Only in one instance, the tail of the lizard, the monstrosity is not rarely found in the form of a threefold ending of the long axis. Now we may remember that long ago these abnormal tails were ascribed to accident and in our days their regenerative origin has been proved by experiment. It is of course not possible to keep the lizard's tail alive by itself, but the orientation of the three tails in the monstrosities conforms so exactly to what would be expected, if a tail nearly broken off regenerated, one in a forward direction and a second one growing backward, that there can be no doubt of the analogy between the faculty of the tail in flatworms and lizards of producing axial heteromorphosis by themselves. Passing over to the lateral appendages, we find triplicity occurring most often in animals with rigid external skeleton, such as crayfish and beetles, or with internal skeleton of hard bone, like frogs, birds and mammals. This correlation indicates the origin by breakage, because plastic, soft parts will easily join up again after having been wounded, whereas rigid structures will remain gaping when they have been broken, thereby giving opportunity for regrowth from the two lips of the wound. In several instances it has been possible to observe the two supplementary components arising in this way; triplicated horns have arisen after centrifuging the unicellular *Ceratium;* treble legs appear in lobster or praying mantis after appropriate injury; trefoil form has been induced in the newt's leg by preventing a cut from reuniting by insertion of a thread and in the arm of the sea-lily *Antedon* by a deep rupture. These observations all refer to animals and stages capable of regeneration. When specimens of frogs with a supernumerary pair of legs are found in nature, they cannot have arisen by regeneration of the frog after its metamorphosis because, as we have mentioned before, this stage is incapable of regrowing members. Here experiments on tadpoles had to be performed in their early stage, when the hind-legs were beginning to appear and they were still capable of regeneration. By an appropriate operation this rudiment was made to develop endings in two different directions, a pair of supernumerary legs, mirror-images of each other, being the result. There can scarcely be a doubt that triplications of a member in other animals incapable of regeneration in their developed state are also due to the severing of cells in the larval or embryonic stage. The fruit fly *Drosophila* has yielded a race in which not unfrequently treble legs appear in the imago. As the maggot has no legs that could break, this deformity must be ascribed to a weakness in the compound of cells developing into the imago's leg, which makes them fall apart, thus making multiple growth possible. In warm-blooded animals the artificial production of triplications has not yet been achieved. Nevertheless, all cases found in nature, to be seen at shows or in museums, conform exactly to Bateson's rule, so that we need not hesitate to see their cause in the rupture of embryonic tissues. In the last few years biologists have begun to make operations on embryos inside the maternal uterus, and will by this technique be able to decide at what stage a given mammal will be able to regenerate an arm or a leg. The few experiments so far conducted on rats indicate that this period lies relatively far before the day of birth. In fowls, the method of grafting pieces from early developmental stages to the chorio-alantoic membrane of the egg, has enabled us to see what becomes of these pieces nourished by the host's blood. This method will make it possible even in birds to test the faculty of embryonic limbs to produce terminal structures at both ends. Everybody is acquainted with the fact of our limbs being mirror-images of those on the other side of the body. It was therefore thought that when supernumerary pairs of legs are found in vertebrates they might represent a bud containing a leg of the left and one of the right side of the body. Apart from the improbability that a left and right member should arise without interposition of the vertebral column, we have been able to collect proofs of both supernumerary members belonging to the same body-side.

Reversal of Claws.—The clue was afforded by some crayfish, which normally possess claws of different size and form on the right and left side of the body. Instances of this heterochely occur in the pistol-crab *Alpheus;* the common lobster *Homarus,* the hermit-crab *Pagurus,* the shore-crab *Carcinus,* the swimming-crab *Portunus,* the fiddler-crab *Gelasimus* and others. When the large crushing shaped claw is removed from a pistol-crab the small cutting claw of the opposite side will, after one or two moults, assume the size and form of its former opponent, whilst a small cutting claw regenerates in place of the latter. When the same loss has befallen a lobster this reversal in the type of claws, as we have observed, will not occur, a crushing claw arising directly by regeneration, the cutting claw remaining as it was. As the type of a given body-side is thus not changed in the claw, we are able to decide in triplicities of a lobster's claw, if one of the components belongs to the other body-side by its type. Fortunately, this sort of monstrosity is not rarely found in lobsters and related species, so that comparisons can be made between supernumeraries on the crushing and cutting claws. On the latter they are always cutters, on the former typical crushers or transitional forms. These latter are easily explained as an earlier stage in the development of every crushing claw. So we can conclude that not only the components with the asymmetry proper to the body-side on which the triplication has appeared, but also the one between these, notwithstanding its mirror-image orientation, is not to be regarded as a limb belonging to the other side, but simply as a proximal outgrowth from a wound of the claw on the same side. The mirroring is accounted for by the anterior margin of the original claw always giving rise to an anterior margin again, the posterior to a posterior one, the dorsal to a dorsal, the ventral to a ventral. Although this example and most regenerations after amputation of parts or whole members by transverse cuts seem to indicate that not only will every tissue produce its own kind, but also the special differentiation it has undergone itself, such a sweeping statement would not be in accord with other facts.

Dual Faculty.—We have already treated of cases in which a dual faculty is revealed by heteromorphic regeneration. Another classical object is the lens of the newt's eye, which during embryological development is formed by the infolding of external skin, but if extracted later is replaced by regeneration from the iris. When bones are totally removed from limbs of newts or salamanders, leaving all the other parts in place, no regeneration of the excised bone is observed. But if now the limb is severed, the plane of amputation passing where the distal end of the removed bone should have been a blastema of regenerating cells will make its appearance. Although no bone is present at its base, this blastema will not only regenerate the general form of the limb, but also all the bones which normally lie distal to the plane of amputation. It is then clear that we have long been cheated by the coincidence of all tissues being present at a cut surface and the orientation of the margins remaining constant to believe in a necessity of the presence of tissues for regeneration which in reality may arise anew in the undifferentiated cells of the regeneration-bud. Remembering the use lower animals make of interstitial cells for restoring their form, we are again led to the conclusion that indifferent material is moulded by a formative agency. It is at present not possible to decide what category of force may be involved. Therefore, in order not to bias further investigation, the term field of force, as used by physicists and chemists, has been applied to regions where formative influences are at play in the organism. Many views have been taken as to the nature of these influences, starting from a crude predetermina-



REGENERATION IN THE LOBSTER (*HOMARUS VULGARIS*)

1, 2 and 3. Three stages of regeneration in the big or crushing claw

4, 5 and 6. Three stages of regeneration of both claws

7. Regeneration stage of the small or nipping claw

8. Triplicity of the penultimate segment or propodite from a lobster's claw found in nature, probably due to regeneration

9. Lobster lying on its back, showing triplicity of the last segment, or dactylopodite in the right crushing claw

In figs. 1–7, the lobsters are represented lying on their backs: The crusher is on the right body-side, the abdomen is not shown. In figs. 8 and 9 note the conformation of three components in the triplicate structure to Bateson's rules; the middle structure being the mirror-image to the others, all three belonging to one plane

tism and merging into conceptions of processes not acting point by point, but more after the manner of electric or magnetic induction, every point of the system being connected with the other by quantitative relations not altered when the size is changed. It has been pointed out how this view harmonizes with the regeneration from a cut surface after extraction of the bone or when a complete structure appears at the end of both parts of a split wound.

Defective Regeneration.—Other facts apparently supporting this conclusion have been found in defective or incomplete regeneration. We have till now only been describing new formations in which either the loss has been totally repaired or another structure taken its place or, lastly, supernumerary parts have arisen. Yet there are typical regenerative phenomena in which none of these possibilities are realized, the restorative process stopping before completion. The earthworm, when its head-region is amputated, does not regenerate as many segments as have been cut off. Stick-insects and other orthoptera with five-jointed tarsi in their limbs replace as a rule only four joints after autotomy. In water-fleas (*Daphnia*), joints in the second antenna are omitted during regeneration. Now in all these instances the terminal endings are always present, the defect resulting from the omission of basal segments. This also occurs in the newt's leg when insufficient material is available for regeneration. This has been especially observed when small regeneration buds are transplanted to another field of regeneration. If the regenerate were growing step by step we would rather expect the basal structures to be present, the distal to be inhibited, when there is a shortage of material. A field of force, on the contrary, could be imagined first laying out the margins and filling up the gaps as best possible afterwards. Captivating as this appears, yet there are other modes of explanation. If we take the direction of growth into account, we find that in the cases cited normal growth does not proceed all the time from the base towards the apex but reverses its direction after the most basal segments have been formed, so that the apex has grown before the segments just in front of it have developed. Therefore the segments omitted in regeneration are those which ought to be last constricted off and would be stopped first in case of deficiency. It is then not necessary to invoke a special action of the field as a whole.

Physiological Gradients.—Regions of active growth may be recognized by high rates of metabolism and physiological gradients made apparent by placing organisms into solutions which change colour on being acted on by the products of metabolic processes. (*See* AXIAL GRADIENT.) In the lower animals, with high regenerative capacities, these gradients are seen to be directed from the head backwards, so that some authors have ventured to attribute the reversion of polarity in cases of heteromorphosis to a high gradient arising through isolation of the head-piece at its new free surface in connection with the higher metabolic rate induced by the external stimuli. But it has not been possible to identify the head-formation with a special magnitude of metabolism, and as a second gradient is normally present passing from the tip of the tail forward it does not seem as if the special forms of head or tail could be explained by one sort of gradient.

Intimate Structure.—It seems necessary to postulate differences of a qualitative sort in the intimate structure of the body-regions to explain the different result, when an anterior or when a posterior piece has been isolated and has in the first case produced a reversed head, in the second a reversed tail, although in both cases the exposure to external stimuli was the same. It may well be that the physiological gradients are set up by differences in this intimate structure. It is also clear that fields of force must arise from a heterogeneous source if they are to be able to produce such complicated forms as we see developing in the long axis and in the members of organisms. What remains to be discovered is how such an intimate structure is able to evolve from protoplasmatic cells which must at the beginning (for instance in the egg) contain all potentialities, as experiments with division of eggs producing several whole embryos show. (*See* EXPERIMENTAL EMBRYOLOGY.) Thus there is a gradual decrease in regenerative potencies with increasing development, whether this be taken as the succession of different stages during the ontogeny of an animal or as the differentiation of regions from the centre of the body towards its periphery or even the attainment of a higher level during evolution of the species. The underlying principle may then be stated as a differentiation of special potencies from an originally unspecialized mass. If we consider different formative processes going on at the same time with different velocities in the developing organism, we have still to account for the orientation the structures show towards each other, when they arise by the various morphogenetic phenomena proceeding with unequal velocity in different directions of the body. This problem, however, does not need a special solution in the realm of regeneration, as here we are always dealing with masses showing in part the definite orientation of the axes in the animal. There can be no doubt that these already definitely oriented systems induce the blastemas of regeneration to conform to their scheme. (*See* also HETEROMORPHOSIS; GRAFTING IN ANIMALS; GROWTH.)

BIBLIOGRAPHY.—T. H. Morgan, *Regeneration* (1901); H. Przibram, "Regeneration," *Exper. Zoologie* ii. (1909); E. Korschelt, "Regeneration," *Reg. and Transplantation* i. (1927). (H. P.)

REGENERATIVE FURNACE: *see* FURNACES, METALLURGICAL.

REGENSBURG (RATISBON), a city and episcopal see of Germany, in the republic of Bavaria, and the capital of the Government district of the Upper Palatinate. Pop. (1925) 76,948. It is situated on the right bank of the Danube, opposite the influx of the Regen, 86 m. by rail N.E. from Munich, and 60 m. S.E. of Nürnberg. The pre-Roman settlement of *Radespona* was chosen by the Romans, who named it *Castra Regina,* as the centre of their power on the upper Danube. It afterwards became the seat of the dukes of Bavaria, and was the focus from which Christianity spread over southern Germany. St. Emmeran founded an abbey here in the middle of the 7th century, and St. Boniface established the bishopric about 100 years later. Regensburg acquired the freedom of the empire in the 13th century, and was for a time the most flourishing city in southern Germany. It became the chief seat of the trade with India and the Levant, and the boatmen of Regensburg are frequently heard of as expediting the journeys of the crusaders. Numerous imperial diets were held here in the middle ages, and, after 1663, it became the regular place of meeting of that body. The Reformation found only temporary acceptance at Regensburg, and was met by a counter-reformation inspired by the Jesuits. Before this period the city had almost wholly lost its commercial importance owing to the changes in the great highways of trade. Regensburg is said to have suffered in all no fewer than 17 sieges. In 1810 the town and bishopric were ceded to Bavaria. In 1809 the French reduced a great part of the city to ashes.

Across the river is Stadt-am-Hof, connected with Regensburg by a stone bridge of the 12th century. One of the most characteristic features in its architecture is the number of strong loop-holed towers attached to the more ancient dwellings.

The cathedral, though small, is a very interesting example of pure German Gothic. It was founded in 1275, and completed in 1634, with the exception of the towers, which were finished in 1869. Adjoining the cloisters are two chapels of earlier date than the cathedral itself, one of which, known as the "old cathedral," goes back perhaps to the 8th century. The church of St. James—also called Schottenkirche—a plain Romanesque basilica of the 12th century, derives its name from the monastery of Irish Benedictines ("Scoti") to which it was attached. The old parish church of St. Ulrich is a good example of the Transition style of the 13th century. Examples of the Romanesque basilica style are the church of Obermünster, dating from 1010, and the abbey church of St. Emmeran, built in the 13th century, and remarkable as one of the few German churches with a detached belfry. The cloisters of the ancient abbey, one of the oldest in Germany, are still in fair preservation. In 1809 the conventual buildings were converted into a palace for the prince of Thurn and Taxis. The town hall, dating in part from the 14th century, contains the rooms occupied by the imperial diet from 1663 to 1806. Among the chief manufactures are pottery, parquet flooring,

musical instruments, furniture, sugar, chemicals, tobacco and lead pencils.

REGENT, one who rules or governs, especially one who acts temporarily as an administrator of the realm during the minority or incapacity of the king. This latter function, however, is one unknown to the English common law. "In judgment of law the king, as king, cannot be said to be a minor, for when the royal body politic of the king doth meet with the natural capacity in one person the whole body shall have the quality of the royal politic, which is the greater and more worthy and wherein is no minority." But for reasons of necessity a regency, however anomalous it may be in strict law, has frequently been constituted both in England and Scotland. The earliest instance in English history is the appointment of the earl of Pembroke with the assent of the loyal barons on the accession of Henry III.

Lord Coke recommends that the office should depend on the will of parliament (*Inst.*, vol. iv. p. 58), and in modern times provision for a regency has always been made by Act of parliament. As late as 1704 provision was made for a regency after the death of Anne. The earliest regency in England resting upon an express statute was that created by 28 Hen. VIII. c. 7, under which the king appointed his executors to exercise the authority of the crown till the successor to the crown should attain the age of 18 if a male or 16 if a female.

The Act of 5 Geo. III. c. 27 vested in the king power to appoint a regent under the sign manual, such regent to be one of certain named members of the royal family. Owing to the king's insanity in 1810 the Act of 51 Geo. III. c. 1 was passed, appointing the prince of Wales regent during the king's incapacity. The royal assent was given by commission authorized by both Houses of Parliament. By this Act no council of regency was appointed. There was no restriction on the regent's authority over treaties, peace and war, or over giving assent to bills varying the Act of Settlement or the Act of Uniformity, as in the previous Regency Acts, but his power of granting peerages, offices and pensions was limited. By 10 Geo. IV. c. 7 the office of regent of the United Kingdom cannot be held by a Roman Catholic. A similar disability is imposed in the great majority, of Regency acts, if not indeed in all of them.

In the State of New York, a Regent is a member of the corporate body known as the University of the State of New York.

REGER, MAX (1873–1916), German composer, was born at Brand, Bavaria, on March 19, 1873. He studied at Weiden, Sondershausen and Wiesbaden, and taught at the Royal academy, Munich, from 1905–07, when he became a teacher at the Leipzig conservatorium, a post which he retained until his death, on May 11, 1916. His early piano works, Variations on a Theme from Bach, Variations on a Theme from Beethoven, the Passacaglia and Fugue, and later the violin sonata in F sharp minor, which show already his individuality and remarkable technical powers, were followed by his first orchestral work, *Sinfonietta* (1906). After moving to Leipzig he wrote the violin concerto and piano concerto, with the powerful Symphonie Prologue to a Tragedy and the Comedy Overture, a number of choral pieces including *Die Nonnen, Der römische Triumphgesang* and *Die Weihe der Nacht,* the fine motets written for the Thomaner-Chor and the *Schlichte Weisen* sonatinas. From the period 1911–13, when he was also director of the court orchestra at Meiningen, there dates the Romantische Suite, Böcklin Suite, Ballet Suite, and later, Variations on a Theme from Mozart. From 1914 onwards his numerous compositions include many chamber works, pieces for choir and orchestra, for the piano and for the organ, and songs.

Reger was one of the most prolific and, in some respects, remarkably gifted composers of his day. His fertility was extraordinary, and he turned out work after work, often on the largest scale and in the most complex forms, with astonishing ease. His powers as a contrapuntist were especially noteworthy, and the fugue was one of his favourite forms. But as to the value of his immense output critical opinion is sharply divided.

A list of Reger's works is given in Grove's *Dict. of Music* (3rd ed., 1928). *See* also K. Hasse, *Max Reger* (Leipzig, 1921); E. Segnitz, *Max Reger* (Leipzig, 1922); and R. Würz, *Max Reger* (Munich, 1920).

REGGIO CALABRIA (anc. *Regium, q.v.*), a town and archiepiscopal see of Calabria, Italy, capital of the province of Reggio, on the Strait of Messina, 248 m. S.S.E. from Naples by rail. Pop. (1921) 53,959 (town); 59,430 (commune). It is the terminus of the railways from Naples along the west coast, and from Metaponto along the east coast of Calabria. The straits are here about 7 m. wide, and the distance to Messina nearly 10 m. The ferryboats to Messina therefore cross by preference from Villa S. Giovanni, 8 m. N. of Reggio, now included within its communal boundary, whence the distance is only 5 m. In 1894 the town suffered from an earthquake, though less severely than in 1783. It was totally destroyed, however, by the great earthquake of December 1908; in the centre of the town about 35,000 out of 40,000 persons perished. The cathedral, which dated from the 17th century, and the ancient castle which rose above it, were wrecked. Great damage was done by a seismic wave following the shock. (*See* MESSINA.)

REGGIO EMILIA, a city and episcopal see of Emilia, Italy, the capital of the province of Reggio Emilia (till 1859 part of the duchy of Modena), 38 m. by rail N.W. of Bologna. Pop. (1906) 19,681 (town) 64,548 (commune); (1921) 49,524 (town) 82,915 (commune). The town is in the shape of a diamond. The cathedral, originally erected in the 12th century, was reconstructed in the 15th and 16th; the façade shows traces of both periods, the Renaissance work by Prospero Spani (1516–1584) being complete only in the lower portion. The Madonna della Ghiara, built in 1597–1619 in the form of a Greek cross, is beautifully proportioned and finely decorated in stucco and with frescoes of the Bolognese school of the early 17th century. S. Prospero has a good façade of 1753. There are several good palaces of the early Renaissance, a fine theatre (1857) and a museum containing important palaeo-ethnological collections, ancient and mediaeval sculptures, and the natural history collection of Lazzaro Spallanzani. Lodovico Ariosto, the poet (1474–1533), was born in Reggio, and his father's house is still preserved. The industries embrace the making of railway locomotives and carriages and tramcars, and of cheese.

Regium Lepidi was probably founded by M. Aemilius Lepidus during the construction of the Via Aemilia (187 B.C.), on which it lay half-way between Mutina and Parma. It was during the Roman period a flourishing town. The bishopric dates perhaps from the 4th century A.D. Under the Lombards the town was the seat of dukes and counts; in the 12th and 13th centuries it formed a flourishing republic, busied in surrounding itself with walls (1229), controlling the Crostolo and constructing navigable canals to the Po. About 1290 it first passed into the hands of Obizzo d'Este, and the authority of the Este family was finally recognized in 1409.

REGICIDE, the name given to anyone who kills a sovereign (Lat. *rex,* a king, and *caedere,* to kill). Regicides is the name given in English history at the Restoration of 1660 to those persons who were responsible for the execution of Charles I. The number of regicides was estimated at 84, this number being composed of the 67 present at the last sitting of the court of justice, 11 others who had attended earlier sittings, four officers of the court and the two executioners.

The trial of the regicides before a court of 34 commissioners took place in Oct. 1660. Twenty-nine were condemned to death, but only ten were actually executed, the remaining 19 with six others being imprisoned for life. The ten who were executed at Charing Cross or Tyburn, London, in Oct. 1660, were Thomas Harrison, John Jones, Adrian Scrope, John Carew, Thomas Scot and Gregory Clement, who had signed the death-warrant; the preacher Hugh Peters; Francis Hacker and Daniel Axtel, who commanded the soldiers at the trial and the execution of the king; and John Cook the solicitor who directed the prosecution.

In Jan. 1661 the bodies of Cromwell, Ireton, and Bradshaw were exhumed and hanged at Tyburn, but Pride's does not appear to have been treated in this way. Of the nineteen or twenty regicides who had escaped and were living abroad, three, Sir John Barkstead, John Okey and Miles Corbet, were arrested in Holland and executed in London in April 1662; and one, John Lisle, was

murdered at Lausanne. The last survivor of the regicides was probably Edmund Ludlow, who died at Vevey in 1692.

BIBLIOGRAPHY.—Ludlow's *Memoirs,* edited by C. H. Firth (Oxford, 1894), give interesting details about the regicides in exile. *See* also D. Masson, *Life of Milton,* vol. vi. (1880), and M. Noble, *Lives of the English Regicides* (1798); L. E. Welles, *History of the Regicides* (1927).

REGILLUS, an ancient lake of Latium, Italy, famous in the legendary history of Rome as the lake in the neighbourhood of which occurred (496 B.C.) the battle which finally decided the hegemony of Rome in Latium. Of the various sites proposed, the best is Pantano Secco, some 2 m. N. of Frascati.

REGINA, the capital city of the province of Saskatchewan, Canada, situated at 104° 36′ W. and 50° 27′ N., and 357 m. W. of Winnipeg. Pop. (1931), 53,209. After the Canadian Pacific railway was completed in 1885, the necessity for a place of government on the railway line pressed itself upon the Dominion government. The North-West Territories were but little settled then, but a central position on the prairies was necessary, where the mounted police might be stationed and where the numerous Indian bands might be easily reached. The minister of the interior at Ottawa, afterwards Governor Dewdney, chose this spot, and for a number of years Regina was the seat of the Territorial government. The governor took up his abode on the adjoining plain, and the North-West Council met each year, with a show of constitutional government about it. On the formation of the province of Saskatchewan in 1905 the choice of capital was left to the first legislature of the province. Prince Albert, Moose Jaw and Saskatoon all advanced claims, but Regina was decided on as the capital.

The city has a large distributing trade and is the central market for an agricultural region. It is on the Canadian Pacific and Canadian National railways, and has 12 radiating lines. There are many mills, banks, wholesale houses and factories, including a large oil refinery. Regina is the western headquarters of the Royal Canadian Mounted Police.

REGINON, or **REGINO OF PRÜM,** mediaeval chronicler, was born at Altripp near Spires, and was educated in the monastery of Prüm. Here he became a monk, and in 892, just after the monastery had been sacked by the Danes, he was chosen abbot. In 899, however, he was deprived of this position and he went to Trier, where he was appointed abbot of St. Martin's. He died in 915, and was buried in the abbey of St. Maximin at Trier, his tomb being discovered there in 1581.

Reginon wrote a *Chronicon,* dedicated to Adalberon, bishop of Augsburg (d. 909), which deals with the history of the world from the commencement of the Christian era to 906, especially with the affairs in Lorraine. The chronicle was first published at Mainz in 1521; another edition is in Band I. of the *Monumenta Germaniae historica. Scriptores* (1826); the best is the one edited by F. Kurze (Hanover, 1890); German trans. by W. Wattenbach (Leipzig, 1890). Reginon also drew up at the request of his patron, Radbod, archbishop of Trier (d. 915), a collection of canons, *Libri duo de synodalibus causis et disciplinis ecclesiasticis;* this is published in Migne's *Patrol. Lat.* t. 132.

See H. Ermisch, *Die Chronik des Regino bis 813* (Göttingen, 1872); P. Schulz, *Die Glaubwürdigkeit des Abtes Regino von Prüm* (Hamburg, 1894); C. Wawra, *De Reginone Prumensis* (Breslau, 1901).

REGIOMONTANUS (1436–1476), German astronomer, was born at Königsberg in Franconia on June 6, 1436. His name originally was Johann Müller, but he called himself, from his birthplace, Joh. de Monteregio, an appellation which became modified into Regiomontanus. At Vienna, from 1452, he was the pupil and associate of George Purbach (1423–1461), and they jointly undertook a reform of astronomy rendered necessary by the errors they detected in the Alphonsine Tables. In this they were much hindered by the lack of correct translations of Ptolemy's works; and in 1462 Regiomontanus accompanied Cardinal Bessarion to Italy to study a copy of the *Almagest.* He rapidly mastered Greek at Rome and Ferrara, lectured on Alfraganus at Padua, and completed at Venice in 1463 Purbach's *Epitome in Cl. Ptolemaei magnam compositionem* (printed at Venice in 1496), and his own *De Triangulis* (Nuremberg, 1533), a treatise on trigonometry. In 1468 he returned to Vienna, and was thence summoned to Buda by Matthias Corvinus, king of Hungary, for the purpose of collating Greek manuscripts. He also finished his *Tabulae Directionum* (Nuremberg, 1475), essentially an astrological work, but containing a valuable table of tangents.

In 1471 Regiomontanus settled at Nuremberg. Bernhard Walther, a rich patrician, became his pupil and patron; and they together equipped the first European observatory, for which Regiomontanus himself constructed instruments of an improved type (described in his posthumous *Scripta,* Nuremberg, 1544). His observations of the great (Halley's) comet of 1472 supplied the basis of modern cometary astronomy. At a printing-press established in Walther's house by Regiomontanus, Purbach's *Theoricae planetarum novae* was published in 1472 or 1473; a series of popular calendars issued from it, and in 1474 a volume of *Ephemerides* calculated by Regiomontanus for thirty-two years (1474–1506), in which the method of "lunar distances," for determining the longitude at sea, was recommended and explained. In 1472 Regiomontanus was summoned to Rome by Pope Sixtus IV., to aid in the reform of the calendar; and there he died on July 6, 1476.

See P. Gassendi, *Vita Jo. Regiomontani* (Parisiis, 1654); and the general histories of astronomy.

REGIONAL PLANNING, a term used by community planners, engineers and geographers to describe a comprehensive ordering of the natural resources of a community, its material equipment and its population for the purpose of laying a sound physical basis for the "good life." In America the term has also been used to describe plans for city extension over wide metropolitan areas; this type of planning should properly be called metropolitan planning. Regional planning involves the development of cities and countrysides, of industries and natural resources, as part of a regional whole.

The programme of regional planning has grown out of a multitude of fresh initiatives; the activities of foresters and conservationists with forest working plans, of engineers with water power plans, of municipal engineers with plans for city extensions and parkways, and finally, of a great school of regional geographers, who, under Vidal de la Blache in France, Herbertson in England, Fenneman, Smith and others in the United States, have established the region as a definite unit, with its special individuality of geologic formation, climate, vegetation, landscape and human culture. The method of the regional plan can perhaps best be grasped by considering its simpler prototype, that which covers but a single aspect of regional life. Take an actual forest working plan for an area in the State of Washington, between the Cascade range and Puget sound: it is about the size of Rhode Island. Except for the mountain barrens and narrow strips of agricultural land along the rivers, the whole region is under forest. The plan divides this area into six "cutting-blocks," each block to be cut within a ten year period and the logs hauled to a central saw mill. When the last block has been cut over the first is ready to be cut again. The central mill and the houses provided for its working force are permanent fixtures.

This plan brings out the essential characteristics of every regional plan, whether specialized or comprehensive. (1) It deals with a geographic area; (2) it surveys that area and discovers its natural characteristics and resources; (3) it suggests a method of conserving its resources and developing its economic life; (4) it erects relatively permanent seats of human habitation, with all the social facilities that derive from such stability. Lacking such a plan and such a public policy, current commercial methods of exploitation would cut over the entire area in one operation, would provide only temporary employment and temporary habitations, would make no provision for natural reforestation, and would, as a result, permit the soil of the timber-mined area to be washed away, degrading the whole region and making further human activity difficult, if not impossible in it.

The Means to an End.—A regional plan, if it is really a plan and not a description, deals not only with a geographic area but with a force or "flow" or group of activities taking place within it. This flow may consist of water or electricity or commodities like lumber, wheat, dairy produce, manufactured articles—some product required for human sustenance. The flow may also be that of population; this includes industrial plant and social institutions—schools, libraries, churches, colleges, museums, hospitals

—in short, a flow of civilization. We usually regard these things as static; actually, they are always in motion, improving, deteriorating, changing their position, if not from year to year, then from decade to decade. Regional planning would direct and modify these changes to the advantage of the whole community, instead of simply letting them "happen." A comprehensive regional plan involves not merely the forces of man's industrial life but his cultural activities as well; for plans that concern themselves solely with the means of life are in danger of defeating man's cultural activities, which express his aims or objectives. In contrast to the view of industrial production almost universally accepted during the 19th century, regional planning recognizes that the means must be subordinate to the ends. Thus, in utilizing sites along a river, the regional planner may reserve for recreation a spot that would ordinarily be dedicated to heavy manufacturing; or between two possible types of industry, he may select that which has a higher civilization-value. Regional planning, following Ruskin, recognizes as the ultimate product of industry not money or commodities but human life. Briefly, regional planning deals with the ecology of the human community. Just as plant ecology treats of the climate, soil, the plant and insect partnerships necessary to the existence of a species of plants, so regional planning deals with the climate, vegetation, minerals, power resources, landscape, economic and social institutions necessary to a flourishing human community. It is not an effort to make a region self-subsistent; it *is* an attempt to bring it into the highest state of economic and human cultivation. No region is a self-contained unit. Except for islands and isolated mountain areas, there are no self-contained units even in the narrow geographic sense, whilst economically and culturally no region has existed without contact with other regions. Inter-regional relationships are just as important as internal ones, and of as much concern to the regional planner. Thus it has been pointed out that the only fundamental solution of New York's congestion of population and traffic involves a redistribution of the flow of commodities through the Atlantic ports, decreasing the share that now falls to New York, and redistributing part of New York's growing population in regional cities outside the immediate metropolitan area. Such a programme was partly sketched out in the final report of the New York State Housing and Regional Planning commission (1926).

Aspects.—In the countries where there is regional planning one aspect or another has usually been dominant, although regional planning involves every aspect of a region's life. In France, for example, the necessity for political administrative units that bear some relation to economics, history and geography has made the political side dominant; similar considerations have governed the drawing up of new governmental units in Siberia. Regional survey brings out the arbitrary nature of a great many political boundaries, and suggests the possibility of re-drawing them, or of co-operatively ignoring them, as in the constitution of the New York-New Jersey port authority. Economically, regional planning seeks the fullest development of local resources and skills, without the extravagant waste and degradation that accompanied this process in the past; in America this aspect of regional planning has been uppermost in the work of foresters and conservationists like Gifford Pinchot and Liberty Hyde Bailey. Socially, regional planning attempts to curb the growth of metropolitan slums and to create independent cities in more effective relationship with nature and industry and to take care of further increments of population: in England, the garden city movement, which has built Letchworth and Welwyn, has emphasized this side of regional planning. In reports on the Deeside and the Doncaster districts in England, and the newly found coal-areas in Kent, as well as in the final report of the New York State Housing and Regional Planning commission, these various aims have been co-ordinated and focussed. Regional rather than metropolitan development has been aided by motor transport and the aeroplane, by the radio, telephone, and giant power; and regional planning tends to make the fullest use of these. Similar reports and surveys have been made for the Ruhr district in Germany, for the French Alps, and, on a smaller scale, for agricultural communities in the Caucasus.

Among the precursors and intellectual preceptors of the modern regional planning movement, one must note Auguste Comte and Frédéric Le Play in political decentralization, Henry Thoreau in philosophy, George Perkins Marsh, author of *The Earth as Modified by Human Action,* Reclus, Ratzel and Shaler in geography, Kropotkin in economics, and Patrick Geddes, whose social studies and technical initiatives as city planner have touched every part of it. The first conception of dealing with the administration of modern utilities like electricity on a regional, rather than a national or local scale, was embodied in a Fabian pamphlet in the "New Heptarchy Series" on *Municipalization by Provinces;* the first definitive project for a regional city was that issued by Sir Ebenezer Howard in *Tomorrow* (*see* GARDEN CITIES) while numerous books and reports have appeared during the last twenty years.

See Benton MacKaye, *The New Exploration, A Philosophy of Regional Planning;* Victor Branford and Patrick Geddes, *The Coming Polity;* C. B. Fawcett, *The Provinces of England;* J. Charles-Brun, *Le Régionalisme;* J. Russell Smith, *North America;* J. M. Mackinder, *Britain and the British Seas;* the "Regional Planning" number of the *Survey Graphic,* May 1925; and the *Report* of the New York State Housing and Regional Planning Commission (1926).

(B. MACK.; L. MU.)

REGISTRATION: *see* BIRTH; SHIPPING; BILL OF SALE; ELECTORAL SYSTEMS; COMPANY LAW; FRIENDLY SOCIETIES; BUILDING SOCIETIES; PRESS LAWS; COPYRIGHT; TRADE MARKS; PATENTS; LAND TITLES.

REGIUM, a city of the territory of the Bruttii in South Italy, on the east side of the strait between Italy and Sicily (*see* REGGIO). A colony, mainly of Chalcidians, partly of Messenians from the Peloponnesus, settled at Regium in the 8th century B.C. About 494 B.C. Anaxilas, a member of the Messenian party, made himself master of Regium (apparently with the help of the Samians: *see* MESSINA) and about 488 joined with them in occupying Zancle (Messina). In 433 Regium made a treaty with Athens, and in 427 joined the Athenians against Syracuse, but in 415 it remained neutral. An attack which it made on Dionysius I. of Syracuse in 399 was the beginning of a great struggle which in 387 resulted in its complete destruction and the dispersion of its inhabitants as slaves: but it soon recovered its prosperity. In 280, Pyrrhus invaded Italy, the Regines admitted within their walls a Roman garrison of Campanian troops; these mercenaries revolted, massacred the male citizens, and held the city till in 270 they were besieged and put to death by the Roman consul Genucius. The city remained faithful to Rome throughout the Punic wars, and Hannibal never succeeded in taking it. It took the name Regium Iulium under Octavius (Augustus); and the pedestal of a statue erected in his honour (as Augustus) has recently been found there. It continued to be a Greek city even under the Empire. Towards the end of the Empire it was made the chief city of the Bruttii.

See P. Larizza, *Rhegium Chalcidense* (Rome, 1905); Orsi in *Notizie degli scavi,* 1922, 151 *sqq.*

REGIUM DONUM or ROYAL GIFT, an annual grant formerly made from the public funds to Presbyterian and other Nonconformist ministers in Great Britain and Ireland. In 1690 William III. made a grant of £1,200 a year to the Presbyterian ministers in Ireland as a reward for their services during his struggle with James II. Owing to the opposition of the Irish House of Lords the money was not paid in 1711 and some subsequent years, but it was revived in 1715 by George I., who increased the amount to £2,000 a year. Further additions were made in 1784 and in 1792, and in 1868 the sum granted to the Irish Presbyterian ministers was £45,000. The Regium Donum was withdrawn by the act of 1869 which disestablished the Irish church. Provision was made, however, for existing interests therein, and many Presbyterian ministers commuted these on the same terms as the clergy of the church of Ireland.

In England the Regium Donum proper dates from 1721, when Dr. Edmund Calamy (1671–1732) received £500 from the royal bounty "for the use and behalf of the poor widows of dissenting ministers." Afterwards this sum was increased to £1,000 and was made an annual payment "for assisting either ministers or their widows," and later it amounted to £1,695 per annum. It was given to distributors who represented the three denomina-

tions, Presbyterians, Baptists and Independents, enjoying the grant. Among the Nonconformists themselves, however, or at least among the Baptists and the Independents, there was some objection to this form of state aid, and it was withdrawn in 1857.

See J. Stoughton, *History of Religion in England* (1901); J. S. Reid, *History of the Presbyterian Church in Ireland* (Belfast, 1867); and E. Calamy, *Historical Account of my own Life*, edited by J. T. Rutt (1829–30).

REGLA, formerly an important suburb of Havana, Cuba, opposite that city, on the bay; now a part of Havana. Pop. (1926) about 30,000. It was formerly the scene of the Havana bull-fights. The church is one of the best in Cuba; the building dates substantially from 1805, but the church settlement goes back to a hermitage established in 1690. Regla is the shipping-point of the Havana sugar trade. It has enormous sugar and tobacco warehouses, fine wharves, a dry-dock, foundries and an electric railway plant. It is the western terminus of the eastern line of the United Railways of Havana, and is connected with the main city of Havana by ferry. A fishing village was established here about 1733. At the end of the 18th century Regla was a principal centre of the smuggling trade, and about 1820 was notorious as a resort of pirates. It first secured an *ayuntamiento* (city council) in 1872, and after 1899 was annexed to Havana.

REGNARD, JEAN FRANÇOIS (1655–1709), French comic dramatist, was born in Paris on Feb. 7, 1655. His masterpieces are *Le Joueur* (Théâtre Français, Dec. 19, 1696), and *Le Légataire universel* (1708). Regnard died on Sept. 4, 1709.

Besides many plays Regnard wrote miscellaneous poems, the autobiographical romance of *La Provençale*, and several short accounts in prose of his travels, published posthumously under the title of *Voyages*.

The first edition of Regnard's works was published in 1731 (5 vols., Rouen and Paris). There is a good selection of almost everything important in the Collection Didot (4 vols., 1819). A selection by L. Moland appeared in 1893. *See* also a *Bibliographie et iconographie des oeuvres de J. F. Regnard* (Paris, Rouquette, 1878); *Le Poète J. F. Regnard en son chasteau de Grillon*, by J. Guyot (Paris, 1907).

REGNAULT, HENRI (1843–1871), French painter, born at Paris on Oct. 31, 1843, was the son of Henri Victor Regnault (*q.v.*). He studied successively under Montfort, Lamothe and Cabanel, and in 1864 exhibited two portraits at the Salon. In 1866, he gained the *Grand Prix* with "Thetis bringing the Arms forged by Vulcan to Achilles" (Beaux-Arts). In Rome Regnault came under the influence of the modern materialistic Hispano-Italian school. His paintings include an imaginative picture of Marshal Prim at the head of his troops, inspired by a glimpse of his subject, received when travelling in Spain; "Judith" (1870), "Salome" and the realistic "Execution without Hearing under the Moorish Kings," painted at Tangiers. Regnault was killed in the Franco-German War on Jan. 19, 1871, while serving under Buzenval.

See *Correspondance de H. Regnault;* Duparc, *H. Regnault, sa vie et son œuvre;* Cazalis, *H. Regnault, 1843–1871;* C. Blanc, *H. Regnault.*

REGNAULT, HENRI VICTOR (1810–1878), French chemist and physicist, was born on July 21, 1810, at Aix-la-Chapelle. His early life was a struggle with poverty, he worked in a drapery establishment in Paris until 1829. Then he entered the École Polytechnique, and passed in 1832 to the École des Mines. A few years later, after studying under Liebig (*q.v.*), he was appointed to a professorship of chemistry at Lyons. His most important contribution to organic chemistry was a series of researches, begun in 1835, on the halogen and other derivatives of unsaturated hydrocarbons. He also studied the alkaloids and organic acids, introduced a classification of the metals and effected a comparison of the chemical composition of atmospheric air from all parts of the world. In 1840 he became professor of chemistry in the École Polytechnique, Paris; he was elected a member of the Academie des Sciences, and in 1841 he succeeded Dulong (*q.v.*), professor of physics in the Collège de France. In 1847 he published a four-volume treatise on *Chemistry* which has been translated into many languages. Regnault's work in physics was remarkably accurate and painstaking. He designed apparatus for a large number of measurements which is the standard apparatus of the present.

Regnault executed a careful redetermination of the specific heats of many solids, liquids and gases. (*See* CALORIMETRY.) He investigated the expansion of gases by heat, and showed that, contrary to previous opinion, no two gases had precisely the same coefficient of expansion. By delicate experiments he proved that Boyle's law is only approximately true for real gases. He studied the subject of thermometry (*q.v.*) critically; he introduced the use of an accurate air-thermometer, and compared its indications with those of a mercurial thermometer, determining the absolute expansion of mercury as a step in the process. He also paid attention to hygrometry and devised Regnault's hygrometer.

In 1854 he was appointed as director of the porcelain manufactory at Sèvres. He carried on his great research on the expansion of gases in the laboratory at Sèvres, but all the results of his latest work were destroyed during the Franco-German War, in which also his son Henri (noticed above) was killed. Regnault never recovered from the double blow, and, although he lived until Jan. 19, 1878, his scientific labours ended in 1872. Regnault's most important work is collected in vols. 21 and 26 of the *Mémoires de l'Académie des Sciences.*

RÉGNIER, HENRI FRANÇOIS JOSEPH DE (1864–), French poet and novelist, was born at Honfleur (Calvados) on Dec. 28, 1864, and was educated in Paris for the law. In 1885 he began to contribute to the Parisian reviews, and his verses found their way into most of the French and Belgian periodicals favourable to the symbolist writers. Having begun, however, to write under the leadership of the Parnassians, he retained the classical tradition, though he adopted some of the innovations of Moréas and Gustave Kahn. His gorgeous and vaguely suggestive style shows the influence of Stéphane Mallarmé. His first volume of poems, *Lendemains*, appeared in 1885, and among numerous later volumes are *Poèmes anciens et romanesques* (1890), *Les Jeux rustiques et divins* (1890), *Les Médailles d'argile* (1900), the most famous and the most read of his books of verse, and *La Cité des eaux* (1903). He is also the author of a series of realistic novels and tales, among which are *La Canne de jaspe* (2nd ed., 1897), *La Double Maîtresse* (5th ed., 1900), and *Les Amants singuliers* (1905).

His later works include: *L'Amphisbène* (1912); *La Pécheresse* (1920); *Vestigia Flammae* (7th ed., 1921); *Le Divertissement Provincial* (1925); *Proses datées* (1925); *L'Escapade* (1926).

See also E. Gosse, *French Profiles* (1905); van Bever and Leautaud, *Poètes d'aujourd'hui* (1900); H. Berton, *Henri de Régnier, le poète et le romancier* (1910); A. Lowell, *Six French Poets* (1915); and R. Honnert, *Henri de Régnier, son oeuvre* (1923).

RÉGNIER, MATHURIN (1573–1613), French satirist, was born at Chartres on Dec. 21, 1573, the son of Jacques Régnier, and Simone Desportes, sister of the poet. Little is known of his youth, except that he received the tonsure at eight years old, and it is chiefly conjecture which fixes the date of his visit to Italy in a humble position in the suite of the cardinal, François de Joyeuse, in 1587. Régnier found his duties irksome, and when, after many years of constant travel in the cardinal's service, he returned definitely to France about 1605, he took advantage of the hospitality of Desportes. In 1606 Desportes died and Régnier obtained a pension of 2,000 livres, chargeable upon one of Desportes' benefices. He was also made in 1609 canon of Chartres through his friendship with the lax bishop, Philippe Hurault, at whose abbey of Royaumont he spent much time in the later years of his dissipated life. The death of Henry IV. deprived him of his last hope of great preferments. He died at Rouen at his hotel, the Écu d'Orléans, on Oct. 22, 1613.

His undoubted work falls into three classes: regular satires in alexandrine couplets, serious poems in various metres, and satirical or jocular epigrams and light pieces, which often, if not always, exhibit considerable licence of language. The real greatness of Régnier consists in the vigour and polish of his satires, contrasted and heightened as that vigour is with the exquisite feeling and melancholy music of some of his minor poems. In these Régnier is a disciple of Ronsard (whom he defended brilliantly

against Malherbe), without the occasional pedantry, the affectation or the undue fluency of the Pléiade; but in the satires he seems to have had no master except the ancients, for some of them were written before the publication of the satires of Vauquelin de la Fresnaye, and the *Tragiques* of D'Aubigné did not appear until 1616. Régnier was an acute critic, and the famous passage (Satire ix., *À Monsieur Rapin*) in which he satirizes Malherbe contains the best denunciation of the merely "correct" theory of poetry that has ever been written. All his merits are displayed in the masterpiece entitled *Macette ou l'Hypocrisie déconcertée*, which does not suffer even on comparison with *Tartuffe;* but hardly any one of the sixteen satires which he has left falls below a very high standard.

Les Premières Oeuvres ou satyres de Régnier (1608) included the *Discours au roi* and ten satires. There was another in 1609, and others in 1612 and 1613. The author had also contributed to two collections—*Les Muses gaillardes* in 1609 and *Le Temple d'Apollon* in 1611. In 1616 appeared *Les Satyres et autres oeuvres folastres du sieur Régnier*, with many additions and some poems by other hands. Two famous editions by Elzevir (Leiden, 1642 and 1652) are highly prized. The chief editions of the 18th century are that of Claude Brossette (printed by Lyon & Woodman, London, 1729), which supplies the standard commentary on Régnier, and that of Lenglet Dufresnoy (printed by J. Tonson, London, 1733). The editions of Prosper Poitevin (Paris, 1860), of Ed. de Barthélemy (Paris, 1862), and of E. Courbet (Paris, 1875), may be specially mentioned. The last, printed after the originals in italic type, and well edited, is perhaps the best. *See* also Vianey's *Mathurin Régnier* (1896); M. H. Chernier, *Bibliographie de Mathurin Régnier* (1884); Jean-Marc Bernard, *L'introducteur de la satire en France: Mathurin Régnier* (1913); Emile Roy, *Notes sur les deux poètes Jean et Mathurin Régnier* (1910).

REGNITZ, a river of Germany, 126 m. long, and a left-bank tributary of the Main. It rises in the Jurassic rocks of the Frankish Jura, but its course is along the Trias, through an undulating vine-clad country, past Fürth, Erlangen, Baiersdorf and Forchheim, from which point it is navigable, and joins the Main at Bischberg, below Bamberg. The Ludwigs canal connects it with the Main and the Danube. Its main tributaries are the Pegnitz, on which is Nurnberg, the Gründlach and the Wiesent (right) and the Zenn, the Aurach and the Aisch (left). (*See* MAIN and RHINE.)

REGRATING, in English criminal law, was the offence of buying and selling again in the same market, or within four miles thereof (O. Fr. *regrater,* to sell by retail). (*See* ENGROSSING.)

REGULA, the Latin word for a rule, hence particularly applied to the rules of a religious order. (*See* MONASTICISM.) In architecture the term is applied to a rule, a square and the short fillet or rectangular block, under the taenia (*q.v.*) on the architrave of the Doric entablature. (*See* ORDER.)

REGULAR (Lat. *regularis,* from *regula,* a rule, O.Fr. *reule*), orderly, following or arranged according to a rule, steady, uniform, formally correct. Until the sixteenth century the adjective was applied exclusively to the discipline and customs of religious orders bound by a rule, and to their members, who constituted the "regular" as opposed to the "secular" clergy. Thus, as a substantive, "regular" means a monk or friar; while there were bodies of canons regular and canons secular. In more recent military usage, the regular forces was the name for the standing army organised on a permanent system, as opposed to "irregulars," levies raised on a voluntary basis.

REGULATION, AUTOMATIC. Modern processing is required in the production of most of the articles of clothing, foodstuffs, and other items that are used in every day life. Processing requires proper conditions not only in workrooms but in the endless variety of boilers, ovens, furnaces, dryers, sterilizers and other types of apparatus. To insure the proper conditions the automatic regulation of *temperature, pressure, humidity, timing, liquid level, flow, specific gravity* of the substance being processed and *speed of moving parts* is of great importance. These eight conditions will be dealt with. *Voltage* (which must be regulated in many devices), *current density* (in electroplating, etc.) and other electrical conditions are discussed under INSTRUMENTS, ELECTRICAL, and ELECTRICITY. No discussion is here given of the regulators, controllers or governors incorporated in engines, turbines, generators and other such machines, since these devices as conceived, designed, built, sold, installed and maintained with the machines, belong to their machines and seldom can function on others.

Automatic regulation of the eight conditions listed above is, however, a science, and the proper application of standardized automatic regulators to improve products and effect economies is a prominent branch of engineering.

Development of Automatic Regulation.—For every industry it has been established that there is one best set of conditions for operation and manufacture. Before the World War, in searching for this "one best way," workers were frequently required to watch indicators and manipulate valves and levers constantly in order to maintain proper conditions, until a fairly suitable automatic device was purchased or painstakingly contrived. Today (1929) specialists may install the required automatic devices as soon as the particular requirements are known. One of the factors that have made this possible is the spread of knowledge of formerly secret processes. This has led to "professional divisions" within the larger engineering societies and to co-operative industrial "institutes" and research bureaux. Competition between industries has also led to the exchange of formulae and data on automatic processes. Instrument-makers have pursued an increasingly active policy of scientific research into processes, with two objectives: (1) the development and standardization of classes and types of automatic regulators, based on industrial requirements; (2) the improvement and standardization of processes through methods worked out by their research staffs.

All these tendencies point to the need of an agency for the systematic utilization of scientific achievements. A central "institute" under the auspices of instrument makers may ultimately be developed. The progress of the last decade will undoubtedly be eclipsed when manufacturers thus combine their research and present their united facilities to the instrument-using industries. For example, the standardization of bulbs, connections, protective sockets, thermocouples, charts, scales, ranges, etc., has been initiated in the United States, but as yet only on a small scale.

Types of Automatic Regulators.—All regulators require some form of power to operate a valve, damper, etc., in order to maintain the optimum condition.

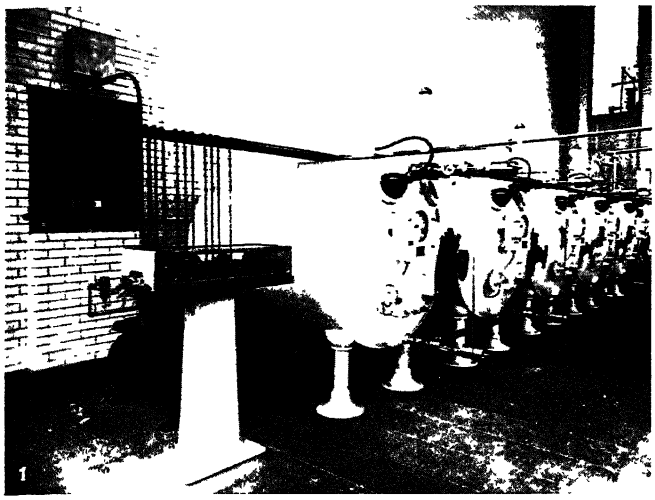
Self-operating regulators requiring no auxiliary power are directly installed (*i.e.,* on a steam line) and usually consist of a globe or balanced valve operated by a bellows; the expansion of the bellows being obtained in temperature regulators by the dilation or evaporation of a liquid in a sensitive bulb, and in pressure regulators by the pressure which is to be regulated. This group of devices includes thermostats and damper regulators.

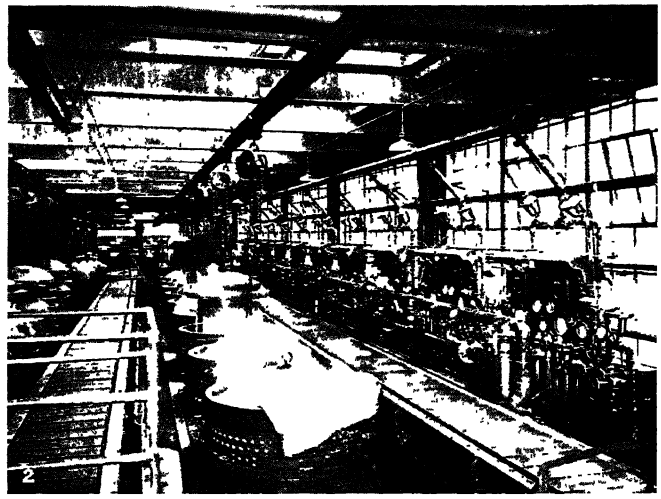
Air-operated regulators are the most wide-spread in industrial process service. They utilize the ample and flexible power of compressed air, controlling its flow to an operative mechanism which usually embodies an elastic diaphragm. Pilot valves add extreme sensitiveness to ample power, obviating the use of bellows—a small capsular or spiral spring or Bourdon tube being sufficient. (*See* Plate, figs. 6 and 7.)

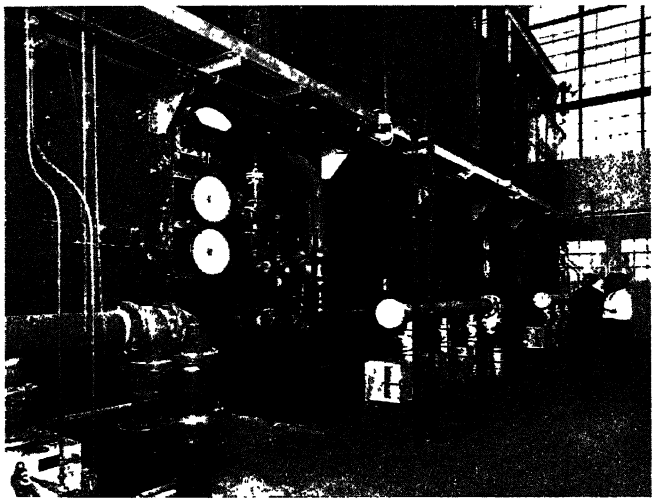
Electrically operated regulators function on the relay principle and actuate standardized electrical mechanisms. Heavy work may be performed through their agency but their on-and-off action produces the frequently objectionable "saw-tooth" record. On a temperature application, for instance, the steam valve would "hunt" whereas air-operated regulators can provide exact throttling regulation. (*See* Plate, fig. 1.)

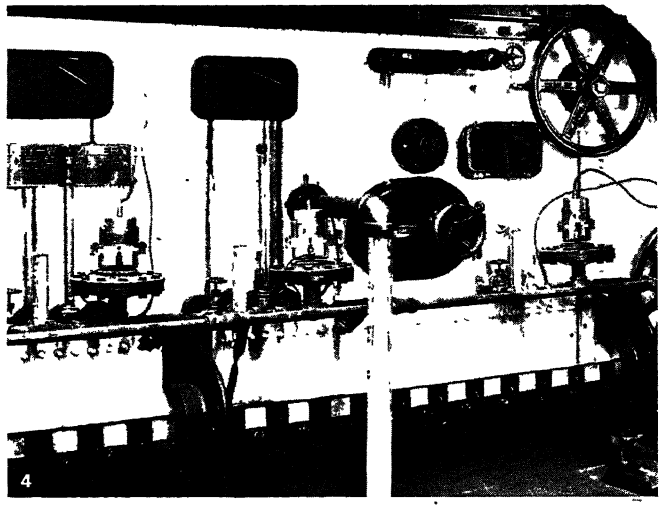
Steam-operated regulators utilize the power of the steam which they control. They embody the sensitive bulb, capillary tube and capsular spring. This latter operates a pilot valve so located that the pressure above a steam diaphragm may be varied with respect to the pressure below it. Pressure fluctuations of the steam supply cannot destroy accuracy, for the differential principle is used. Valves up to 4 in. are successfully operated by diaphragms up to 11 in. diameter. (*See* Plate, figs. 3 and 4.)

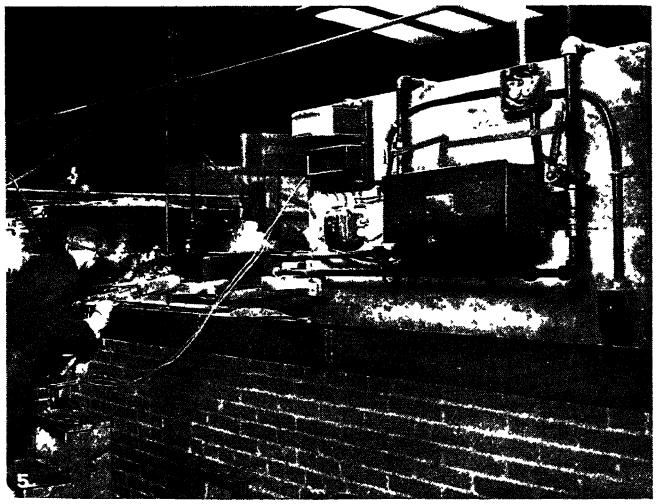
Temperature Systems. *Fixed Stem.*—It is sometimes possible to use the "solid expansion" principle, and the sensitive member then consists of a bimetallic stem (or of a carbon or quartz rod

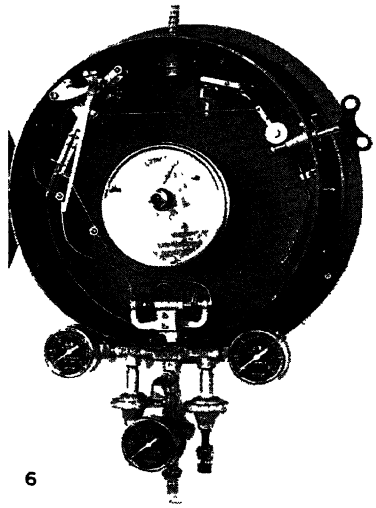

1


2




4


5


6


7

BY COURTESY OF (1, 2, 4) THE C. J. TAGLIABUE MANUFACTURING COMPANY, (5) THE BROWN INSTRUMENT COMPANY, (3) THE REPUBLIC FLOW METERS COMPANY, (6, 7) THE FOXBORO COMPANY

INSTALLATIONS OF AUTOMATIC CONTROLLERS IN VARIOUS INDUSTRIES

1. Process controller in milk pasteurization. The automatic cycle controller, on the pedestal to left, regulates the filling of each of the separate pasteurization vats, to the right, with the proper quantity of milk; holds the fluid for the required length of time; maintains the proper heat at a uniform temperature, and empties the vats when the cycle has been completed. 2. Process controller in tyre manufacturing. Automatic combination controllers which maintain the correct cure temperature and the time in tyre vulcanization. 3. Regulating and indicating instruments in a modern boiler room, indicating and regulating the flow of steam, air, water and gas. 4. Steam-operated temperature controllers on a bottle washing machine. 5. Decorating lehr, or heated oven, in a glass plant. High grade perfumery bottles are passed through the lehr for annealing and burning on the enamel decorations. An automatic control pyrometer governs the motor driven valve in the rectangular box to the right. 6. Interior of a temperature recorder-controller. Air-operated recorder showing helical tubes which actuate a flapper valve, one for heat control and the other for vapour or humidity control. All temperature variations are recorded graphically. 7. Diaphragm temperature control valve, air-operated. Among other uses the valve may be installed in an oil still, dyeing machine, tyre press, or pasteurization vat

within a metal tube) to which the instrument "head" with its graduated dial is directly attached. The great majority of applications, however, demand a *remote* bulb or thermocouple with either a closed system or an electrical system.

Closed Systems consist of bulb, capillary tube and Bourdon tube or capsular spring. They are either *completely* filled with mercury, another liquid or a gas; or *partially* filled with a volatile liquid the vapour pressure of which is utilized.

Electric Systems possess three advantages: (1) applicability to high temperature work, (2) practicability of long distance regulation, (3) replaceability of sensitive element. *Radiation Pyrometric Systems* are seldom used for automatic regulation. *Resistance Systems* are applicable for temperatures up to 300° F with base metal (nickel) elements and up to 1,500° F with platinum. *Thermoelectric Systems* may be of the galvanometric or potentiometric type. The latter has several advantages for "medium" temperatures. Usual range limitations are 300° to 1,800° F with base metal and 1,000° to 2,500° F with rare metal couples.

Other Conditions. *Pressure.*—The majority of pressure regulators are of the self-operating type, but for process work the air-operated type is being increasingly adopted. "Absolute pressure" and "differential pressure" regulators are in use in gas and by-product plants.

Humidity.—In general, instruments regulating the humidity in dryers consist of a pair of automatic temperature regulators of the closed system type—the bulb of one being affected by "air temperature" while the bulb of the other is enclosed in a constantly moistened porous sleeve exposed to the cooling effect of fairly rapid air circulation. The dry-bulb regulator unit controls the source of heat, while the wet-bulb unit controls the "spray." Many ingenious humidity regulators have recently appeared, including models which provide a "drying schedule."

Timing.—The first automatic regulators for this purpose were "modified alarm clocks." Modern ones dependably perform the complex cycles of operations required in vulcanization, dyeing, pasteurization of milk, etc. (*See* ROBOTS.)

Liquid Level.—An "automatic liquid level regulator" is to be found in every modern bathroom, but the industrial types necessarily differ. They utilize auxiliary power to operate large valves. Extra heavy and corrosion-resisting models are used in petroleum refineries and chemical plants under severe temperature and pressure conditions.

Flow.—While flow meters are being increasingly adopted in power plants and numerous industries, the demand for automatic regulation of flow has not as yet brought about the full development of special instruments.

Specific Gravity.—Two types of devices which automatically regulate the density of the substance being processed are commercially manufactured. One utilizes the hydrometric principle and embodies a float chamber; the other utilizes the electrical resistance of the substance being processed.

Speed.—Standardized commercial devices consist essentially of tachometers provided with electric contacts or other means of operating levers, rheostats or other appliances.

See *The Instrument World* (London) and *Instruments* (Pittsburgh, Pa.). (M. F. Bé.)

REGULUS, MARCUS ATILIUS, Roman general and consul (for the second time) in the ninth year of the First Punic War (256 B.C.). He was one of the commanders in the naval expedition which shattered the Carthaginian fleet at Ecnomus, and landed an army on Carthaginian territory (*see* PUNIC WARS).

The other consul was recalled, Regulus being left behind to finish the war. After a severe defeat at Adys near Carthage, the Carthaginians were inclined for peace, but the terms proposed by Regulus were so harsh that they resolved to continue the war. In 255, Regulus was completely defeated and taken prisoner by the Spartan Xanthippus. There is no further trustworthy information about him. According to tradition, he remained in captivity until 250, when after the defeat of the Carthaginians at Panormus he was sent to Rome on parole to negotiate a peace or exchange of prisoners. On his arrival he strongly urged the senate to refuse both proposals, and returning to Carthage was tortured to death (Horace, *Odes,* iii. 5). The story is insufficiently attested; it may have been invented to excuse the treatment of Carthaginian prisoners at Rome but it served to make Regulus the type of heroic endurance to the later Romans.

See Polybius i. 25–34; Florus ii. 2; Cicero, *De Officiis,* iii. 26; Livy, *Epit.* 18; Valerius Maximus ix. 2; Sil. Ital. vi. 299–550; Appian, *Punica,* 4; Zonaras viii. 15; *see* also O. Jäger, *M. Atilius Regulus* (1878).

REHAN, ADA (1860–1916), American actress, whose real name was Crehan, was born in Limerick, Ireland, on April 22, 1860. Her parents removed to the United States when she was five years old. She made her first stage appearance in *Across the Continent* at Newark (N.J.), in 1874. She was with Mrs. John Drew's stock company in Philadelphia, John W. Albaugh's in Albany and Baltimore, and other companies for several seasons, playing a variety of minor parts, until she became connected with Augustin Daly's theatrical management in 1879. Under his training she soon showed her talents for vivid, charming portrayal of character in modern and older comedies.

She was the heroine in all the Daly adaptations from the German, and added to her triumphs the parts of Peggy in Wycherly's *Country Girl,* Julia in the *Hunchback,* and especially Katharina in *The Taming of the Shrew,* besides playing Rosalind and Viola. Miss Rehan accompanied Daly's company to England (first in 1884), France and Germany (1886). She died in New York city, on Jan. 8, 1916.

REHOBOAM, son and successor of king Solomon (*q.v.*), began to reign *c.* 937 B.C. He was not acceptable to the northern tribes of Israel, who recalled Jeroboam from his exile in Egypt and made Rehoboam's contemptuous refusal of their demands the occasion for instituting a rival kingdom under Jeroboam (I Kings xii.). It is probable that this was done with the encouragement of Egypt. Shishak of Egypt attacked the kingdom of Judah *c.* 930, and despoiled the temple at Jerusalem of its treasures. Rehoboam's reign was marked by constant conflict with the kingdom of Israel. An unfavourable judgment is pronounced on him by the editor of Kings because he favoured customs connected with Baal worship. The fact that his mother was an Ammonitess may in some measure account for this. He was succeeded after a reign of 17 years by his son Abijah (in I Kings, Abijam) of whom little is known save a victory over Jeroboam.

REICHENAU, a picturesque island in the Untersee or western arm of the lake of Constance, 3 m. long by 1 broad, and connected with the east shore by a causeway three-quarters of a mile long. It belongs to the Republic of Baden. It had 2,055 inhabitants in 1925. The soil is very fertile, and excellent wine is produced in sufficient quantity for exportation. The Benedictine abbey of Reichenau, founded in 724, was long celebrated for its wealth and for the services rendered by its monks to the cause of learning. In 1540 the abbey, which had previously been independent, was annexed to the see of Constance, and in 1799 it was secularized. The abbey church, dating in part from the 9th century, contains the tomb of Charles the Fat (d. 888), who retired to this island in 887, after losing the empire of Charlemagne.

REICHENBACH, a town in the Prussian province of Silesia, situated on the Peile, at the foot of the Eulengebirge, a spur of the Riesengebirge, 30 m. S.W. of Breslau by rail. Pop. (1925) 16,093. Among its industries are dyeing, brewing and machine building and the manufacture of chemicals and glass buttons, and there is a considerable trade in grain and cattle. Here was held, in 1790, the congress which resulted in the convention of Reichenbach—between Great Britain, Prussia, Austria, Poland and Holland—guaranteeing the integrity of Turkey. Here, too, in 1813, was signed the treaty for the prosecution of the war against France.

REICHENBACH, a town in the republic of Saxony, situated in the Vogtland, 11 m. S.W. of Zwickau, at the junction of the main lines of railway Dresden-Leipzig-Hof. Pop. (1925) 30,862. The earliest mention of the town occurs in a document of 1212. The woollen manufacture was introduced in the 15th century, and took the place of the mining industry. The industries include the manufacture of textile goods and machinery and dyeing.

REICHENBERG: *see* LIBEREC.

REICHENHALL, a town in the republic of Bavaria, on the river Saalach, 1,570 ft. above sea-level, 9 m. S.W. of Salzburg Pop. (1925) 8,274. The brine springs of Reichenhall are mentioned in a document of the 8th century and were perhaps known to the Romans; but almost all trace of antiquity of the town was destroyed by a conflagration in 1834. The brine conduit to Traunstein dates from 1618. The water of some of the springs, the sources of which are 50 ft. below the surface, is so strongly saturated with salt (up to 24%) that it is at once conducted to the boiling houses, while that of the others is first submitted to a process of evaporation. Reichenhall is the centre of the four chief Bavarian salt-works: Berchtesgaden, Traunstein and Rosenheim. Reichenhall has become within the last century an important health-resort.

REICHSBANK. The Reichsbank is the central bank of Germany, corresponding to the Bank of England. It was founded in 1875, following upon the unification of the German empire. Under its original constitution, its management was divided between its shareholders, acting through a committee, and the Government, but the latter exercised the real control.

In considering the pre-war duties and functions of the Reichsbank, it must be remembered that it did not "grow up" like the Bank of England, but was founded as part of the set scheme of the German empire. Hence the close control exercised by the State, and hence the fact that it assumed certain duties which in England were performed by other organisms.

The chief points of difference were: (*a*) that the Reichsbank did not confine itself to being a bankers' bank; and (*b*) it performed the functions of the London provincial bankers' clearing houses. From these two points follows the fact that the Reichsbank had as many as 400 to 500 offices and agencies situated in every part of the empire, and was also accustomed to discount paper which did not invariably possess the standing required in London by the Bank of England.

The "giro" or clearing system was based on that of the Hamburg clearing house, which was absorbed by the Reichsbank on its foundation. The clearing system of the Bank of Prussia was taken over a year later. Clients, who might be other banks or private individuals, had to maintain a minimum "giro" balance with the Reichsbank, which, in 1913, averaged mks.25,000, and could then have money due to them paid in by their debtors at any office of the Reichsbank and remitted to their credit free of charge. This system was inaugurated with the deliberate object of facilitating trade, and its success is measured by the fact that 1913 witnessed 26·5 million "giro" entries in the books of the Reichsbank. It must be remembered that during the last century, cheques in Germany were hardly in use. Hence the need for this system.

Prior to 1871, the note issue was in the hands of various State and private banks. Political and other considerations made it unwise to attempt to suppress these, but the Reichsbank was given the right of issue, and its notes eventually outweighed in number and importance those of other banks. As has happened in England, some private banks allowed their right of issue to lapse, and immediately prior to the war, only five banks were entitled to issue notes beyond the limits of their gold cover. These were:—

Reichsbank could issue, uncovered, mks.	470,000,000
Bank of Saxony could issue, uncovered, mks.	17,000,000
Bank of Bavaria could issue, uncovered, mks.	32,000,000
Bank of Würtemburg could issue, uncovered, mks.	10,000,000
Bank of Baden could issue, uncovered, mks.	10,000,000
Mks.	539,000,000

The predominance of the Reichsbank is apparent.

The Reichsbank was in theory bound to redeem its notes in gold on demand, but in practice it discouraged applications. This was a matter of national policy, as the Government was continually adding to the country's gold stocks in preparation for future events.

The existence of a fixed limit to the fiduciary issue of 470 million marks placed the Reichsbank in a similar position to the Bank of England (*q.v.*) under Peel's Act of 1844. There was, however, one vital point of distinction. The Bank of England could not exceed the limit without special authority from the Government, and so only did so four times in the 70 years 1844–1914. The Reichsbank could always exceed its limit on payment of a five per cent. tax on the excess issue, and so habitually did so as a matter of course.

Reichsbank and the World War.—On the outbreak of war in 1914, the Reichsbank obligation to redeem notes in gold and its liability to tax on its excess note issue were suspended, while Treasury bills and bonds, with less than three months to run, were authorized to be used as cover to the note issue. (Cover was originally limited to Treasury notes redeemable in cash on demand, notes of the issuing banks which were allowed to be reckoned as specie and bills carrying at least two good names and maturing within three months.) A vigorous propaganda was instituted to concentrate gold in the hands of the Reichsbank, and this met with some measure of success. On the other hand, the bank was bound to discount such Treasury bills and bonds as the State required it to, and to issue notes against them. This was the method by which currency inflation was carried out in Germany.

Dr. Schacht, in his book *The Stabilisation of the Mark,* states that the war inflation was such as to raise the *per capita* note circulation from mks.110 to mks.430. The history of the post-war inflation period is told elsewhere (*see* CURRENCY; GERMANY; MARK), but for the first few years the Reichsbank was under the control of the Government, and had to discount such Treasury bills as were presented to it and to issue notes against them. The amendment of the Bank Law of July 8, 1926, authorizes the Bank to discount Treasury bills of the Reich with a maturity of not more than three months, and to grant advances against such bills up to 400,000,000 Reichsmarks.

In 1922 the Reichsbank was freed by legislation from Government control and so gained its nominal independence. For a few months it tried to arrest the fall in the mark, but the pressure of events was too much for it. The occupation of the Ruhr in early 1923 gave the mark its death-blow.

During most of 1923, the Reichsbank was perforce a passive spectator of the general collapse, and the first step to recovery, namely the institution of the Rentenmark, was taken by an organization nominally independent of the Reichsbank. Later on the Reichsbank was able to take definite and decisive action. At the end of 1923, it forced the Government to abandon its policy of ceaseless borrowing from the bank by the discount of Treasury bills; in early 1924, under the presidency of Dr. Schacht, it promoted the establishment of the Gold Discount Bank; and in April 1924, it put into force a general rationing of credit. (*See* MARK.)

Reconstitution of 1924.—During these months, the Dawes commission was at work, and among its duties was that of the reconstitution of the Reichsbank. In effecting this, the Dawes commission had two objects. One was the economic reconstruction of Germany, and the other was the organization of adequate reparations payments. As regards the last, the scheme was for the German Government to pay the sums due into the accounts held by the agent-general for reparations at the Reichsbank, for him in his turn to transfer to the recipient nations in such amounts and at such times as the state of the foreign exchanges permitted.

This second objective had a marked effect upon the new constitution of the Reichsbank. Foreign control was clearly necessary, and yet due regard had to be paid to German claims. Dr. Schacht gives in his book a very clear account of the negotiations. In sum, a council was set up, composed of an equal number of German and foreign representatives. This had certain powers, including the appointment of the directors of the bank, who exercised the executive control. These last, however, had to be Germans, and the president had to have his appointment confirmed by the president of the State. In case of dead-lock, the president could reject the first two nominees of the council, but the third choice of the council could be appointed over his head.

The new note issue was based on the American ratio system, and the relation between the various notes was fixed at 1 new Reichsmark=1 Rentenmark=1,000,000,000,000 old marks. The right of the Reichsbank to issue notes was extended from 10 to

50 years, during which period the State could not abrogate it. Of the note issue 40% had to be covered by gold or "gold exchange" (30% to be gold), and this cover was provided initially by the German loan floated internationally in the autumn of 1924. Furthermore, 40% of deposits had to be covered by "liquid assets," such as short-term bills. The compulsory redemption by the bank of notes in gold was postponed pending a general return by other nations to the gold standard.

Issue of uncovered notes beyond the 40% ratio is permitted, subjected to a graduated tax on the excess and regulations as to the bank's discount rate. If by the issue of additional notes the ratio falls to 37–40%, the tax is 3%; between 35 and 37%, 5%; and between 33⅓ and 35%, 8%, rising by a point for every point fall below 33⅓%. The discount rate must be at least 5%, rising above this by at least one-third of tax payable. Other provisions included the organisation of the State's debt to the bank, the reduction and fixation of the bank's capital, the allocation of profits between the shareholders and the State, and the retirement of Rentenmark and other temporary notes. The independence of the bank from the State is definitely maintained.

The new Bank law came into force on 11th October, 1924. The subsequent history of the Reichsbank is part of the general economic history of Germany (*q.v.*). It is sufficient to add that the Reichsbank has played its part in the economic resettlement of the world. (N. E. C.)

REICHSTADT, NAPOLEON FRANCIS JOSEPH CHARLES, DUKE OF (1811–1832), known by the Bonapartists as Napoleon II., was the son of the Emperor Napoleon I. and Marie Louise, archduchess of Austria. He was born on March 20, 1811, in Paris at the Tuileries palace. He was at first named the king of Rome, after the analogy of the heirs of the emperors of the Holy Roman Empire. By his birth the Napoleonic dynasty seemed to be finally established; but in three years it crumbled in the dust. At the time of the downfall of the empire (April 1814) Marie Louise and the king of Rome were at Blois with Joseph and Jerome Bonaparte, who wished to keep them as hostages. This design, however, was frustrated. Napoleon abdicated in favour of his son; but events prevented the reign of Napoleon II. from being more than titular. While Napoleon repaired to Elba, his consort and child went to Vienna; and they remained in Austria during the Hundred Days (1815), despite efforts made by the Bonapartists to carry off the prince to his father at Paris. In the settlements of 1814 and 1815 (*see* MARIE LOUISE)—the powers opposed all participation of the prince in the affairs of his mother's duchy of Parma. He therefore remained at Vienna. From this time onward he became, as it were, a pawn in the complex game of European politics, his claims being put forward sometimes by Metternich, sometimes by the unionists of Italy, while occasionally malcontents in France used his name to discredit the French Bourbons. In November 1816 the court of Vienna informed Marie Louise that her son could not succeed to the duchies. This decision was confirmed by the treaty of Paris of June 10, 1817. The title of "duke of Reichstadt" was conferred on him on July 22, 1818 by way of compensation. Thus Napoleon I., who once averred that he would prefer that his son should be strangled rather than brought up as an Austrian prince, lived to see his son reduced to a rank inferior to that of the Austrian archdukes.

His education was confided chiefly to Count Dietrichstein, who found him precocious, volatile, passionate and fond of military affairs. His nature was sensitive, as appeared on his receiving the news of the death of his father in 1821. The upheaval in France in 1830 and the disturbances which ensued led many Frenchmen to turn their thoughts to Napoleon II.; but though Metternich dallied for a time with the French Bonapartists, he had no intention of inaugurating a Napoleonic revival. The duke's indulgence in physical exercise far beyond his powers aggravated a natural weakness of the chest, and he died on July 22, 1832.

See A. M. Barthelemy and J. P. A. Méry, *Le Fils de l'homme* (Paris, 1829); Baron G. I. Comte de Montbel, *Le Duc de Reichstadt* (Paris, 1832); J. de Saint-Félix, *Histoire de Napoléon II.* (Paris, 1853); Guy de l'Hérault, *Histoire de Napoléon II.* (Paris, 1853); Count Anton von Prokesch-Osten, *Mein Verhältniss zum Herzog von Reichstadt* (Stuttgart, 1878); H. Welschinger, *Le Roi de Rome* (Paris, 1897); E. de Wertheimer, *The Duke of Reichstadt* (Eng. ed., 1905); C. Tschudi, *Napoleon's Son* (Eng. trs., 1912); H. Fleischmann, *Le Roi de Rome et des femmes* (1910); M. Rostand's *L'Aiglon;* Marie Louise, consort of Napoleon I., *Private Diaries* (1922).

REID, SIR GEORGE (1841–1913), knighted in 1902, Scottish artist, was born in Aberdeen on Oct. 31, 1841. He was apprenticed in 1854 for seven years to Messrs. Keith & Gibb, lithographers in Aberdeen. In 1861 Reid took lessons from an itinerant portrait-painter, William Niddrie, who had been a pupil of James Giles, R.S.A., and afterwards entered the school of the Board of Trustees in Edinburgh. His first portrait of interest was that of George Macdonald, the poet and novelist, now the property of the university of Aberdeen. In 1865 he went to Utrecht to study under A. Mollinger, whose work he admired for its unity and simplicity. For some years after this his work failed to please the Scottish authorities, but after his further studies under Yvon in Paris and Josef Israëls at The Hague, Reid's success was assured. A typical landscape is his "Whins in Bloom," which combines great breadth with fine detail. His flower-pieces, such as "Roses," were brilliant, but his most individual work is found in his portraits, which show great insight.

REID, SIR GEORGE HOUSTON, K.C.M.G., 1909 (1845–1918), Australian politician, was born on Feb. 25, 1845, at Johnstone, Renfrewshire, and emigrated in 1852 to Australia. He practised as a barrister in Sydney and was elected to the New South Wales parliament in 1880. In 1883–84 he was minister of public instruction and from 1891–94 was leader of the free trade party. In 1894 he became premier and retained office until 1899. Reid played a conspicuous part in the federation movement and was a member of the first Commonwealth parliament in 1901, leading the free trade opposition to Sir Edmund Barton. In 1904 he became Prime Minister, but he stood for a programme which was unacceptable to a predominantly protectionist country, and after his fall in the following year he never again held office. He led the opposition from 1905–08 and in the latter year retired from Australian politics. In 1909 he was appointed high commissioner in London; and on the expiration of his term entered the House of Commons as Conservative member for St. George's, Hanover Square, London. He published *My Reminiscences* in 1917. He died on Sept. 12, 1918.

REID, ROBERT (1862–1929), American artist, was born at Stockbridge (Mass.), on July 29, 1862. He studied at the art schools of the Boston Museum of Fine Arts, the Art Students' League, New York, and under Boulanger and Lefebvre in Paris. His early pictures were figures of French peasants, painted at Étaples, but subsequently he became best known for mural decoration and designs for stained glass. He contributed with others to the frescoes of the dome of the Liberal Arts Building at the Columbian Exposition, Chicago, in 1893. Other work is in the Congressional Library, Washington, the Appellate Court House, New York, and the State House, Boston, where are his three large panels, "James Otis Delivering his Speech against the Writs of Assistance," "Paul Revere's Ride," and the "Boston Tea Party." He executed a panel for the American pavilion at the Paris Exhibition, 1900, and in 1906 he completed a series of ten stained glass windows for a church at Fairhaven (Mass.), for the Rogers memorial. In 1906 he became a full member of the National Academy of Design. He died at Clifton Springs, New York, on December 2, 1929.

REID, SIR ROBERT GILLESPIE (1840–1908), Canadian railway contractor, was born at Coupar-Angus, Scotland. When a young man he spent a few years in Australia gold-mining, and in 1871 he settled in America, where he began his career as a contractor. He built one section of the Canadian Pacific railway, and was responsible for the erection of the international bridge over the Niagara river, the international railway bridge over the Rio Grande river and the Lachine bridge over the St. Lawrence. In 1893 Reid signed a contract with the government of Newfoundland by which he undertook to construct a railway from St. John's to Port-aux-Basques and to work the line for ten years in return for a large grant of land. In 1898 he further contracted to work all the railways in Newfoundland for 50 years on condi-

tion that at the end of this time they should become his property. This bargain, which included other matters such as steamers, docks and telegraphs, was extraordinarily favourable to Reid, who, by further enormous grants of land, became one of the largest landed proprietors in the world; public opinion was aroused against it, and eventually the terms of the contract were revised, being made more favourable to Newfoundland, and Reid's interests were transferred to a company, the Reid Newfoundland Company, of which he was the first president (*see* NEWFOUNDLAND, *Roads and Railways*). Reid was knighted in 1907. He died on June 3, 1908.

REID, THOMAS (1710–1796), the founder of the "Scottish School" of philosophy, was born on April 26, 1710, at Strachan in Kincardineshire, where his father was minister. He graduated at Aberdeen in 1726, remained there as librarian for ten years, and was presented to the living of Newmachar near Aberdeen in 1737. His first philosophical work, *Essay on Quantity, occasioned by reading a Treatise in which Simple and Compound Ratios are applied to Virtue and Merit,* denying the possibility of mathematical treatment of moral subjects, appeared in the *Transactions* of the Royal Society (1748). In 1740 Reid married a cousin, the daughter of a London physician. In 1752 he became professor of philosophy at King's college, Aberdeen. The Aberdeen Philosophical Society (the "Wise Club"), which numbered among its members Campbell, Beattie, Gerard and Dr. John Gregory, was mainly founded by Reid, who was secretary for the first year (1758). Reid propounded his point of view in the *Enquiry into the Human Mind on the Principles of Common Sense* (1764). In this year, Reid succeeded Adam Smith as professor of moral philosophy at Glasgow.

After 17 years he retired to complete his philosophical system. The *Essays on the Intellectual Powers of Man* appeared in 1785, and their ethical complement, the *Essays on the Active Powers of the Human Mind,* in 1788. These, with an account of Aristotle's *Logic* appended to Lord Kames's *Sketches of the History of Man* (1774), conclude the list of works published in Reid's lifetime. He died of paralysis on Oct. 7, 1796.

The key to Reid's philosophy is to be found in his revulsion from the sceptical conclusions of Hume. In several passages of his writings he expressly dates his philosophical awakening from the appearance of the *Treatise of Human Nature.* In the dedication of the *Enquiry,* he says: "The ingenious author of that treatise upon the principles of Locke—who was no sceptic—hath built a system of scepticism which leaves no ground to believe any one thing rather than its contrary. His reasoning appeared to me to be just; there was, therefore, a necessity to call in question the principles upon which it was founded, or to admit the conclusion." Having decided that the rationalist philosophy was subversive of religion and morals he examined the doctrine, which he declared to be contrary to experience. He appealed not to eternal truths, but to the testimony of experience. He maintained that we do not start with "ideas," and afterwards refer them to objects; we are never restricted to our own minds, but are from the first immediately related to a permanent world. There are certain presuppositions unassailable by doubt which are older and more authoritative than any philosophy. Among these he places the belief in a material external world and in the existence of the soul. Reid has a variety of names for the principles which, by their presence, lift us out of subjectivity into perception. One of these, "principles of common sense," which became the current one, conveyed a false impression of Scottish philosophy. Reid did not merely appeal from the reasoned conclusions of philosophers to the unreasoned beliefs of common life. His real mode of procedure is to redargue Hume's conclusions by a refutation of the premises inherited by him from his predecessors. Reid everywhere unites common sense and reason, making the former "only another name for one branch or degree of reason." Reason, as judging of things self-evident, is called common sense to distinguish it from ratiocination or reasoning. And in regard to Reid's favourite proof of the principles in question by reference to "the consent of ages and nations, of the learned and unlearned," it is only fair to observe that this argument assumes a much more scientific form in the *Essays,* where it is almost identified with an appeal to "the structure and grammar of all languages." "The structure of all languages," he says, "is grounded upon common sense." To take but one example, "the distinction between sensible qualities and the substance to which they belong, and between thought and the mind that thinks, is not the invention of philosophers; it is found in the structure of all languages, and therefore must be common to all men who speak with understanding" (Hamilton's *Reid,* pp. 229 and 454).

BIBLIOGRAPHY.—The best edition of Reid's *Works* is that by Sir William Hamilton (2 vols.). *See* also "Reid and the Philosophy of Common Sense" in J. F. Ferrier's *Lectures,* ed. Grant and Lushington (1866); A. C. Fraser, *Thomas Reid* ("Famous Scots Series," 1898); K. Peters, *Thomas Reid als Kritiker von David Hume* (Leipzig, 1909); O. M. Jones, *Empiricism and Intuitionism in Reid's Common Sense Philosophy* (1927).

REID, THOMAS MAYNE (1818–1883), better known as MAYNE REID, British novelist, the son of a Presbyterian minister, was born at Ballyroney, Co. Down, Ireland, on April 4, 1818. His own early life was as adventurous as any boy reader of his novels could desire. When 20 years old he went to America in search of adventure. He traded on the Red river, studying the ways of the red man and the white pioneer; he made acquaintance with the Missouri in the same way. In Philadelphia, where he was engaged in journalism from 1843 to 1846, he made the acquaintance of Edgar Allan Poe. When the war with Mexico broke out in 1846 he obtained a captain's commission, was present at the siege and capture of Vera Cruz, and led a forlorn hope at Chapultepec, where he sustained such severe injuries that his life was despaired of. In one of his novels he says that he believed theoretically in the military value of untrained troops, and that he had found his theories confirmed in actual warfare. He offered his services to the Hungarian insurgents in 1849, raised a body of volunteers, and sailed for Europe, but arrived too late. He then settled in England, and began his career of a novelist with the publication, in 1850, of the *Rifle Rangers.* This was followed next year by the *Scalp Hunters.* He never surpassed his first productions, except perhaps in *The White Chief* (1859) and *The Quadroon* (1856); but he continued to produce tales of self-reliant enterprise and exciting adventure with great fertility. He died in London on Oct. 22, 1883.

See *Memoir* (1890) by his widow, Elizabeth Mayne Reid.

REID, WHITELAW (1837–1912), American journalist and diplomatist, was born of Scotch parentage, near Xenia, O., on Oct. 27, 1837. He graduated at Miami University in 1856, and spoke frequently in behalf of John C. Frémont, the Republican candidate for the presidency in that year. In 1860 he became legislative correspondent at Columbus for several Ohio newspapers, including the Cincinnati *Gazette,* of which he was made city editor in 1861. He was war correspondent for the *Gazette* in 1861–62, serving also as volunteer aide-de-camp to generals Thomas A. Morris, William S. Rosecrans in West Virginia, and was Washington correspondent of the *Gazette* in 1862–68. In 1868 he became a leading editorial writer for the New York *Tribune,* in the following year was made managing editor, and in 1872, upon the death of Horace Greeley, became the principal proprietor and editor-in-chief. In 1905 Reid relinquished his active editorship of the *Tribune,* but retained financial control. He served as minister to France in 1889–92, and in 1892 was the unsuccessful Republican candidate for vice president on the ticket with Benjamin Harrison. In 1897 he was special ambassador of the United States on the occasion of Queen Victoria's jubilee; in 1902 was special ambassador of the United States at the coronation of King Edward VII., and in 1905 became ambassador to Great Britain. In 1881 he married a daughter of Darius Ogden Mills (1825–1910), a prominent financier. He died in London on Dec. 15, 1912.

His publications include *After the War* (1867); *Ohio in the War* (1868); *Some Consequences of the Last Treaty of Paris* (1899); *Our New Duties* (1899); *Later Aspects of Our New Duties* (1899); *Problems of Expansion* (1900); *The Greatest Fact in Modern History* (1906); *How America Faced its Educational Problem* (1906); *The Scot in America and the Ulster Scot* (1912), and posthumously, *American and English Studies* (1913),

See Royal Cortissoz, *The Life of Whitelaw Reid* (1921).

REIDSVILLE, a town of Rockingham county, North Carolina, U.S.A., in the northern part of the State, at an altitude of 822 ft.; on the Southern railway and Federal highway 170, 20 m. S.W. of Danville, Va. Pop. 5,333 in 1920 (37% negroes); and 6,851 in 1930 by the Federal census. It is an important tobacco-shipping point, and has cotton and silk mills, and factories making 60,000,000 cigarettes daily. The town was founded about 1860 and incorporated in 1873. It has a commission-manager form of government.

REIGATE, a market town and municipal borough in Surrey, England, 24 m. S. by W. of London by the S.R. Pop. (1931) 30,830. Reigate (*Cherchefelle, Regat, Reygate*), at a cross-road on the Pilgrim's Way, at the foot of the North Downs, had a castle, a stronghold of the De Warennes in the 12th, 13th and 14th centuries. On the death of Edith, the widow of Edward the Confessor, to whom it belonged, William I. secured the manor of Cherchefelle, as it was then called. It was granted by William Rufus to Earl Warenne, through whose family it passed in 1347 to the earls of Arundel. The name Reigate occurs in 1199. Burgesses of Reigate are mentioned in a close roll of 1348, but no early charter is known. The town was incorporated in 1863. It returned two members to parliament from 1295 till 1831, and afterwards one member only until 1867, when it was disfranchised for corruption. It is situated at the head of the long valley of Holmsdale Hollow. Of the old castle built before the Conquest, there only remains the entrance to a cave beneath, 150 ft. long and from 10 to 12 ft. high, excavated in the sandstone, which was used as a guardroom. The grounds are laid out as a public garden. Near the market house is the site of an ancient chapel dedicated to Thomas à Becket. In the chancel of the parish church of St. Mary (Transitional Norman to Perpendicular) is buried Lord Howard, the commander of the English navy against the Spanish Armada. Above the vestry is a library containing manuscripts and rare books. The grammar school was founded in 1675.

REIMARUS, HERMANN SAMUEL (1694–1768), German philosopher and man of letters, was born at Hamburg, on Dec. 22, 1694. He was educated by his father and by the famous scholar J. A. Fabricius, whose son-in-law he became, and later at Jena. He was professor of Hebrew and Oriental languages in the high school of his native city from 1727 till his death. His house was the centre of the highest culture, and a monument of his influence in that city still remains in the *Haus der patriotischen Gesellschaft,* where the learned and artistic societies partly founded by him still meet. He died on March 1, 1768.

Reimarus's reputation as a scholar rests on the valuable edition of Dio Cassius (1750–52) which he prepared from the materials collected by J. A. Fabricius. He also published *Abhandlungen von den vornehmsten Wahrheiten der natürlichen Religion* (Hamburg, 1754, 6th ed. 1791); *Vernunftlehre* (Hamburg and Kiel, 1756, 5th ed., 1790); *Betrachtungen über der Kunsttriebe der Thiere* (Hamburg, 1762, 4th ed., 1798). But his best-known work is his *Apologie oder Schutzschrift für die vernünftigen Verehrer Gottes* (carefully kept back during his lifetime), from which, after his death, Lessing published certain chapters under the title of the *Wolfenbüttel Fragments* (*see* LESSING). Other portions were published by "C. A. Schmidt" (1787) and D. W. Klose (1850–52). The original MS. is in the Hamburg town library.

The standpoint of the *Apologie* is that of pure naturalistic deism. Miracles and mysteries, with the exception of the Creation, are denied, and natural religion is put forward as the absolute contradiction of revealed. The essential truths of the former are the existence of a wise and good Creator and the immortality of the soul. These truths are discoverable by reason, and are such as can constitute the basis of a universal religion and lead to happiness. A revealed religion could never obtain universality, as it could never be intelligible and credible to all men.

See the "Fragments" as published by Lessing, reprinted in vol. xv. of *Lessing's Werke,* Hempel's edition; D. F. Strauss, *H. S. Reimarus und seine Schutzschrift für die vernünftigen Verehrer Gottes* (1862, 2nd ed., 1877); C. Voysey, *Fragments from Reimarus* (1879) (a translation of Strauss's book, with the second part of the seventh fragment, on the "Object of Jesus and his Disciples"); R. Schettler, *Die Stellung d. Philos. Reimarus zur Religion* (Leipzig, 1904), and J. Engert, *Reimarus als Metaphysiker* (Paderborn, 1909).

REIMS (RHEIMS), a city of north-eastern France, chief town of an arrondissement of the department of Marne, 98 m. E.N.E. of Paris, on the Eastern railway. Pop. (1926) 97,825. Reims stands in a plain on the right bank of the Vesle, a tributary of the Aisne, and on the canal which connects the Aisne with the Marne. South and west rise the "montagne de Reims" and vine-clad hills.

Before the Roman conquest Reims, as *Durocortorum,* was capital of the Remi, from whose name that of the town was subsequently derived. The Remi made voluntary submission to the Romans, and by their fidelity secured the special favour of their conquerors. Christianity was established in the town by the middle of the 3rd century, at which period the bishopric was founded. The consul Jovinus, an influential supporter of the new faith, repulsed the barbarians who invaded Champagne in 336; but the Vandals captured the town in 406 and slew St. Nicasus, and Attila afterwards put it to fire and sword. Clovis, after his victory at Soissons (486), was baptized at Reims in 496 by St. Remigius. Later kings desired to be consecrated at Reims with the oil of the sacred phial which was believed to have been brought from heaven by a dove for the baptism of Clovis and was preserved in the abbey of St. Remi. Meetings of Pope Stephen III. with Pippin the Short, and of Leo III. with Charlemagne, took place at Reims; and here Louis the Débonnaire was crowned by Stephen IV. Louis IV. gave the town and countship of Reims to the archbishop Artaldus in 940. Louis VII. gave the title of duke and peer to William of Champagne, archbishop from 1176 to 1202 and the archbishops of Reims took precedence of the other ecclesiastical peers of the realm.

In the 10th century Reims had become a centre of intellectual culture, Archbishop Adalberon, seconded by the monk Gerbert (afterwards Pope Silvester II.), having founded schools where the "liberal arts" were taught. Adalberon was also one of the prime authors of the revolution which put the Capet house in the place of the Carolingians. The most important prerogative of the archbishops was the consecration of the kings of France—a privilege which was exercised, except in a few cases, from the time of Philip Augustus to that of Charles X. Louis VII. granted the town a communal charter in 1139. The treaty of Troyes (1420) ceded it to the English, who had made a futile attempt to take it by siege in 1360; but they were expelled on the approach of Joan of Arc, who in 1429 caused Charles VII. to be consecrated in the cathedral. A revolt at Reims, caused by the salt tax in 1461, was cruelly repressed by Louis XI. The town sided with the League (1585), but submitted to Henry IV. after the battle of Ivry. In the foreign invasions of 1814 it was captured and recaptured; in 1870–71 it was made by the Germans the seat of a governor-general and impoverished by heavy requisitions.

In the World War.—Reims suffered severely during the war of 1914–18. The town was heavily bombarded by the Germans in September 1914, and the population took shelter in the huge subterranean wine cellars, occupying old chalk quarries, where dormitories were made, schools were held, and a daily paper was published. In 1917 the civilian population which remained was evacuated; in 1918 the town was one of the objectives of the Germans, but it was held until freed by the allied offensive in October. Reims was then in ruins, and the cathedral was severely damaged, especially on the south-west side. The work of restoration of the cathedral, to the cost of which there was a large American contribution, took many years to complete. The statue of St. Joan of Arc, which stood in front of the cathedral, was removed during the war for safety, and replaced in 1921; many of the art treasures, tapestries, etc., were also saved.

The oldest monument in Reims is the Mars Gate (so called from a temple to Mars in the neighbourhood), a triumphal arch 108 ft. in length by 43 in height, consisting of three archways flanked by columns. It is popularly supposed to have been erected by the Remi in honour of Augustus when Agrippa made the great roads terminating at the town, but probably belongs to

the 3rd or 4th century. In its vicinity a curious mosaic, measuring 36 ft. by 26, with thirty-five medallions representing animals and gladiators, was discovered in 1860. To these remains must be added a Gallo-Roman sarcophagus, said to be that of the consul Jovinus and preserved in the archaeological museum in the cloister of the abbey of St. Remi.

The cathedral of Notre Dame, where the kings of France used to be crowned, replaced an older church (burned in 1211) built on the site of the basilica where Clovis was baptized by St. Remigius. The cathedral, with the exception of the west front, was completed by the end of the 13th century. That portion was erected in the 14th century after 13th-century designs—the nave having in the meantime been lengthened to afford room for the crowds that attended the coronations. In 1481 fire destroyed the roof and the spires. The façade was one of the most perfect masterpieces of the middle ages. The three portals are laden with statues and statuettes. The central portal, dedicated to the Virgin, was surmounted by a rose-window framed in an arch itself decorated with statuary. The rose-window, the statue of the smiling angel, the still more famous "Beau Dieu" statue were all severely damaged in the World War. The gallery of the kings above the rose-window survived but the angel spire was destroyed.

The archiepiscopal palace, built between 1498 and 1509, and in part rebuilt in 1675, was almost completely destroyed. The church of St. Remi (11th, 12th, 13th and 15th centuries) still retains intact its façade and two Romanesque towers; the nave and choir were ruined, and the mausoleum of St. Remigius (1847), containing the reliquary of the saint, behind the high altar, had to be reconstructed.

Reims is the seat of an archbishop, a court of assize and a sub-prefect, and a tribunal and a chamber of commerce. It is an important centre for the combing, carding and spinning of wool and the weaving of flannel, merino, cloth and woollen goods of all kinds. The manufacture of and trade in champagne are also very important. The wine is stored in large cellars tunnelled in the chalk. Other manufactures are linoleum, safes, capsules, bottles, casks, candles, soap and paper. The town is well known for its cakes and biscuits.

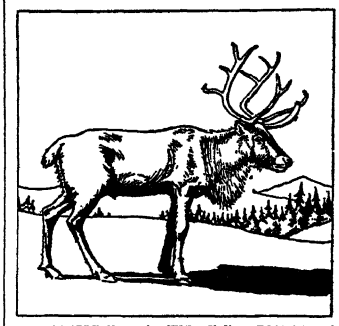
REINACH, JOSEPH (1856–1921), French author and politician, was born in Paris on Sept. 30, 1856. After leaving the Lycée Condorcet he was called to the bar in 1887. He attracted the attention of Gambetta by articles on Balkan politics published in the *Revue bleue,* and in Gambetta's *grand ministère* Reinach was his secretary. In the *République française* he waged a steady war against General Boulanger which brought him three duels, one with Edmond Magnier and two with Paul Déroulède. Between 1889 and 1898 he sat for the Chamber of Deputies for Digne. He brought forward many reform bills, advocated complete freedom of the theatre and the press, the abolition of public executions, and denounced political corruption. But he is best known as the champion of Captain Dreyfus. At the time of the original trial he attempted to secure a public hearing of the case, and in 1897 he allied himself with Scheurer-Kestner to demand its revision. He denounced in the *Siècle* the Henry forgery, and Esterhazy's complicity. His articles in the *Siècle* aroused the fury of the anti-Dreyfusard party, especially as he was himself a Jew and therefore open to the charge of bias. He lost his seat in the Chamber of Deputies, and, having refused to fight Henri Rochefort, eventually brought an action for libel against him. Finally, the "affaire" being terminated and Dreyfus pardoned, he undertook to write the history of the case, the first four volumes of which appeared in 1901. This was completed in 1905. In 1906 M. Reinach was re-elected for Digne. He died in Paris on April 18, 1921.

SALOMON REINACH (1858–), born at St. Germain-en-Laye on Aug. 29, 1858, brother of Joseph Reinach (*q.v.*), was educated at the École Normale Supérieure, and joined the French school at Athens in 1879. He made valuable archaeological discoveries at Myrina near Smyrna in 1880–82, at Cyme in 1881, at Thasos, Imbros and Lesbos (1882), at Carthage and Meninx (1883–84), at Odessa (1893) and elsewhere. He received in 1886 an appointment at the National Museum of Antiquities at St. Germain; in 1893 he became assistant keeper, and in 1902 keeper of the national museums. In 1903 he became joint editor of the *Revue archéologique,* and in the same year officer of the Legion of Honour. The lectures he delivered on art at the École du Louvre in 1902–3 were published by him under the title of *Apollo.*

His other works include: *Manuel de philologie classique* (1880–1884); *La Nécropole de Myrina* (1887), written with E. Pottier; *Répertoire de la statuaire grecque et romaine* (3 vols., 1897–98); *Répertoire de peintures du moyen âge et de la Renaissance 1280–1580* (1905, etc.); *Répertoire des vases peints grecs et étrusques* (1900). In 1905 he began his *Cultes, mythes et religions;* and in 1909 he published a general sketch of the history of religions under the title of *Orpheus.*

REINCARNATION, the belief that the soul after death returns to human life after a period of existence elsewhere, perhaps in animal or plant form or in some separate place, is found in many parts of the world. For an account of this doctrine in its social, religious and historical aspect see *Metempsychosis.*

REINDEER, a large Arctic and sub-Arctic deer, the American species of which is called caribou. The reindeer constitutes the genus *Rangifer,* characterized by the possession of antlers by both sexes, though those of the male are larger and more complex. Reindeer are clumsily built animals, with large lateral hoofs, hairy muzzles, and a curious type of antler with the brow-tine directed downwards. The compact, dense coat is clove-brown in colour above and white below, with a white tail-patch. The ears and tail are short and the throat is maned. A tarsal gland is present. The lateral metacarpal bones are represented only by their lower extremities (*see* DEER).



BY COURTESY OF THE N.Y. ZOOLOGICAL SOCIETY

REINDEER (RANGIFER TARANDUS) It inhabits arctic and sub-arctic regions

The type of the genus (*R. tarandus*) is the Scandinavian wild form. Two main distinct races, possibly species of the American form (*R. caribou*), are found—the woodland caribou, the largest of all reindeer, and the barren-ground caribou of the more northerly tundra, with a smaller body but larger antlers. The latter migrates south in huge herds at the approach of winter. A small species (*R. platyrhynchus*) inhabits Spitzbergen and Novaya Zembla. The reindeer has been domesticated by the Lapps and introduced as a domestic animal into Arctic Canada and Alaska. Reindeer feed largely on lichens, one species of which is the so-called "reindeer moss." It is a mistake to suppose that the brow-tine is used to scrape away snow; this is done with the hoofs, the horns being shed at the beginning of winter.

See M. Grant, "The Caribou," *7th Annual Report, New York Zoological Society* (1902); J. G. Millais, *Newfoundland and its Untrodden Ways* (1908).

REINDEER MOSS (*Cladonia rangiferina*), a species of lichen found in great abundance in Arctic lands. It is an erect, much branched plant, a few inches in height, which covers immense areas somewhat in the manner of pasture grasses in the temperate regions. In many districts it forms the chief food of the reindeer, and it also provides forage for the barren-ground caribou and the musk-ox. (*See* LICHENS.)

REINFORCED CONCRETE is a structural system utilizing fine concrete strengthened or reinforced in places by means of steel bars embedded within its mass. The concrete is so disposed as to resist the compressive or crushing stresses and form the general binding material while the steel bars act to prevent rupture at places where tension develops. The system is economical, durable and fire resisting and is adapted to an infinite variety of purposes in engineering and building construction. *See* FERRO-CONCRETE and CONCRETE.

REINFORCED GLASS: *see* GLASS, SAFETY.

REINHARDT, MAX (1873–), Austrian theatrical producer, was born in Raden, near Vienna, Austria, on Sept. 9, 1873. He was educated at the Untergymnasium, and then entered a

bank, where he remained until 17 years of age. He studied for the stage under Emil Burde, and in 1890 at the School of Acting of the Vienna Conservatorium. He began his professional career in 1893 at the Stadt theatre in Salzburg, where his characterization of elderly rôles attracted the attention of Otto Brahm, who engaged him for the Deutsches theater, Berlin, in 1894. There he met with notable success, creating such rôles as Baumert in Hauptmann's *The Weavers;* Akim in Tolstoy's *The Power of Darkness;* Engstrand in Ibsen's *Ghosts;* and many others. In 1903 he left the Brahm ensemble to begin his career as a director at the Neues theater, Berlin, with the production of Shakespeare's *A Midsummer Night's Dream,* in which he assumed leadership of the neo-romantic movement against the prevailing school of naturalism. He soon transferred his activities to the Deutsches theater, where, during the following years, he produced practically all the plays of Shakespeare, Molière, Goethe, Strindberg, Wedekind, Ibsen, Shaw and others, as well as musical comedies and operas, turning from the purely literary and historical conception of stage management to one essentially dramatic. In 1902, he opened his Kleines theater, and in 1906 his Kammerspielhaus. He was the first German producer to be invited to produce plays in foreign countries. Since 1909 he has given many productions in European cities, and in 1927–28 several notable ones in New York city. *See* Huntly Carter, *The Theatre of Max Reinhardt* (1914); *Max Reinhardt and His Theatre,* ed. Oliver M. Sayler (1924).

REINKENS, JOSEPH HUBERT (1821–1896), German Old Catholic bishop, was born at Burtscheid, near Aix-la-Chapelle on March 1, 1821. He became professor of ecclesiastical history at Breslau, and in 1865 rector of the university. In 1870, Reinkens opposed the proclamation of the dogma of papal infallibility. He signed the Declaration of Nüremberg in 1871, and took a conspicuous part in the Bonn conferences with the Orientals and Anglicans in 1874 and 1875. The Old Catholics having decided on secession, Reinkens was chosen their bishop in Germany at Cologne in 1873 (*see* OLD CATHOLICS). His best-known theological work is his treatise on Cyprian and the Unity of the Church (1873). In 1881 Reinkens visited England, and in 1894 he defended the validity of Anglican orders against his co-religionists, the Old Catholics of Holland. He died at Bonn on Jan. 4, 1896.

See *Joseph Hubert Reinkens,* by his nephew, J. M. Reinkens (Gotha, 1906).

REINSURANCE. Reinsurance is the term used to denote the transaction whereby a person who has insured a risk insures again a part or the whole of that risk with another person. The purpose of reinsurance is to relieve the original insurer from a liability which is too heavy for him to carry. There is no privity of contract between the reinsurer and the original insured, so that the latter could not sue the former to recover any part of a loss, but the insured could recover in respect of a loss against the original insurer up to the full amount of the policy, notwithstanding that part of it had been reinsured.

In a reinsurance transaction the company which reinsures is called the ceding company, the accepting company is called the reinsurer, and the transaction itself is termed a cession.

It is not known when reinsurance was first practised, though there is evidence of its existence at least as early as the first half of the 18th century. In the early days of insurance insurers did not, as a rule, insure for greater amounts than they were prepared to keep for themselves, and, even when this rule began to be relaxed, the arrangements whereby they relieved themselves of heavy commitments partook more of the nature of co-insurance than of reinsurance. Under such arrangements the original insured was in contractual relationship with each of the insurers.

However, in marine business reinsurance was known nearly 200 years ago, for in 1746 an act of parliament made it illegal, a prohibition which was not raised until 1864. It is thought by some that the Act of 1746 really prohibited double insurance; *i.e.,* where the insured covered his property twice, but the word used in the act is "reassurance." However this may be, it is certain that the growth of reinsurance in various sections of the business was slow until well into the 19th century, and it is only during the past 30 years or so that it has developed into its present important and widespread position.

Reinsurance may be divided into two main branches:—Facultative (or optional) and Treaty (or automatic or obligatory).

Facultative Reinsurance.—This was the original form. By this method each risk is offered for reinsurance separately and the ceding company has a free choice as to where it will offer the business. Similarly the reinsurer has freedom to accept or decline. The term facultative is derived from the power of choice, which this method implies. This system of reinsurance is cumbersome, as each risk reinsured has to be handled separately. The particulars of the risk are first shown to the reinsurer on a slip, which it initials for the share it is prepared to accept. This is followed by a request note; *i.e.,* a formal demand issued by the ceding company to the reinsurer for the specified reinsurance. Upon this the reinsurer issues its take note, which is its official acceptance given pending the issue of a reinsurance policy. This last is the final stage in the transaction, and forms the contract between the parties in respect of the risk reinsured.

The facultative system served its purpose at a time when insurance was transacted on a small scale, and when the need for reinsurance cover was neither great nor urgent. But the need arose in course of time for some more efficient method, and this was eventually found in the reinsurance treaty.

Reinsurance by Treaty.—A treaty is an obligatory arrangement, under which the ceding company binds itself to cede, and the reinsurer binds itself to accept, a fixed share of every risk, of a nature as defined in the contract, which the ceding company has to reinsure. A treaty, therefore, provides not for the reinsurance of an individual risk, but for all the risks of a given class. The power of choice is here eliminated. The two parties are reciprocally bound, one to cede and the other to accept.

This is an advantage to both, since the ceding company knows in advance that it can place the reinsurances and the reinsurer can rely on receiving a regular flow of business under the treaty. It is a condition of all treaties that, as soon as a reinsurance is placed thereunder the reinsurer's liability commences from the same moment as the liability of the ceding company, while the obligation to cede prevents the ceding company placing some of its reinsurances with one reinsurer and some with another, or favouring one at the expense of another. In both these particulars reinsurance by treaty differs from and represents a considerable advance over the older facultative method.

It is extremely rare for a ceding company to place a treaty with only one reinsurer, for this would be to entrust too great a responsibility to one undertaking. It is therefore customary to arrange a treaty so that a number of reinsurers share in it, each accepting only a proportionate part of the business ceded.

There are three kinds of reinsurance treaty in general use:—Quota-share or Open Treaties; Surplus Treaties; and Excess of Loss Treaties.

Quota-Share Treaty.—A quota-share treaty is one under which the ceding company agrees to cede a fixed share of every risk which it accepts from its clients. There is a necessary tendency for reinsurance business to comprise risks of a second class nature, since the better the risk the more the ceding company keeps for itself. But in a quota-share treaty this feature is not present. Every risk must be reinsured, whether it be good or bad, large or small. For this reason the quota-share treaty is not greatly used, except by small companies, which can obtain sound reinsurance cover only by offering attractive terms.

Surplus Treaty.—The surplus treaty is that in common use. Under this the ceding company first fixes the amount it will keep, which is called its retention, and the remainder of the amount insured constitutes the surplus. This is divided amongst the treaty reinsurers according to their due proportion. The whole surplus is usually divided into percentages, each reinsurer taking 1% or more as agreed of every surplus. But the amount which can be ceded is always governed by the ceding company's retention.

Excess of Loss Treaty.—An excess of loss treaty is an agreement under which no part of any individual risk is reinsured, but the ceding company arranges to cover only the excess of any one

loss over and above an agreed figure. This is a treaty to guard against catastrophe. A ceding company may arrange to cover itself by reinsurance against the excess of loss over £50,000 in respect of any one fire, the cover to run, say, up to £100,000; *i.e.*, a further £50,000. Then if one fire results in a loss to that company of £50,000, or less, the reinsurers pay nothing, but if the cost of the fire exceeds that figure the reinsurers pay the amount of the excess, according to their agreed proportions. This kind of treaty is largely used in motor insurance; but in fire insurance its use is a modern development. In that branch it is operated independently of and in addition to the surplus treaty. The ceding company must still use its surplus treaty to limit its liability on individual risks, taking out an excess of loss cover only to protect itself against heavy conflagrations.

Conditions of Reinsurance.—The conditions applying to a reinsurance are, as a rule, the same as those which apply to the original insurance. Thus the reinsurer receives the same rate of premium and must pay its proportionate share of any claim. There are, however, exceptions to this rule. Under an excess of loss treaty the reinsurer receives no specific premium, but is paid a percentage of the total premium income derived by the ceding company from the class of business to which the treaty applies. In marine reinsurance there is a practice to reinsure risks which are affected by a possibility of loss, and in such cases much higher premium may be paid than under the original policy.

The share of premium payable to the reinsurer is subject to a deduction of commission, which varies from 20% to 35% or, in rare cases, 40% or 45%. Reinsurance commission has to cover not only the agent's commission paid on the original insurance, but also a part of the ceding company's expense of obtaining and dealing with the business. The rate of reinsurance commission depends partly on the level of the expense of dealing with the business and partly on the quality of the treaty. Treaties giving consistently good results can command better terms than poor treaties. As well as commission deducted from premium, the reinsurer has to pay a commission—usually 10%—on the profits. In this way the profitable treaty automatically receives better terms than the bad one. The profit on a treaty is computed after making due provision for all claims and liabilities outstanding at the end of the year. The commission is payable on the average of the profit of the year of account, and of the two preceding years, so that a reinsurer shall not be required to pay away part of its profits in a year which follows a year showing a heavy loss.

The reinsurer, being liable to pay its share of all losses, is entitled to a like share of any amounts recovered as salvage. The ceding company has the control of all loss settlements and may settle a loss or contest a claim as it thinks fit. The reinsurer is bound to follow the fortunes of the ceding company in this matter.

Disputes arising between the parties to a reinsurance treaty, as to any matter coming thereunder, are almost invariably settled by arbitration.

Bordereaux.—Particulars of cessions made under a treaty are advised by the ceding company to the reinsurer by means of bordereaux. A bordereau is a statement giving the name and address of the insured, the nature of the risk, the sum insured, the premium, the amount reinsured and the reinsurance premium. No reinsurance policies are issued under treaties, as the reinsurance cover operates under the treaty contract. In marine business, however, properly stamped policies have to be issued even for reinsurance, under the provisions of the Stamp Act, 1891, and the Marine Insurance Act, 1906.

Retrocession.—A reinsurer, receiving particulars of its cessions by bordereaux, will itself deal with the business so received, and will in its turn arrange treaties to cede off its own surplus lines. A reinsurance of a reinsurance is called a retrocession. Retrocession is an important part of reinsurance business because where a reinsurer has a share of many treaties it will frequently receive a share of the same risk under many of its different treaties and must needs relieve itself by retrocession of the accumulation of risk. (C. E. G.)

United States.—The American reinsurance business has grown by leaps and bounds in the last two decades. For instance, according to the New York State Insurance reports on casualty insurance the ratio of reinsurance premiums to net premiums was 3·5% in 1915, while in 1925 the ratio was 8·3 per cent. As in the European countries Facultative and the three kinds of Treaty insurance are used, but the percentage of Facultative is rapidly diminishing because of delay and uncertainty.

What may be called a variation of the Fixed Treaty is the "Pool" or "Syndicate." Here as many as thirty-five companies will enter into an agreement to share all insurance in a given territory on a basis of certain agreed proportions both as regards premiums and losses. In order to facilitate the placing of reinsurance and to bring about greater uniformity of practice, reinsurance "Clearing Houses" or "Exchanges" have been established. Here the detailed reinsurance agreement is subscribed to by the member companies who are all represented by a manager. Many of the life insurance companies still use the Facultative plan of reinsurance. There are two ways of reinsuring. The smaller companies will reinsure the amount at risk with term insurance. Most of the larger companies use the "Coinsurance" plan, whereby the reinsurance company receives a proportionate part of the premium and guarantees a proportionate part of all payments including expenses and taxes. There are to-day many companies whose business is entirely reinsurance. (R. Ret.)

REISKE, JOHANN JACOB (1716–1774), German scholar and physician, was born on Dec. 25, 1716, at Zörbig in Electoral Saxony. From the Waisenhaus at Halle he passed in 1733 to the university of Leipzig, and there spent five years. He bought Arabic books, and when he had read all that was then printed he thirsted for manuscripts, and in March 1738 started on foot for Hamburg. At Hamburg he got money and letters of recommendation from the Hebraist Wolf, and took ship to Amsterdam. Reiske refused a generous offer from d'Orville at Amsterdam for his services as amanuensis. Ultimately he got free access to the Leiden collection, which he re-catalogued—the work of almost a whole summer, for which the curators rewarded him with nine guilders. D'Orville and Schultens helped him to find teaching and reading for the press. On the advice of Schultens he qualified as a doctor, after which, in 1746 he returned to Leipzig.

But he failed to secure any medical practice at Leipzig, and lived, as before, on ill-paid literary hack work. Although the electoral prince gave him the title of professor he was not permitted to lecture. At length in 1758 the magistrates of Leipzig rescued him from poverty by giving him the rectorate of St. Nicolai, and, though he still met with hostility in the university, he enjoyed the esteem of Frederick the Great, of Lessing, Karsten Niebuhr, and many foreign scholars. The last decade of his life was made cheerful by his marriage with Ernestine Müller, who shared all his interests and learned Greek to help him with collations. Reiske died on Aug. 14, 1774, and his ms. remains passed, through Lessing's mediation, to the Danish minister Suhm, and are now in the Copenhagen library.

Reiske surpassed all his predecessors in the range and quality of his knowledge of Arabic literature. In the *Adnotationes historicae* to his Abulfeda (*Abulf. Annales Moslemici*, 5 vols., Copenhagen, 1789–91), he collected a veritable treasure of sound and original research; he knew the Byzantine writers as thoroughly as the Arabic authors, and was alike at home in modern works of travel in all languages and in ancient and mediaeval authorities. He was interested too in numismatics, and his letters on Arabic coinage (in Eichhorn's *Repertorium*, vols. ix.–xi.) form, according to De Sacy, the basis of that branch of study.

In Leipzig Reiske worked mainly at Greek. His corrections are often hasty and false, but a surprisingly large proportion of them have since received confirmation from MSS. His German translations shew more practical insight than was usual in his time.

For a list of Reiske's writings *see* Meusel, xi. 192 *seq.* His chief Arabic works (all posthumous) have been mentioned above. In Greek letters his chief works are *Constantini Porphyrogeniti libri II. de ceremoniis aulae Byzant.*, vols. i. ii. (Leipzig, 1751–66), vol. iii. (Bonn, 1829); *Animadv. ad Graecos auctores* (5 vols., Leipzig, 1751–66) (the rest lies unprinted at Copenhagen); *Oratorum Graec. quae supersunt* (8 vols., Leipzig, 1770–73); *App. crit. ad Demosthenem* (3 vols., *ib.*,

1774–75); *Maximus Tyr.* (*ib.*, 1774); *Plutarchus* (11 vols., *ib.*, 1774–79); *Dionys Italic.* (6 vols., *ib.*, 1774–77); *Libanius* (4 vols., Altenburg, 1784–97). Various reviews in the *Acta eruditorum* and *Zuverl. Nachrichten* are characteristic and worth reading. Compare *D. Johann Jacob Reiskens von ihm selbst aufgesetzte Lebensbeschreibung* (Leipzig, 1783).

RÉJANE, GABRIELLE (CHARLOTTE RÉJU) (1857–1920), French actress, was born in Paris, the daughter of an actor. She was a pupil of Regnier at the Conservatoire, and took the second prize for comedy in 1874. Her *début* was made the next year, during which she played attractively a number of light—especially soubrette—parts. Her first great success was in Henri Meilhac's *Ma camarade* (1883), and she soon became known as an emotional actress of rare gifts, notably in *Décoré, Germinie Lacerteux, Ma cousine, Amoureuse* and *Lysistrata.* In 1892 she married Porel, the director of the Vaudeville theatre, but the marriage was dissolved in 1905. Her performances in *Madame Sans Gêne* (1893) made her as well known in England and America as in Paris, and in later years she appeared in characteristic parts in both countries, being particularly successful in *Zaza* and *La Passerelle.* She opened the Théâtre Réjane in Paris in 1906. The essence of French vivacity and animated expression appeared to be concentrated in Madame Réjane's acting, and made her unrivalled in the parts which she had made her own. She died in Paris on June 14, 1920.

REJANG, a tribe of Proto-Malayan or mixed Indonesian stock, partly akin to the Achinese, Bugis and Mangkassaras (*qq.v*). Though now Muslim they were formerly influenced by Indo-Javanese culture and retain an alphabet derived from that source, speaking a language of the Austronesian family. Their alphabet has been described as "pure Phoenician," but is intimately related to others derived from the Indo-Javan culture. Ideas of ancestor-worship are strong, and metempsychosis (*q.v.*) is vaguely believed in, tigers in particular being regarded as embodying the souls of the dead. Worship of the sea also prevails. It is believed that invulnerability can be acquired. Teknonymy is practised, and persons object to mentioning their own names. The dead are buried in a chamber excavated to one side of the grave. Betel is chewed. In blood-tariffs the value of a woman is nearly double that of a man except in the case of chiefs, only the highest of whom are rated higher than their wives.

See Marsden, *History of Sumatra* (1783). (J. H. H.)

REJERIA, the Spanish form of open-work screens made from combinations of wrought and cast iron work. The word *reja* is used for a screen, individually; *rejeria* properly signifies this whole class of iron work. A magnificent example is the *reja* of the Capilla Mayor of Seville cathedral (1518–33). Many beautiful examples of this type are found as window guards in Spanish Renaissance houses.

REJUVENATION. In all multicellular animals the process of regeneration, growth and rejuvenation is constant as is shown typically by the hair and nails. It is now possible to cultivate tissues in suitable media (*see* TISSUE CULTURE) and to keep them alive long after the death of the parent organism. This proves that death is not the inevitable end of cellular vitality, but is in every case the result of unfavourable conditions to which the cells are subjected at a given moment.

The endocrine glands produce substances (hormones), which they pour into the circulatory system and thereby influence the metabolic processes, the growth and morphology of the cells. One of these glands should have as its special function the secretion of a substance which gives tone and stimulus to cellular vitality during a certain period of life and ceases to do this on the approach of old age. This cannot be the special function of the thyroid, parathyroid, pituitary or suprarenal glands, since they continue to act during old age. The only gland which constitutes an exception to this rule is the genital gland. It plays a double rôle. It secretes spermatozoa externally, and it secretes internally hormones which it passes into the blood stream, actively at puberty and during maturity, but less and less thereafter, so that the diminution and disappearance of its activity correspond with old age.

Examination of male vertebrate animals, including man, after removal of the genital glands shows distinctly the nature of the influence of the internal secretion of these glands on the whole organism as affecting, not only the secondary male sexual characters, but also the growth and development of the body as a whole, the brain and skin cells, the bones and tissues. The physical and intellectual qualities of animals and of man are as intimately conditioned by the hormone secreted by the testicles as are the secondary sexual characters.

There can thus be no doubt as to the nature of the relation between the general reduction of the forces of the organism and the disappearance of the internal secretion of the testicles. No organ can keep its vital energy and yield a full return if the cells are not stimulated and vivified by the testicular hormone. It acts more or less directly on other endocrine glands, since castration is followed by hypertrophy of the anterior lobe of the pituitary gland and by regression of the thyroid body and epiphysis. If the genital glands remained active in old age, were they not the only glands which cease to secrete hormones, old age would certainly be delayed.

Eunuchs in Cairo who had been castrated at an early age and had therefore never been exposed to the activity of the testicular hormones, were never known to have been more than 60 at death. All had the appearance of old men, with desiccated skins, haggard eyes, bent, and looking like centenarians.

It is obvious that the deprivation of the internal secretion of the testicles accelerates the advance of old age and shortens life. The only remedy is to graft a young testicle, whether that of a young human being or of an ape, by which the tone-giving substance is provided, so as to increase the vitality of all the cells which are weakened but are not yet atrophied and therefore still able to renew themselves, and thus effectively to rejuvenate the whole organism. So long as an organism, however old, continues to exist, its cells continue to be renewed and rejuvenated. Unfortunately, in old age this process of rejuvenation is slowed down, a certain number of the functional cells regress and are replaced by conjunctive tissue. The cells which escape this are renewed more slowly, but continue to be renewed to the extreme limit of their vitality.

With a rich addition of the testicular hormone, the cells acquire new energy, grow more rapidly, proliferate more intensely and rejuvenate the whole system. At the end of several years the beneficent action of the grafted gland is exhausted because the grafts in turn are subject to positive regression. The organism is again deprived of the stimulating hormones and the symptoms of old age reappear. In most cases testicular grafting is adequate, but in some cases thyroid grafts have to be added. *See* S. Voronoff, *Rejuvenation by Grafting* (1925). (S. V.)

RELANDER, LAURI KRISTIAN (1883–), president of the republic of Finland, born May 31, 1883, and educated at Helsingfors university. He was a member of the central committee of the agrarian party in 1909, sat in the Diet from 1910 to 1913, and 1917–19, when he became its speaker. On Feb. 16, 1925, he was elected president of the republic.

RELAPSING FEVER (*Febris recurrens*), the name given to a specific infectious disease occasionally appearing as an epidemic in communities suffering from scarcity or famine. It is characterized mainly by its sudden invasion, with violent febrile symptoms, which continue for about a week and end in a crisis, but are followed after another week, during which the patient is fairly well, by a return of the fever. In exceptional cases, second, third and even fourth relapses may occur.

This disease has received many other names, the best known of which are famine fever, seven-day bilious relapsing fever, and spirillum fever. Like typhoid, relapsing fever was long believed to be simply a form of typhus. The distinction between them appears to have been first clearly established in 1826, in connection with an epidemic in Ireland.

In 1873 Obermeier discovered in the blood of persons suffering from relapsing fever minute spiral filaments of the genus *Spirochaete,* having rotatory or twisting movements. This organism received the name of *Spirillum obermeieri.* Fritz Schaudinn brought forward evidence that it is an animal parasite. Relapsing

fever is most commonly met with in the young. One attack does not appear to protect from others, but rather, according to some authorities, engenders liability. The incubation of the disease is about one week.

The mortality in relapsing fever is comparatively small, about 5% being the average death-rate in epidemics (Murchison). The fatal cases occur mostly from the complications common to continued fevers. The treatment is essentially the same as that for typhus fever. Löwenthal and Gabritochewsky by using the serum of an immune horse succeeded in averting the relapse in 40% of cases.

RELATIONSHIP TERMS. Relationship terms are studied by the anthropologist not merely as so many words inviting philological analysis and comparison, but as correlates of social custom. Broadly speaking, the use of a specific kinship designation, *e.g.*, for the maternal as distinguished from the paternal uncle, indicates that the former receives differential treatment at the hands of his nephews and nieces. Further, if a term of this sort embraces a number of individuals, the probability is that the speaker is linked to all of them by the same set of mutual duties and claims, though their intensity may vary with the closeness of the relationship. Sometimes the very essence of a social fabric may be demonstrably connected with the mode of classifying kin. Thus, kinship nomenclature becomes one of the most important topics of Social Organization.

In the daily routine of savage life, relationship terms are not only important as at once ticketing the status of the person addressed or mentioned with reference to the speaker, but also because often there is no other mode of address. This is because of the widespread prejudice against the vocative use of personal names, for which accordingly kinship appellations are substituted, even to the extent of assuming a relationship where none exists.

CLASSIFICATION OF KINSHIP TERMINOLOGIES

The foundation of the scientific study of this subject was laid by Lewis H. Morgan in his *Systems of Consanguinity and Affinity of the Human Family* (Smithsonian Contributions to Knowledge, XVII., Washington, 1871). In this great work were assembled comprehensive schedules for every major area of the globe except Africa and Australia, for which data were largely or wholly inaccessible to the author. Morgan grouped all terminologies under two main heads—the descriptive and the classificatory. The descriptive system, ascribed to the Aryan, Semitic and Uralian families, "describes collateral *consanguinei*, for the most part, by an augmentation or combination of the primary terms of relationship" (pp. 12, 468). The classificatory system never describes *consanguinei* by a combination of primary terms but ranges them into great classes or categories: "All the individuals of the same class are admitted into one and the same relationship, and the same special term is applied indiscriminately to each and all of them" (p. 143). Two varieties of the classificatory type were recognized—the Malayan, which merged all kindred of one generation irrespective of proximity in one category; and the Turanian-Ganowanian, in which only some of the collateral kin of a generation were merged with the lineal, the remainder being separated by distinctive terms.

This dichotomy is unacceptable. As Kroeber[1] and Rivers[2] remark, *our* words for uncle, aunt and cousin likewise range *consanguinei* into large classes, so that the absoluteness of the distinction breaks down. Furthermore, Rivers notes[3] that "descriptive" does not strictly apply to the English and related terminologies, which rarely augment or combine the primary terms. That epithet may be properly reserved for such Norwegian words as *farbror* and *morbror* for father's and mother's brother, respectively; and hence for certain nomenclatures, *e.g.*, the Arabic, which largely employ expressions of this order. Thus, Rivers supplanted Morgan's dualism with a tripartite scheme, recognizing denotative, descriptive and classificatory types. Elsewhere he suggests the appellations family, kindred and clan systems, the "kindred" being a major bilateral unit.[4] These latter terms are, however, objectionable since they inject the inferential basis of a system into its descriptive definition. There are clanless tribes with clan systems in Rivers' sense, and the result would be confusion. Apart from this terminological difficulty, the scheme fails to obviate a logical fault in Morgan's earlier effort. "Descriptive" and "classificatory" do not relate to the same logical universe, hence are not complementary terms. "Classificatory" relates to the number of individuals defined, "descriptive" to the technique of defining a relationship. It is possible to augment or combine primary terms and then apply the resultant to an indefinitely large class of persons. The antithesis to "classificatory" is the concept "individualizing," as Morgan felt, though he failed to express it.

But the purging of the traditional terminology does not carry us very far. How shall we characterize our simple English system if it embodies both individualizing *and* classificatory principles? The answer is provided in Kroeber's above-cited essay: a kinship terminology is not a logically coherent whole but must be resolved into the several categories recognized. Those enumerated by Kroeber are: the difference of generations; the difference between lineal and collateral kin; the difference of age within one generation; sex; the speaker's sex; the connecting relative's sex; the difference between consanguinity and affinity; and the life or death of the connecting relative.

This pioneer attempt requires both revision and amplification. The last mentioned feature, *e.g.*, is of purely local significance in western North America and of limited application where found. The differentiation between elder and younger sibling (brother *or* sister) means psychologically simply the intercalation of two additional generations. On the other hand, the reciprocity principle, linking by a common term distinct generations, merits independent status. Cognizance must also be taken of the frequent duplication of terms in address and mere reference, the mode of classification itself sometimes differing. Extra-American terminologies also suggest that the categories laid down by Kroeber might be materially increased. Even as it stands, however, his sketch furnishes a valuable instrument for the precise definition and comparison of distinct systems.[5]

In the present state of our knowledge it is impracticable to do more than concentrate upon an unequivocally significant feature as a basis for classification in a world-wide survey, and to refine areally by supplementary characteristics. The trait that obtrudes itself on our notice is the treatment of collateral as compared with lineal kin in the first ascending and descending generations. It is implicitly the phenomenon that impressed Morgan; it has a bearing on Tylor's and Rivers' theories (*see* below); and constitutes one of Kroeber's categories. Practically, the data usually suffice to characterize systems from this point of view.

The logical possibilities are as follows: (a) Collateral lines are wholly merged in the lineal within a particular generation (generation system); (b) each generation is bisected so that only half the collateral kin are merged in the lineal (bifurcate merging system); (c) the immediate collateral lines are distinguished from the lineal *and from each other* (bifurcate collateral system); (d) collateral lines are distinguished from the lineal, but *not from each other* (lineal).

In standard samples of these four systems logical coherence prevails: *if* the father's brother is called father, he addresses his brother's son as son; *if* there is a separate word for mother's brother, there is likely to be one for nephew. However, discrepancies occur, and a system must sometimes be classed by the preponderance of its affiliations. Taking the classification of uncles for illustration, the scheme may be illustrated by the table on page 85.

The second system, which Morgan and Rivers genetically connect with the first (though in a reverse sense), is not one whit farther from the third; and the bifurcate collateral system sets off the immediate family as sharply from the rest of the universe as

[1]A. L. Kroeber, "Classificatory Systems of Relationship," *Journal Royal Anthrop. Instit.*, 1909, 39: 77–84.
[2]W. H. R. Rivers, *Social Organization*, 1924, 51–77.
[3]Id., article "Kin, Kinship" in Hastings' *Encyclopaedia of Religion and Ethics.*
[4]*Social Organization*, 55 *sq.*
[5]E. W. Gifford, *California Kinship Terminologies* (Univ. Cal. Pub., vol. 18, 1922).

System	Relatives				Criterion
Generation . .	Father	Father's Br.		Mother's Br.	One "father" term
Bifurcate Merging .	,,	,,	,,	,, ,,	Two terms; partial merging
Bifurcate Collateral	,,	,,	,,	,, ,,	Three terms; no merging
Lineal . . .	,,	,,	,,	, ,	Two terms; merging only of collaterals

our English lineal system. All four systems actually occur in primitive communities, notwithstanding the widespread notion that they have only the first two, corresponding to Morgan's classificatory types.

With this provisional scheme it is possible to characterize the main areas of the globe. Since regional summaries are available for Australia and North America, it will be best to begin with these continents.

AUSTRALIA

Australian kinship terminologies follow the bifurcate merging plan.

Certain other traits are characteristic. Among these is the use of separate terms for maternal and paternal grandparents. Thus, the Kakadu in Northern Australia call the father's father *kaga*, but the mother's father *peipi*. With many tribes this trait is coupled with the reciprocity principle: in Arunta, *arunga* designates simultaneously the father's father and the son's child. Again, the world-wide distinction between the speaker's elder and younger siblings often displays refinement, so that in Arunta the father's elder brother's sons are "elder brothers," while the father's younger brother's sons are "younger brothers." More rarely, as among the Mungarai, the uncles and aunts themselves are distinguished with reference to their age as compared with the speaker's parents.

While these features have parallels in remote areas, others seem distinctive. According to Radcliffe-Brown, all nomenclatures of the region conform to two types, correlated with distinct forms of marriage law. In type I., as found among the West Australian Kariera and the Urabunna of the Lake Eyre region, the father's father is classed with the mother's mother's brother; by the correlated matrimonial rule a man is prohibited from marrying any woman unless she stands to him in the relation of a mother's brother's daughter. In type II., the mother's mother's brother is distinguished from the father's father, being often classed with the mother's mother; here the prescribed marriage is between the children of two female cross-cousins, a man marrying his mother's mother's brother's daughter's daughter. This second type is of wider distribution than the first, having been discovered among the Dieri, the Central tribes generally, from the Arunta northward to the Anula and Mara, and among such West Australians as the Mardudhunera.[1]

Probably most of the tribes substitute relationship terms for personal names in ordinary intercourse, but the central Australians only tabu sacred appellations, while secular names are used in address, interchangeably with the kinship terms.[2]

A feature worth noting is the absence of terms of affinity. This is evidently to be correlated with the fact that in Australia marriage is prescribed with definite blood relatives. Accordingly there is no necessity for coining new words for connections by marriage. This same trait may be expected to occur in greater or lesser degree in other parts of the world where corresponding forms of marriage with blood relatives are either obligatory or at least preferred.

[1]A. R. Brown, "Three Tribes of Western Australia," *Journ. Royal Anthrop. Instit.*, 1913, vol. 43, 143–194.

[2]For Australia in general *cf.* Brown in Walter Hutchinson, ed., *Customs of the World*, 160. B. Spencer and Gillen, *The Native Tribes of the Northern Territory of Australia*, 1914, 65–82, and *The Native Tribes of Central Australia*, 1898, 66–91, 637.

NORTH AMERICA

North America north of Mexico may be split into two main divisions. Among the Eskimo, in southern British Columbia, the Basin states, Washington, Oregon, and part of California, there are predominantly lineal or bifurcate collateral systems; in the remainder of the continent the terminologies are bifurcate merging. These two main areas correspond roughly to a social organization on the family basis and a clan organization, respectively.

Two Australian features, the reciprocity principle and the discrimination of maternal and paternal grandparents, occur exclusively, or nearly so, in the Far West. However, they do not appear with bifurcate merging traits.

Primarily on the basis of cousin grouping Spier has established eight varieties of nomenclature.[3] The Iroquois type maintains the separation of generations, treats parallel cousins as siblings, and designates cross-cousins by a specific cousin term. The Mackenzie Basin type drops distinctions between cousins, treating all alike as siblings. The Eskimo type resembles the foregoing in merging parallel and cross-cousins, but separates them from siblings. The Omaha systems, embracing several Californian as well as Central tribes, distinguish among cross-cousins. The father's sister's children are regarded as sister's children, which classes them (on bifurcate merging principles) as children if the speaker is a woman. Correlatively, the mother's brother's daughter is classed as a mother, while the mother's brother's son is equated with the mother's brother. In the Crow type the reverse confusion of generations occurs; the father's sister's son is a "father" and addresses his mother's brother's children as his "children"; the father's sister's daughter is a father's sister.

Spier's remaining varieties rest on other principles. His Salish type diverges in displaying lineal features. The Acoma type is segregated by virtue of its three grandparental terms,—one for a man's grandfather, another for a woman's grandmother, a third for a grandparent of the opposite sex. Finally, the Yuman variety is characterized by a refinement of age distinctions,—the father's elder brothers and mother's elder sisters being distinguished from their younger siblings, while parallel cousins are sometimes classed as elder or younger siblings according to their parents' rather than their own ages.

Spier's types avowedly embrace tribes neither geographically nor linguistically close to their eponyms. Thus, the Iroquois type embraces the Iroquois, Ojibwa, Cree, Dakota, some Californian groups, and the Tsimshian of British Columbia.

Based on different principles, Spier's findings (for which he deprecates any interpretation) are not at once wholly convertible into our terminology. However, the Salish case, which he refuses to class by the cousin criterion as of the Mackenzie Basin category, is coextensive with the lineal type. Moreover, both his Omaha and Crow types are varieties of the bifurcate merging type. This, in its classical Seneca form, largely coincides with Spier's Iroquois type, though his stressing of cousin terminology leads to the admission of several tribes who do not merge parents' siblings and parents. In Spier's scheme, the Eskimo are segregated because they use a distinctive cousin term for all cousins. Their separation is undoubtedly warranted. Morgan himself, though describing their system as "classificatory," shows that the nomenclature has "but two, out of ten, of the indicative features of the system of the Ganowanian family" and that "in the greater and most important fundamental characteristics of this system it is wanting."[4] On Morgan's evidence, the use of individualizing terms for the parents and the segregation of maternal from paternal uncles and aunts, would place the Eskimo under the bifurcate collateral head; more recent data for another local division are confirmatory.[5]

Spier's Acoma and Yuman varieties, logically outside his own scheme, hardly merit separate categories, as he himself admits in the Acoma case.

A summary classification of the North American systems thus leads to the following tentative scheme:

[3]L. Spier, *The Distribution of Kinship Systems in North America*, Univ. of Washington Pub. in Anthropology, Seattle, 1925, vol. 1, 69–88.

[4]Morgan, *op. cit.*, p. 277.

[5]D. Jenness, *The Life of the Copper Eskimos*, Ottawa, 1922.

1. Bifurcate Merging	(a)	Iroquois; Dakota; Ojibwa
	(b)	Omaha; Menomini, Sauk; Miwok, Wintun
	(c)	Crow; Pawnee; Creek; Cherokee; Hopi; S. Pomo; Tlingit
2. Bifurcate Collateral		Eskimo, Mono
3. Lineal		Salish; Nootka, Kwakiutl

The Generation system is lacking. Faintly adumbrated, it appears in Spier's Mackenzie Basin type, but the generation principle is restricted in application, so that there is no approach to the Hawaiian scheme. Various Californian and Basin tribes classed by Spier as of the Mackenzie pattern appropriately fall under the bifurcate collateral group, deviating from the norm only in the grouping of cousins. Such tribes as the Northwestern Maidu belong to the same category and show how this may approach the merging type: parallel cousins here coincide with siblings, while cross-cousins are separated by a special term.[1] The gap between this Maidu and the Iroquois system is thus reduced to the distinction the former maintains between the father and his brother, the mother and her sister.

Sporadically, instances occur in otherwise bifurcate merging systems of a partial failure to bifurcate. Thus, the Crow, though only in direct address, use one term for the mother and either kind of aunt.

Personal names are generally eschewed in address.

CENTRAL AND SOUTH AMERICA

Central American systems are known mainly through such sources as Gilberti's *Diccionario de la lengua Tarasca* (1559), Molina's *Vocabulario de la lengua Mexicana* (1571), and Beltran's *Arte del idioma Maya* (1742).[2] The distinction of elder and younger sibling is general, and so is the use of reciprocal terms between different generations. Thus, Maya *mam* is applied to the maternal grandfather and the daughter's son. The principle of reciprocity occurs among the Miskito of Nicaragua, *dapna* designating father-in-law and son-in-law, as well as mother-in-law and daughter-in-law in female speech. The former classification is shared by the Chibcha of Colombia. In the Ucayali region, the Sipibo apply the word *rayos* to parent-in-law and son-in-law, while the words for maternal uncle and sister's son—*cuca* and *cucu* suggest a common stem.[3] In America there is thus a fairly continuous distribution of the reciprocity principle extending from British Columbia through the Pacific and Basin States into Mexico and northern South America.

Several tribes in Latin America recognize to an unusual extent Kroeber's category of the speaker's sex. While a Cakchiquel man calls his son *cahol* and his daughter *mial*, a woman uses *val* and *vixocal*.

From the scanty material accessible it is not clear how commonly bifurcate merging systems occur south of the Rio Grande. Molina's Nahuatl nomenclature is Hawaiian in grouping all uncles with the father, *tlatli;* but it is lineal in segregating aunts, *auitl* from the mother, *nantli*, and all nepotic kin as *machtli* from the son *tepitlzin* and daughter, *teichpuch*. The Cakchiquel use of *tata* for father and paternal uncle is true to the bifurcate merging type, but the reported classification of the *paternal* aunt with the mother, *te*, while both maternal aunt and uncle are called *vican* is so anomalous as to call for corroboratory evidence.[4]

Lineal uncle and aunt terms are reported for the Pomeroon Arawak. On the whole, the frequency of lineal and bifurcate collateral features arrests our attention. Thus, the Miskito, while using for the maternal aunt a word from the stem for mother (*yapti;* mother's sister: *yaptislip*), call the father *aisa*, the paternal uncle *urappia*, the mother's brother *tarti*. A glossary of Arawakan languages shows no discrimination between paternal and maternal uncles except in Siusi; there the bifurcate collateral rather than the bifurcate merging principle obtains since the father's brother is not identified with the father. A single term for aunt (distinct from mother) indicates either inconsistency or inaccurate reporting.[5] The Tupi generic terms exist for aunt and uncle (*aixe* and *tutyra*), but the father term is said to be applicable to all the father's male kin. In short, there is a mingling of lineal and merging features.[6] More consistently, the Sipibo separate the father, *papa*, from both the father's brother, *eppa*, and the maternal uncle, *cuca*, and similarly segregate the mother from the maternal as well as the paternal aunt (*tita, huasta, yaya*, respectively; it is not clear to what extent the matter is complicated by the use of separate words by men and women). The Araucanian terminology is in part bifurcate collateral: the father, *chao*, is distinguished from his brother, *malle* and his brother-in-law, *huecu;* while the mother's sister is designated by a derivative from the mother term.[7]

It cannot be denied that there are nomenclatures of the usual "classificatory" type. According to Ruiz de Montoya (1640), the Guarani was of this order.[8] Nevertheless, the South American tendency toward collateral or lineal usage cannot be ignored.

ASIA

In Asia the wide distribution of status terms expressive of relative seniority is noteworthy, differences of generation being sometimes disregarded, while again the relative seniority of relatives other than those immediately concerned may be significant. The system of the Turkic Yakut of northern Siberia illustrates some of the relevant complications. Radically of the bifurcate merging type, it groups together as *agas* the elder sister and all older women in the speaker's clan, those younger being designated as *babys*, and the words for elder brother are similarly extended. But the seniority idea overrides the generation principle when *ini* designates not only younger brother or cousin within the clan, but also, the father's younger brother and his son; or when *ogom* is applied indifferently to a child, a grandchild, and even to younger people without reference to relationship. Again, while the father's elder brother is called by a derivative from the father term, this same word is extended by the seniority principle to the mother's father; and while *tay* marks off the maternal from the paternal uncles, the mother's sisters are called according to their age with reference to the mother, *tay agas* and *tay babys*. Thus, since the mother is *yä*, there is in so far forth bifurcation without merging.[9]

When the two parental lines are discriminated and the parents' siblings are set off from the parents by mere modifiers of the primary "parent" stem, it seems legitimate to speak of a basically bifurcate merging system. The primitive Sinitic languages in part present this phenomenon and suggest that the proto-Chinese system may have conformed to this model. Its present form is puzzling. Morgan vacillated between calling it Malayan or Turanian, *i.e.*, a generation or a bifurcate merging system. If we stress the specialization of, say, uncles by modifiers rather than the use of a common primary stem, it would be recognized as collateral; otherwise it might rank as a generation system. Some traits however, such as the classing of brother's sons by males indicate bifurcation. It is evident that emphasis on status and seniority would cause a drift from the bifurcate merging toward the generation pattern. Of the primitive members of the Sinitic stock, the Sema, Ao, Angami and Lhota fall rather clearly under the bifurcate merging division, some of them definitely presenting the Omaha variety. Thus, Lhota *omo*, *Sema angu*, Chongli Ao *okhu* mean the maternal uncle *and* his son; Sema *atikeshiu*, Lhota *orrho*, and Chongli *anok* refer to the sister's son and the father's sister's son in male speech.

[1]E. W. Gifford, *Californian Kinship Terminologies*, Univ. of Cal. Pub., 1922, 18:43.

[2]A. C. Breton, "Relationships in Central America," in *Man*, Dec. 1919, 186–192. R. H. Lowrie, *Culture and Ethnology*, 1917, 125f.

[3]K. von den Steinen, *Diccionario Sipibo*, Berlin, 1904.

[4]Breton, *l.c.*

[5]W. E. Roth, *An Introductory Study of the Arts, Crafts and Customs of the Guiana Indians* (38th Rept. Bur. Amer. Ethnol.; 1924, p. 674). Th. Koch-Grünberg, *Aruak-Sprachen Nordwestbrasiliens u. der angrenzenden Gebiete*, Mitteill der Anthrop. Gesell. in Wien, 1911, 41:83 *sq.*

[6]C. F. Th. von Martius, *Beiträge zur Ethnographie u. Sprachenkunde Amerikas, zumal Brasiliens*, Leipzig, 1876, 1:353.

[7]Otto Bürger, *Acht Lehr- und Wanderjahre in Chile*, Leipzig, 1909, 86.

[8]S. A. Lafone Quevedo, *Los términos de parentesco en la organización social sud-americana*, Revista de la Univ. de Buenos Aires, 1917, 37:32 *sq.*

[9]M. A. Czaplicka, *Aboriginal Siberia*, 1914, p. 59.

The complete lack of certain kinship terms in some Assamese tribes is remarkable; in Angami, for example, parallel cousins can be designated only by their personal names. The Chinese *may* combine such names with the specific kinship terms.[1]

Typical nomenclatures of the bifurcate merging type occur among the peoples of Southern India (including the Toda) and the Vedda of Ceylon. Here, and in other tribes of the area showing this pattern in obscured form, the terminology is affected by cross-cousin marriage. Since a Kachin seeks to marry the daughter of his maternal uncle, he calls his father-in-law and his mother's brother alike *tsa;* while in Mikir the sister's son and the son-in-law are both a man's *osa,* and the wife's brother is his *òng-so* or "little maternal uncle," in other words, his maternal uncle's son.[2]

The two Negrito tribes of Southern Asia differ radically inasmuch as in address the Semang of the Malay Peninsula avoid personal names, while the Andamanese use them exclusively. They resemble each other in stressing status in their nomenclature. Indeed, it seems doubtful whether the Andamanese have any true kinship terms. Though a parent may be individualized by prefixing the personal pronoun to an appropriate noun, this by itself expresses no bond of consanguinity but simply the status of being *some one's* parent. Correspondingly, other words denote relative seniority in varying degrees: *mama* extends to all considerably older persons such as grandparents and parents-in-law. The Andamanese nomenclature lacks bifurcation completely and might be treated as a variety of the generation system; this feature, linked with the vocative use of names, suggests affiliation with Polynesia, where however, generation terms are limited to actual kin. The Semang system is not so well known, but bifurcation seems undeveloped. From *ai,* father, designations for *either* parent's elder and younger brother are formed by the addition of age-suffixes; the word for mother with the appropriate suffix means *either* parent's elder sister, while a new stem designates a younger sister of father or mother. We shall not go far wrong in assigning this system also to the generation category.[3]

In western Asia, the Semitic tribes have been treated as typical of the "descriptive" pattern. As has been shown, the descriptive *technique* is wholly consistent with a "classificatory" meaning. The Arabic terminology is on the face of it bifurcate collateral. It is partly shaped by the custom of parallel-cousin marriage, so that father's brother and father-in-law are identified in fact and in masculine speech. The absence of a common word for paternal uncle in Semitic languages has suggested the hypothesis, as yet awaiting confirmation, that the proto-Semitic system was of the merging type.[4]

Lineal systems occur in northeastern Siberia among the Koryak and Chukchee, where clans are lacking. Both tribes distinguish younger and elder siblings, and the Chukchee have even a separate term for "middle" brother. The Yukaghir terminology presents disparate features. In a sense, the parents are individualized, the children are set off from nepotic kin, and the distinction between paternal and maternal uncles indicates a bifurcate collateral system. However, some of the uncle-aunt words are etymological derivatives from the parent terms, suggesting a merging principle. In addition, the seniority principle of the Yakut order plays a large part, putting both grandmothers in the same class with the father's elder sister, both grandfathers with the elder brother. The technique is sometimes denotative, sometimes descriptive. It is plausible to regard this medley as at least partly the result of distinct culture layers. An archaic system resting on the family may have been complicated by a bifurcate merging system, stressing the seniority idea. In other words, a palae-Asiatic layer may have had Yakut-like accretions.[5]

AFRICA

In the southern half of the continent bifurcate merging systems prevail. The Hottentot nomenclature approximates the Iroquois pattern, though the occasional classification of the mother's brother's son with the maternal uncle marks a deviation in the Omaha direction. For the Bushmen, data are inadequate, though reported suggestions of a "classificatory system" indicate another sample of the Iroquois form. With modifications of a minor character this holds for most of the Bantu. There is little to support Morgan's interpretation that the terminology is "Malayan." His guess that the stem for mother's brother was a recently evolved substitute for the father term is refuted by its occurrence in much the same form among the Thonga and Wayao, while the concept is attested for as far north as Uganda and the Congo. The very fact cited by Morgan that a single word denotes the paternal aunt and the father proves the stress on bifurcation, even to the detriment of sex distinctions. The generation factor doubtless asserts itself in the classification of all cousins with siblings, but this is far from universal in Bantu speech. The Wayao, *e.g.,* distinguish cross-cousins from parallel cousins by a distinctive designation. Moreover, the very essence of the generation principle is ignored by a number of tribes. The Thonga, like the Hottentot, *may* call the mother's brother's son *malume,* like the maternal uncle, while the daughter of the mother's brother is a "mother," and sometimes the grandchild and the sister's child fail to be distinguished.

Again, the wife's parent and the wife's elder sibling fall into the same Thonga category, and sometimes the grandfather term embraces the maternal uncle. Finally, the Wayao have a reciprocal term for parent-in-law and child-in-law. There is thus no warrant for putting the Bantu with the Polynesians: their system is basically of the bifurcate merging type, modified locally by various causes, sometimes along Omaha lines.[6]

The Hamitic and Hamitoid tribes are generally credited with "descriptive" systems. In fact, the descriptive technique may be employed to an unusual degree, so that the 'Afar of the East Horn call a brother "mother's son." This, however, does not preclude a classificatory meaning for the descriptive designation, much less for other parts of the same nomenclature. Galla *abba,* for example, may be applied not only to the father but as an honorific appellation to any old man. The Somali system is definitely bifurcate collateral. Among the Masai the paucity of genuine kinship terms is no less remarkable than certain correlated usages. While father's and mother's siblings are distinguished from the parents by descriptive phrases, this discrimination extends only to reference, while in address the father's brother is a father. Most kinsmen, however, are not called by terms of consanguinity or affinity but according to the livestock they have received from the speaker: if he has presented a man with a bull (*ainoni*), the beneficiary is called *b-ainoni,* etc. Generations often fail to be separated: *koko* embraces aunt *and* grandmother, and with a suffix the word is applied to a woman's grandson. Similarly, a reciprocal stem embraces grandfather and a man's grandson.[7]

Among the Sudanese negroes a great diversity obtains. The Timne terminology is lineal, the words for aunt and uncle being generic and distinct from the parent terms, while cousins in a lump

[1]Ching-Chao Wu, "The Chinese Family: Organization, Names and Kinship Terms," *Amer. Anthrop.,* 1927, 316 *sq.* L. H. Morgan, *Systems,* 413 *sq.* F. W. Baller, *A Mandarin Primer,* 1911, 369. J. H. Hutton, *The Angami Nagas,* 1921, 132; *id., The Sema Nagas,* 1921, 138, 382. J. P. Mills, *The Lhota Nagas,* 1922, 93; *id., The Ao Nagas,* 1926, 164.

[2]E. Stack and Sir Ch. Lyall, *The Mikirs,* 2of. C. G. Seligmann, *The Veddas,* 1911, 64. W. H. R. Rivers, *The Todas,* 1906, 484. O. Hanson, *The Kachins,* Rangoon, 1913, 215 *sq.*

[3]A. R. Brown, *The Andaman Islanders,* 1922, 53–69. P. Schebesta, *Bei den Urwaldzwergen von Malaya,* 1927, 108.

[4]C. S. and B. Z. Seligman, *The Kababish, a Sudan Arab Tribe,* Harvard African Studies, II., 1918, 123. B. Z. Seligman, "Studies in Semitic Kinship," *Bull. School of Oriental Studies,* London Institution, III., pt. 1, 1923, 51–68, 263–279.

[5]W. Jochelson, "The Koryak," *Mem. Amer. Mus. Nat. Hist.,* X., 1905–08, 759; *id.* "The Yukaghir and the Yukaghirized Tungus," *ibid.,* XIII., 1910, 68. W. Borogas, *The Chukchee, ibid.,* XI., 1907, 538.

[6]A. W. Hoernlé, "The Social Organization of the Nama Hottentots of Southwest Africa," *Amer. Anthrop.,* 1925, 1–24. I. Schapera, *South African Journal of Science,* 1926, XXIII., 847. Morgan, *Systems,* 465. H. Junod, *The Life of a South African Tribe,* 1912 I., 217 *sq.* H. S. Stannus, *The Wayao of Nyasaland,* Harvard African Studies, III., 1922, 281. E. W. Smith and A. M. Dale, *The Ila-speaking Peoples of Northern Rhodesia,* 1920, I., 316 *sq.* R. S. Dennett, *At the Back of the Black Man's Mind,* 1906, 35. B. Z. Seligman, "Marital Gerontocracy in Africa," *Journal Royal Anthrop. Inst.,* 1924, 231 *sq.*

[7]Ph. Paulitschke, *Ethnographie Nordost-Afrikas,* 1893, I., 188. M. Merker, *Die Masai,* 1904, p. 41.

are separated from siblings. Some of the languages display an amazing paucity of primary stems, lacking even distinct vocables for siblings. Thus, in Ewe "brother" is designated by the descriptive compound "mother's-child-male," and the Edo construct descriptive compounds for "brother" according to whether he is fellow-child through the father or the mother. However, the bifurcate merging principle is by no means eliminated since even in Edo the paternal uncle is frequently classed with the father in address. Nor are typical systems on the bifurcate merging plan lacking. The Susu nomenclature conforms to the Iroquois standard, and this essentially holds for the Ashanti also. Here, however, cross-cousin marriage in some measure has affected classification and the rather extensive use of reciprocal terms partly breaks down the barriers between generations. Thus, *ase* means spouse's parent *or* child's spouse; *nana* is applied to the grandparent and his sibling *or* to the grandchild and the sibling's grandchild. Some relatives *may* be designated descriptively, but this does not interfere with the "classificatory" use of the phrase. For example, the father's brother's child is called either "brother" or "father's child" without any individualization of meaning in either case.[1]

Finally, the Lango terminology is of the bifurcate merging type, the partial use of the descriptive technique being once more consistent with "classificatory" meanings. A noteworthy feature is the anomolous designation of cousins. The maternal uncle's son and daughter are designated by descriptive compounds; a distinct stem, with varying vocalic sex-prefix (*okeo, akeo*), is applied to the paternal aunt's children; another stem, similarly varied, denotes the mother's sister's son and daughter; while the father's brother's children are treated as siblings. Thus, neither the two kinds of cross-cousins nor the two kinds of parallel cousins are grouped together. The classification of the father's sister's children with the sister's children exhibits an element of the Omaha variety, while other deviations from the generation principle can be derived from rules of widow-inheritance. The occasional designation of a father's sister's son as father is contingent on inheritance of a maternal uncle's widow, making her children the heir's step-children. The Lango nomenclature has been partly shaped by loans from Hamitic neighbours, which have been engrafted on the old Nilotic nomenclature.[2]

INDONESIA AND OCEANIA

Morgan based his "Malayan" type on Polynesian terminologies. For the Malay branch of the Malayo-Polynesian family he had a single incomplete report from Borneo, which seemed, however, to conform to the Hawaiian norm. There is still great dearth of material for this area. In the Philippines, bifurcation is generally lacking and approximation to the generation system frequently results. But even there the Tinguian, Professor Fay-Cooper Cole states, distinguish uncles and aunts from parents, *i.e.*, fall into the lineal category. This is at least partly true of some "Pagan" systems from Borneo, where aunt and mother are indeed merged, but where the father is distinguished from uncles generally. The importance some Malayans attach to status is probably significant; where a parent is addressed teknonymously and a grandfather receives an appropriate title, people are on the high-road to stratifying society in terms of generation. However, the Mentawei islanders, representative of archaic Malayan culture, radically differ from the Polynesians in not using personal names in address. They exhibit conflicting tendencies toward a generation, a bifurcate merging, and a bifurcate collateral system: while "ina" is the term of address for mother and father's sister alike, the latter has a separate term in non-vocative use; the maternal uncle is distinguished from the paternal, and the latter is distinguished from the father except vocatively.[3]

[1]N. W. Thomas, *Anthropological Report on Sierra Leone*, I: *Law and Customs of the Timne and other Tribes*, 1916, 103 sq.; *id.*, *Anthropological Report on the Edo-speaking Peoples of Nigeria*, I., 1910, 112 *sq.* R. S. Rattray, *Ashanti*, 1923, 24 *sq.*

[2]J. H. Driberg, *The Lango, a Nilotic Tribe of Uganda*, 1923, 178 *sq.*

[3]Morgan, *Systems*, 451. Ch. Hose and Wm. McDougall, *The Pagan Tribes of Borneo*, I., 80 *sq.* Kroeber, *Kinship in the Philippines*, Anthrop. Papers, American Museum of Natural History, XIX., 1919, 75 *sq.* E. M. Loeb, ms. on the Mentawei Islands.

For most of Oceania Rivers has given a convenient summary. Broadly, the Melanesians refrain from using personal names whenever there is a suitable term of relationship, while the Polynesians use personal names even for the closest relatives.

Of the Papuans, the Bánaro, settled on a tributary of the Augusta River, have been accurately described. The differentiation of the maternal uncle suggests a bifurcate merging system, but in other respects they have developed on generation lines, though anomalous matrimonial customs colour the terminology. An interesting distinction is drawn between a paternal aunt who has and one who has not been exchanged for the speaker's mother: the former is called "mother," the latter "maternal uncle's wife." In the contemporary generation, siblings are distinguished according to seniority, cousins are treated as siblings, but are designated in accordance with the relative seniority of the connecting *parents*. This feature is shared by such Melanesians of New Guinea as the Jabim. These tribes fall into the bifurcate merging category. Reciprocal terms occur for grandfather and grandson, maternal uncle and sister's son, parent-in-law and child-in-law.[4]

HISTORICAL AND SOCIOLOGICAL INTERPRETATIONS

Morgan inaugurated both historical and sociological interpretations of the facts he scheduled. Starting from the axioms that kinship classifications were "independent of the mutations of language" (p. 506) and that they could not be diffused except if the phonetic symbols themselves were borrowed, he accepted the similarity of systems as proof of *racial* identity. He thus inferred the unity of the Dravidians and the American Indians, and that of the Zulu and the Hawaiians (p. 466). Apart from the questionableness of the premises this argument would lead to the absurd conclusion that the Eastern North American Indians stood racially much closer to the Melanesians and various Africans than to their congeners of the Basin area. However, by his collation of specific resemblances, Morgan paved the way for sound historical conclusions. For example, he recognized the likeness of certain Central Algonkian and southern Siouan systems (p. 179)—a fact now interpreted as the result of diffusion. Diffusion evidently is the only possible explanation of the concentration west of the Rockies of such features as the discrimination between paternal and maternal grandparents.

Sociologically, Morgan viewed his nomenclatures as indices of family life. The "Malayan" as the simplest was considered the earliest; and since it failed to distinguish the mother's brother from the father, Morgan concluded that the two were identical, *i.e.*, that a man had access to his own sister when the system originated. The introduction of a term for maternal uncle was said to result from the prohibition of such unions when the Turanian-Ganowanian system arose. Finally, the "descriptive" terminology, failing to merge *any* collateral relatives with the direct line of descent, was correlated with the rise of property rights and the parents' insistence on transmitting them only to direct descendants (p. 492f.). The scheme thus forms part of an evolutionary theory explaining the gradual rise of our civilized family out of more or less promiscuous beginnings.

These interpretations are now recognized as basically wrong. Morgan was not warranted in assuming that the Polynesian term translated "father" implied procreation: the facts simply reveal a common status term for all kindred of one generation. Simplicity here, as in many other linguistic phenomena, is a late development, not a badge of antiquity. Three independent investigators, Sternberg in Siberia, Rivers in Oceania, Lowie in North America, have been able to show recent transformations of bifurcate merging nomenclatures in the direction of generation systems.

Morgan's extravagance led Kroeber to reject sociological interpretations almost *in toto*. In reply to criticism by Rivers, he has long since receded from this position, specifically admitting the correlation of certain terminological features with cross-cousin terminology. The issue was thus reduced to a difference in philosophical attitude toward cultural phenomena. Rivers championed a rigid determinism, contending that "not only has the

[4]R. Thurnwald, *Die Gemeinde der Bánaro*, 1921, 60 *sq.* C. G. Seligman, *The Melanesians of British New Guinea*, 1910, 66, 481, 707.

general character of systems of relationship been strictly determined by social conditions, but every detail of these systems has also been so determined." On the other hand, Kroeber insisted that "the infinitely variable play of the variable factors forbids any true determinations of causality of a sweeping character."[1]

Kroeber was unquestionably right in rejecting Rivers' extreme claim, and in maintaining that since kinship terms were linguistic phenomena, they were subject to alterations of a linguistic character, *e.g.*, extensions in meaning, independently of social conditions. However, he did not sufficiently consider that language represents reality and that in so far as it related to social phenomena it is likely to mirror them, even though imperfectly. The empirical facts of distribution indicate that the correlation between social custom and nomenclature is indeed far from perfect, but fairly high.

First of all, there is an undeniable tendency to designate by separate terms relatives with distinctive social functions. It is not sheer accident that Polynesians generally lack a term for the maternal uncle, but that a term appears with the avunculate. Furthermore, the same term applied to different individuals is an index of their sharing the same duties and claims, as Radcliffe-Brown has pointed out for Australia.

Secondly, how are we to interpret the data of geographical distribution? Rivers found that neighboring Oceanians often differed more widely in their kinship systems than remote tribes. A survey of the world establishes this fact on a broader basis. Morgan's solution of resemblances in Dravidian and Iroquois nomenclature is impossible, but he put his finger on a real problem. When the Omaha of Nebraska resemble the Californian Miwok far more than their fellow-Siouans; when specific Omaha features crop up in some Assamese tribes and again on the upper Nile, the fact naturally arouses curiosity and calls for explanation. If the same social factors uniformly accompany the terminological resemblance, a genuine correlation is established. Thus, the grouping of the mother's brother's son with the maternal uncle in the tribes cited is linked with paternal descent, while the classification of the father's sister's son with the father, and of the father's sister's daughter with the paternal aunt generally accompanies maternal descent. We are not dealing with a simple causal nexus, for there are matrilineal tribes like the Seneca and patrilineal tribes like the Ojibwa who do not override the generation principle in this fashion. But a functional relationship remains. It is conceivable that the Omaha and Crow varieties of the bifurcate merging type depend on additional factors that may some time be discovered.

That, without prejudice to other functional relations, a high correlation obtains between a clan organization and the bifurcate merging system, seems certain. Clanless tribes like the Andamanese, Chukchee, Basin Shoshoneans, Hawaiians, have no terminologies of this type; characteristic clan organizations are almost uniformly coupled with them. Tylor's generalization, corroborated by Rivers and Lowie for Oceania and North America, respectively, seems to hold.[2] Yet it is possible to derive the terminology from the joint effect of the levirate and the sororate, institutions probably quite as widely distributed as the clan organization. True, they do not explain why in the common Iroquois variety of the type parallel cousins of the same sex are grouped together, while cross-cousins of the same sex are segregated under a common term of their own. Tylor's idea that the moiety represents the primeval clan does explain this; but large sections of the world with the bifurcate merging nomenclature—notably Africa—lack moieties.

In the present state of our knowledge, then, we may say that while social correlations of terminological features are undeniable, we are not usually in a position to determine a simple cause-effect relationship. There are often alternative explanations: the mother's brother may be identified with the father's sister's husband because of cross-cousin marriage *or* because they both belong to the same exogamous moiety or because two households arrange to marry off their respective daughters to the boys in the other household (Rivers). The safe rule is to reject any social determinant of a nomenclatorial trait unless it is reported as extant in the tribe or at least in the general area in question.

Other phases of the problem must be considered. An institution may be overshadowed by coexisting institutions or it may not yet have had time to assert itself terminologically. The Miwok, *e.g.*, practise cross-cousin marriage but their terminology shows a far deeper impress of rival forms of marriage. It seems a fair conclusion that the latter are of greater antiquity.[3]

Diffusion presents a further complication. While harmony between the nomenclature and the social structure is frequent, there are discrepancies that can be most readily interpreted by borrowing. To exemplify, there are tribes with a bifurcate merging terminology that lack clans, but their location suggests that they have borrowed a neighbor's nomenclature. It would be dangerous to infer that they had at one time been organized into clans, unless extraneous data so suggest.

Finally, there are the linguistic factors stressed by Kroeber. When nearly all Siouan languages have a separate term for paternal aunt, the lack of such a word (in address only) among the Crow must be interpreted as a late development; and the use of the "mother" word appears as a characteristic sample of linguistic extension,—the same phenomenon as when English uses "wife" as a special term of affinity while the cognate German *Weib* applies to woman generically. The reality of such phenomena militates against any attempt to reduce the whole of kinship terminology to social causes. There will always be residual phenomena resisting interpretation on any but linguistic lines. This means that they are in a sense unique facts that can be understood after they have been observed but that could not be deduced from general principles.[4]

These cautions limit but do not destroy the sociological significance of relationship terminologies. When all allowances are made for disturbing factors, a host of correlations remain between kinship features and sociological factors. When more intensive studies of large linguistic families shall be available, it will be possible to balance with greater nicety the relative importance of sociological and other factors as determinants. (R. H. Lo.)

RELATIVITY. The progress of natural science in the first quarter of the present century was especially noteworthy through the appearance of the doctrine of relativity, and its almost immediate acceptance by the scientific world in general. The need for some such theory had long been felt and was becoming continually more urgent. As far back as 1887 Michelson and Morley, experimenting for quite another purpose, had obtained results which obstinately refused to fit into 19th-century conceptions of the general nature of the universe. Experiments in other directions soon indicated that the difficulties thus revealed were not isolated difficulties confined to one special corner of science, but extended throughout a large part of electrical and optical science. Theoretical discussions by Lorentz, Larmor and others drew attention to the serious nature and extent of the difficulties which had arisen, and pointed, although somewhat vaguely, to the direction in which a solution was likely to be found.

In 1905 a paper appeared by Albert Einstein, then professor of theoretical physics in the University of Berne, which showed, although its implications were not at first fully understood, that the difficulties revealed by the experiment of Michelson and Morley, as well as others which had subsequently come to light, could be removed at the expense of pouring into the melting-pot all the ideas then prevalent as to the fundamental nature and meaning of space and time. In effect, although this again was not

[1]Rivers, *Kinship and Social Organization*, 1914; id., *History of Melanesian Society*, II., 11, *passim*. Kroeber, *Classificatory Systems of Relationship*, 1909; id., "California Kinship Systems," *Univ. of Cal. Pub.*, vol. 12, no. 9, p.p. 385–396 (1917).

[2]E. B. Tylor, "On a Method of Investigating the Development of Institutions, applied to Laws of Marriage and Descent," *Jour. Anthrop. Inst.* XVIII., 1889, 245–272. Rivers, *Kinship and Social Organization*. Lowie, "Exogamy and the Classificatory System of Relationships," *Am. Anth.*, 1915, 223–239.

[3]E. W. Gifford, "Miwok Moieties," *U. Cal. Pub.*, 1916, vol. 12, 139–194, esp. 181 *seq.* (1916).

[4]R. H. Lowie, "The Kinship Systems of the Crow and Hidatsa," *Proc. 19th Intern. Congr. Americ.*, 1917, 340.

realized at the time, it went further and showed that the experiments in question actually compelled a recasting of these ideas.

At this time gravitation held obstinately aloof from all other physical phenomena; an ether had been devised which explained optical and electrical phenomena with fair success, but it refused to find room for the phenomenon of gravitation. In 1915 Einstein published further papers which showed that gravitation admitted of a very simple explanation in terms of the new ideas as to the nature of space and time. The gravitation which was explained in this way was, however, just a shade different from the gravitation of Newton. When it was realized that the gravitation of nature was also just a shade different from that of Newton, and it was further discovered that nature ranged herself completely with Einstein in this matter, then the acceptance of Einstein's theory was universal and complete.

While gravitation fitted quite naturally into the new scheme of nature demanded by the theory of relativity, it was found to be less easy to fit in the general phenomena of electro-magnetism. The last few years have seen a great deal of discussion as to the way in which these must be joined on to Einstein's general theory of relativity and, as we shall see below, the issue is still in doubt.

General Nature of the Principle.—Science advances in two ways, by the discovery of new facts, and by the discovery of mechanisms or systems which account for the facts already known. The outstanding landmarks in the progress of science have all been of the second kind. Such, for instance, was the Copernican system of astronomy, which explained the already known motions of the planets; such was the Newtonian mechanism (the force of gravitation) which explained the elliptic orbits of the planets and the earth's pull on terrestrial bodies; such was the Darwinian mechanism of natural selection, which explained the survival of some species and the extinction of others. Such also is the theory of relativity.

The scientist's desire to discover mechanisms or systems arises no doubt primarily from the constitution of the human mind; our intellects, unsatisfied with a mere accumulation of facts, impel us ever to search for the causes underlying the facts: *Vere scire est per causas scire.* But to the working scientist the discovery of a mechanism has an additional and more practical value. When he has found a mechanism which will account for certain laws, he can proceed to examine the complete set of laws which the mechanism demands. If his mechanism corresponds with sufficient closeness to reality he may in this way be led to the discovery of new natural laws. On the other hand, the new laws deduced from the supposed mechanism may be false. If the falsity of the new laws is not at once revealed science may for a time be led into wrong paths. When more accurate experimenting or observation discloses that the new laws are not true a recasting of ideas becomes necessary, and the branch of science concerned may experience a time of revolution followed by a period of rapid growth.

An obvious illustration of these general statements is provided by the history of astronomy. The laws of the motions of the planets, as observed from the earth, were tolerably well known to the Greeks. They had also evolved an explanatory mechanism starting from the premise, which seemed to them to be necessary on metaphysical grounds, that the paths of the planets must necessarily be circles. The earth was the centre of the universe and round this revolved spheres to which the planets were attached. The retrograde motion of the outer planets was explained by supposing that they were attached to secondary spheres revolving about points on the primary spheres which in turn revolved about the earth. This mechanism of cycles and epicycles as an explanation of planetary motion held the field for 18 centuries. Finally the observations of Tycho Brahe provided a test which revealed the falsity of the whole structure. The position of Mars was found to differ from that required by the mechanism of epicycles by an amount as great as eight minutes of arc. "Out of these eight minutes," said Kepler, "we will construct a new theory that will explain the motions of all the planets."

The history of the succeeding century of astronomy need not be recapitulated here. The earth yielded its place as the centre of the universe, and the structure of cycles and epicycles crumbled away. The laws of planetary motion were determined with a precision which for the time appeared to be final. The mechanism underlying these laws was supposed to be a "force" of gravitation. This force was supposed to act between every pair of particles in the universe, its intensity varying directly as the product of the masses of the particles and inversely as the square of the distance separating them—the famous law of Newton.

In science, history repeats itself and, in recent years, the theory of relativity has provided a further instance of the general processes we have been considering. Under the Newtonian mechanism every planet would describe a perfect ellipse about the sun as focus, and these elliptic orbits would repeat themselves indefinitely except in so far as they were disturbed by the gravitational forces arising from the other planets. But, after allowing for these disturbing influences, Leverrier found that the orbit of the planet Mercury was rotating in its own plane at the rate of 43 seconds a century. Various attempts have been made to reconcile this observed motion with the Newtonian mechanism. The gravitational forces arising from the known planets were demonstrably unable to produce the motion in question, but it was possible that Mercury's orbit was being disturbed by matter so far unknown to us.

Investigations were made as to the disturbance to be expected from various hypothetical gravitating masses—a planet or a ring of planets between Mercury and the sun, a ring of planets outside the orbit of Mercury, a belt of matter extended in a flattened disc in a plane through the sun's centre, an oblateness greater than that suggested by the shape of the sun's surface, in the arrangement of the internal layers of the sun's mass. In every case the mass required to produce the observed disturbance in the motion of Mercury would have also produced disturbances not observed in the motions of the other planets. The solution of the problem came only with the theory of relativity. Just as Tycho's eight minutes of arc, in the hands of Kepler and Newton, revolutionized mediaeval conceptions of the mechanism of the universe, so Leverrier's 43 seconds of arc, in the hands of Einstein, has revolutionized our 19th-century conceptions, not only of purely astronomical mechanism, but also of the nature of time and space and of the fundamental ideas of science. The history of this revolution is in effect the history of the theory of relativity. It falls naturally into three chapters, a first narrating the building of the earlier physical theory of relativity, a second dealing with the extension of that theory to gravitation, and a third, which is still in process of being written, attempting to include electro-magnetism in the physical system presented by the existing theory of relativity.

THE PHYSICAL THEORY OF RELATIVITY

The earliest successful attempt to formulate the laws governing the general motion of matter is found in Newton's laws. The first law states that:—

Every body perseveres in its state of rest or of uniform motion in a right line unless it is compelled to change that state by forces impressed thereon.

In this law no distinction is made between rest and uniform motion in a straight line, and the same is true of the remaining laws. Hence follows the remarkable property to which Newton draws explicit attention in his fifth corollary to the laws of motion:—

The motions of bodies included in a given space are the same among themselves, whether that space is at rest, or moves uniformly forwards in a right line without any circular motion.

As a concrete application of his principle, Newton instances "the experiment of a ship, where all motions happen after the same manner whether the ship is at rest or is carried uniformly forward in a right line." Just as a passenger on a ship in a still sea could not determine, from the behaviour of bodies inside the ship, whether the ship was at rest or moving uniformly forward, so we cannot determine from the behaviour of bodies on our earth whether the earth is at rest or not. We believe the earth to be moving round the sun with a speed of about 30km.

a second, so that there can be no question of the earth being permanently at rest, but we are unable to determine whether it is at rest at any specified point of its orbit, or, in the probable event of its not being at rest, what its absolute velocity may be. There is no more reason for thinking the sun, than the earth, to be at rest. Newton wrote as follows:—

"It is possible that in the remote regions of the fixed stars, or perhaps far beyond them, there may be some body absolutely at rest, but impossible to know, from the positions of bodies to one another in our regions, whether any of these do keep the same position to that remote body. It follows that absolute rest cannot be determined from the position of bodies in our regions."

The above quotations are all from the first book of the *Principia Mathematica*. Previous to them all Newton writes: "I have no regard in this place to a medium, if any such there is, that freely pervades the interstices between the parts of bodies." The two centuries which elapsed after the publication of the *Principia* witnessed a steady growth of the belief in the reality of such an all-pervading medium. It was called the ether, or aether, and by the end of these two centuries (1887) it was almost universally believed that light and all electro-magnetic phenomena were evidence of actions taking place in this ether. Light from the most distant stars was supposed to be transmitted to us in the form of wave motions in the ether, and we could see the stars only because the sea of ether between us and these stars was unbroken. It had been proved that if this sea of ether existed it must be at rest, for the alternative hypothesis that the ether was dragged about by ponderable bodies in their motions had been shown to be incompatible with the observed phenomenon of astronomical aberration and other facts of nature. On this view it was no longer necessary to go to Newton's "remote regions of the fixed stars, or perhaps far beyond them," to find absolute rest. A standard of absolute rest was provided by the ether which filled our laboratories and pervaded all bodies. Owing to our motion it would appear to be rushing past us, although without encountering any hindrance—"like the wind through a grove of trees," to borrow the simile of Thomas Young. The determination of the absolute velocity of the earth was reduced to the problem of measuring the velocity of an ether current flowing past us and through us.

In this same year (1887) the first experimental determination of this velocity was attempted by the Chicago physicist Michelson. The velocity of light was known to be, in round numbers, 300,000 km. a second, a velocity which was interpreted as representing the rate of progress of wave motion through the ether. If the earth were moving through the ether with a velocity of 1,000km. a second, the velocity of light relative to a terrestrial observer ought to be only 299,000km. a second when the light was sent in exactly the direction of the earth's motion through the ether, but would be 301,000km. a second if the light was sent in the opposite direction. In more general terms, if the earth were moving through the ether, the velocity of light, as measured by a terrestrial observer, would depend on the direction of the light, and the extent of this dependence would give a measure of the earth's velocity. The velocity of light along a single straight course does not permit of direct experimental determination, but the same property of dependence on direction ought to be true, although to a less extent, of the average to-and-fro velocity of a beam of light sent along any path and then reflected back along the same path.

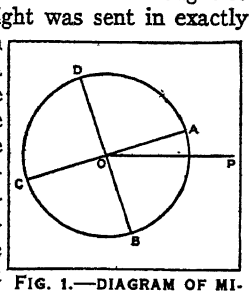


FIG. 1.—DIAGRAM OF MICHELSON'S APPARATUS
Designed to ascertain the earth's velocity through the ether

It was through this property that Michelson attempted to measure the earth's velocity through the ether. The apparatus was simple in principle. A circular table ABCD (*see* fig. 1) was arranged so as to be capable of slow rotation about its centre O. Light sent along CO was divided up at O into two beams which were made to travel along perpendicular radii OA, OB. The arms OA, OB were made as equal as possible and mirrors were placed at A and B to reflect the beams of light back to O. An extremely sensitive optical method made it possible to detect even a very slight difference in the times of the total paths of the two beams from O back to O. There would in any case be a difference owing to the necessarily imperfect equalization of the lengths of the arms OA, OB, but if the earth is moving through the ether in some direction OP, and if the table is made to rotate slowly about O, then this difference ought itself to vary on account of the earth's motion through the ether. Michelson, and afterwards Michelson and Morley in collaboration, attempted to estimate the amount of this variation. No variation whatsoever could be detected, although their final apparatus was so sensitive that the variation produced by a velocity through the ether of even 1km. a second ought to have shown itself quite clearly.

Thus to the question "What is our velocity through the ether?" nature appeared to give the answer "None." It was never suggested that this answer should be accepted as final; this would have brought us back to a geocentric universe. Clearly either the question had been wrongly framed or the answer wrongly interpreted. It was pointed out in 1893 by Fitzgerald, and again independently, in 1895, by Lorentz, that the *null* result of the Michelson-Morley experiment could be explained if it could be supposed that motion through the ether altered the linear dimensions of bodies. They both showed that the experiment would invariably and of necessity give a *null* result if every body moving through the ether with a velocity u was contracted in the direction of its motion in the ratio $\sqrt{1-\frac{u^2}{c^2}}$, c being the velocity of light. The supposition that such a contraction occurred was not only permissible—it was almost demanded by electrical theory. Indeed, Lorentz had already shown that if matter were a purely electrical structure, the constituent parts would of necessity readjust their relative positions when set in motion through the ether and the final position of equilibrium would be one showing precisely the contraction just mentioned.

On this view, there was no prima facie necessity to abandon the attempt to measure the earth's velocity through the ether. The answer to the problem had merely been pushed one stage farther back, and it now became necessary only to measure the shrinkage of matter produced by motion. It was obvious from the first that no direct material measurement could disclose the amount of this shrinkage, since any measuring rod would shrink in exactly the same ratio as the length to be measured; but optical and electrical methods appeared to be available. Experiments to this end were devised and performed by Rayleigh, Brace, Trouton and Noble, Trouton and Rankine and others. In every case a *null* result was obtained. It appeared then that if the earth moved through the ether this motion was concealed by a universal shrinkage of matter, and this shrinkage was in turn concealed by some other agency or agencies.

At this time the word "conspiracy" found its way into the technical language of science. There was supposed to be a conspiracy on the part of the various agencies of nature to prevent man from measuring his velocity of motion in space. If this motion produced a direct effect x on any phenomenon, the other agencies of nature seemed to be in league to produce a countervailing effect $-x$. A long train of experiments had not revealed, as was intended, our velocity through the ether; they had merely created a conviction that it was beyond the power of man to measure this velocity. The conspiracy, if such there was, appeared to have been perfectly organized.

A perfectly organized conspiracy of this kind differs only in name from a law of nature. The inventor who tries to devise a perpetual-motion machine may come to the conclusion that the forces of nature have joined in a conspiracy to prevent his machine from working, but wider knowledge shows that he is in conflict not with a conspiracy, but with a law of nature—the conservation of energy. In 1905 Einstein, crystallizing an idea which must have been vaguely present in many minds, propounded the hypothesis that the apparent conspiracy might be in effect a law of nature. He suggested that there might be a true law to the effect that "it is of necessity impossible to determine absolute motion by any experiment whatever." This hypothetical law may

again be put in the equivalent form: "The phenomena of nature will be the same to two observers who move with any uniform velocity whatever relative to one another." This may be called the hypothesis of relativity.

The hypothesis in itself was not of a sensational character. Indeed, from the quotations which have already been given from Newton's works, it appears probable that Newton himself would have accepted the hypothesis without hesitation: he might even have regarded it as superfluous. The true significance of the hypothesis can only be understood by a reference to the scientific history of the two centuries which had elapsed since Newton. The Newtonian view that absolute rest was to be found only "in the remote regions of the fixed stars, or perhaps far beyond them," had given place to a belief that absolute rest was to be found all around us in an ether which permeated all bodies. What was striking about the hypothesis was its implication—either that we could not measure the velocity relative to ourselves of a medium which surrounded us on all sides, or else that no such medium existed.

The hypothesis demanded detailed and exhaustive examination. It was for the mathematician to test whether it was in opposition to known and established laws of physics, and to this task Einstein, Lorentz and others set themselves. If the hypothesis proved to be in opposition to a single firmly established law, then of course it must be abandoned. It was unlikely that such an event would occur among the well-established laws, for if it did, the phenomena governed by that law would enable direct measurement to be made of the earth's velocity through the ether, a measurement which had so far eluded all attempts of experimenters. It was among the more obscure and less well-established laws, if anywhere, that discrepancies were to be looked for.

It is impossible here to give a complete account of the many tests to which the relativity hypothesis has been subjected. The result of all can be summed up in one concise and quite general statement:—Wherever the hypothesis of relativity has appeared to be in conflict with known or suspected natural laws, further experiment, where possible, has without a single exception shown the laws to be erroneous, and has moreover shown the alternative laws suggested by the hypothesis of relativity to be accurate. It is only in somewhat exceptional cases that the hypothesis of relativity suffices of itself to determine fully the form of a natural law; these cases constitute the most striking triumphs of the theory. As instances may be mentioned the determination of the law connecting the mass of an electron with its velocity; of the law expressing the velocity of light through a transparent medium in motion (Fizeau's water-tube experiment); and of the formulae for the magnetic forces on moving dielectric media (experiments of Eichenwald and H. A. Wilson).[1]

Before leaving this general statement, particular mention must be made of one special case. A natural law which, at an early stage, was seen to be in conflict with the hypothesis of relativity was Newton's famous law of gravitation—namely, that every particle of matter attracts every other particle with a force proportional to the product of the two masses, and to the inverse square of their distance apart. Either, then, Newton's great law had to be abandoned, or else the hypothesis of relativity had to be discarded, in which case it would immediately become possible, in theory at least, to determine the earth's velocity through space by gravitational means. It is the choice between these two alternatives that has led to the most surprising developments of the theory of relativity; and to these we shall return later.

The hypothesis of relativity, as has already been explained in this section, postulates that the phenomena of nature will be the same to two trained observers moving relative to one another with any uniform velocity whatever. The hypothesis has been so amply tested as regards all optical and electro-magnetic phenomena that no doubt is felt, or can rationally be felt, as to its truth with respect to these phenomena. The hypothesis can be examined and developed in two opposite directions. We may, on the one hand, proceed from the general hypothesis to the detailed laws implied in it; this has already been done, with completely satisfactory results as regards confirmation of the hypothesis. Or regarding the hypothesis of relativity as being itself a detailed law, we may attempt to generalize upward to something still wider. It is this possibility which must for the moment claim our attention.

In 1905 Einstein examined in full the consequences of the hypothesis that one simple optical phenomenon—namely, the transmission of a ray of light in free space—was, in accordance with the hypothesis of relativity, independent of the velocity of the observer. If an ether existed, and provided a fixed framework of reference, then light set free at any instant would obviously travel with a velocity which would appear to an observer at rest in this ether to be the same in all directions, and the wave front at any instant would be a sphere having the observer as centre. On the hypothesis of relativity the phenomenon of light transmission must remain unaffected by the motion of the observer, so that the light must appear, to a moving observer also, to travel with a uniform velocity in all directions, and thus to the moving observer also the wave front must appear to be a sphere of which he is the centre. It is, however, quite obvious that the same spherical wave front cannot appear, to each of two observers who have moved some distance apart, to be centred round himself, unless the use either of the common conceptions of science or of the ordinary words of language is greatly changed. In fig. 2 it is not possible, in ordinary language, that both O and P should at the same instant be at the centre of the sphere ABC. The change to which Einstein was forced is one which has an intimate bearing upon our fundamental conceptions of the nature of space and time; this change it will be necessary to explain in some detail.

Suppose that two observatories, say Greenwich and Paris, wish to synchronize their clocks, with a view to, let us say, an exact determination of their longitude difference. Paris will send out a wireless signal at exact midnight as shown by the Paris clock, and Greenwich will note the time shown by the Greenwich clock at the instant of receipt of the signal. Greenwich will not, however, adjust their clock so as to show exact midnight when the signal is received; a correction of about ·001 second must be made to allow for the time occupied by the signal in traversing the distance from Paris to Greenwich. To turn to mathematical symbols, if t_0 is the time at which a signal is sent out from one station, the time of receipt at a second station is taken to be $t_0+\frac{x}{c}$, where x is their distance apart, and c is the velocity of light. This represents the ordinary practice of astronomers, but it is clear that if the earth is travelling through a fixed ether with a velocity u in the direction of the line joining the two observatories, the velocity of transmission of the signal relative to the two observatories will not be c but $c+u$, and the time of receipt at the second station will be $t_0+\frac{x}{c+u}$. Thus it appears that it is impossible to synchronize two clocks unless we know the value of u, and that the ordinary practice of astronomers will not, as they expect, synchronize their clocks, but set them at an interval apart equal to

$$x\left(\frac{1}{c}-\frac{1}{c+u}\right)$$

which may, to an approximation, be put equal to $\frac{ux}{c^2}$.

According to the hypothesis of relativity, it is impossible ever to determine the value of u, and so it is impossible ever truly to synchronize two clocks. Moreover, according to this hypothesis, the phenomena of nature go on just the same whatever the value of u, so that the want of synchrony cannot in any way show itself—in fact, if it did, it would immediately become possible to measure the effect and so arrange for true synchrony.

As the earth moves in its orbit, the value of u changes, so that its value in the spring, for instance, will be different from its value in the autumn. One pair of astronomers may attempt to synchronize a pair of clocks in the spring, but their synchronization will appear faulty to a second pair who repeat the determination in the autumn. There will, so to speak, be one synchrony for the spring

[1] For references to the original papers dealing with these and other tests of the hypothesis of relativity *see* Cunningham, *The Principle of Relativity*, or J. H. Jeans, *Mathematical Theory of Electricity and Magnetism* (4th or 5th ed.).

and another for the autumn, and neither pair of astronomers will be able to claim that their results are more accurate than those of their colleagues. Different conceptions of synchrony will correspond to different velocities of translation.

These elementary considerations bring us to the heart of the problem which we illustrated diagrammatically in fig. 2. The observer at O in the diagram will have one conception of simultaneity, while the second observer who moves from O to P will, on account of his different velocity, have a different conception of simultaneity. The instants at which the wave front of the light signal from O reaches the various points A, B, C in the diagram will be deemed to be simultaneous by the observer who remains at O, but the observer who moves from O to P will quite unconsciously have different ideas as to simultaneity. At instants which he regards as simultaneous the wave front will have some form other than that of the sphere ABC surrounding O. If the hypothesis of relativity is to be true in its application to the transmission of light signals, this wave front must be a sphere having P as its centre. Einstein examined mathematically the conditions that this should be possible. A precise statement of his conclusions can only be given in mathematical language.

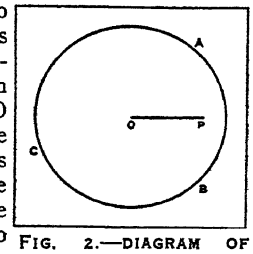


FIG. 2.—DIAGRAM OF MOTION OF OBSERVER AND LIGHT-SIGNAL

The observer who remains at O in fig. 2 may be supposed to make exact observations and to record these observations in mathematical terms. To fix the positions of points in space he will map out a "frame of reference" consisting of three orthogonal axes, and use Cartesian co-ordinates x, y, z, to specify the projections along these axes of the radius from the origin to any given point. He will also use a time co-ordinate t which may be supposed to specify the time which has lapsed since a given instant, as measured by a clock in his possession. Any observations he may make on the transmission of light signals can be recorded in the form of equations between the four co-ordinates x, y, z, t. For instance, the circumstance that light travels from the origin with the same velocity c in all directions will be expressed by the equation (of the wave front):—

$$x^2+y^2+z^2-c^2t^2=0 \quad .. \quad .. \quad .. \quad (1)$$

The second observer who moves from O to P will also construct a frame of reference, and we can simplify the problem by supposing that his axes are parallel to those already selected by the first observer. His co-ordinates, to distinguish them from those used by the first observer, may be denoted by the accented letters x', y', z', t'. If his observations also are to show light always to travel with the same velocity c in all directions, the equation of the wave front, as observed by him, must be:—

$$x'^2+y'^2+z'^2-c^2t'^2=0 \quad .. \quad .. \quad .. \quad (2)$$

A 19th-century mathematician would have insisted that x, y, z, t must necessarily be connected with x', y', z', t' by the simple relations:—

$$\left.\begin{aligned} x'&=x-ut \\ y'&=y \\ z'&=z \\ t'&=t \end{aligned}\right\} \quad .. \quad .. \quad .. \quad .. \quad (A)$$

Indeed, he would have been unable to imagine that there should be any other relation connecting these quantities. It is, however, obvious that if these relations hold, then equation (1) cannot transform into equation (2). Einstein showed that equation (1) will transform into equation (2) provided the co-ordinates x, y, z, t of the first observer are connected with the co-ordinates x', y', z', t' of the second observer by the equations:—

$$\left.\begin{aligned} x'&=\beta(x-ut) \\ y'&=y \\ z'&=z \\ t'&=\beta\left(t-\frac{ux}{c^2}\right) \end{aligned}\right\} \quad .. \quad .. \quad .. \quad (B)$$

where β stands for $\left(1-\frac{u^2}{c^2}\right)^{-\frac{1}{2}}$

To form some idea of the physical meaning of these equations, let us consider the simple case in which the first observer is at rest in the ether while the second moves through the ether with velocity u. The points of difference between equations (B) and (A) then admit of simple explanation. The factor β in the first of equations (B) is simply, according to the suggestion of Fitzgerald and Lorentz already mentioned, the factor according to which all lengths parallel to the axis of x must be adjusted on account of motion through the ether with velocity u. The moving observer must correct his lengths by this factor, and he must correct his times by the same factor in order that the velocity of propagation of light along the axis of x may still have the same velocity c; this explains the presence of the multiplier β in the last of equations (B). The one remaining difference between the two sets of equations, namely, the replacement of t in (A) by $t-\frac{ux}{c^2}$ in (B), represents exactly the want of synchrony which, as we have already seen, is to be expected in the observations of two observers whose velocity differs by a velocity u.

Although the equations admit of simple illustration by considering the case in which one observer is at rest in a supposed ether, it will be understood that the equations are more general than the illustration. They are in no way concerned with the possibility of an observer being at rest in an ether, or indeed the existence of an ether at all. Their general interpretation is this: If one observer O, having any motion whatever, finds, as a matter of observation, that light for him travels uniformly in all directions with a constant velocity c, then a second observer P, moving relative to O with a constant velocity u along the axis of x, will find, as a matter of observation, that light, for him also, travels uniformly in all directions with the same constant velocity c, provided he uses, for his observations, co-ordinates which are connected with the co-ordinates of O by equations (B).

This is the meaning that was attached to the equations by Einstein in 1905, but the equations had been familiar to mathematicians before this date. They had in fact been discovered by Lorentz in 1895 as expressing the condition that all electro-magnetic phenomena, including of course the propagation of light, should be the same for an observer moving through the ether with velocity u as for an observer at rest in the ether. For this reason the transformation of co-ordinates specified by these equations is universally spoken of as a "Lorentz transformation." What Einstein introduced in 1905 was not a new system of equations but a new interpretation of old equations. The two observers who used the co-ordinates x, y, z, t and x', y', z', t' had been regarded by Lorentz as being one at rest in an ether and one in motion with a velocity u; for Einstein they were observers moving with any velocities whatever subject to their relative velocity being u. Lorentz had regarded t as the true time and t' as an artificial time. If the observer could be persuaded to measure time in this artificial way, setting his clocks wrong to begin with and then making them gain or lose permanently, the effect of his supposed artificiality would just counterbalance the effects of his motion through the ether. With Einstein came the conception that both times, t and t', had precisely equal rights to be regarded as true time. The measure t' of time is precisely that which would be adopted naturally by any set of observers, or race of men, who disregarded their steady motion through space; their adoption of it would be above criticism if, as Einstein suggested, their motion through space had no influence on material phenomena, and it represents, as we have seen, the usual practice of astronomers in comparing time at different places. From this point of view neither measure of time is more accurate or more logical than the other. There are as many ways of measuring time as there are observers, and all are right.

The investigator who is trying to discover laws of nature will, in general, require to measure both time and space either directly or indirectly. If, to take a simple case, he is studying the motion of a single particle, he will measure out the position of the particle at definite instants as determined by his clock. He may specify the position of the particle at any instant by three measurements in space—for instance, he may say that two seconds after his particle started it was 6ft. to the E. of the point from which it

started, 9ft. to the N. and 12ft. vertically upward. The mathematician would express this by taking axes x, y, z to the E., to the N. and vertically upwards, and saying that at time $t=2$ the particle had co-ordinates $x=6$, $y=9$, $z=12$. Or he might, putting his time co-ordinate t on the same footing as the space co-ordinates x, y, z, simply say that $x=6$, $y=9$, $z=12$, $t=2$ represented one position of the particle. A complete set of readings of this type, each consisting of values of four co-ordinates, would give the complete history of the motion of the particle.

Such sets of simultaneous measurements form the common material of investigations in both pure and applied science. For instance, the engineer may measure the extension of a sample of steel corresponding to different loads; the electrician may measure the amount of light given by an electric filament corresponding to different amounts of current passed through it. In each of these cases there are only two quantities to be measured simultaneously, and an investigator can conveniently represent the result of the whole series of his measurements in graphical form; a single reading is represented by a point whose distances from two fixed perpendicular lines represent the quantities measured, and the curve obtained by joining these single points will give all the information contained in the whole set of readings.

We have seen that, in studying the motion of a particle in space, four sets of quantities must be measured, so that the results obtained cannot be plotted graphically on a piece of paper. Their proper representation demands a four-dimensional space, in which x, y, z and t are taken as co-ordinates. The practical importance of such graphical representation is *nil,* since it is impossible to construct a four-dimensional graph, but its theoretical importance to the theory of relativity is immense. For if the hypothesis of relativity is true, then the four-dimensional graphs of any natural event constructed by all observers, no matter what their relative motions, will be identical. The influence of their motion will be shown only in that the axes of x, y, z and t will be different for different observers, and the relations between these sets of axes will be those given by the foregoing equations (B).

The importance of this conception can hardly be overestimated, and it may be well to consider it further with the help of an illustrative example. Imagine a number of aeroplanes flying over England, and, in order to eliminate one of the three directions in space —the vertical—let us limit them to fly always at the same height, say 1,000ft. above sea-level. Imagine a number of similar plates of glass prepared, each marked faintly with an outline map of England and with lines of latitude and longitude. Suppose that at 12h.0m. G.M.T. a plate is taken and the position of each aeroplane marked by a thick black dot. At 12h. 1m. let a second plate be taken and similarly marked, and let this be done every minute for an hour. The 60 plates so marked will constitute a record of the motion of each aeroplane within this hour. If, now, we place the plates in order, one above the other, on a horizontal table, the mass of glass so formed will present a graphical representation, in three dimensions, of the motions of all the aeroplanes. In this graph the two horizontal co-ordinates represent motions in any two rectangular directions over England, say east and north, while the third co-ordinate—the vertical—represents time. The individual black dots which represent the positions of any one aeroplane will form a dotted curve, and this curve gives a graphical representation of the motion of the particular aeroplane. Our rectangle of glass contains the history, for one hour, of all the aeroplanes in graphical form.

To represent the motion of particles in the whole world of space a four-dimensional graph is required. The four-dimensional space in which it is constructed may, following the usual terminology, be spoken of as a four-dimensional continuum. The history of any particle in the universe—just as that of any aeroplane flying over England—will be represented by a continuous line in the continuum, and this is called the "world line" of the particle. If the hypothesis of relativity is true the same continuum and the same world lines will represent the history of the particles of the universe equally well for all observers, the influence of their motions being shown only through their choosing different axes in the continuum for their axes of space and time. Thus the continuum must be thought of as something real and objective, but the choice of axes is subjective and will vary with the observer, the relation between different choices being expressed mathematically by our equations (B), the equations of the Lorentz transformation. An inspection of these equations shows that the sets of axes chosen by different observers have different orientations in the continuum, so that what one observer describes as a pure space interval will appear to another to be a mixture of time and space.

The instant of time and point in space at which any event occurs can be fixed by a single point in the continuum, so that the interval between two events will be represented by a finite line. The events and the interval between them are absolute, but the interval will be split up into time and space in different ways by different observers. The interval between any two events, such as the great fire of London and the outburst on the star Nova Persei, may be measured by one set of observers as so many years and so many millions of miles, but another set of observers may divide the interval quite differently. For instance a terrestrial astronomer may reckon that the outburst on Nova Persei occurred a century before the great fire of London, but an astronomer on the Nova may reckon with equal accuracy that the great fire occurred a century before the outburst on the Nova. A third astronomer may insist that the events were simultaneous. All may be equally right, although none will be right in an absolute sense. At this stage we may notice one respect in which our pile of glass plates failed to represent the true continuum. The mass of glass was stratified into different plates which represent different times for one particular observer. To obtain a section which would represent what an observer in motion relative to this first observer could regard as simultaneous positions of the aeroplanes, we should have to cut the mass of glass on the slant. The continuum is more closely represented by our plates of glass if they are annealed into a solid mass from which all trace of the original stratification is made to disappear. All observers, no matter what their motion, are then equally free to cut a section to represent their individual ideas of simultaneity.

Thus space and time fade into subjective conceptions, just as subjective as right hand or left hand, front and behind, are in ordinary life. The continuum alone is objective and may be thought of as containing an objective record of the motion of every particle of the universe. The curve in which this record is embodied is spoken of as the world line of the particle in question. To use the words of Minkowski: "Space in itself and time in itself sink to mere shadows, and only a kind of union of the two retains an independent existence."

GRAVITATION AND RELATIVITY

Since all the phenomena of light and of electro-magnetism are believed, on almost incontrovertible evidence, to be in accordance with the hypothesis of relativity, it is necessarily impossible to determine absolute velocity by optical or gravitational means. On the other hand, as we have already mentioned, the Newtonian law of gravitation is readily seen to be inconsistent with the hypothesis of relativity. Three alternatives are open:—

(i.) The Newtonian law may be true, in which case it must be possible to determine absolute velocity by gravitational means.

(ii.) The Newtonian law may be untrue in its original form, but may become true when amended so as to conform to the relativity hypothesis.

(iii.) Neither of the foregoing possibilities may be true.

Alternative (i.) was explored by Sir Oliver Lodge, who, assuming the exact truth of the Newtonian law of gravitation, deduced that the observed motion of the perihelion of Mercury could be accounted for if the sun were moving through space with a velocity of about 70km. a second in a certain direction. This investigation had to be abandoned when Eddington pointed out that a similar discussion of the motions of the other planets would lead to vastly different values for the sun's velocity. Alternative (ii.) was explored by Einstein and others, but was found to lead to a motion of the perihelion of Mercury equal only to one-sixth part of that actually observed.

Alternative (iii.) remained with its innumerable possibilities.

Einstein commenced his attack on the problem by eliminating all possibilities which did not conform to two general principles. The first of these was the principle of relativity. Inasmuch as all physical phenomena except gravitation were believed to conform to this principle, it was natural to try, as a working hypothesis, the effect of assuming gravitation also to conform. The second principle was the so-called principle of equivalence, and this demands a word of explanation.

To our children we explain that an apple falls to the ground because a force of gravitation inherent in the earth's mass impels the apple towards the centre of the earth. Most schoolboys know that this is not quite the whole story; the path of the apple is more accurately determined by supposing the apple to be acted on simultaneously by two forces—a gravitational force of attraction towards the earth's centre and the centrifugal force arising from the earth's rotation. It is only because the earth's rotation is comparatively slow that the conception of an attraction towards the earth's centre gives a tolerably plausible account of the fall of the apple. If the earth rotated at 17 times its present rate objects would not fall, even approximately, towards the earth's centre; they would fall always parallel to the earth's axis, and the inhabitants of the northern hemisphere might explain this as arising from a force of repulsion inherent in the pole star. If the earth rotated many times faster even than this, bodies would fall always perpendicularly away from the earth's axis, and this might be interpreted as arising from a gravitational repulsion residing in the earth's axis.

These illustrations will show that it is easy to confuse acceleration arising from the earth's rotation with gravitational attraction. We may go further and say that it is impossible to distinguish between the effects of gravitational attraction and the effects of acceleration of any kind whatever. Every aviator knows this to his sorrow; it is inherently impossible to devise any instrument which shall show the direction of the vertical in an aeroplane, since an acceleration of the aeroplane produces on any instrument whatever, effects which are indistinguishable from those of gravity. From such considerations Einstein was led to his principle of equivalence, which may be enunciated as follows:—

"A gravitational field of force at any point of space is in every way equivalent to an artificial field of force resulting from acceleration, so that no experiment can possibly distinguish between them."

Guided by these two principles—relativity and equivalence—Einstein was led to the view that all gravitational "fields of force" must be illusions. The apparent "force" arises solely from acceleration and there is no other kind of gravitational force at all. In this statement, as in the statement of the principle of equivalence above, the word acceleration is used in its widest sense. Acceleration results not only from change in the amount of a velocity, but from a change in its direction also. For instance a motor-cyclist riding in a circle at a uniform speed of 60 miles an hour will be the subject of an acceleration towards the centre of the circle. He knows that the apparent force so produced is just as real in its effects as gravitation, and to save himself from falling as a result of its influence he must incline the direction of his machine to the vertical.

It is clear that the acceleration or curvature of path which figures as gravitation cannot be an acceleration or curvature in ordinary three-dimensional space. Before the apple starts to fall from the tree there is neither acceleration nor curvature, and yet the apple is undoubtedly acted on by gravitation. Moreover, this three-dimensional space is, as we have seen, different for different observers—it is a subjective and not an objective conception, and the gravitation resulting from such a curvature could not conform to the relativity condition. Einstein was accordingly led to suppose that gravitation arose from curvature in the four-dimensional space, or continuum, in which time formed the fourth dimension. This continuum, as has been seen, is objective and if the path of the particle can also be made objective, the resulting gravitation will conform to the relativity principle. The path of the particle in the continuum is, however, simply its "world line," which we have already had under discussion. This world line is determined by natural laws, and if these are to be objective the specification of the world line must also be objective. There is, however, only one specification of world lines in the continuum which is objective in the sense that the same specification will give the same world lines to observers moving with different velocities. It is that every world line must be so drawn as to represent the shortest path between any two points on it. Mathematically, lines which satisfy this condition are known as *geodesics*. Thus Einstein was led to suppose that world lines must be geodesics in the four-dimensional continuum.

Consider for a moment a page of this volume as presenting a two-dimensional analogy of the continuum. The shortest distance between any two points is of course the straight line joining them, so that the geodesics are simply straight lines. These possess no curvature of path, and if they formed a true analogy to the geodesics in the continuum there could clearly be no explanation of gravitation of the type we have been contemplating. There is, however, another type of two-dimensional surface. It is represented by the surface of a solid body such as a sphere—say the earth. On the earth's surface the geodesics are the great circles; every mariner or aviator who desires to sail the shortest course between two points sails along a great circle. To take a definite instance, the shortest course from Panama to Ceylon is not along the parallel of lat. (about 9°N.) which joins them—the aviator who wishes to fly the shortest course between the two countries will fly north-east from Panama, he will pass over England and finally reach Ceylon from the north-west. The reader may rapidly verify this by stretching a thread tightly over the surface of an ordinary geographical globe. Let him now trace out the course on an ordinary Mercator chart, and it will be found to appear very curved indeed—the course of the aviator will look surprisingly like that of a comet describing an orbit under the attraction of a sun situated somewhere near the middle of the Sahara.

The reader who performs these simple experiments will understand how Einstein was led to suppose that gravitation could be explained by a curvature inherent in the continuum. The world lines of particles are geodesics but the space itself, so to speak, provides the curvature. The curvature of path is thrust upon the particle by the nature of the continuum, but we, who until recently have been unaware even of the existence of the continuum, have been tempted to ascribe it to the action of a special agency which we have invented *ad hoc* and called "gravitation." According to Einstein's view of the nature of gravitation, it is no more accurate to say that the earth attracts the moon than to say that the pockets of an uneven billiard table attract or repel the balls.

Perhaps this train of thought may seem artificial. If so, the reason is that we have not been able to explore the other possibilities which have branched off our main line of thought. In point of fact, Einstein found himself practically limited to the conclusion we have stated. Not only so, but the actual type and degree of curvature in the continuum prove to be uniquely fixed in terms of the masses of the gravitating bodies. Thus Einstein, knowing the mass of the sun, found himself in a position to predict absolutely what the motion of the perihelion of Mercury must be. It was found to be 42·9″ a century, a figure which agreed with observation to well within the limits of error of the observations. The motions of the other planets as predicted by the theory of relativity, have also been found to agree with those observed to within the errors of observation. This latter test is not a very stringent one, since the departures from the motion predicted by the Newtonian law are too small to admit of very precise measurement.

Effect of Gravitation on Light.—Einstein's theory requires that the world line of a ray of light also shall be a geodesic in the continuum. In interstellar space and regions remote from gravitating masses, this merely means that light travels in straight lines. But a star or other massive body distorts the continuum in its neighbourhood by an amount which is proportional to its mass. In the neighbourhood of such a body a ray of light does not travel in a straight line; it is deflected by the gravitational field of the body by an amount which is directly proportional to the mass of the body, and also, of course, depends on how closely

the ray approaches the body. Einstein calculated that a ray of light which comes from a distant star and passes near the edge of the sun on its journey must be bent, in its passage past the sun, by an angle which should be 1·745″ if the ray just grazes the sun, and would be less, in proportion to the inverse distance from the centre of the sun, for other rays.

The observatories of Greenwich and Cambridge despatched expeditions to test this prediction at the eclipse of 1919. It was found that the stars which appeared near to the sun at the instant of eclipse showed an appreciable displacement, as compared with their normal positions, of the type required by Einstein's theory. Exact measurement confirmed that the displacement varied approximately as the inverse distance from the sun, and that the displacement at the limb was sensibly equal to Einstein's predicted value of 1·745″. The Cambridge observers, hampered by cloudy weather, obtained for this quantity the value 1·61″ but with a probable error of 0·30″. The Greenwich observers obtained a value of 1·98″ with a probable error of 0·12″, but Prof. H. N. Russell subsequently pointed out that their photographs contained intrinsic evidence of a horizontal and vertical scale difference of the order of one part in 12,000 almost certainly due to a distortion of the coelostat mirror under the sun's rays, and if the measures are corrected for this the result is brought much closer to the theoretical prediction. Three years later an expedition, sent out by Lick observatory to observe the 1922 eclipse, was favoured by good weather and obtained for the displacement at the sun's limb, a value of 1·72″ with a probable error of 0·11″. None of the expeditions had of course measured the deflections of stars actually at the sun's limb; most of the stars were several diameters away from the limb, the observed deflections being corrected so as to bring them to the limb. The deflections of stars at all distances were found to agree well with the predictions of Einstein's theory.

The Gravitational Shift of Spectral Lines.—The theory makes one further prediction which admits of experimental test. The atoms of any element, say calcium, may be supposed to be formed according to a definite specification, the terms of which depend neither on the velocity of a particular observer nor on his position relative to the gravitational fields of the universe. It can be deduced that the light received from a calcium atom situated in the intense gravitational field near the sun's surface ought to be of slower period, and therefore of redder colour, than the similar light emitted by terrestrial atoms. To be more precise, the Fraunhofer lines in the solar spectrum ought to show a displacement to the red; this displacement ought to be homologous, and should be of amount 0·008 Å units at the cyanogen band λ 3883 at which observations have been chiefly made. Early attempts to test this prediction led to strangely discordant results. All observers found some effect of the kind predicted, but its amount was generally substantially less than the predicted amount, varying from almost *nil* (St. John, 1917) to nearly the full amount to be expected (Evershed, 1918 and 1923, Grebe and Bachem, 1919). The latest measurements of the displacement are those of Evershed (1927). Measuring the mean displacement shown by the lines of 29 prominences, Evershed found that the H and K lines of calcium showed the same mean displacement of 0·009 Å, as compared with 0·008 Å required by theory.

The want of success of the earlier observations is explained by the circumstance that the relativity shift of 0·008 Å is liable to be masked by larger shifts of uncertain amount arising from other causes. Larger shifts would be expected in stars which were of larger mass than the sun or of smaller radii. Many known stars have masses far larger than the sun, but they also have larger radii, and so ought to show only about the same spectral shift as the sun. On the other hand the class of stars known as "white dwarfs" have masses comparable with that of the sun, but far smaller radii. For instance, calculation shows that the companion to Sirius, a star whose radius is only about $\frac{1}{35}$ of that of our sun, ought to show a shift of as much as 0·30 Å. On putting the matter to the test at Mount Wilson observatory, W. S. Adams found an actual shift of 0·32 Å. It is hardly possible any longer to doubt that the spectral shift predicted by Einstein really exists.

ELECTRO-MAGNETIC FORCES

The restricted physical theory of relativity introduced a revolution into the foundations of scientific thought by destroying the objectivity of time and space. The gravitational theory has effected a hardly less important revolution by destroying our belief in the reality of gravitation as a "force." The physicist has, however, to deal with other "forces" besides those of gravitation, namely, the electro-magnetic forces which are concerned in all electrical, magnetic and chemical phenomena, and the question inevitably arises as to whether these also must be regarded as illusions, arising only from our faulty interpretation of the special metrical properties of the continuum. Analysis makes it clear that the continuum as imagined by Einstein has no capacity for simulating any forces beyond those of gravitation. If electro-magnetic forces are evidence of special geometrical properties of the continuum, then the continuum is more complicated even than Einstein imagined.

In a brilliant paper published in 1918 (*Berlin Sitzungsber.*, 1918, p. 465) H. Weyl proved that Einstein's geometry is far from being the most general geometry which is consistent with the general principle of relativity, and showed that certain at least of the forces of electro-magnetism could be explained very naturally by adding an extra degree of complexity to the geometry of the continuum. In the continuum as imagined by Einstein, the length of a measuring rod might change as it was moved about in a gravitational field, but its length at any instant would depend solely on its position in space. Weyl imagined a continuum in which it is meaningless to speak of comparing two lengths at different points; we can compare two lengths at the same point, such as two measuring rods pointing in different directions at the same place, but we can only measure a length by comparison with a standard length already in existence at the point at which the measurement is made. The standard length was peculiar to the point at which it existed, so that Weyl had to imagine the whole of the continuum, every point of space at every instant of time, filled with an infinite series of gauges against which a moving object might be measured. Whether the length of a measuring rod changed as it was moved about would now of course depend on whether the arbitrary selection of gauges had been arranged so as to make it change or so as to keep it constant.

We might, for instance, select the yard as unit length in London, and the metre in Paris. In this case a standard yard transferred to London from Paris might be said to shrink by about a tenth of its length. Suppose now that two standard yards are taken from London to Paris. When we compare them with the standard length at Paris they may both be said to have shrunk, but if we compare them with one another in Paris—and this is possible, even in Weyl's geometry—we may expect to find them both of the same length. If they appear to have shrunk when measured against the Paris unit of length, they have at least shrunk equally.

Imagine first that the two standard yards travel from London to Paris lying side by side in the same box, so that they pass through the same experiences on their journey. If physical changes are governed by a law of causation, so that similar causes always produce the same effects, then the two rods will necessarily have the same length when they arrive in Paris.

Suppose, however, that one standard travelled via Calais and one via Havre. The two rods have now been subjected to different influences on their journey, and there is no *a priori* reason why their lengths should not be different when they arrive in Paris. Weyl's geometry expects, as a matter of course, that their lengths will be different, at least until the contrary is proved. And if the length of one proves to be 0·9143 metres, while that of the other proves to be 0·9144 metres, Weyl's geometry would merely interpret this as evidence that the two rods had travelled by different routes.

The practical working physicist, confronted with two rods which were of equal lengths when they left London, but of different lengths when they reached Paris, would also conclude that they had travelled by different routes, or at least had experienced different physical conditions on their journey. If the measured

rods had travelled side by side packed in the same box he would find the difference in length inexplicable; for why, he would say, if one has shrunk, did not the other shrink by an equal amount. But he would consider the difference in length quite natural if they had travelled by different routes. One might have passed through a succession of heatings and coolings so that fatigue-phenomena had permanently changed its molecular structure, or might have experienced a series of magnetic changes so that hysteresis had affected its length.

The foregoing elementary considerations will show why Weyl's geometry, which attempts to take account of physical forces, and so of varying physical conditions, must necessarily break away from Einstein's geometry, which took no cognizance of physical changes. On Einstein's scheme a measuring rod, or any other piece of matter, had a standard physical state which it eternally carried about with it; it could not expand with heat or contract with cold, and its physical condition did not enter into the discussion at all.

Weyl begins, in effect, by supposing, quite generally, that moving a rod through a small distance will produce a small change in its length, the amount of this change depending on the physical conditions in the small region through which the rod is moved. Any motion of a measuring rod is represented by a world line in the four-dimensional space time continuum. Taking x, y, z as co-ordinates of space and t as time co-ordinate, a small journey, or a small piece of the world line of the measuring rod, will be represented by small changes dx, dy, dz, dt in the values, x, y, z, t. Weyl supposes that this small journey produces a change dl in the length of the rod, l, given by

$$dl = l(\mathrm{F}dx + \mathrm{G}dy + \mathrm{H}dz + \mathrm{K}dt)$$

The factor l occurs outside because the change dl must necessarily be proportional to the length l of the rod; F, G, H and K then depend only on the conditions prevailing at the point $x\ y\ z\ t$ of the continuum, *i.e.*, on the physical conditions in the region occupied by the rod at the instant when the journey is performed.

If two rods move over the same journey, say from London to Paris, and one is found to be slightly longer than the other by a factor $(l - \theta)$ when the two are compared at the end of the journey, it is easily shown that

$$\theta = \int(\mathrm{F}dx + \mathrm{G}dy + \mathrm{H}dz + \mathrm{K}dt)$$

The world lines of the two rods intersect twice, first in London at the beginning of the journey, and again in Paris at the end of the journey. The above integral must be taken round a complete circuit in the four-dimensional continuum, starting from Paris, retracing the journey of the first rod to London, and then starting out again from London and following the route of the second rod to Paris.

The condition that the two rods shall be of the same length when they reach Paris is that $\theta = 0$, or that the integrand $\mathrm{F}dx + \mathrm{G}dy + \mathrm{H}dz + \mathrm{K}dt$ shall be a perfect differential. The conditions for this are expressed by the six equations:—

$$\frac{\delta \mathrm{H}}{\delta y} - \frac{\delta \mathrm{G}}{\delta x} = 0, \text{ etc.}; \quad \frac{\delta \mathrm{K}}{\delta x} - \frac{\delta \mathrm{F}}{\delta t} = 0, \text{ etc.}$$

Compare these with Maxwell's equations for the components (α, β, γ) of magnetic force and the components (x, y, z) of electric force, namely

$$\frac{\delta \mathrm{H}}{\delta y} - \frac{\delta \mathrm{G}}{\delta x} = \alpha, \text{ etc.}; \quad -\mathrm{C}\frac{\delta \Psi}{\delta x} - \frac{\delta \mathrm{F}}{\delta t} = \mathrm{CX}, \text{ etc.}$$

where F, G, H are the components of the magnetic vector-potential, Ψ is the electrostatic potential, and C is the velocity of light. We at once see that if we identify the F, G, H and K which specify the change of length of the measuring rod with Maxwell's F, G, H and $-\mathrm{C}\Psi$, then the condition that θ, the relative change of length, shall be zero, is identical with the condition that all the electric and magnetic forces are zero, so that there is no electro-magnetic field. When this condition is satisfied Weyl's geometry becomes identical with that of Einstein. Since θ is now always zero, the length of a given measuring rod depends only on its position in space and time, and not on the route by which it attained that position, this being a fundamental consequence of Einstein's scheme.

Weyl's extension of Einstein's scheme consists in introducing the four quantities we have denoted by F, G, H and K, and identifying them with Maxwell's F, G, H and $-\mathrm{C}\Psi$. This is equivalent, as we have just seen, to introducing the magnetic forces α, β, γ and the electric forces X, Y, Z into his geometry. It is now possible to explain all electro-magnetic phenomena in free space in terms of geometry, for all such phenomena can be deduced from Maxwell's equations.

Einstein's theory of gravitation differed slightly from that of Newton, and so predicted slightly different phenomena. These slight differences made direct experimental tests between the two theories possible and these were found to decide in favour of Einstein. Weyl's theory, on the other hand, is formally identical with that of Maxwell, and so predicts precisely the same phenomena in free space. For this reason no experimental test between the two theories is possible.

In 1921 Eddington extended Weyl's geometry into a still more general system of geometry, in which even lengths at the same point were not assumed to be capable of direct comparison. This geometry had a certain advantage over Weyl's original geometry in that the terms which were ultimately called on to explain electro-magnetic phenomena occurred naturally as a necessary development of the geometry. In Weyl's geometry the necessary terms are shaped to fill a gap, and it is then found that they fit exactly. In Eddington's geometry no shaping is necessary, or, rather, the shaping process is performed off the stage or before the curtain rises. The gravitational and electro-magnetic forces are accounted for by the symmetrical and antisymmetrical parts of a single tensor, so that an electro-magnetic field appears almost to be a necessary accompaniment to a gravitational field. But Eddington's geometry, like that of Weyl, predicts precisely the same phenomena as Maxwell's classical electro-magnetic theory, so that again experimental test is impossible.

Both these geometries are successful in interpreting the electro-magnetic field in free space in terms of geometry, but show less success in interpreting the ponderomotive forces on charged bodies, electrons, protons, etc. The difficulty is not that they cannot explain the observed forces, but that they do not explain them in a simple, natural way, and that they explain too much. Although nothing less than the proposed geometries would have sufficed to explain the electro-magnetic field in free space, it looks as if something less would be adequate to explain the ponderomotive forces exerted by the field on its own electric charges. The proposed geometries are too rich and predict not only observed phenomena but also others which have then to be explained away as being incapable of observation.

After making great advances in the direction of clearing away these difficulties, Einstein washed his hands of the whole attempt in 1926.

Later Einstein proposed a scheme based on a geometry fundamentally different from either of the foregoing, which he describes as the "Unitary Field Theory." His main object is to avoid the dualism by which the gravitational field and the electro-magnetic field were exhibited in former theories as independent constructions in the space-time continuum, and instead to display "both types of field as manifestations of one comprehensive type of spatial structure in the space-time continuum." The new theory resulted from the discovery that types of geometry exist in which distant lines may be parallel, but in which lengths in the neighbourhood of a point obey laws of measurement of the same type (Riemannian) as in the simple purely gravitational theory, so that the geometry is not Euclidean. The new geometry has been described as a geometry in which there can be parallels but not parallelograms; if we attempt to draw a figure which is to have pairs of equal and parallel lines as its opposite sides, we find that the parallelogram we are attempting to build refuses to close up at its fourth corner. So far Einstein has developed the consequences of his "Unitary Field Theory" to a first approximation only. The new theory obviously escapes some of the reproaches which have been brought against its predecessors; whether it has any claims to finality remains to be seen.

The Position of the Ether.—It is clear that the doctrine of relativity must profoundly affect our views of the ether and its function in the scheme of the universe. At one stage in the history of science, there was a tendency to imagine space filled with innumerable ethers, to the extent almost of one ether for every set of phenomena requiring explanation. That stage passed, and by the end of the 19th century only one ether received serious consideration, the so-called electro-magnetic ether of Faraday and Maxwell. This ether gave a plausible mechanical explanation of electrostatic phenomena, although it was more than doubtful whether it could account for the electro-magnetic phenomena from which it took its name, and it was comparatively certain that it could not account for gravitation. It gave, however, a satisfactory explanation of the propagation of waves of light—they were simply waves in the ether which travelled with an absolute velocity c determined once and for all by the structure of the ether. On this view it was quite certain that an observer moving through the ether with a velocity u would measure the velocity of light travelling in the same direction as himself as $c-u$. Relativity, teaching that this velocity is always precisely c, dismisses the particular type of ether imagined by Faraday and Maxwell. Whether any new ether will be devised to replace it remains to be seen, but none appears to be necessary. Any ether which can be imagined would appear to depend upon an objective separation of time and space. Relativity does not deny that such an objective separation may, in the last resort, really exist, but it shows that no material phenomena are concerned with such a separation. By a very slight turn of thought, the primary postulate of relativity may be expressed in the form that the material world goes on as though no ether existed.

To the relativist the essential background to the picture of the universe is not the varying agitation of a sea of ether in a three-dimensional space but a tangle of world lines in a four-dimensional space. Only the intersections of the world lines are important. An intersection at a point in the continuum represents an event, while the part of a world line which is free from intersections represents the mere uneventful existence of a particle or a pulse of light. And so, since our whole knowledge of the universe is made up of events, it comes about that the tangle of world lines may be distorted and bent to any degree we please; so long as the order of the intersections is not altered, it will still represent the same universe. Thus the last function of the ether, that of providing a scale of absolute measurements in space, becomes a superfluity. To the physicist who urges that space measurements without an underlying ether become meaningless, the relativist can reply that time-measurements without an underlying "time-ether" are equally meaningless. A "time-ether" has never been regarded as a necessity, and the relativist may fairly argue that the "space-ether" has no greater claim to retention.

Probably, however, final judgment on this, as on other similar questions, must be suspended until the position of electro-magnetic forces in the general scheme of relativity is better understood than it is now.

COSMOLOGY

According to the simple views of space and time which prevailed before the advent of relativity, time had no properties except duration, and space had no properties except extension. Every instant of time was, in its essence, precisely similar to every other instant of time, so that time must go on forever unless it was stopped by something different from time; it could not end of itself, for this would require the last instant of time to have different properties from all other instants of time. Similarly all elements of space were supposed to be intrinsically of the same nature and thus required that space should extend to infinity in all directions unless it were abruptly ended by something that was not space.

Einstein's theory of relativity changed all this. According to this theory the space-time in the neighbourhood of a gravitating mass is essentially different from space-time which is far away from all masses; the former is curved, while the latter, at least if all gravitating masses are infinitely far away, is not. The curvature of the space-time in the neighbourhood of the sun causes the planets to describe ellipses, whereas if all masses were infinitely removed, they would describe straight lines. When it is once admitted that all elements of space-time are not intrinsically similar, no reason remains either why space should be of infinite extent or why time should be of infinite duration.

On Einstein's theory, the curvature of space-time at any point of the continuum is proportional to the value of the gravitational potential at the point. To calculate this we must take the different masses of the universe in turn, divide each by its distance from the point in question, and add together the quotients so obtained. When this is done it is found that, unless there happens to be a large mass very near to the point, distant stars and masses contribute far more to the gravitational potential than near ones. The distant masses have to be divided by a greater distance, but are so much more numerous than the near masses that their greater numbers more than compensate for their distance. Accordingly, except in the near neighbourhood of massive bodies, the curvature of the continuum is determined by the distant masses of the universe, and there will be a regular and continuous field of curvature, disturbed only in the neighbourhood of massive bodies, by the additional curvature impressed by these bodies. An analogy in two dimensions is provided by the spherical surface of the earth, which we may imagine to be deformed here and there by mole-hills or other small undulations; these correspond to the local curvatures which are impressed on the general curvature of space by the proximity of massive bodies.

When our ancestors found that the earth's surface was curved it was natural for them to suppose that its curvature bent it round into a closed surface, so that a traveller continually following a straight path could come back to his starting point. The earth might have been shaped like a saucer or a basin, but it was much simpler and more natural to suppose it to be spherical. In the same way when the space-time continuum is found to be curved with a fairly uniform curvature, it is natural to conjecture that this curvature of itself closes the continuum and so reduces it to finite dimensions. There still remain innumerable different ways in which this can be effected.

The general curvature of the continuum at any point is determined by the distant masses of the universe, so that if space is closed, the volume of this space and the distribution of masses inside it must determine its curvature at every point. The curvature in turn fixes the volume and this will not be the volume from which we started unless the masses are of exactly the right amount. Thus we see that a universe of given size requires masses of a certain amount to maintain it at this size, and, conversely, given masses require a universe of a certain definite size in which to exist. In the simplest case in which the matter is supposed to be spread uniformly throughout the universe, the total mass of the universe is proportional to its radius, or, what is the same thing, both the mass and the radius of the universe vary inversely as the square root of the density of the matter. Thus a great amount of matter requires a large universe in which to exist, and exists in this universe in a highly attenuated state, whereas a small amount of matter must have a small universe in which it exists in a state of high density.

De Sitter attempted in 1917 to calculate the radius of the universe from the observed mean density of matter, but his estimate for this observed mean density, namely, 10^{-26} was probably far too high. In 1926 Hubble estimated the mean density of matter in space to be of the order of $1{\cdot}5 \times 10^{-31}$ grammes per cubic centimetre, and calculated the radius of the universe to be $8{\cdot}5 \times 10^{28}$ centimetres or 88,000 million light years. This is about 600 times the greatest distance at which spiral nebulae are visible in the great 100-inch telescope at Mount Wilson, so that we may say that the range of vision of this telescope is one six-hundredth part of the radius of the universe. The mass corresponding to this size of universe is $1{\cdot}8 \times 10^{57}$ grammes or about 900,000 million million million times the mass of the sun.

These calculations have been made on the supposition that, apart from local irregularities, the curvature of space is the same everywhere so that space is spherical; this is consistent with the

assumption that the mean density of matter has a uniform value throughout space.

There is no reason why space should not, to an approximation, be spherical, but it is unlikely that the whole continuum can be. The cross-section of the continuum which corresponds to a given instant of time is the spatial universe at that instant, and if the continuum were spherical, this cross-section would be of ever-varying size, so that the mass of the universe would have to vary continually.

For this and other reasons Einstein imagines the continuum to be cylindrical as regards its extension in time, but spherical as regards its extension in space, so that cross-sections at different instants always give a spherical universe of constant size and so of constant mass.

To avoid the difficulty of writing and reading in terms of four-dimensional time-space, let us abstract two dimensions from space, so that the continuum becomes two-dimensional, one dimension representing space and the other representing time. The axis of time may be conveniently supposed to be vertical, the past being down below and the future up above. A horizontal cross-section will give the state of the universe at any instant; this horizontal cross-section will consist of a line, on which all the particles of the universe will lie; we may think of them as beads on a wire, capable only of motion backwards and forwards along the wire.

In terms of this simplified scheme, the primitive cosmology of pre-relativity days would represent the continuum by a plane which extended to infinity in all directions, both of space and time. In accordance with Newton's first Law of Motion the world lines of particles are straight lines in the plane, except in so far as the particles are compelled by impressed "forces" to depart from these straight lines. It is convenient to take as unit of length the distance travelled by light in the unit of time, so that unless the particles move with velocities comparable with that of light, their world lines are approximately parallel to the axis of time, and so are nearly vertical. The world lines of rays of light are straight lines inclined at angles of 45° to the vertical.

Einstein's cosmology replaces this plane by a right circular cylinder, whose axis is the axis of time. The world lines of particles whose velocity is small compared with that of light are vertical lines on this cylinder. The world line of a ray of light is a helix which travels round and round the cylinder, always making an angle of 45° with the horizontal. This meets the world line of a particle an infinite number of times at intervals of time apart, each of which represents the time taken for light to travel completely round the universe. A consequence, which is of greater interest theoretically than practically, is that an observer would see an infinite number of images of every star, exhibiting its state at successive epochs in its development, these being separated by the time taken for light to travel round the universe.

De Sitter has proposed a modification of Einstein's cosmology which is free from this last feature. He replaces Einstein's cylinder by a hyperboloid of one sheet on which the rectilinear generators are inclined at an angle of 45° to the vertical. These rectilinear generators now represent the paths of rays of light, while the world lines of particles are hyperbolae, which are nearly in vertical planes provided that the velocities of the particles are small in comparison with that of light. In this scheme the world lines of a particle and of a light ray only intersect once. De Sitter's scheme requires that the distances of particles from one another should increase with the progress of time, so that the relative velocities of pairs of objects in the universe ought to be mainly velocities of recession. With few exceptions the spectra of the spiral nebulae are observed to show a strong displacement of their lines towards the red. This is generally interpreted as evidence of a velocity of recession which appears to average some 700km. a second, and if this is the true interpretation, it obviously lends some support to De Sitter's scheme of cosmology.

Modifications of the schemes of Einstein and De Sitter have been proposed by Weyl and Lanczos, but astronomical observation has so far provided no means either of deciding between the original schemes or between the proposed modifications.

BIBLIOGRAPHY.—General: A. S. Eddington, *Space, Time and Gravitation* (1921); A. Einstein, *The Meaning of Relativity* (1922); H. Weyl, *Space, Time and Matter* (1922); A. N. Whitehead, *The Principle of Relativity* (1922); T. P. Nunn, *Relativity and Gravitation* (1923); *The Mathematical Theory of Relativity* (1924); Bertrand Russell, *A.B.C. of Relativity* (1925); E. T. Whittaker, "The Outstanding Problems of Relativity," *Nature*, 120, p. 368 (1927); A. S. Eddington, "Einstein's Field-Theory," *Nature*, 123, p. 280 (1929).

Technical: A. Einstein, "Zur Elektrodynamik bewegter Körper," *Ann. d. Physik*, 17, p. 891 (1905); A. Einstein, "Die Grundlage der Allgemeinen Relativitätstheorie," *Ann. d. Physik*, 49, p. 769 (1916); W. de Sitter, "On Einstein's Theory of Gravitation and its Astronomical Consequences," *Monthly Notices, Royal Astronomical Soc.*, vol. lxxvii. (1917); H. Weyl, "Gravitation und Elektricität," *Sitzungsberichte Berliner Akademie*, p. 465, (1918); A. S. Eddington, "A Generalisation of Weyl's Theory of the Electromagnetic and Gravitational Fields," *Proc. Roy. Soc.*, A. vol. lxxxxix. (1921); A. Einstein, "Zur allgemeinen Relativitätstheorie," *Sitzungsberichte Berliner Akademie*, p. 32 (1923); K. Lanczos, "Über eine stationäre Kosmologie im Sinne der Einsteinschen Gravitationstheorie," *Zeitschrift für Physik*, vol. xxi. (1924); A. Einstein, "Einheitliche Feldtheorie von Gravitation und Elektricität," *Sitzungsberichte Berliner Akademie*, p. 414 (1925); A. S. Eddington, *The Nature of the Physical World* (1928); A. Einstein, *Zur Einheitlichen Feldtheorie*, (1929). (J. H. J.)

RELATIVITY: PHILOSOPHICAL CONSEQUENCES. Of the consequences in philosophy which may be supposed to follow from the theory of relativity (*q.v.*), some are fairly certain, while others are open to question. There has been a tendency, not uncommon in the case of a new scientific theory, for every philosopher to interpret the work of Einstein in accordance with his own metaphysical system, and to suggest that the outcome is a great accession of strength to the views which the philosopher in question previously held. This cannot be true in all cases; and it may be hoped that it is true in none. It would be disappointing if so fundamental a change as Einstein has introduced involved no philosophical novelty. (*See* SPACE-TIME.)

Space-time.—For philosophy, the most important novelty was present already in the special theory of relativity; that is, the substitution of space-time for space and time. In Newtonian dynamics, two events were separated by two kinds of interval, one being distance in space, the other lapse of time. As soon as it was realised that all motion is relative (which happened long before Einstein), distance in space became ambiguous except in the case of *simultaneous* events, but it was still thought that there was no ambiguity about simultaneity in different places. The special theory of relativity showed, by experimental arguments which were new, and by logical arguments which could have been discovered any time after it became known that light travels with a finite velocity, that simultaneity is only definite when it applies to events in the same place, and becomes more and more ambiguous as the events are more widely removed from each other in space.

This statement is not quite correct, since it still uses the notion of "space." The correct statement is this: Events have a four-dimensional order, by means of which we can say that an event A is nearer to an event B than to an event C; this is a purely ordinal matter, not involving anything quantitative. But, in addition, there is between neighbouring events a quantitative relation called "interval," which fulfils the functions both of distance in space and of lapse of time in the traditional dynamics, but fulfils them with a difference. If a body can move so as to be present at both events, the interval is time-like. If a ray of light can move so as to be present at both events, the interval is zero. If neither can happen, the interval is space-like. When we speak of a body being present "at" an event, we mean that the event occurs in the same place in space-time as one of the events which make up the history of the body; and when we say that two events occur at the same place in space-time, we mean that there is no event between them in the four-dimensional space-time order. All the events which happen to a man at a given moment (in his own time) are, in this sense, in one place; for example, if we hear a noise and see a colour simultaneously, our two perceptions are both in one place in space-time.

When one body can be present at two events which are not in one place in space-time, the time-order of the two events is not ambiguous, though the magnitude of the time-interval will be different in different systems of measurement. But whenever the

interval between two events is space-like, their time-order will be different in different equally legitimate systems of measurement; in this case, therefore, the time-order does not represent a physical fact. It follows that, when two bodies are in relative motion, like the sun and a planet, there is no such physical fact as "the distance between the bodies at a given time"; this alone shows that Newton's law of gravitation is logically faulty. Fortunately, Einstein has not only pointed out the defect, but remedied it. His arguments against Newton, however, would have remained valid even if his own law of gravitation had not proved right.

The fact that time is private to each body, not a single cosmic order, involves changes in the notions of substance and cause, and suggests the substitution of a series of events for a substance with changing states. The controversy about the ether thus becomes rather unreal. Undoubtedly, when light-waves travel, events occur, and it used to be thought that these events must be "in" something; the something in which they were was called the ether. But there seems no reason except a logical prejudice to suppose that the events are "in" anything. Matter, also, may be reduced to a law according to which events succeed each other and spread out from centres; but here we enter upon more speculative considerations.

Physical Laws.—Prof. Eddington has emphasised an aspect of relativity theory which is of great philosophical importance, but difficult to make clear without somewhat abstruse mathematics. The aspect in question is the reduction of what used to be regarded as physical laws to the status of truisms or definitions. Prof. Eddington, in a profoundly interesting essay on "The Domain of Physical Science," states the matter as follows:—

> In the present stage of science the laws of physics appear to be divisible into three classes—the identical, the statistical and the transcendental. The "identical laws" include the great field-laws which are commonly quoted as typical instances of natural law—the law of gravitation, the law of conservation of mass and energy, the laws of electric and magnetic force and the conservation of electric charge. These are seen to be identities, when we refer to the cycle so as to understand the constitution of the entities obeying them; and unless we have misunderstood this constitution, violation of these laws is inconceivable. They do not in any way limit the actual basal structure of the world, and are not laws of governance (*op. cit.*, pp. 214–215).

It is these identical laws that form the subject-matter of relativity theory; the other laws of physics, the statistical and transcendental, lie outside its scope. Thus the net result of relativity theory is to show that the traditional laws of physics, rightly understood, tell us almost nothing about the course of nature, being rather of the nature of logical truisms.

This surprising result is an outcome of increased mathematical skill. As the same author says elsewhere:—

> In one sense deductive theory is the enemy of experimental physics. The latter is always striving to settle by crucial tests the nature of the fundamental things; the former strives to minimise the successes obtained by showing how wide a nature of things is compatible with all experimental results.

The suggestion is that, in almost any conceivable world, *something* will be conserved; mathematics gives us the means of constructing a variety of mathematical expressions having this property of conservation. It is natural to suppose that it is useful to have senses which notice these conserved entities; hence mass, energy, and so on *seem* to have a basis in our experience, but are in fact merely certain quantities which are conserved and which we are adapted for noticing. If this view is correct, physics tells us much less about the real world than was formerly supposed.

Force and Gravitation.—An important aspect of relativity is the elimination of "force." This is not new in idea; indeed, it was already accepted in rational dynamics. But there remained the outstanding difficulty of gravitation, which Einstein has overcome. The sun is, so to speak, at the summit of a hill, and the planets are on the slopes. They move as they do because of the slope where they are, not because of some mysterious influence emanating from the summit. Bodies move as they do because that is the easiest possible movement in the region of space-time in which they find themselves, not because "forces" operate upon them. The apparent need of forces to account for observed motions arises from mistaken insistence upon Euclidean geometry; when once we have overcome this prejudice, we find that observed motions, instead of showing the presence of forces, show the nature of the geometry applicable to the region concerned. Bodies thus become far more independent of each other than they were in Newtonian physics: there is an increase of individualism and a diminution of central government, if one may be permitted such metaphorical language. This may, in time, considerably modify the ordinary educated man's picture of the universe, possibly with far-reaching results.

Realism in Relativity.—It is a mistake to suppose that relativity adopts an idealistic picture of the world—using "idealism" in the technical sense, in which it implies that there can be nothing which is not experience. The "observer" who is often mentioned in expositions of relativity need not be a mind, but may be a photographic plate or any kind of recording instrument. The fundamental assumption of relativity is realistic, namely, that those respects in which all observers agree when they record a given phenomenon may be regarded as objective, and not as contributed by the observers. This assumption is made by common sense. The apparent sizes and shapes of objects differ according to the point of view, but common sense discounts these differences. Relativity theory merely extends this process. By taking into account not only human observers, who all share the motion of the earth, but also possible "observers" in very rapid motion relatively to the earth, it is found that much more depends upon the point of view of the observer than was formerly thought. But there is found to be a residue which is not so dependent; this is the part which can be expressed by the method of "tensors." The importance of this method can hardly be exaggerated; it is, however, quite impossible to explain it in non-mathematical terms.

Relativity Physics.—Relativity physics is, of course, concerned only with the quantitative aspects of the world. The picture which it suggests is somewhat as follows:—In the four-dimensional space-time frame there are events everywhere, usually many events in a single place in space-time. The abstract mathematical relations of these events proceed according to the laws of physics, but the intrinsic nature of the events is wholly and inevitably unknown except when they occur in a region where there is the sort of structure we call a brain. Then they become the familiar sights and sounds and so on of our daily life. We know what it is like to see a star, but we do not know the nature of the events which constitute the ray of light that travels from the star to our eye. And the space-time frame itself is known only in its abstract mathematical properties; there is no reason to suppose it similar in intrinsic character to the spatial and temporal relations of our perceptions as known in experience. There does not seem any possible way of overcoming this ignorance, since the very nature of physical reasoning allows only the most abstract inferences, and only the most abstract properties of our perceptions can be regarded as having objective validity. Whether any other science than physics can tell us more, does not fall within the scope of the present article.

Meanwhile, it is a curious fact that this meagre kind of knowledge is sufficient for the *practical* uses of physics. From a practical point of view, the physical world only matters in so far as it affects us, and the intrinsic nature of what goes on in our absence is irrelevant, provided we can predict the effects upon ourselves. This we can do, just as a person can use a telephone without understanding electricity. Only the most abstract knowledge is required for practical manipulation of matter. But there is a grave danger when this habit of manipulation based upon mathematical laws is carried over into our dealings with human beings, since they, unlike the telephone wire, are capable of happiness and misery, desire and aversion. It would therefore be unfortunate if the habits of mind which are appropriate and right in dealing with material mechanisms were allowed to dominate the administrator's attempts at social constructiveness.

BIBLIOGRAPHY.—A. S. Eddington, *Space, Time and Gravitation* (Cambridge, 1921); Bertrand A. W. Russell, *The A. B. C. of Relativity* (1925).

(B. A. W. R.)

RELEASE, in law, the term applied to the discharge of some obligation, by which it is extinguished (*see* DEBT), and to the

conveyance of an estate or interest in real or personal property to one who has already some estate or interest therein. For the special form of conveyancing known as "lease and release," *see* LEASE.

RELICS, the name given in the Church to, (1) the bodies of the saints, or portions of them, (2) such objects as the saints made use of during their lives, or as were used at their martyrdom (Lat., *reliquiae,* the equivalent of the English "remains" in the sense of a dead body). These objects are held by the Church in religious veneration, and by their means it hopes to obtain divine grace and miraculous benefits (*Conc. Trid.* sess. 24).

These ideas had taken shape, in all essentials, during the early days of the Church, underwent further development in the middle ages, and were maintained by the Roman Church in the face of the opposition of the Reformers, while all the Protestant Churches rejected them.

The origins of the veneration of relics lie in the anxiety for the preservation of the bodies of the martyrs. The church at Smyrna at the death of their bishop Polycarp (155) collected and buried the remains of the martyr in order duly to celebrate the anniversary of the martyrdom at the place of burial.

The custom of which we have here for the first time an account had become universal by the 3rd century. In all parts the Christians assembled on the anniversary of the martyrs' death at their graves, to celebrate the Agape and the Eucharist at this spot. It was a favourite custom to bury the dead near the graves of the martyrs; and it was the highest wish of many to "rest with the saints." It was the body lying in the tomb which was venerated (*see* Euseb. *Hist. eccl.* vii. 11, 24; viii. 6, 7).

But these customs soon underwent a further development. About the end of the 3rd and the beginning of the 4th century it became customary for the bodies of the martyrs not to be buried, but preserved for the purpose of veneration. Already individual Christians began to possess themselves of portions of the bodies of martyrs, and to carry them about with them. Both these practices met with criticism and opposition, especially from the leading men of the Church. According to the testimony of Athanasius of Alexandria, the hermit Anthony decided that it should be held to be unlawful and impious to leave the bodies of the martyrs unburied (*Vita Ant.* 90). In Carthage the archdeacon and later the bishop Caecilianus severely blamed a certain Lucilla for carrying about with her a relic which she used to kiss before receiving the Eucharist (Optatus, *De schism. Donat.* i. 16). The compiler of the *Acta S. Fructuosi,* a Spanish ecclesiastic, represents the martyred bishop as himself requesting the burial of his relics. But energetic as the opposition was, it was unsuccessful, and died out. For in the meantime opinion as to the efficacy of relics had undergone a transformation, parallel with the growth of the theory, which soon predominated in the Church, that material instruments are the vehicles of divine grace. When the Christians of Smyrna decided that the bones of the martyrs were of more worth than gold or gems, and when Origen (*Exh. ad mart.* 50) spoke of the precious blood of the martyrs, they were thinking of the act of faith which the martyrs had accomplished by the sacrifice of their life. Now, on the other hand, the relic came to be looked upon as in itself a thing of value as the channel of miraculous divine powers. These ideas are set forth by Cyril of Jerusalem. He taught that a certain power dwelt in the body of the saint, even when the soul had departed from it; just as it was the instrument of the soul during life, so the power passed permanently into it (*Cat.* xviii. 16). This was coming very near to a belief that objects which the saints had used during their life had also a share in their miraculous powers. And this conclusion Cyril had already come to (*loc. cit.*).

We can see how early this estimate of relics became general from the fact that the former hesitation as to whether they should be venerated as sacred died out during the 4th century. The Fathers of the Greek Church especially were united in recommending the veneration of relics. All the great theologians of the 4th and 5th centuries may be quoted as evidence of this: Eusebius of Caesarea (*Praep. Ev.* xiii. 11), Gregory of Nazianzus (*Orat. in Cypr.* 17), Gregory of Nyssa (*Orat. de. S. Theod. Mart.*), Basil of Caesarea (*Ep.* ii. 197), Chrysostom (*Laud. Drosidis*), Theodoret of Cyrus (*Inps. 67,* 11), etc. John of Damascus, the great exponent of dogma in the 8th century, gave expression to the result of a uniform development which had been going on for centuries when he taught that Christ offers the relics to Christians as means of salvation.

Such was the theory; and the practice was in harmony with it. Throughout the whole of the Eastern Church the veneration of relics prevailed. Nobody hesitated to divide up the bodies of the saints in order to afford as many portions of them as possible. They were shared among the inhabitants of cities and villages, Theodoret tells us, and cherished by everybody as healers and physicians for both body and soul (*Decur. Graec. aff.* 8). The transition from the true relic to the hallowed object was especially common. Jerusalem, as early as the time of Eusebius, rejoiced in the possession of the episcopal chair of James the Just (*Hist. eccl.* vii. 19); and as late as the 4th century was discovered the most important of the relics of Christ, the cross which was alleged to have been His. Cyril of Jerusalem already remarks that the whole world was filled with portions of the wood of the cross (*Cat.* iv. 10).

The development which the veneration of relics underwent in the West did not differ essentially from that in the East. The only doubt which was felt was as to whether the bodies of the saints should be divided, and removed from their original resting-place. Both practices were forbidden by law under the emperor Theodosius I. (*Cod. Theodos.* ix. 17, 7), and the division of the bodies of martyrs into pieces was prohibited for centuries. Even Pope Gregory I., in a letter to the empress Constantia, disapproved it (*Ep.* iv. 30). Ambrose of Milan, by the discovery of the relics of Protasius and Gervasius (cf. *Ep.* 22 and Augustine, *Confess.* ix. 7), started in the West the long series of discoveries and translations of hitherto unknown relics. His example was followed, to name only the best known instances, by Bishop Theodore of Octodurum (now Martigny in the canton of Vaud), who discovered the relics of the Theban legion alleged to have been destroyed by the emperor Maximian on account of its belief in the Christian faith (see *Passio Acaun. Mart.* 16), and by Clematius, a citizen of Cologne, to whom the virgin martyrs of this city revealed themselves (Kraus, *Inschriften der Rheinlande,* No. 294), afterwards to be known as St. Ursula and her eleven thousand virgins.

The West was much poorer in relics than the East. Rome, it is true, possessed in the bodies of Peter and Paul a treasure the virtue of which outshone all the sacred treasures of the East. But many other places were entirely wanting in relics. By the discoveries which we have mentioned their number was notably increased. But the longing for these pledges of the divine assistance was insatiable. In order to satisfy it relics were made by placing pieces of cloth on the graves of the saints, which were afterwards taken by the pilgrims to their homes and venerated. The same purpose was served by oil taken from the lamps burning at the graves, flowers from the altars, water from some holy well, pieces of the garments of saints, earth from Jerusalem, and especially keys which had been laid on the grave of St. Peter at Rome. All these things were not looked upon as mementos, but the conviction prevailed that they were endowed with a miraculous power, which had passed into them through contact with that which was originally sacred (*cf.* Greg. Tur. *De Glor. Mart.* i. 25; Greg. I. *Ep.* iv. 29, No. 30). A dishonest means of satisfying the craving for relics was that of forging them, and how common this became can be gathered from the many complaints about spurious relics (Sulp. Sev. *Vita Mart.* 8; Aug. *De op. mon.* 28; Greg. I. *Ep.* iv. 30, etc.).

But in the long run these substitutes for relics did not satisfy the Christians of the West, and, following the example of the Eastern Church, they took to dividing the bodies of the saints. Mediaeval relics in the West also were mostly portions of the bodies of saints or of things which they had used during their lives. The veneration of relics also received a strong impulse from the fact that the Church required that a relic should be deposited

in every altar. Among the first of those whom we know to have attached importance to the placing of relics in churches is Ambrose of Milan (*Ep.* 22), and the 7th general council of Nicaea (787) forbade the consecration of churches in which relics were not present, under pain of excommunication. This has remained part of the law of the Roman Catholic Church.

The most famous relics discovered during the middle ages were those of the apostle James at St. Jago de Compostella in Spain (*see* PILGRIMAGE), the bodies of the three kings, which were brought from Milan to Cologne in 1164 by the emperor Frederick I. (*Chron. reg. Colon.* for the year 1164), the so-called *sudarium* of St. Veronica, which from the 12th century onwards was preserved in the Capella Santa Maria ad praesepe of St. Peter's in Rome (*see* Dobschütz, *Christusbilder*, p. 218 *seq.*), and the seamless robe of Christ, the possession of which lent renown to the cathedral of Trier since the beginning of the 12th century (*Gesta Trevir., Mon. Germ. Scr.* viii. p. 152).

The number of relics increased to a fabulous extent during the middle ages. There were churches which possessed hundreds, even thousands, of relics. In the cathedral of Eichstätt were to be found, as early as 1071, 683 relics (Gundech, *Lib. pont. Eist., Mon. Germ. Scr.* vii. p. 246 *seq.*); the monastery of Hirschau had 222 in the year 1091 (*De cons. mai. mon., Mon. Germ. Scr.* xiv. p. 261); the monastery of Stedernburg 515 in the year 1166 (*Ann. Sted. Scr.* xvi. p. 212 *seq.*). But these figures are trifling compared with those at the end of the middle ages. In the year 1520 could be counted 19,013 in the Schlosskirche at Wittenberg, and 21,483 in the Schlosskirche at Halle in 1521 (Köstlin, *Friedrich der W., und die Schlosskirche zu Wittenberg*, p. 58 *seq.*; Redlich, *Cardinal Albrecht und das Neue Stift zu Halle*, p. 260). There were also collections on the same scale belonging to individuals; a patrician of Nuremberg named Muffel had possession of 308 relics (*Chroniken der deutschen Städte*, xi. p. 745).

It is curious that while the popular craving for relics had passed all bounds, mediaeval theology was very cautious in its declarations on the subject of the veneration of relics. Thomas Aquinas based his justification of them on the idea of reverent commemoration; since we venerate the saints, we must also show reverence for their relics, for whoever loves another does honour to that which remains of him after death. On this account it is our duty, in memory of the saints, to pay due honour to their relics and especially to their bodies, which were the temples and dwellings of the Holy Ghost in which He dwelt and worked, and which in the resurrection are to be made like to the body of Christ; and likewise because God honours them, in that He works wonders in their presence (*Summa theol.* iii. qu. 25, art. 6). The great scholastic philosopher abandoned the theory that the relics in themselves are vessels and instruments of the divine grace and miraculous power. But these ideas were revived, on the other hand, by the Catholicism of the counter-Reformation, which again taught and teaches that God grants many benefits to mankind through the sacred bodies of the martyrs (*Conc. Trid.* sess. xxv.). The doctrine has adapted itself to the popular belief.

(A. HK.)

RELIEF, in sculpture a term signifying ornament, a figure or figures raised from the ground of a flat surface, of which the sculptured portion forms an inherent part of the body of the whole. The design may be in high relief—"alto-relievo" (*q.v.*), or low relief—"bas-relief" or "basso-relievo" (*q.v.*). The Egyptians merely sunk the outlines and barely suggested the modelling of the figures, which never projected beyond the face of the surrounding ground. The Persians, the Etruscans and the Greeks carried on the art to the highest perfection, alike in sculpture and architectural ornament, and they applied it to gem sculpture, as in the case of "cameo" (*q.v.*). Similarly, the inverse treatment of relief—that is, sunk *below* the surface, in order that when used for seals a true relief is obtained—was early brought to great completeness; this form of engraving is called "intaglio" (*q.v.*). The degree of projection in relief, broadly speaking, has varied greatly with the periods of art. Thus, in Byzantine and Romanesque art the relief was low. In Gothic it increased with the increased desire to render several planes one behind the other. With the Renaissance it became still more accentuated. Very full in Louis XIV. and Louis XV. styles, in Louis XVI. it is considerably reduced.

The term "relief" is also used as follows: it was one of the feudal incidents between lord and vassal, and consisted of a payment to the lord in kind or money made by the heir on the death of the ancestor for the privilege of succession, for, fiefs not being hereditary, the estate had lapsed to the lord. The word is also generally used, in law, for any exemption granted by a court from the strict legal consequences of an act. And also for the assistance given to the indigent poor by the Poor Law authorities.

RELIGION AND THEOLOGY, ARTICLES ON. For the purpose of enumerating the main articles in this section, a division will be made into (1) Christian, and (2) Non-Christian.

(1) CHRISTIAN

The number of articles on the different aspects of Christian doctrine, faith and Church is so great that nothing beyond a casual selection of titles can be made here. Anything approaching a complete guide to the separate religious divisions would be a lengthy index of titles of differing merit. To begin with, all the prophets of the Old Testament, all the disciples of the New Testament, and all the books of the Bible have separate articles under their own headings. Special terms occurring in the Scriptures, such as ALPHA AND OMEGA; ARMAGEDDON; APOSTLE; ANGEL, etc., have articles to themselves, where their meaning and connection with other passages in Holy Writ are given in some detail. The article BIBLE is divided, for convenience of reference, into sections and sub-sections, with appropriate subheads and sideheads to mark out the main points of interest. CONCORDANCE is exhaustively treated, and the article JESUS CHRIST deals with the life of the Founder of Christianity and all His activities and influences. JOSEPH (husband of Mary) and MARY (the Mother of Jesus), are important articles, and those such as APOCALYPSE and PASTORAL EPISTLES are deserving of attention. VULGATE; ATHEISM; DEISM; IMMORTALITY; MIRACLE; MYSTICISM; ESCHATOLOGY; APOLOGETICS; DOGMA; DOGMATIC THEOLOGY; ABSOLUTION; ANTICHRIST; APOSTASY; ATONEMENT; BAPTISM; BENEDICTION; CATECHISM; CATHOLIC; CHURCH; CONFESSION; CONFIRMATION; CREEDS; EXCOMMUNICATION; EXTREME UNCTION; FASTING; GRACE; MARTYR; PREACHING; RELICS; SACRAMENT; SECT; SIN; SYNOD and WORSHIP, are all important articles worthy of special attention. The different sects and divisions of Christian practice and worship are treated under their own headings.

CHURCH HISTORY is a long article suitably sub-divided for convenience of reference. The different councils (*e.g.*, COUNCIL OF BASEL, etc.) are treated in separate articles apart from the main article COUNCIL. The synods, too, have special articles under the names they usually bear, as is also the case with the different courts. The famous heresies are also treated under their separate names. There is also a large article PAPACY.

The chief saints of the Church Calendar are noted and details are given under their respective names. The popes have biographies, and are also treated in connection with their special work in separate articles where there is historical mention of their times. There is a sub-section of religion entitled *Christian Documents*, and it has been found more satisfactory to treat these separately, under their own headings, rather than in a general group. The reader should, therefore, refer to APOSTOLICAL CONSTITUTIONS; APOSTOLIC CANONS; DIDACHE, THE, etc., for the documents required.

There are comprehensive articles on the religious orders. (*See* for example, AMBROSIANS; BENEDICTINES; CAPUCHINS, etc.) In addition to the main article ROMAN CATHOLIC CHURCH, all important sub-divisions of this aspect of Christian worship have articles under their own headings, *e.g.*, IMMACULATE CONCEPTION; INDULGENCE; PENANCE, etc. All the main Eastern Churches have articles devoted specially to them. All relationships of the Church of England and the modern Continental Churches, their special forms of worship and attitude to problems of belief and practice are treated under their own headings. Ecclesiastical offices are

treated under separate headings, *e.g.*, ABBESS; ACOLYTE; ARCHBISHOP; ARCHDEACON, etc. The ecclesiastical seasons have all their own headings, and this is also the case with Ecclesiology and its sub-divisions. Bible and Biblical Criticism is a section which contains important articles on the prophets and books of the Old Testament, and the Apostles and books of the New.

2. NON-CHRISTIAN

In this section appear such major articles as BABYLONIAN AND ASSYRIAN RELIGION; GREEK RELIGION; ROMAN RELIGION; HINDUISM; ANCESTOR WORSHIP; ZOROASTER (for Zoroastrianism); ASCETICISM, etc. Apart from the main articles on Greek and Roman Religion, there are numerous short articles on the gods and goddesses of the ancient classical world. Such articles as ANIMISM; ANTHROPOMORPHISM; DEMONOLOGY; DIVINATION; EXORCISM; FETISHISM; FUNERAL RITES; IDOLATRY; IMAGE WORSHIP; LYCANTHROPY; MYTHOLOGY; NECROMANCY; PRIEST; RITUAL and WITCHCRAFT are the main supports of the non-Christian religious programme.

In addition to these there are numerous accounts, each under its own heading, of the gods and spirits of Brahmanism, Buddhism, etc., and the early faiths of Scandinavia, Europe, and the two divisions of America.

RELIGION. The treatment of this subject will fall into two distinct sections, *A. Primitive Religion* and *B. The Higher Religions.*

A. PRIMITIVE RELIGION

I. Definition of Primitive Religion.—Amongst the numberless definitions of religion that have been suggested, those that have been most frequently adopted for working purposes by anthropologists are Tylor's and Frazer's. Sir E. B. Tylor in *Primitive Culture* (1), i. 424, proposes as a "minimum definition" of religion "the belief in spiritual beings." Objections to this definition on the score of incompleteness are, firstly, that, besides belief, practice must be reckoned with (since, as W. Robertson Smith has made clear in his *Lectures on the Religion of the Semites,* 18 *sqq.*, ritual is in fact primary for primitive religion, whilst dogma and myth are secondary); secondly, that the outlook of such belief and practice is not exclusively towards the spiritual, unless this term be widened until it mean next to nothing, but is likewise towards the quasi-material, as will be shown presently. The merit of this definition, on the other hand, lies in its bilateral form, which calls attention to the need of characterizing both the religious attitude and the religious object to which the former has reference. The same form appears in Sir J. G. Frazer's definition in *The Golden Bough* (3rd ed.), i. 222. He understands by religion "a propitiation or conciliation of powers superior to man which are believed to direct and control the course of nature and of human life." He goes on to explain that by "powers" he means "conscious or personal agents." It is also to be noted that he is here definitely opposing religion to magic, which he holds to be based on the (implicit) assumption "that the course of nature is determined, not by the passions or caprice of personal beings, but by the operation of immutable laws acting mechanically." His definition improves on Tylor's in so far as it makes worship integral to the religious attitude. By regarding the object of religion as necessarily personal, however, he is led to exclude much that the primitive man undoubtedly treats with awe and respect as exerting a mystic effect on his life. Further, in maintaining that the powers recognized by religion are always superior to man, he leaves unclassed a host of practices that display a bargaining, or even a hectoring, spirit on the part of those addressing them (*see* PRAYER). Threatening or beating a fetish cannot be brought under the head of magic, even if we adopt Frazer's principle (*op. cit.* i. 225) that to constrain or coerce a personal being is to treat him as an inanimate agent; for such a principle is quite inapplicable to cases of mere terrorism, whilst it may be doubted if it even renders the sense of the magician's typical notion of his mode of operation, viz., as the bringing to bear of a greater *mana* or psychic influence (*see* below) on what has less, and must therefore do as it is bidden. Such definitions, then, are to be accepted, if at all, as definitions of type, selective designations of leading but not strictly universal features. An encyclopaedic account, however, should rest rather on an exterior definition which can serve as it were to pigeon-hole the whole mass of significant facts. Such an exterior definition is suggested by E. Crawley in *The Tree of Life,* 209, where he points out that "neither the Greek nor the Latin language has any comprehensive term for religion, except in the one ἱερά and in the other *sacra,* words which are equivalent to 'sacred.' No other term covers the whole of religious phenomena, and a survey of the complex details of various worships results in showing that no other conception will comprise the whole body of religious facts." It may be added that we have here no generalization imported from a higher level of culture, but an idea or blend of ideas familiar to primitive thought. An important consequence of thus giving the study of primitive religion the wide scope of a comparative hierology is that magic is no longer divorced from religion, since the sacred will now be found to be coextensive with the magico-religious, that largely undifferentiated plasm out of which religion and magic slowly take separate shapes as society comes more and more to contrast legitimate with illicit modes of dealing with the sacred. We may define, then, the religious object as the sacred, and the corresponding religious attitude as consisting in such manifestation of feeling, thought and action in regard to the sacred as is held to conduce to the welfare of the community or to that of individuals considered as members of the community.

II. Aspects of the Nature of the Sacred.—To exhibit the general character of the sacred as it exists for primitive religion it is simplest to take stock of various aspects recognized by primitive thought as expressed in language. If some, and not the least essential, of these aspects are quasi-negative, it must be remembered that negations—witness the Unseen, the Unknown, the Infinite of a more advanced theology—are well adapted to supply that mystery on which the religious consciousness feeds with the slight basis of conceptual support it needs. (1) *The sacred as the forbidden.* The primitive notion that perhaps comes nearest to our "sacred," whilst it immediately underlies the meanings of the Latin *sacer* and *sanctus,* is that of a *taboo,* a Polynesian term for which equivalents can be quoted from most savage vocabularies. The root idea seems to be that something is marked off as to be shunned, with the added hint of a mystic sanction or penalty enforcing the avoidance. Two derivative senses of a more positive import call for special notice. On the one hand, since that which is tabooed is held to punish the taboo-breaker by a sort of mystic infection, taboo comes to stand for uncleanness and sin. On the other hand, since the isolation of the sacred, even when originally conceived in the interest of the profane, may be interpreted as self-protection on the part of the sacred as against defiling contact, taboo takes on the connotation of ascetic virtue, purity, devotion, dignity and blessedness. Primary and secondary senses of the term between them cover so much ground that it is not surprising to find taboo used in Polynesia as a name for the whole system of religion, founded as it largely is on prohibitions and abstinences. (2) *The sacred as the mysterious.* Another quasi-negative notion of more restricted distribution is that of the mysterious or strange, as we have it expressed, for example, in the Siouan *wakan,* though possibly this is a derivative meaning. Meanwhile, it is certain that what is strange, new or portentous is regularly treated by all savages as sacred. (3) *The sacred as the secret.* The literal sense of the term *churinga,* applied by the Central Australians to their sacred objects, and likewise used more abstractly to denote mystic power, as when a man is said to be "full of *churinga,*" is "secret," and is symptomatic of the esotericism that is a striking mark of Australian, and indeed of all primitive, religion, with its insistence on initiation, its exclusion of women, and its strictly enforced reticence concerning traditional lore and proceedings. (4) *The sacred as the potent.* Passing on to positive conceptions of the sacred, perhaps the most fundamental is that which identifies the efficacy of sacredness with such mystic or magical power as is signified by the *mana* of the Pacific or *orenda* of the Hurons, terms for which analogies are forthcoming on all

sides. Of *mana* R. H. Codrington in *The Melanesians,* 119 *n.,* writes: "It essentially belongs to personal beings to originate it, though it may act through the medium of water, or a stone or a bone. All Melanesian religion consists . . . in getting this *mana* for oneself, or getting it used for one's benefit." E. Tregear's *Maori-Polynesian Comparative Dictionary* shows how the word and its derivatives are used to express thought, memory, emotion, desire, will—in short, psychic energy of all kinds. It also stands for the vehicle of the magician's energy—the spell; which would seem likewise to be a meaning, perhaps the root-meaning, of *orenda* (*cf.* J. N. B. Hewitt, *American Anthropologist,* N.S., iv. 40). Whereas everything, perhaps, has some share of indwelling potency, whatever is sacred manifests this potency in an extraordinary degree, as typically the wonder-working leader of society, whose *mana* consists in his cunning and luck together. Altogether, in *mana* we have what is *par excellence* the primitive religious idea in its positive aspect, taboo representing its negative side, since whatever has *mana* is taboo, and whatever is taboo has *mana.* (5) *The sacred as the animate.* The term "animism," which embodies Tylor's classical theory of primitive religion, is unfortunately somewhat ambiguous. If we take it strictly to mean the belief in ghosts or spirits having the "vaporous materiality" proper to the objects of dream or hallucination, it is certain that the agency of such phantasms is not the sole cause to which all mystic happenings are referred (though ghosts and spirits are everywhere believed in, and appear to be endowed with greater predominance as religious synthesis advances amongst primitive peoples). Thus there is good evidence to show that many of the early gods, notably those that are held to be especially well disposed to man, are conceived rather in the shape of magnified non-natural men dwelling somewhere apart, such as the Mungan-ngaur of the Kurnai of S.E. Australia (*cf.* A. Lang, *The Making of Religion,* x. *seq.*). Such anthropomorphism is with difficulty reduced to the Tylorian animism. The term, however, will have to be used still more vaguely, if it is to cover all attribution of personality, will or vitality. This can be more simply brought under the notion of *mana.* Meanwhile, since quasi-mechanical means are freely resorted to in dealing with the sacred, as when a Maori chief snuffs up the sanctity his fingers have acquired by touching his own sacred head that he may restore the virtue to the part whence it was taken (R. Taylor, *Te Ika a Maui,* 165), or when uncleanness is removed as if it were a physical secretion by washing, wiping and so forth, it is hard to say whether what we should now call a "material" nature is not ascribed to the sacred, more especially when its transmissibility after the manner of a contagion is the trait that holds the attention. It is possible, however, that the savage always distinguishes in a dim way between the material medium and the indwelling principle of vital energy, examples of a pure fetishism, in the sense of the cult of the purely material, recognized as such, being hard to find. (6) *The sacred as the ancient.* The prominence of the notion of the *Alcheringa* "dreamtime," or sacred past, in Central Australian religion illustrates the essential connection perceived by the savage to lie between the sacred and the traditional. Ritualistic conservatism may be instanced as a practical outcome of this feeling. Another development is ancestor-worship, the organized cult of ancestors marking, however, a certain stage of advance beyond the very primitive, though the dead are always sacred and have *mana* which the living may exploit for their own advantage.

III. The Activity of the Sacred.—The foregoing views of the sacred, though starting from distinct conceptions, converge in a single complex notion, as may be seen from the many-sided sense borne by such a term as *wakan,* which may stand not only for "mystery," but also for "power, sacred, ancient, grandeur, animate, immortal" (W. J. McGee, *15th Report of U. S. Bureau of Ethnology,* 182). The reason for this convergence is that, whereas there is found great difficulty in characterizing the elusive nature of the sacred, its mode of manifesting itself is recognized to be much the same in all its phases. Uniform characteristics are the fecundity, ambiguity, relativity and transmissibility of its activity. (1) *Fecundity.* The mystic potency of the sacred is no fixed quantity, but is big with possibilities of all sorts. The same sacred person, object, act, will suffice for a variety of purposes. Even where a piece of sympathetic magic appears to promise definite results, or when a departmental god is recognized, there would seem to be room left for a more or less indefinite expectancy. It must be remembered that the meaning of a rite is for the most part obscure to the participants, being overlaid by its traditional character, which but guarantees a general efficacy. "Blessings come, evils go," may be said to be the magico-religious formula implicit in all socially approved dealings with the sacred, however specialized in semblance. (2) *Ambiguity.* Mystic potency, however, because of the very indefiniteness of its action, is a two-edged sword. The sacred is not to be approached lightly. It will heal or blast, according as it is handled with or without due circumspection. That which is taboo, for instance, the person of the king, or woman's blood, is poison or medicine according as it is manipulated, being inherently just a potentiality for wonder-working in any direction. Not but what primitive thought shows a tendency to mark off a certain kind of mystic power as wholly bad by a special name, *e.g.,* the *arungquilta* of Central Australia; and here, we may note, we come nearest to a conception of magic as something other than religion, the trafficker in *arungquilta* being socially suspect, nay, liable to persecution, and even death (as amongst the Arunta tribe, *see* Spencer and Gillen, *The Arunta,* ii. 414 *n.*), at the hands of his fellows. On the other hand, wholly beneficent powers seem hardly to be recognized, unless we find them in beings such as Mungan-ngaur ("father-our"), who derive an ethical character from their association with the initiation ceremonies and the moral instruction given thereat (*cf.* Lang, *l.c.*). (3) *Relativity.* So far we have tended to represent the activity of the sacred as that of a universal force, somewhat in the style of our "electricity" or "mind." It remains to add that this activity manifests itself at numberless independent centres. These differ amongst themselves in the degree of their energy. One spell is stronger than another, one taboo more inviolable than another. W. H. R. Rivers (*The Todas,* 448) gives an interesting analysis of the grades of sanctity apparent in Toda religion. The gods of the hill-tops come first. The sacred buffaloes, their milk, their bells, the dairies and their vessels are on a lower plane; whilst we may note that there are several grades amongst the dairies, increase of sanctity going with elaboration of dairy ritual (*cf. ibid.* 232). Still lower is the dairyman, who is in no way divine, yet has sanctity as one who maintains a condition of ceremonial purity. (4) *Transmissibility.* If, however, this activity originates at certain centres, it tends to spread therefrom in all directions. F. B. Jevons (in *An Introduction to the History of Religion,* vii.) distinguishes between "things taboo," which have the mystic contagion inherent in them, and "things tabooed," to which the taboo-infection has been transmitted. In the former class he places supernatural beings (including men with *mana* as well as ghosts and spirits), blood, new-born children with their mothers, and corpses; which list might be considerably extended, for instance, by the inclusion of natural portents, and animals and plants such as are strikingly odd, dangerous or useful. Any one of these can pass on its sacred quality to other persons and objects (as a corpse defiles the mourner and his clothes), nay to actions, places and times as well (as a corpse will likewise cause work to be tabooed, ground to be set apart, a holy season to be observed). Such transmissibility is commonly explained by the association of ideas, that becoming sacred which as it were reminds one of the sacred; though it is important to add, firstly, that such association takes place under the influence of a selective interest generated by strong religious feeling, and, secondly, that this interest is primarily a collective product, being governed by a social tradition which causes certain possibilities of ideal combination alone to be realized, whilst it is the chief guarantee of the objectivity of what they suggest.

IV. The Exploitation of the Sacred. A. Methods.—It is hard to find terms general enough to cover dealings with the sacred that range from the manipulation of an almost inanimate type of power to intercourse modelled on that between man and man. Primitive religion, however, resorts to either way of ap-

proach so indifferently as to prove that there is little or no awareness of an inconsistency of attitude. The radical contrast between mechanical and spiritual religion, though fundamental for modern theology, is alien to the primitive point of view, and is therefore inappropriate to the purposes of anthropological description. (1) *Acquisition.* Mystic power may be regarded as innate so far as skill, luck or queerness are signs and conditions of its presence. On the whole, however, savage society tends to regard it as something acquired, the product of acts and abstinences having a traditional character for imparting magico-religious virtue. An external symbol in the shape of a ceremony or cult-object is of great assistance to the dim eye of primitive faith. Again, the savage universe is no preserve of man, but is an open field wherein human and non-human activities of all sorts compete on more or less equal terms, yet so that a certain measure of predominance may be secured by a judicious combination of forces. (2) *Concentration.* Hence the magico-religious society or individual practitioner piles ceremony on ceremony, name of power on name of power, relic on relic, to consolidate the forces within reach and assume direction thereof. The transmissibility of the sacred ensures the fusion of powers drawn from all sources, however disparate. (3) *Induction.* It is necessary, however, as it were, to bring this force to a head. This would appear to be the essential significance of sacrifice, where a number of sacred operations and instruments are made to discharge their efficacy into the victim as into a vat, so that a blessing-yielding, evil-neutralizing force of highest attainable potency is obtained (*see* H. Hubert and M. Mauss, "Essai sur la nature et la fonction du sacrifice" in *L'Année sociologique,* ii.). (4) *Renovation.* An important *motif* in magico-religious ritual, which may not have been without effect on the development of sacrifice, is, as Frazer's main thesis in *The Golden Bough* asserts, the imparting of reproductive energy to animals, plants and man himself, its cessation being suggested by such phenomena as old age and the fall of the year. To concentrate, induce and renovate are, however, but aspects of one process of acquisition by the transfusion of a transmissible energy. (5) *Demission.* Hubert and Mauss show in their penetrating analysis of sacrifice that after the rite has been brought to its culminating point there follows as a pendant a ceremony of re-entry into ordinary life, the idea of which is preserved in the Christian formula *Ite, missa est.* (6) *Insulation.* Such deposition of sacredness is but an aspect of the wider method that causes a ring-fence to be erected round the sacred to ward off casual trespassers at once in their own interest and to prevent contamination. We see here a natural outcome of religious awe supported by the spirit of esotericism, and by a sense of the need for an expert handling of that which is so potent for good or ill. (7) *Direction.* This last consideration brings to notice the fact that throughout magico-religious practice of all kinds the human operator retains a certain control over the issue. In the numberless transitions that, whilst connecting, separate the spell and the prayer we observe as the accompaniment of every mood from extreme imperiousness to extreme humility an abiding will and desire to help the action out. Even "Thy will be done" preserves the echo of a direction, and, needless to say, this is hardly a form of primitive address. At the bottom is the vague feeling that it is man's own self-directed mysterious energy that is at work, however much it needs to be reinforced from without. Meanwhile, tradition strictly prescribes the ways and means of such reinforcement, so that religion becomes largely a matter of sacred lore; and the expert director of rites, who is likewise usually at this stage the leader of society, comes more and more to be needed as an intermediary between the lay portion of the community and the sacred powers.

V. Results.—Hitherto our account of primitive religion has had to move on somewhat abstract lines. His religion is, however, anything but an abstraction to the savage, and stands rather for the whole of his concrete life so far as it is penetrated by a spirit of earnest endeavour. The end and result of primitive religion is, in a word, the consecration of life, the stimulation of the will to live and to do. This bracing of the vital feeling takes place by means of imaginative appeal to the great forces man perceives stirring within him and about him, such appeal proving effective doubtless by reason of the psychological law that to conceive strongly is to imitate. Meanwhile, security against any clashing of conceptions to inhibit the tendency of the idea of an acquired "grace" to realize itself in action, is assured by the complete unanimity of public opinion, dominated as it is by an inveterate custom. To appreciate the consecrating effect of religion on primitive life we have only to look to the *churinga*-worship of the Central Australians (as described by Spencer and Gillen in *The Native Tribes of Central Australia,* [1] *The Northern Tribes of Central Australia* and *The Arunta*). Contact with these repositories of mystic influence "makes them glad" (*Nat. Tr.* 165); it likewise makes them "good," so that they are no longer greedy or selfish (*North. Tr.* 266); it endows them with second sight (*ibid.*); it gives them confidence and success in war (*Nat. Tr.* 135); in fact, there is no end to its "strengthening" effects (*ibid. n.*). Or, again, we may note the earnestness and solemnity that characterize all their sacred ceremonies. The inwardness of primitive religion is, however, non-existent for those who observe it as uninitiated strangers; whilst, again, it evaporates as soon as native custom breaks down under pressure of civilization, when only fragments of meaningless superstition survive: for which reason travesties of primitive religion abound.

It remains to consider shortly the consecration of life in relation to particular categories and departments. (1) *Education.* Almost every tribe has its initiation ceremonies, and in many tribes adult life may almost be described as a continuous initiation. The object of these rites is primarily to impart mystic virtue to the novice, such virtue, in the eyes of the primitive man, being always something more than social usefulness, amounting as it does to a share in the tribal luck by means of association with all it holds sacred. Incidentally the candidate is trained to perform his duties as a tribesman, but religion presides over the course, demanding earnest endeavour of an impressionable age. (2) *Government.* Where society is most primitive it is most democratic, as in Australia, and magico-religious powers are possessed by the whole body of fully initiated males, age, however, conferring increase of sacred lore and consequently of authority; whilst even at this stage the experts tend to form an inner circle of rulers. The man with *mana* is bound to come to the top, both because his gifts give him a start and because his success is taken as a sign that he has the gift. A decisive "moment" in the evolution of chiefship is the recognition of hereditary *mana,* bound up as this is with the handing on of ceremonies and cult-objects. Invested, as society grows more complex, with a sanctity increasingly superior to that of the layman, the priest-king becomes the representative of the community as repository of its luck, whilst, as controller of all sacred forces that bear thereon, he is, as Frazer puts it, "dynamical centre of the universe" (*The Golden Bough* [3rd ed.], iii. 1). Only when the holy man's duty to preserve his holiness binds him hand and foot in a network of taboos does his temporal power tend to devolve on a deputy. (3) *Food-supply.* In accordance with the principle of Renovation (*see* above), the root-idea of the application of religion to economics is not the extorting of boons from an unwilling nature, but rather the stimulation of the sources of life, so that all beings alike may increase and multiply. (4) *Food-taking.* Meanwhile, the primitive meal is always more or less of a sacrament, and there are many food-taboos, the significance of which is, however, not so much that certain foods are unclean and poisonous as that they are of special virtue and must be partaken of solemnly and with circumspection. (5) *Kinship.* It is hard to say whether the unit of primitive society is the tribe or the group of kinsmen. Both are forms of union that are consolidated by means of religious usages. Thus in Australia the initiation ceremonies, concerned as they partly are with marriage, always an affair between the kin-groups, are tribal, whilst the totemic rites are the prime concern of the members of the totem clans. The significance of a common name and a common blood is immensely enhanced by its association with mystic rights and duties, and the pulse of brotherhood beats faster. (6) *The Family.* Side by side with the kin there is always found the domestic group, but the latter

institution develops fully only as the former weakens, so that the one comes largely to inherit the functions of the other, whilst the tribe too in its turn hands over certain interests. Thus in process of time birth-rites, marriage-rites, funeral-rites, not to mention subordinate ceremonies such as those of name-giving and food-taking, become domestic sacraments. (7) *Sex.* Woman, for certain physiological reasons, is always for primitive peoples hedged round with sanctity, whilst man does all he can to inspire awe of his powers in woman by keeping religion largely in his own hands. The result, so far as woman is concerned, is that, in company with those males who are endowed with sacredness in a more than ordinary degree, she tends as a sex to lose in freedom as much as she gains in respect. (8) *Personality.* Every one has his modicum of innate *mana,* or at least may develop it in himself by communicating with powers that can be brought into answering relation by the proper means. Nagualism, or the acquisition of a mystic guardian, is a widely distributed custom, the essence of which probably consists in the procuring of a personal name having potency. The exceptional man is recognized as having *mana* in a special degree, and a belief thus held at once by others and by himself is bound to stimulate his individuality. The primitive community is not so custom-bound that personality has no chance to make itself felt, and the leader of men possessed of an inner fund of inspiration is the wonder-worker who encourages all forms of social advance.

VI. Psychology of the Primitive Attitude Towards the Sacred.—We are on firmer ground when simply describing the phenomena of primitive religion than when seeking to account for these in terms of natural law—in whatever sense the conception of natural law be applicable to the facts of the mental life of man. One thing is certain, namely, that savages stand on virtually one footing with the civilized as regards the type of explanation appropriate to their beliefs and practices. We have no right to refer to "instincts" in the case of primitive man, any more at any rate than we have in our own case. A child of civilized parents brought up from the first amongst savages is a savage, neither more nor less. Though race may count for something in the matter of mental effectiveness—and at least it would seem to involve differences in weight of brain—it clearly counts for much less than does *milieu,* to wit, that social environment of ideas and institutions which depends so largely for its effectiveness on mechanical means of tradition, such as the art of writing. The outstanding feature of the mental life of savages known to psychologists as "primitive credulity" is doubtless chiefly due to sheer want of diversity of suggestiveness in their intellectual surroundings. Their notions stick fast because there are no competing notions to dislodge them. Society suffers a sort of perpetual obsession, and remains self-hypnotized as it were within a magic circle of traditional views. A rigid orthodoxy is sustained by means of purblind imitation assisted by no little persecution. Such changes as occur come about, not in consequence of a new direction taken by conscious policy, but rather in the way that fashions in dress alter amongst ourselves, by subconscious, hardly purposive drifting. The crowd rather than the individual is the thinking unit. A proof is the mysterious rapid extinction of savages the moment that their group-life is broken up; they are individually so many lost sheep, without self-reliance or initiative. And the thinking power of a crowd—that is, a mob, not a deliberative assembly—is of a very low order, emotion of a "panicky" type driving it hither and thither like a rudderless ship. However, as the students of mob-psychology have shown, every crowd tends to have its *meneur,* its mob-leader, the man who sets the cheering or starts the running-away. So too, then, with the primitive society. Grossly ignorant of all that falls outside "the daily round, the common task," they are full of panicky fears in regard to this unknown, and the primary attitude of society towards it is sheer avoidance, taboo. But the mysterious has another face. To the mob the mob-leader is mysterious in his power of bringing luck and salvation; to himself also he is a wonder, since he wills, and lo! things happen accordingly. He has *mana,* power, and by means of this *mana,* felt inwardly by himself, acknowledged by his fellows, he stems the social impulse to run away from a mystery. Not without nervous dread—witness the special taboo to which the leader of society is subject—he draws near and strives to constrain, conciliate or cajole the awful forces with which the life of the group is set about. He enters the Holy of Holies; the rest remain without, and are more than half afraid of their mediator. In short, from the standpoint of lay society, the manipulator of the sacred is himself sacred, and shares in all the associations of sacredness. An anthropomorphism which is specifically a "magomorphism" renders the sacred powers increasingly one with the governing element in society, and religion assumes an ethico-political character, whilst correspondingly authority and law are invested with a deeper meaning.

VII. The Abuse of the Sacred.—Lest our picture of primitive religion appear too brightly coloured, a word must be said on the perversions to which the exploitation of the sacred is liable. Envy, malice and uncharitableness are found in primitive society, as elsewhere, and on their behalf the mystic forces are not infrequently unloosed by those who know how to do so. To use the sacred to the detriment of the community, as does, for instance, the expert who casts a spell, or utters a prayer, to his neighbour's hurt, is what primitive society understands by magic (*cf. arungquilta,* above), and anthropology has no business to attach any other meaning to the word if it undertakes to interpret the primitive point of view. On the other hand, if those in authority perpetrate in the name of what their society holds sacred, and therefore with its full approval, acts that to the modern mind are cruel, silly or revolting, it is bad science and bad ethics to speak of vice and degradation, unless it can be shown that the community in which these things occur is thereby brought nearer to elimination in the struggle for existence. As a matter of fact, the earlier and more democratic types of primitive society, uncontaminated by our civilization, do not present many features to which the modern conscience can take exception, but display rather the edifying spectacle of religious brotherhoods encouraging themselves by mystical communion to common effort. With the evolution of rank, however, and the concentration of magico-religious power in the hands of certain orders, there is less solidarity and more individualism, or at all events more opportunity for sectional interests to be pursued at other than critical times; whereupon fraud and violence are apt to infect religion. Indeed, as the history of the higher religions shows, religion tends in the end to break away from secular government with its aristocratic traditions, and to revert to the more democratic spirit of the primitive age, having by now obtained a clearer consciousness of its purpose, yet nevertheless clinging to the inveterate forms of human ritual as still adequate to symbolize the consecration of life—the quickening of the will to face life earnestly.

BIBLIOGRAPHY.—The number of works dealing with primitive religion is endless. The English reader who is more or less new to the subject is recommended to begin with Sir E. B. Tylor, *Primitive Culture* (4th ed., Lond. 1903), and then to proceed to Sir J. G. Frazer, *The Golden Bough* (3rd ed., Lond. 1911–15), together with his other works *The Belief in Immortality* 1913; *Folk-Lore in the Old Testament,* 1919; *The Worship of Nature,* 1926. Only second in importance to the above are W. Robertson Smith, *Lectures on the Religion of the Semites* (3rd ed. with Introd. and additional notes by Dr. S. A. Cook, Lond. 1927); A. Lang, *Myth, Ritual and Religion* (2nd ed., Lond. 1899), and *Magic and Religion* (Lond. 1902); E. S. Hartland, *The Legend of Perseus* (Lond. 1894–96); F. B. Jevons, *An Introduction to the History of Religion* (2nd ed., 1902); E. Crawley, *The Tree of Life* and *The Mystic Rose* (2nd ed. Lond. 1927). The two last-mentioned works perhaps most nearly represent the views taken in the text, which are also developed by the present writer in *The Threshold of Religion* (2nd ed., 1909) and *Psychology and Folk-Lore,* 1920. *See* also H. Hubert and M. Mauss, "Essai sur la nature et la fonction du sacrifice," *L'Année sociologique,* ii.; and "Esquisse d'une théorie générale de la magie," *ibid* vii.; E. Durkheim, *Les formes élémentaires et la vie religieuse,* Paris, 1912; L. Levy-Bruhl, *Les fonctions mentales dans les sociétes inférieures,* Paris, 1912; R. H. Lowie, *Primitive Religion,* 1925, E. Westermarck, *Ritual and Belief in Morocco,* 1926; R. Briffault, *The Mothers,* 1927.

Side by side with works of general theory, first-hand authorities should be freely used. To make a selection from these is not easy, but the following at least are very important: R. H. Codrington, *The Melanesians* (Oxford, 1891); W. B. Spencer and F. J. Gillen, *The*

Native Tribes of Central Australia (Lond. 1899); *The Northern Tribes of Central Australia* (Lond. 1904); *The Arunta* (Lond. 1927); A. W. Howitt, *The Native Tribes of South-Eastern Australia* (Lond. 1904); A. C. Haddon, *Reports of the Cambridge Anthropological Expedition to Torres Straits* (Cambridge, 1904, vol. v.); A. B. Ellis, *The Tshi-Speaking Peoples of the Gold Coast* (Lond. 1897); *The Ewe-Speaking Peoples of the Slave Coast* (Lond. 1890); *The Yoruba-Speaking Peoples of the Slave Coast* (Lond. 1894); Miss M. H. Kingsley, *Travels in West Africa* (Lond. 1898), and *West African Studies* (Lond. 1899); R. S. Rattray, *Ashanti* (1923); *Religion and Art in Ashanti* (1927); E. Westermarck, *Ritual and Belief in Morocco* (1926); A. C. Hollis, *The Masai* (1905); W. Crooke, *The North-West Provinces of India* (Lond. 1897); W. H. R. Rivers, *The Todas* (1906). An immense amount of valuable evidence is to be obtained in the *Reports of the Bureau of Ethnology*, Smithsonian Institution, Washington. *See* Nos. 2, 5, 6, 7, 8, 9, 11, 13, 14, 15, 16, 18, 19, 21, 22, 23, and specially J. O. Dorsey, *A Study of Siouan Cults*, in No. 11; A. C. Fletcher, *The Hako*, in No. 22; and M. C. Stevenson, *The Zuñi Indians*, in No. 23. Though dealing primarily with a more advanced culture, J. J. M. de Groot, *The Religious System of China* (1892–1901), will be found to throw much light on primitive ideas. Finally let it be repeated that there is offered here no more than an introductory course of standard authorities suitable for the English reader. (R. R. M.)

B. THE HIGHER RELIGIONS

No attempt can here be made to deal in detail with the Higher Religions. These are treated elsewhere under their respective headings. The different Higher Religions will only be considered in so far as they exhibit general principles. The main object of this section will be to show the lines on which the higher religious consciousness has developed, the broad features which it discloses, and the way in which it gives expression to human needs.

I. THE BASIS OF HIGHER RELIGION

Higher religions have developed on a pre-existing basis, in response to an impulse of the religious spirit seeking better self-expression. They have grown out of primitive religion, and all of them exhibit traces of their lineage. The survival of primitive traits in developed religion is a recurring phenomenon.

Evidently a higher religion can only emerge from a lower by a process of selection and development. Certain elements in early religion were intractable to development, while others were capable of it. To the former must be reckoned the strongly local character and particularist tendency of primitive religion. Spirits or powers attached to a definite spot, or embodied in a specific object, are not easily elevated or expanded. Sentiment is conservative, and the being reverenced is too much lacking in individual quality to be readily transformed into a personal god. On the other hand, though the feeling of the clan that its objects of worship belong to it resists absorption in a larger cult, the strong sense of affinity with divine powers is capable of being elevated to a higher religious relationship. The same holds of primitive rites of communion. So too primitive ideas of Tabu and Interdiction have naturally passed into conceptions of the sacred and not-sacred, the pure and the impure, ideas that play a great part in developed religion. Again the cult of the dead, passing into that of family ancestors (*see* ANCESTOR-WORSHIP) easily expands with the enlargement of society: it has contributed important elements to national religion as in the case of China and ancient Rome. There are then higher possibilities in primitive religion, but they can only come to fruition with the emergence of new needs and a wider outlook.

II. THE RISE AND GROWTH OF POLYTHEISM

Higher religions emerge after the tribal has been superseded by the national culture. The transition to the more developed stage was the outcome of social changes which were reflected in the growth of man's inner life. This enrichment of personal life carried with it the need of a revised idea of the objects of worship and of the religious relation. The old spiritism, with its multitude of indefinite powers and capricious daemons, no longer corresponded to man's better ordered life and his varied and specialized interests. The larger and more constant values of a social order based on agriculture required divine beings capable of responding to its wants, and the rise of polytheism was the answer to these religious demands. The polytheistic system was the expression of man's vision of the world, a world of diverse departments and manifestations though not a real unity. But polytheism marks an advance. For it helped (a) to liberate religion from its bondage to purely local associations. And (b), it replaced the colourless powers or *numina* of older belief by a number of divine beings of more specific character and with more or less definite spheres of activity. A god, as distinguished from a spirit, is a being with determinate qualities which embody the values of which men are conscious.

(1) *The Emergence of Gods.*—The formless spirits supply only a shifting and uncertain basis on which to evolve a god. It has been suggested that the Greek deities Hermes and Artemis were developed in this way, and the Roman goddess Juno has been construed as the general personification of the fertility *numen* or Juno of every woman. In any case such a process is infrequent. And the instances in which a totem has grown into a god, if they do occur at all, are extremely rare. What is clear is, that many of the greater gods have a connection with the phenomena of nature, and show traces of this relationship. Sometimes the connection is quite definite. Thus the Egyptian Ra and the Babylonian Shamash are sun-gods. The Greek Zeus, to whom corresponds the Vedic Dyaus, is a sky-god, and Ushas of the Vedic Hymns is a dawn-goddess. But there are many instances where the connection of a deity with nature cannot be precisely stated, though the general fact is not in doubt. Thus it remains uncertain what the natural basis of the Egyptian Osiris is; and we cannot say more of the Vedic Varuna and Vishnu than that they are connected with light and the heaven. The later development of a deity usually furnishes a very slender clue to his real origin. Moreover when the identification of a deity with a phenomenon of nature is transparent and precise, it is difficult for the god to develop by assuming new and higher qualities.

But while the greater phenomena of nature, by the fact that they possess a kind of physical universality, were a means of helping the mind to rise to the conception of deities of wider range and power, all gods are not to be explained thus. For some of them have their origin in the cult. The Hindu Soma is the power of the sacrificial libation, and Brahma the power of the sacrificial prayer personified. The Greek Hestia and the Roman Vesta (*q.v.*) have grown out of the sacred hearth as the centre of family life. Again, aspects of the cultural life, such as war and agriculture, have suggested deities who preside over them. In some cases men remarkable for their power and deeds have been exalted to the rank of divine, or semi-divine beings, *e.g.*, the Greek Herakles and Asklepios (*q.v.*). The motives which develop polytheism are complex.

(2) *The Characterization of the Gods.*—As social life expands, its values become more varied, and the representations of the gods gain correspondingly in content. A god takes on new qualities and aspects in response to the needs and desires of his worshippers, and this process appears in all religions. Few gods have acquired so varied qualities and offices as the Greek Apollo. His identification with the sun is comparatively late, and his original character obscure. But he came to figure as the lord of flocks and herds, the master of oracles and prophecy, the god of healing, of purification, and of poesy. The imaginative process which predicated diversified attributes to a deity at the same time expressed the interests and aspirations of his worshippers. And the cultus was the chief medium by which these tendencies were developed and took concrete form.

The problem of organization is urgent where a religion arises out of the fusion of different cultures. Conspicuous instances are Babylonian and Greek religion. The Semitic invaders of Babylonia absorbed the older Sumerian culture, and found a place for Sumerian deities within their own pantheon. Greek civilization, as we now know, was the result of a fusion of two races, a race of Aryan invaders with the "Helladic" race. And it is almost certain that some of the Hellenic deities, *e.g.* Athene, Artemis, and Aphrodite, were adopted by the Greeks from the older culture. Yet it is always hard to achieve organization in the religious complex of polytheism even when a fusion of cultures seems to render it essential. The local associations and the cult-interests of the dei-

ties of the conquered race resist absorption. This difficulty may be overcome by fitting them into the enlarged pantheon as sons or servants of greater gods. Even then the older cults and beliefs will linger on. Homeric religion is no doubt an example of organisation; but it is artificial and literary, it does not fairly represent the actual beliefs and cult-practices in Greece. Still, however imperfectly the process may work itself out, there is behind polytheistic religion an impulse towards order and system. The development of social life, with its well-marked departments and functions, prompted the mind to conceive the divine world after the pattern of the human. The needs of worship, where not dominated by magical ideas, led in the same direction. For worship at the higher level cannot be easily apportioned among a number of divine beings whose mutual relations are quite indefinite. Some order and gradation are necessary.

III. THE CULTUS IN HIGHER RELIGIONS

The cultus is the focus of a religion: here it is concentrated and symbolized. As the focus of religious life the cultus becomes the point at which the sense of the sacred is most concentrated and intense. Radiating from this centre the sacred suffuses associated elements, investing with religious significance things and persons, places and times.

(1) *The Sacred Place.*—In early religion a place or thing became sacred through the presence in it of a spirit or power: *numen inest.* But when men began to build houses, when the house became the centre of family life, the thought lay to hand that there must be a house for the deity to be the focus of his worship. So the temple arose, reared often on sacred spots or "high places," hallowed by immemorial associations. As the deity was supposed to be more intimately present in his temple, it often became a centre of oracles and prophecy.

(2) *Sacred Men: the Priesthood.*—To holy places correspond holy men. The priest has his precursor in the wizard of the lower culture. The priest is a man endowed with a special knowledge of the cultus, is possessed of ritual purity, and embodies in his person the power of the sacred. At first priestly functions were not the exclusive privilege of a class. The head of the family, or the king as head of the people, offers sacrifice, so in the old Hebrew and Roman religions. But with the growing value attached to sacred functions there was the tendency to assign the priestly office to a particular class, as in the Hebrew, Persian and Hindu religions. Nowhere have the priests formed a more strict and exclusive caste than in Brahmanism.

(a) *Prayer.*—Perhaps nowhere does the spirit of a religion reveal itself more intimately than in its prayers. Yet even in the higher religions the idea of prayer as the free outpouring of the soul to the divine comes late. Primitive prayer is closely allied to the spell, and it must take a fixed form of words to be effective. The elevation of prayer comes with the development of inner life and an enhanced sense of ethical and spiritual values. Some knowledge of the kind of prayers offered in the cultus may be gathered from liturgical forms, *e.g.* from the sacrificial hymns of the Gathas and the Vedas. Prayer as petition to the gods is universal. But only in a few religions do we find prayers containing confessions of sin *e.g.* in the penitential psalms of the Hebrew and the Babylonian religions. Nowhere is the mysterious potency of prayer so exalted as in Brahmanism. Here prayer becomes a cosmic power which constrains the gods, and is finally construed as the divine principle of things. But wherever prayer ceases to be the expression of a fundamental dependence on the Divine, it loses its essential meaning and value. An intrinsically efficacious form of words is really a reversion to the magic spell. (*See* PRAYER.)

(b) *Sacrifice.*—Sacrifice springs from a deep-rooted impulse of the religious nature. It plays a part in early religion, and is present in some form in all the higher religions. The purpose of sacrifice is to maintain and strengthen, or to restore, fellowship with divine powers, and it takes a central place in the cultus. In the burnt-offering the sacrifice is wafted to the gods. In the bloody offering the victim, through contact with the altar, becomes charged with the sacred, and its sprinkled blood has atoning virtue. The idea of substitutionary atonement is later and is due to reflection. In sacrifices of purification and atonement there is an ethical element which may lead to the higher development of religion. Just as with prayer, however, sacrifice may evolve in a way which is detrimental to the religious relation. What lifts sacrifice to an ethical and spiritual level is the conception of the righteousness of God. Where this obtains it is the inner side of the sacrificial act which is emphasised, the offering of the contrite heart and the obedient will. (*See* SACRIFICE.)

IV. RELIGIONS OF OBSERVANCE AND PROPHETIC RELIGIONS

The ritual aspect of religion tends to grow with the increasing complexity of the social order. When this tendency prevails religion takes on the specific character of legal observance.

(1) *Religions of Observance and Law.*—The idea of fixed observances or rules binding on the faithful develops where the idea of ritual purity is emphasised. The roots of the conception of the clean and unclean go back to primitive ideas of the sacred and of the dangerous with the associated apotropaic rites of expulsion. The growth of a sacral system leads to the fuller definition of the clean and unclean, and rules and forms are prescribed to preserve purity and remove impurity. In many higher religions there are detailed methods and a ritual of cleansing. In Roman religion we have lustration, which combined cathartic and apotropaic rites, and in Greece cathartic rites were specially connected with Apollo, the god of ritual purity. It is, however, in later Persian religion that rites of purification receive the most comprehensive and detailed expression, and nowhere is the notion of purity so dominant and pervasive. To all the numerous defilements that are possible correspond stated cleansings, and the Vendidad itself has been described as a kind of sin-codex. With this we may compare the laws of purity and impurity in the book of Leviticus, a book which embodies the cathartic ritual of post-Exilic Judaism. When a higher religion has developed a complicated system of ritual observance it brings the sense of the sacred into close and constant relation with the varied details of life. On the other hand, the religion itself is exposed to great dangers. The magical beliefs, which are a heritage of older religion, always tend to reassert themselves, and the religious rites readily degenerate to a mechanical performance which has intrinsic efficacy. When this happens the way to spiritual development is closed, and the later Persian and Jewish religions did not wholly escape the danger.

(2) *Prophetic Religion.*—Religion as piety has its centre within. The prophetic spirit proclaims this principle, and is itself the issue of personal and moral conviction. The prophet turns from the formal and external side of religion to emphasize its inner life, and when such a movement appears within a national religion it involves a loosening of religion from the social and political system. Great religious reforms and renewals arise from an individual or individuals for whom religion has become an intense and personal concern. Such a prophetic figure was Zarathustra. As we picture him from the Gathas he was a man of burning conviction, for whom Ahura Mazda was a supreme and moral deity whose cause is the right as against the lie. In this conflict the prophet calls men to fight and freely to choose the good. A like intense moral conviction and faith in the righteousness of Jahveh appears in the eighth century prophets of Israel linked with an even greater stress on the inner side of piety. The same note recurs in the teaching of Jesus that the vision of God is for the pure in heart.

It is curious to find an emphasis on the inner side of religion appearing within Hinduism. It emerges in the doctrine of Bhakti which has its classical expression in the *Bhagavad Gita.* Here we have the doctrine that trust and devotion, faith and love, to the divine power are a means of salvation. Religion assumes a personal colour. With Buddha this principle appears in the form of an extreme subjectivism. Within man himself lies the secret of salvation.

The work of the prophetic spirit makes possible the high stages of spiritual religion. Apart from its vivifying influence institu-

tional religion tends to grow formal and fixed, and its inner life to ebb. "Where there is no vision the people perish." The uprising of the prophet is a token that a religion which seems dead has still within it the springs of life.

V. REDEMPTIVE RELIGIONS

The prophetic movement is one symptom of the enhanced sense of personal and religious values, and the emergence of religions of salvation or redemption is another. Both indicate a slackening of the tie which binds religion to the national and political structure. For the official religion which men share simply as citizens of the state, a religion concerned with external observance rather than inner spirit and motives, no longer satisfies the more personal needs of which men are becoming aware. Corresponding to this increasing self-consciousness there grows up a craving for a more intimate and individual relation with the divine Power, a craving which the traditional religious forms cannot meet. And this feeling is deepened by the personal sense of the evils and sufferings of life. This longing for deliverance finds no fulfilment in the customary and external religion that a man inherits from his social group. Some better way is necessary; and the personal consciousness of the need of salvation carries with it a sense of responsibility for realizing it. So men seek some mode of expressing the religious spirit which shall embody their choice and preference, for religion must be in a more intimate sense their own. As the new movement takes its rise from broadly human needs, the form of religion which meets these needs cannot be merely local and particular: in its meaning at least it will be universal. This implies that the form of the religious relation is reconstituted, and this carries with it a differentiation of the religious community from political society. There now come into being religious associations or churches, where membership is based on a voluntary adherence to a particular religion or cult. This principle of a sacred society or church, clearly distinguished from secular society, is of great significance in the evolution of religion. For only under such conditions can the other-worldly or transcendent element in faith come to its due, and religion itself be delivered from bondage to political and secular interests. The idea of the sacred gains spiritual significance: the sacred community is united not merely in the observance of sacred rites but by a common disposition of the mind and will towards a religious good. And this good is not mundane but supramundane.

The new tendency finds expression in different ways. It appears as a movement which, without deliberately breaking with existing religion, takes form in religious associations which minister to felt religious wants. Again it appears as a philosophic gospel which offers spiritual deliverance to elect souls. Finally it manifests itself in the birth of a new religion, a religion which originates with a personal founder who proclaims a message of salvation. To the first class belong the various forms of Mystery-Religions which were common in Greek and Mediterranean lands from a period of eight centuries B.C. One of the best known is the Orphic Mysteries, a cult open at least to all Hellenes who underwent initiation. This cult held out the prospect of immortality and union with the divine. The body was a kind of tomb (σῶμα, σῆμα) from which the soul had to win deliverance. The way of salvation was by purification, abstinence and sacramental rites. The idea of something peculiarly sacred, in which the initiated participate, is common to Mystery-Religions. The later Mystery-Cults, like those of Attis, Isis and Mithras, which were widespread in Eastern Mediterranean lands in the post-Alexandrian period, set in the foreground the spectacle of the dying and reviving god. Their votaries, through baptism, purification and a sacramental meal, somehow shared in the being of the god and with him rose to new life.

In the philosophic sphere, Neo-Platonism proclaims the deliverance of the soul through an ecstatic union with the One that transcends rational thinking. Philosophic Brahmanism likewise has a doctrine of salvation, but a salvation through knowledge of the identity of the self with the Absolute or Brahman.

In Buddhism and in Christianity the spirit of redemptive religion is most fully expressed. In Buddhism the principle is seen taking an extreme subjective form. Buddha discards the metaphysics of Brahmanism, though he shares with it the idea that salvation comes through knowledge. The Enlightened, the Arahat, knows that thirst, with its attendant desire and suffering, is the evil of life, and by following the Noble Eightfold Way he advances to that indefinable goal, Nirvana. Redemption is thus a negative process: it is a gospel for the monk who breaks with the world rather than for the ordinary man who has to live in the world. Christian redemption is a richer and more positive conception. The deliverance sought is from moral evil or sin, and it is conditioned by repentance and faith. The end is not the extinction of personality but its enrichment through the power of a divine life, and it has corporate expression in life in the Kingdom of God which overcomes the evil in the world. Christian redemption is marked by its theistic basis, its sense of personal values and its positive character. The religious society of Buddhism is a monkish community: that of Christianity is the Church, or the fellowship of the faithful united in the service of God.

VI. PANTHEISM, MYSTICISM AND MONOTHEISM

These are features found only in the higher religious culture. They all claim to be an advance on some existing religious system.

(1) *Pantheism.*

Pantheism is in the main due to the development of reflective thinking. In the many it finds merely the passing appearances of the One. If pantheism is a late development, it was at least foreshadowed at earlier stages of religious evolution. Men soon became dimly conscious of a unity pervading the cosmic order and everywhere operative throughout it. In the Hindu conception of Rita and of Karma we have the idea of a power behind all things working by inflexible law. The ancient Chinese Tao conveys a sense of the eternal order and way of the universe. And the Greek Moira and the Persian Asha contain the same ideas. This belief in a universal principle, when applied to polytheism, leads to the notion of a common power behind the gods, and suggests that the various gods are only forms of the one Reality. Thus during the Middle Kingdom in Egypt reflective thinking treated the various gods as manifestations of Ra, and among the priesthood there was an esoteric pantheism.

The trend towards pantheism works itself out more readily when the gods are not sharply defined in their specific character and attributes. This was the case with the Vedic gods, since the qualities of one were often transferred to another. In the avatars of Vishnu one god assumes many divine forms. So by an easy process of transition the pantheism of the Upanishads and the Vedânta is reached. Here pantheism is thorough-going. All cosmic and psychical phenomena are unified in the one real Being: Brahman-Atman, the soul and the Absolute, are identical. *Tat tvam asi:* "that art thou." The multiplicity of the phenomenal world is only Maya or illusion; it disappears with knowledge. In contrast the clear-cut gods of Greece resisted a process of fusion. The Stoic pantheism, which identified Zeus with the universal and immanent reason or Logos, was rather an independent speculative theory than a development of Greek religion.

Religious pantheism is in the main a reflective development due to rational demands. If consistent, it is not a working religious creed, for it abolishes the religious relation by reducing it to an identity. (*See* PANTHEISM.)

(2) *Mysticism.*

Mysticism, like pantheism, in the strict sense is a phenomenon of highly developed religion. Individualistic in character, it is the outcome of a longing for intimate communion with the Divine. The Mystery-Religions show a mystic tendency in their doctrine of union with the god through the sacramental meal. The same is perhaps true of Hindu Yoga which is a method of inducing religious ecstasy by concentration and absorption of mind. The Yogin became for others a kind of supernatural being. But mysticism proper is a conscious reaction against the externality of a merely intellectual knowledge of God: its goal is a perfect union with the Deity in which the element of difference implied in thinking is overcome. The Neo-Platonic union of the

soul with the One is a purely mystical experience. The same spiritual movement appeared within Islam in Sufism, which no doubt was influenced by Neo-Platonism. The sufi sought to purge his mind of all that was not God, and the perfect man attained to absorption in God. The great mediaeval mystics sought the same consummation, an *unio mystica* achieved by transcending the form of thinking. Mysticism is loosely related to official and institutional religion. Possessing a "more excellent way," it can dispense with the recognized means of mediation. But if it invests religion with a new warmth and intimacy, it is deficient as a social power. And mysticism is always exposed to the danger of falling into pantheism. (*See* MYSTICISM.)

(3) *Monotheism.*

Monotheism is a late phenomenon of religion. The hypothesis of a primitive monotheism lacks foundation, and is intrinsically improbable. Beyond doubt the spirit and meaning of religion attain their fullest and best expression in some form of monotheistic faith. Polytheism disperses the religious interest: intimacy of worship and the confidence of trust are only possible when there is one, and only one, object of religious devotion. The trend towards monotheism was gradual, and it had preparatory stages. The first stage was what is called monarchianism. After the analogy of human society one deity is exalted above the rest, and becomes the king of the gods. A familiar example is the Homeric Zeus who stands supreme over all the gods and looks down on the conflicts of mortals among whom his will is accomplished. (Διὸς δ' ἐτελείετο βουλή.) The Babylonian Marduk and the Egyptian Ra are illustrations of the same phenomenon of one deity attaining a position of undisputed sovereignty. A rather more advanced stage is that of monolatry, where other gods are admitted to exist, but worship is reserved for one. This we find in Hebrew religion in the pre-prophetic period.

The earliest attempt—an abortive one—to introduce a pure monotheism, in this case a solar monotheism, is that of the Egyptian Amenhotep IV. in the XIVth century B.C. More impressive is the monotheism of Zarathustra, perhaps some eight hundred years before our era. This monotheism rests on a comprehensive view of the world. The physical and moral order derive from the one God, his will is right, and all the pure elements of life belong to his kingdom. The pronounced dualism of the later Avesta is absent from the prophet's teaching. With the eighth century prophets of Israel the earlier monolatry became a true monotheism. This monotheistic universalism finds its clearest utterance in the work of Deutero-Isaiah. From this heritage of Hebrew religion Christianity derived its pure monotheism, and the same influence is manifest in the monotheism of Islam.

Monotheism is the ripest expression of the religious consciousness. It rests on the conviction that the ethical and religious values must have a sufficient ground, and this is the one God on whom all existence and value depend.

VII. REVELATION AND THEOLOGY

Belief in the communication of truth to man from a divine source is common in religions. This kind of communication usually concerns the future, and may be subject to a process of interpretation. Hence the practices of divination, the reading of omens and auspices, and star-lore. But the communication may be in and to the individual, for instance through visions and dreams.

(1) *Revelation.*

More especially is revelation thought to come through inspiration or "possession" by a divine power. The words spoken by the individual thus "possessed" are identified with the utterances of the god. The Greek Apollo was the god of prophecy, and the words spoken by his inspired priestess at Delphi were deemed to be the authentic voice of the god himself. The religious value of revelation depends on the character of the deity who is believed to reveal; and it is the consciousness of ethical values leading to an ethical idea of deity which purifies the content of revelation. Revelation in the large and comprehensive sense is linked with monotheistic religion. So Zarathustra proclaimed the message communicated to him by Ahura Mazda, and Mohammed in his visions had the truth revealed to him by Allah. The divine word came to the prophets of Israel, and the preface to their message was, "Thus saith the Lord." What they spoke Jahveh had caused them to know. At this level revelation centres in an experience or illumination within. But these inspired utterances were afterwards written down and collected: in the form of sacred books they came to be regarded as objective statements of divine truth. Hence the claims made for the Avesta, the Veda, the Koran, and the Old and New Testaments. Books which were accepted as statements of revealed truth naturally became authoritative, and as expressing authoritatively the content of a religion they furnished a basis for theology. (*See* REVELATION.)

(2) *Theology.*

Theology grows out of the beliefs contained in an historic religion: it is an endeavour to state what is involved in a definite religious type of experience in general propositions or doctrines. The earliest anticipation of this is the myth framed to explain the meaning of something done in the cult. Theology is not detached like speculation, it is a natural and necessary outgrowth from the life of religion itself. It is the product of a mature religion, and commonly has its basis in the sacred books which record its religious experience. We find theological developments in Judaism and Buddhism, but in a more complete form in Islam and in Christianity. The Islamic and the Christian theologies claim to interpret the authoritative revelation contained in their sacred scriptures. In both instances the growth of theology was stimulated by the presence of beliefs judged to be heretical. The Mutazalite movement, with its doctrines of faith and free-will and its criticism of tradition, impelled the orthodox party in Islam to define the true doctrine of Allah and his attributes. In a like way the Gnostic heresies provoked the growth of a Christian theology which sought to expound the doctrines involved in Christian faith and practice. The Islamic conception of religion, however, is too much interwoven with what is external and political to furnish a favourable field for theological development. Christianity, on the other hand, has developed a body of religious experience of a wealth and amplitude capable of sustaining an impressive body of doctrine.

The function of theology is primarily to interpret. As contrasted with speculation it leans on authoritative revelation, and stands in organic relation to a specific historic religion. (*See* THEOLOGY.)

VIII. ETHICS AND ESCHATOLOGY

The ethical element is of fundamental importance in determining the quality of a religion: it is a powerful factor in elevating the object of worship, the religious relation, and the religious life. At the pre-deistic stage the sacred is interpenetrated with magical beliefs, and ethical principles have their lowly precursor in the sanctity of tribal custom. When through the growth of social culture the moral virtues are recognized as values, they are made to qualify the character of the gods.

(1) *Ethics.*

The process may not be easy when the deity has a pronounced natural basis, but still it does occur, as in the case of the Vedic Varuna and the Babylonian Shamash. On the other hand, the Persian Ahura Mazda became a definitely ethical god who demands pure living and right thinking. At a later date Mithra was revered as the god of truth and loyalty. The Greek Zeus acquired moral functions, and Δικη, or Justice, was proclaimed to be his daughter. The feeling for the moral element in religion appears in the saying of Euripides: "If the gods do aught that is shameful, they are no gods." A profound appreciation of the moral values is seen in the Hebrew prophets who passionately declared that Jahveh is a righteous God who demands righteousness in his people. And when men cherish the conviction that the divine Power is righteous, the efficacy of sacrifice is made to depend on moral conditions.

Through the interpenetration of ethics with religion the sphere of the sacred is enlarged, and the moral life becomes an aspect of the religious vocation. Moral laws rank as divine commands, and ethical duty as a religious obligation. On the other hand, when the notion of divine personality is weak or lacking, ethics inevi-

tably assume a worldly or a negative character. Chinese religious ethics, for instance, founds on the idea of Tao or world-order, and man's duty is to reflect this order in his life. The ethical ideal is one of conformity, propriety and measure. A like utilitarianism is present in the Roman *pietas*, the knowledge of the *jus divinum* which enables a man to keep on profitable terms with the divine powers. The negative conception of ethics is strongly marked in Buddhism, which, in its original form, had no deity. The ideal of the Arahat is merely an ascetic discipline by which the dominion of desire and sense may be extinguished and Nirvana attained. In strong contrast is Christian ethics which rests on an ethical monotheism. Here the ideal is positive, the development of man's ethical life as a member of the Kingdom of God.

(2) *Eschatology.*

The problem of eschatology is the ultimate destiny of man and the world. It is a problem which lies in the background of the religious consciousness, though eschatological motives may powerfully affect the working of religion. Thus eschatology looms large in the old Egyptian, the Christian and the Islamic religions, but it plays a feeble part in the Babylonian, the old Hebrew and the early Greek religions. There is no side of religion where the survival of old ideas is more apparent, or where the presence of inconsistent elements is more conspicuous. This is intelligible; for eschatological ideas do not lend themselves to verification in religious experience, and they offer an ample field for religious imagination.

Primitive eschatological ideas gather round the fate of the dead, and are unleavened by ethical elements. Two factors promote the growth of eschatology in higher religions, a quickened moral consciousness and the sense of the value of the individual. If ethical ideas, however, be cast in a utilitarian mould, the eschatological interest may be slender; and even though they are of a higher order, as in Hebrew Prophetic religion, the merging of the individual in the people as the religious unit has the same result. Post-Exilic Judaism gained a new sense of the value of the individual, and felt the need of retribution, and this led to decided eschatological developments. In Buddhism, where ethics are negative and personality an obstruction rather than a value, eschatological doctrine is nebulous in the extreme.

Of the ethical ideas which promote eschatology the most prominent is that of justice, for it directly suggests the notion of future rewards and punishments. Justice, it is felt, is only imperfectly done on earth. The Osiris-Religion of Egypt figured the soul of the dead man ushered into the judgment-hall of Osiris, where his deeds were weighed in a balance. Those who pass the test go to serve Osiris in the fields of Earu. In the Avesta, Shraoshi, the guide of souls, is said to lead the just over the heavenly bridge to the gate of paradise. Orphism taught that the initiated were rewarded by a happy life in the Elysian Fields, while the wicked were cast into Tartarus. In the Persian, Christian, and Islamic religions, along with the judgment of the individual there is conjoined the idea of a world-judgment and the final separation of the good from the wicked.

The fuller development of eschatological doctrines belongs to the ethical and redemptive religions. But no religion has done this consistently, and eschatology remains the most backward aspect of religion. Here the material and the ethical, the sensuous and the spiritual, are often incongruously blended, and old beliefs survive in an alien environment. The Islamic eschatology, for instance, is on a lower level than that of a religion of salvation. And Christian eschatology, at least in its traditional form, is only imperfectly spiritualized. The problem of a consistent eschatology is a difficult one. (*See* ESCHATOLOGY; IMMORTALITY.)

IX. CLASSIFICATION OF RELIGIONS

Various attempts have been made to classify religions, but with only partial success, and there is no generally accepted scheme. Every religion is a complex of many elements, and there is no one specific feature which adequately characterizes it. One of the earlier classifications is that of Hegel into Nature-Religions, Religions of Spiritual Individuality, and Absolute Religion. But he arbitrarily groups together very disparate materials, and in the light of modern knowledge the scheme is unworkable. Edward Caird's revision into Objective, Subjective, and Absolute or Universal Religion is less open to this objection, but it is too vague and too much dependent on a particular philosophic construction of religion. Tiele adopts a very broad classification into Nature-Religions and Ethical Religions, while Siebeck groups religions into Primitive Religions, Morality-Religions, and Redemptive Religions. The latter scheme is certainly suggestive, though the distinction between ethical religions and redemptive religions can hardly be carried out consistently. Even the broad distinction between natural and ethical religion would have to be applied rather arbitrarily.

In the classification of religions into Tribal, National, and Universal, the line of demarcation is much more distinct and can be more easily used. But it may be objected to this classification that it is based on a principle which gives no clue to the character and content of the religions. Moreover it may be said that no religion is *de facto* universal. And from an evolutionary standpoint it is a defect in a classification that it ignores the principle of valuation.

The complexity and variety of the materials render a complete and consistent classification impracticable. But it is always possible to apply different criteria in surveying the religious field. Religions may be grouped according to their conception of the Divine, according to the types of piety they foster, or according to the ideal after which they strive. But such classifications will be merely provisional: though suitable for the purpose on hand, they cannot claim to be comprehensive and final.

BIBLIOGRAPHY.—Monographs dealing with particular religions will be found under the respective headings. The literature on religion is vast, and only a few of the works likely to be useful are noted here.

(a) *Histories of Religion.*

The most compact and complete history, embodying the results of recent research, is the *Lehrbuch der Religionsgeschichte*, edited by Bertholet and Lehmann, 2 vols. 1925. G. F. Moore, *History of Religions*, 2 vols., 1914, 1920. A. Menzies, *History of Religion* (1st ed., 1895, and later editions). Toy, *Introduction to the History of Religions* (1913). The *Religionsgeschichtliche Lesebuch* (1908), ed. by Bertholet, gives a translation of extracts from the chief religious classics. A new edition is appearing. There is also the *Textbuch zur Religionsgeschichte* (1912), by E. Lehmann.

(b) *The General Development of Religion.*

E. Caird, *The Evolution of Religion* (1894). Tiele, *Elements of the Science of Religion* (2 vols., 1897 & 1899). Bousset, *Das Wesen der Religion* (1904); Galloway, *Principles of Religious Development* (1909). King, *The Development of Religion* (1910). Farnell, *Greece and Babylon* (1911), and *Attributes of God* (1925). Wundt, *Mythus und Religion* (1909). G. F. Moore, *The Birth and Growth of Religion* (1923). Some works of more restricted scope are valuable for the light they cast on religious development, *e.g.* W. R. Smith's *Religion of the Semites* (3rd ed. 1927), Nilsson's *History of Greek Religion* (1925), and Warde Fowler's *Religious Experience of the Roman People* (1911).

(c) *Psychology and Philosophy of Religion.*

For the Psychology of Religion James's *Varieties of Religious Experience* (1902), Stratton's *Psychology of the Religious Life* (1911), Pratt's *The Religious Consciousness* (1923), will be found useful, and other works equally deserve mention.

Hegel's *Philosophie der Religion* (1840) is historically important. Among other works on the subject are those of J. Caird, Rauwenhoff, Höffding, Siebeck, Pfleiderer, Galloway and Ladd. (G. GA.)

RELIGION, WARS OF (1562-1609). The so-called Wars of Religion opened with the massacre of sixty Huguenots at Vassy in 1562, and ended with the declaration of the twelve years' truce between Spain and Prince Maurice of the Netherlands in 1609. They included eight civil wars in France, the revolt of the Netherlands, and a number of less important rebellions. Though outwardly religious in character, inwardly they were influenced by economic and financial causes, constituting as they did a revolt against the fiscal policy of the mediaeval papacy.

Causes and Personalities.—During the Crusades the Church became an all-controlling power, establishing its own law courts, its own tax collectors and its own prisons in nearly every European country. As long as the various kings were occupied in mastering their feudal nobility the papacy remained all-powerful, but once control over them was established the next conflict was between the more progressive of the kings and the pope. This

quarrel centred round the questions of appointments, taxation, "benefit of clergy" and the interference of the pope in national government. In 1296, Edward I. of England demanded one-fifth of the personal property of the clergy, and four years later Philip the Fair of France openly quarrelled with Boniface VIII. over taxation. A religious-economic conflict then began which lasted until the peace of Westphalia in 1648.

In England, John Wycliffe began to preach reform about 1366. Eleven years later the papacy moved back from Avignon to Rome, and the whole question of papal control was thrown into the melting pot. Then arose the question of whether a general council of Christendom was not superior to the papacy. This question gave rise to the Council of Constance in 1414, which, in 1415, condemned Hus, a Bohemian reformer influenced by Wycliffe, to be burnt. This in turn brought about the Hussite wars (1419–1436)—the forerunner of the wars of religion.

By the opening of the 16th century discontent against the Church was general, especially so in Germany, and all that was wanting were leaders. These, as is always the case during revolutionary periods, soon came to the fore. The most prominent were Erasmus, a Dutchman (1469–1536); Luther, a German (1483–1546); Zwingli, a Swiss (1484–1531), and Calvin, a Frenchman (1509–1564). Erasmus was an evolutionary, he believed in a slow and steady change; Luther was the reverse, he wanted immediate change, and his doctrine of "justification by faith" sent a thrill of horror through the Catholic Church. He was a democrat and an economist as well as a religious reformer. He attacked "indulgences," and said: "Since the pope is rich as Croesus, why does he not build St. Peter's with his own money, instead of taking that of the poor man?" In 1520 he was excommunicated, and this same year at Wittenberg he threw the Papal bull into the flames. He was of opinion that the power of the papacy rested on money, and if money were withheld in two years the papacy would vanish.

Turmoil.—The results of his teachings led to a peasants' war in Germany in 1525. In Switzerland, Zwingli (the originator of the name Protestant) attacked the Church, and the first conflict between Protestants and Catholics took place at Kappel, in 1531. In France Calvin's doctrines, based on the infallibility of the Bible in place of that of the Church and pope, gave rise to the Huguenot and Presbyterian movements. Meanwhile, in England, out of Henry VIII.'s first divorce arose a quarrel with Rome which ended in 1534 in the revolt of the English Church from the pope and in the closing of the monasteries, whereby Henry enriched himself.

The greatest part of Europe was now thrown into a spiritual and economic turmoil. On one side stood religious freedom confronted by papal infallibility, on the other fiscal control faced by papal anathema. Nations, cities, villages and families were divided. A general Council of the Church was held at Trent in 1545, but the Protestants refused to attend. The "Society of Jesus," founded by Loyola in 1538, gained strength, its scientific system of propaganda rousing the fury of the Reformed Church.

Hostilities in France.—The first clash came in France which had been stirred by the preaching of Lefevre (1450–1537). Henry II. (1547–1559) swore to extirpate the Protestants, and burnt them in hundreds. He was succeeded by his son Francis II., a boy of sixteen married to Mary Queen of Scots. As Francis was too young to rule, the duke of Guise put himself at the head of the army, and when Francis died, in 1560, the duke was reluctant to surrender his power so that a conflict soon arose between him and the Huguenots under Coligny, merging, in 1562, into the First Civil War. An indecisive battle was fought at Dreux; then two other civil wars followed, in which battles were fought at St. Denis in 1567, and Jarnac and Moncontour in 1569. These were concluded by the peace of St. Germain, according to which the Huguenots were to be tolerated, Coligny being received on friendly terms by Charles IX. of France and his mother, Catharine de' Medici.

The Catholic party of the Guises, determining to put an end to this friendship, plotted and carried out the massacre of St. Bartholomew on August 23, 1572. The result was the Fourth Civil War which was followed by the fifth, sixth, seventh and eighth. The last of these known as the war of the three Henrys—Henry III., Henry of Navarre and Henry of Guise—ended with the assassination of the first and third, leaving Henry of Navarre, now Henry IV., the national hero. In 1590, he won the battles of Arques and Ivry, and to put an end to the war, in 1593, re-entered the Catholic Church. In 1598, he issued the Edict of Nantes by which the Calvinists were permitted to worship as they chose, and to be eligible to hold government appointments. Meanwhile an even more terrible war was being waged in the Netherlands.

Spain and the Netherlands.—In the second half of the 16th century, the chief ally of the pope was Philip II., son of the emperor Charles V. Charles though a firm Catholic was not a fanatic; Philip's attitude was very different, for he was willing to sacrifice everything so long as the Protestants were exterminated. In 1555 Charles abdicated, handing over his Habsburg possessions to his brother Ferdinand, and Spain, the American Colonies, the Two Sicilies and the Netherlands to his son Philip. For ten years the Dutch suffered Philip's rule. Then in 1566, five hundred of the nobles protested against his policy. Thereupon Philip sent the duke of Alva to the Low Countries. William of Orange fled to Germany and thousands of Flemish weavers sought refuge in England. Alva's administration was a veritable reign of terror. Though not unaccustomed to persecution, for Charles V. had burnt many of them, the people revolted and found their leader in William, Prince of Orange and Count of Nassau (1533–1584), who in 1568 collected together a small army and opened the wars of religion with Spain. Defeated again and again he was never conquered, and in 1572 the northern provinces of Holland chose William as their governor.

After six years of tyranny Alva was recalled, but this did not improve things as his leaderless soldiers committed every possible atrocity. The north, guided by William, now refused to recognise Philip as their king, and the Union of Utrecht followed in 1579, by which the United Provinces were constituted. Two years later these provinces declared themselves independent of Spain. Philip realising that William was the heart and soul of the revolt offered a patent of nobility and a large sum of money to anyone who would assassinate him, with the result that the great patriot was shot at Delft in 1584.

His son, Maurice of Nassau (1567–1625) succeeded him, and was made stadtholder. When Queen Elizabeth of England decided to send troops to his assistance, Philip was so enraged that he determined on the conquest of England, and, in 1588, equipped and despatched the "Armada." Its defeat and destruction as well as the failing resources of Spain were of the greatest assistance to Maurice, who soon showed himself to be a general far in advance of any of his contemporaries. A great campaign was fought in 1597. From then onwards to 1609 battles were waged and sieges undertaken, and though Maurice was by no means always successful, as was notably the case in 1605, the power of Spain was definitely on the decline, and in 1609 a twelve years' truce was concluded and the United Provinces took their place in the European system "as a free and independent State."

This truce was but an interlude in the struggle for freedom, for in 1618 the Thirty Years' War (*q.v.*) broke out, and it was not until it ended with the Treaty of Westphalia in 1648, that once and for all the semi-religious conflict of nearly 100 years was brought to an end, Europe emerging out of the night into the daylight of modern history.

BIBLIOGRAPHY.—The bibliography of this period is extensive, and the reader is referred to *The Cambridge Modern History*, vol. iii., 1904, and especially to the full list of books at the end of the volume.

(J. F. C. F.)

RELIGIOUS AND MEMORIAL ARCHITECTURE.

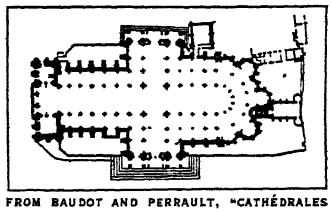
The earliest religious buildings were not so much congregational as shelters for the mysteries or provisions for the rite, sometimes consisting merely of an altar; and the earliest memorials were a stone or a mound. Even the Egyptian temple, with its court guarded by pylons or towers and approaching avenue of sphinxes or colossal human figures, was a sanctuary for kings and priests

rather than a place of worship for the people; and the pyramids were the tombs of kings, furnished with the necessities of the future life (*see* EGYPTIAN ARCHITECTURE). The Greek temple, with its central shrine for a statue of the god or goddess, porticoes to front and rear, and flanking colonnades, was more like a place of worship as we understand it to-day. It was at least a public building. Greek memorials were generally tombs (*see* GREEK ARCHITECTURE). The Roman temple, of which the construction was determined by the blending of the Greek columnar system with the Etruscan arch, came nearer than the Greek to the Christian church in plan; the *cella*—used as a treasury or as a museum of sculpture and frequently occupying the whole width of the building—corresponding to the chancel or sanctuary, and the deep portico and steps of the entrance anticipating the west front. A favourite form of Roman memorial, reflecting a proud spirit, was the triumphal arch (*see* ROMAN ARCHITECTURE).

Early Christian and Mediaeval.—It is probable that the earliest Christian churches, in countries under Persian rule, were humble structures of wood, clay, or at the most brick concrete, in the form of a shrine for an altar where two or three might be gathered together. Such churches, of which remains have been found in Syria, Palestine, Armenia and north Africa, were concentric in plan—that is to say, square, circular, octagonal or cruciform—and roofed with a dome. With the conversion of Rome to Christianity in the 4th century, and the establishment of Constantine's new capital at Byzantium, a more congregational form of church was evolved by adjustments between the domed, concentric shrine and the plan derived from the Roman basilica, or hall of justice. In the Eastern empire the interactions between East and West were extremely complicated, and authorities still differ about the respective shares of Greek, oriental and Roman influence in forming the religious architecture that we call Byzantine. The result, however, was a square, circular, octagonal or cruciform church of brick and concrete, with a central space covered by the principal dome, and arms or extensions covered by subsidiary domes. One arm was provided with an apse for the altar—now removed from the centre of the building—and another with a narthex, or porch. Decoration took the form of a continuous sheathing or "skin" of marble and mosaic. St. Sophia, Constantinople, and St. Mark's, Venice, are famous surviving examples.

In the Western empire development was simpler, and the earliest Christian churches in Rome itself were copies or even adaptations of Roman buildings, frequently embodying fragments of pagan temples in their construction, following, with internal modifications, the plan of the basilica. The usual arrangement of basilican churches was that of nave and aisles, divided by arcades, with a semi-circular apse for the altar and a choir enclosed by low screen walls at one end, and a covered narthex, or porch, preceded by an open court, or atrium, at the other. From the basilica, with some reflection from the East, was evolved the form known as Romanesque. The addition of transepts and the prolongation of the sanctuary resulted in a cruciform plan, and the flat wooden roof of the basilica was gradually exchanged for vaulting in stone. In northern Italy conditions favoured a mixed style, so that it is sometimes difficult to say whether a particular building should be described as Byzantine or Romanesque, but in passing down the Rhine and extending into France and Germany Romanesque became more clearly defined, reaching England finally in the form we know as Norman. (*See* BYZANTINE AND ROMANESQUE ARCHITECTURE.)

Gothic, which may be dated from the 12th century, proceeded logically from Romanesque by the substitution of the pointed for the round arch and the development of rib vaulting—changes which enabled unequal spans to be vaulted to the same height and smaller units of inferior materials to be used for filling the spaces between the ribs. With the progress of Gothic the onus of stability tended to be put more and more upon the stone skeleton, with its elaborate system of thrust and counterthrust, the downward pressure of the nave vaulting being met externally by buttresses and flying buttresses, while the inactive wall-spaces were pierced by larger and larger traceried window openings filled with stained glass. Architecturally the Gothic church was a collaboration of many kinds of craftsmen—masons, carvers, painters and glaziers—organized into guilds and working more or less "freehand" under a master mason, and ecclesiastically it was adapted to the requirements of a powerful priesthood. Its characters can be studied to advantage in Chartres and Reims cathedrals in France, and Westminster Abbey and Canterbury and Wells cathedrals in England. Gothic memorials were almost exclusively religious, in such forms as "Eleanor" and market crosses (*see* GOTHIC ARCHITECTURE). In the 20th century the Gothic, because of its aspiring verticality, has sometimes been adapted to tall, non-religious buildings (*see* ARCHITECTURE).

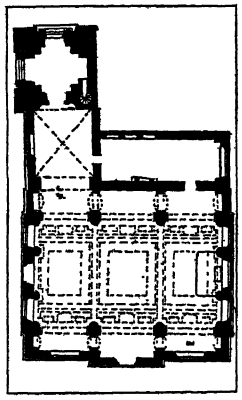


FROM BAUDOT AND PERRAULT, "CATHÉDRALES DE FRANCE" (LAURENS)

FIG. 1.—PLAN OF CHARTRES CATHEDRAL

Renaissance.—In Northern Europe, at any rate, the Renaissance and the Reformation went hand in hand in deciding the form and character of churches. As was natural, the revival of Roman architecture began in Italy, where the tradition survived, and it gradually spread to the rest of Europe with local modifications due to the resistance of native styles. For our purposes the critical example is St. Paul's cathedral, designed by Sir Christopher Wren and built between 1675 and 1710. Disliking Gothic, which he called "barbarous," Wren observed that the chief requirement of the Reformed religion was a preaching space or auditorium. His first design for St. Paul's was a Greek cross in plan, and though clerical opposition compelled the adoption of a Latin cross he carried out his ideas to some extent in the great space under the dome at the crossing of the transepts. His other city churches, of which St. Stephen, Walbrook, and St. Mary-le-Bow are examples, were frankly rectangular sermon halls with at most a shallow recess for the communion table. The plan of church introduced by Wren persisted through the 18th century, as may be seen in St. Mary, Woolnoth, by Wren's pupil Hawksmoor, and St. Martin-in-the-Fields and St. Mary-le-Strand, by James Gibbs.

Even on the Continent, in countries untouched by the Reformation, the revival of Roman architecture restored a similar plan, as we see in the Pantheon and the churches of St. Sulpice and the Madeleine, Paris. In Italy and Spain the Renaissance passed into Baroque, with its free handling of form without reference to construction, and florid ornament, characters which have been associated with the religious movement known as the Counter-Reformation (*see* BAROQUE ARCHITECTURE). The memorials of the Renaissance period are chiefly sculptured tombs, in which Christian and classical sentiment are blended (*see* RENAISSANCE ARCHITECTURE).



FROM BIRCH, "LONDON CHURCHES OF THE 17TH AND 18TH CENTURIES" (BATSFORD)

FIG. 2.—PLAN OF ST. MARY-LE-BOW

In England the general tendency of the Renaissance in church designing was interrupted by the Gothic revival. Its earliest phase, like that of the Renaissance itself, appears to have been purely literary and romantic, but as time went on it became associated with the definitely religious Oxford Movement of High Anglicanism. Contributing causes were undoubtedly the scientific materialism of the 19th century, which sharpened and stiffened the religious attitude in opposition, and the observed effects of the industrial revolution, which made men like Ruskin look for a remedy in the revival of handicrafts (*see* MODERN ARCHITECTURE: *18th and 19th Centuries*).

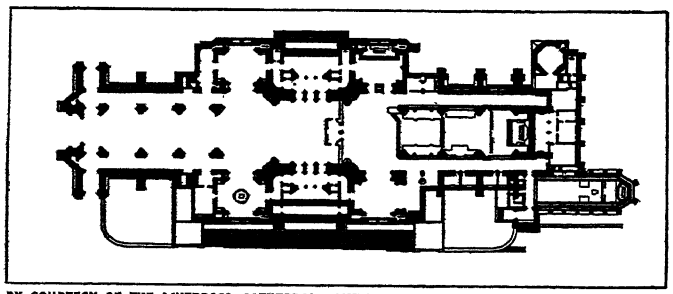
The Orient.—The many examples of religious and memorial architecture in the countries of Asia are treated in the articles CHINESE ARCHITECTURE; INDIAN ARCHITECTURE; JAPANESE ARCHITECTURE; MOHAMMEDAN ARCHITECTURE. It is interesting to note here that the aspiring quality of the Gothic is also expressed in religious architecture in the Orient.

THE MODERN PERIOD

For present purposes the modern period may be regarded as the last 50 years, with special emphasis upon the first quarter of the 20th century. When considering the causes which led to the more practical designing of churches after the Gothic revival we are inclined to give first place to the decline of materialism as a respectable philosophy and the consequent easing of the conflict between science and religion. Pressure removed, there was not the same need for the church to insist upon the outward forms of its past. At the same time there was a change in the spirit of industry. It began to be recognized that though craftsmanship—in the mediaeval sense—could not be revived, self-interest required that mechanical skill should be given its best opportunity. The result, in religious architecture, was a broader system of planning, to the actual requirements of the religion of the day rather than to advertise its historical claims, and a more intelligent use of the mechanical skill that survived, instead of a hankering after a craftsmanship impossible to restore.

Great Britain.—The first important result of the new spirit in religious architecture in Great Britain was the Roman Catholic cathedral of Westminster, designed by John Francis Bentley (1839–1902) and begun in 1894. Bentley himself would have preferred a Gothic design, but several good reasons were given for the Byzantine building decided upon: a wide nave and a view of the sanctuary best adapted to the congregational needs of a metropolitan cathedral; economy—since the whole space could be covered and the whole building erected, apart from decoration and ornament, which in other styles would form a substantial and costly part of the structure itself; avoidance of hopeless competition with Westminster Abbey; an opportunity to suggest an international character by the use of a style associated with inclusive primitive Christianity up to the 9th century. Externally Westminster cathedral is remarkable for its tall campanile, and for the bold use of brick and stone in alternating bands. The interior consists of a vast nave of three bays, 60 ft. square, each surmounted by a saucer-shaped concrete dome. A fourth bay, with a more elaborate dome, 52 ft. in diameter and pierced for the admission of light, forms the sanctuary, and behind it is the apse, with a raised retro-choir visible from the whole of the nave. Each bay of the nave is divided by lesser piers and again by monolith columns, forming an arcaded aisle.

With Liverpool cathedral, designed by Sir Giles Gilbert Scott, R.A. (b. 1880) at the age of 22, and begun in 1904, there was a return to Gothic, but Gothic with a difference. Liverpool cathedral is an example of designing in mass instead of in line, the style being a free interpretation of Decorated or 14th century Gothic (*see* DECORATED PERIOD) and the material a warm red



BY COURTESY OF THE LIVERPOOL CATHEDRAL COMMITTEE

FIG. 3.—PLAN OF LIVERPOOL CATHEDRAL

sandstone, with dressings of lighter stone. Standing on the summit of a rocky mass, St. James's Mount, in the heart of the city, the building when completed will consist of a central square space rising into a great tower crowned with an octagonal lantern, with eastern and western transepts and two oblong extensions, nearly equal in length, forming the nave and choir. In a side view the central mass formed by the tower and transepts will be absolutely, and the whole building nearly, symmetrical, the choir having a different termination to that of the nave. A striking feature of Liverpool cathedral is the great size of the bays which make up the nave and choir—three only occupying the space which in older buildings would be divided into something nearer ten. Each bay is lighted by a single two-light window, and the aisles are reduced to passage-ways through the return walls, continuous with the buttresses outside, which divide the bays.

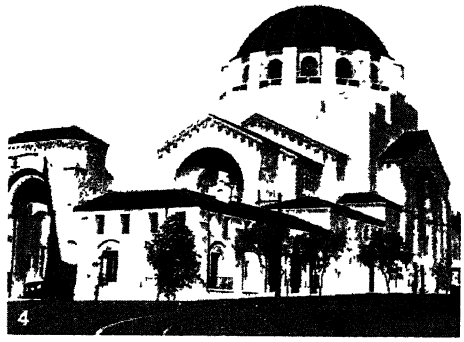
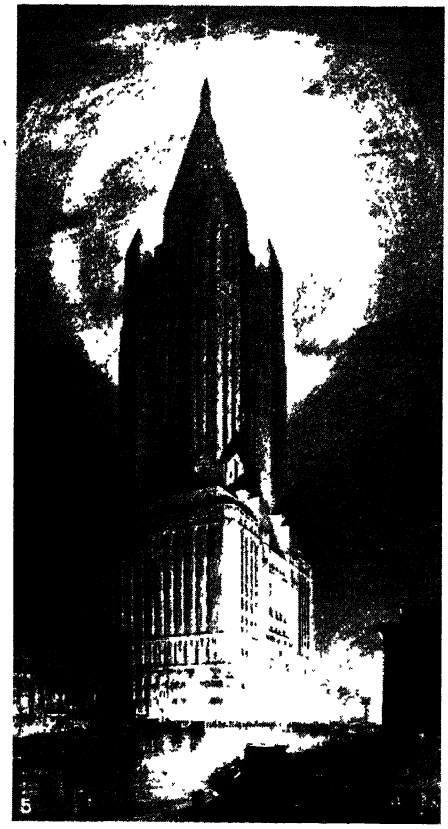
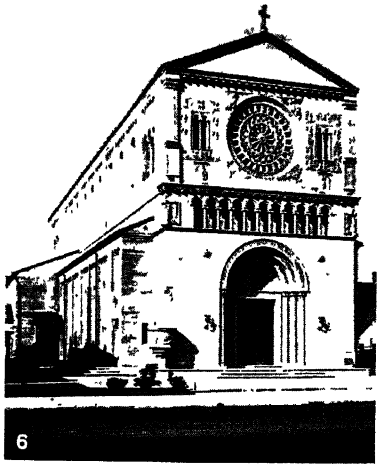
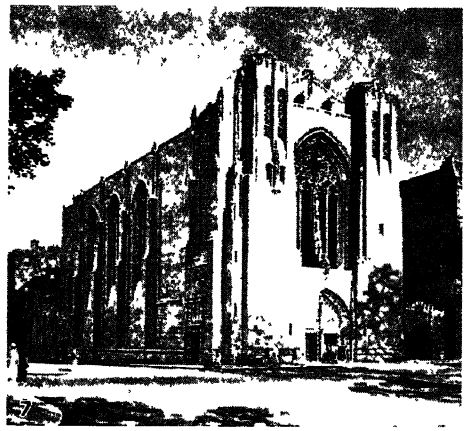
In the space of a short article dealing with the modern religious and memorial architecture of the world it is not possible to select more than a few significant examples, preferably those with the most modern characteristics. From this point of view there is a special interest in churches associated with town-planning schemes (*see* TOWN AND CITY PLANNING). Earliest in order of date are the church of St. Jude's-on-the-Hill and the free church in the Hampstead garden suburb, designed by Sir Edwin Lutyens R.A. The strongly domestic flavour of these, with their deep tiled roofs and cornices at the level of those of the surrounding houses, is in keeping with the communal ideals of a garden suburb. Naturally it is in the neighbourhood of London, with its rapid growth of population, that some of the most characteristically modern churches are to be found. St. Catherine Coleman, Hammersmith, designed by Robert Atkinson F.R.I.B.A., is essentially a rectangular auditorium with short chancel, both barrel vaulted by means of steel arches embedded in concrete, faced externally with London "stock" bricks and roofed with pantiles, and finished off internally with a surface of rough plaster. The stylish allusion is Byzantine, which appears to be the natural consequence of brick and concrete building for congregational needs. Within a few hundred yards of St. Catherine Coleman there is an exceptionally beautiful church, St. Saviour's, designed by Edward Maufe F.R.I.B.A. for the Royal Association in Aid of the Deaf and Dumb. In this church, which is of brick in a free interpretation of Decorated or 14th century Gothic, everything is adapted to sight to the exclusion of hearing. There is no organ and no provision for a choir, the clergy seats being in two "ambos" set at an angle to keep the occupants in full view, the nave walls splay in to the chancel, the floor rakes as in a theatre, and there is a western gallery. A feature of the interior is restful colour decoration.

St. Barnabas mission church, Dalston, designed by Prof. C. H. Reilly F.R.I.B.A. and built about 1910, is an example of an urban building so closely surrounded that it can be seen only as an interior. This, of London "stock" bricks, is of almost startling grandeur; the brick being used, not as by Bentley at Westminster as a support for marble sheathing, but for its own decorative effect; the full colour value being brought out by the use of white metal instead of brass for candlesticks, chancel gates and other fittings. Unlike most modern churches below cathedral rank, St. Barnabas has what amounts to a choir, formed by the crossing of the shallow transepts, saucer-domed in concrete above and separated from the barrel-vaulted nave of three bays by a wooden screen of four columns supporting the rood beam. The special point about St. Andrew's, Ilford, designed by Sir Herbert Baker, A.R.A., is that it is an exercise in brick and timber construction, giving full opportunity to the native craftsmanship in these materials, the only stone employed being in the chancel flooring, the corbels supporting the roof timbers and the font. Characteristically modern is the addition of decorative details by prominent artists and craftsmen; an altar and reredos carved by Lawrence Turner, a triptych painted by Colin Gill, a lunette of glazed pottery—in the baptistery—by the Poole Potteries, and, externally, a bronze figure of the angel of peace by Charles Wheeler.

Mention must be made of a few other recent churches in England of special architectural interest. In the neighbourhood of Liverpool and elsewhere Sir Giles Gilbert Scott has designed several churches in his characteristic manner of moulded Gothic—as it might be called in distinction from the stone skeleton construction of the middle ages—St. Paul's, Derby lane, Liverpool, being a good example.

As an instance of planning to requirements, combining the maximum of space and unimpeded movement, sight and hearing with a dignified architectural effect, special mention must be made of the new church at Hindley, Lancashire, designed by Robert Atkinson F.R.I.B.A.



BY COURTESY OF (1) THE NATIONAL CATHEDRAL ASSOCIATION; PHOTOGRAPHS, (2) STEWART BALE, (4) DORIS DAY, (6) WM. M. CLARKE

MODERN CATHEDRALS AND CHURCHES

1. Washington Cathedral, Washington, D.C., U.S.A. Frohman, Robb and Little, architects. This view shows the building as it will appear when completed. It embodies a modernized version of English Gothic precedent
2. Liverpool Cathedral, one of the most original creations among modern churches, Sir Giles Gilbert Scott, architect, is based on Gothic precedent. The present building embraces only the eastern end and the crossing of the eventual structure; a magnificent tower will crown the crossing
3. Methodist Episcopal Church of Christ the King, Tulsa, Oklahoma, U.S.A. Barry Byrne, the architect, and Alphonso Jannelli, the collaborating sculptor, have attempted, in this church, the creation of new architectural forms, entirely without precedent, which, nevertheless, express the religious function of the building as well as its structural arrangement
4. Temple Emmanuel, San Francisco, California, U.S.A., Bakewell and Brown, architects. A modified Byzantine style is used to achieve an effect of great dignity and solemnity
5. The Broadway Temple in New York, conceived originally by the late Donn Barber, and carried on by Voorhees, Gmelin and Walker, daringly combines a church auditorium, a parish house, and a large hotel, in an attempt to make high city land values contribute to the church support
6. St. John's Episcopal Church, Los Angeles, California, U.S.A. Pierpont and Walter S. Davis, architects. In an eclectic, Romanesque style, it is an interesting example of the adaptation of a modern material, (reinforced concrete), to church design
7. Church of the Heavenly Rest and the Beloved Disciple, New York; Mayers, Murray and Phillip (the Goodhue Associates) architects. Detail based on Gothic precedent is used in a fresh and novel manner to decorate a building whose basic forms are entirely modern and the direct expression of the requirements and the site

With the exception of Westminster cathedral which has already been described all the buildings we have been discussing belong to the Established Church of England. To a certain extent the characters described—congregational plan. and construction in terms of contemporary labour and most readily available materials—are common to the modern churches of all creeds and sects, but every creed has its particular requirements. Naturally the Roman Catholic Church puts the emphasis upon its Roman tradition, with a preference for the basilica form, and the somewhat exuberant Baroque of the Brompton oratory, by Herbert A. K. Gribble, finds more sober echoes elsewhere. Beyond dispensing with the chancel the Protestant Free Churches of England do not follow the lead, peculiarly suitable to their requirements, given to them by Wren, but rather surprisingly cling to Gothic, though here and there, as in the Broadway Congregational church, Hammersmith, by Cecil M. Quilter, the plan of the sermon hall is frankly adopted.

Christian Science, however, has followed a bolder policy, and all its churches in England are designed as auditoriums, with a platform for the "readers" and a screened organ chamber in place of a chancel, and generally a raking floor, as in a theatre. One of the most recent examples, the Eleventh Church of Christ, Nutford place, Bryanston square, by Oswald P. Milne F.R.I.B.A., seems to have arrived at a perfect adjustment between form and requirement, and is in every respect an admirable building, proclaiming at a glance its purpose and construction as an auditorium with a very wide span of roof, buttressed at each corner by a tower-like bastion or pavilion containing a staircase. The interior, which will seat 900, is designed to allow complete circulation of the building without disturbing the congregation.

In memorial architecture the most extensive work in England during the period under review is the memorial to Queen Victoria, in front of Buckingham palace, designed by Sir Aston Webb R.A. Otherwise the memorial architecture of the period resolves itself inevitably into war memorials. Of these by far the most important, by reason of its wide appeal, is the cenotaph in Whitehall, designed by Sir Edwin Lutyens R.A., the stone of remembrance by the same architect, and the memorial cross by Sir Reginald Blomfield R.A. Modifications and combinations of these three architectural forms have been used as war memorials in several provincial centres.

Many war memorials, however, have taken the form of halls and chapels, either as new structures or as additions to existing buildings. The Scottish national war memorial is a reconstruction of part of Edinburgh castle, designed by Sir Robert Lorimer, A.R.A. On the site of an old barrack, and improving the general outline of the castle from a distance, the memorial is in the form of the letter E, with a heptagonal shrine, containing the memorial casket supported by a marble table, projecting at the back in line with the middle limb, which thus forms a porch allowing a vista into the shrine. The stem of the E forms a gallery of honour, with a bay for each of the 12 Scottish regiments; and, by means of stained glass, moulded bronze, carved stone and wood, metalwork and painting, the place is made a museum of illustrative symbolism—not only every type of soldier and the women's services, but even animals and carrier pigeons and the actual arms and materials used in the War being recorded.

Though not on English soil, reference must be made to the several important memorials designed by English architects for war areas in France and Belgium. Three in particular claim attention: the memorial to the missing at St. Quentin, by Sir Edwin Lutyens R.A.; the Menin gate memorial to the missing, Ypres, by Sir Reginald Blomfield R.A.; and the memorial to the missing, Ploegsteert wood, by H. Chalton Bradshaw, A.R.I.B.A. The last is a circular pavilion, the others taking the form of the triumphal arch with the provision of extensive surfaces for the inscription of names by means of vaulted passages.

The British Dominions.—With one exception religious architecture in the oversea dominions of the British empire cannot be said to show any very interesting modern developments. The noteworthy exception is Africa, chiefly through the initiative of Sir Herbert Baker A.R.A., whose cathedrals of Cape Town, Pretoria and Salisbury, Rhodesia, and other churches, show a most interesting adaptation to local materials and conditions, working out, at Pretoria and Salisbury, as a spacious Romanesque-Byzantine type of building, with the exclusion of light except that from comparatively small clerestorey windows. Among works in memorial architecture produced by or for the dominions must be named the "All India" war memorial, Delhi, in the form of a triumphal arch, by Sir Edwin Lutyens R.A.; the South African war memorial, Delville wood, France, by Sir Herbert Baker A.R.A.; and the Australian war memorial, Villers-Bretonneux, France, by William Lucas. The national war memorial for New Zealand is to take the form of an art gallery and museum, with a campanile and a hall of memories. In the mandatory country of Palestine there is the Jerusalem war cemetery, by Sir John Burnet R.A.

The Continent of Europe.—During the last 50 years, religious and memorial architecture all over the world has been moulded by the same influences: a less dogmatic attitude in religion and science alike, a decline in the social authority of the churches, a growth of the democratic spirit, and a progressive mechanization of labour accompanied by the discovery of new materials and methods of construction.

In France the modern period may be said to open with the basilica of the Sacré Coeur, Paris, designed by Abadie and begun in 1875. Standing on the summit of the Butte Montmartre, it forms a conspicuous object in the northern approach to Paris, and closes impressively the vistas of streets ascending from the main boulevards. Romanesque-Byzantine in style, the Sacré Coeur represents the first important break with the Renaissance tradition in France. Otherwise recent religious architecture in France is remarkable chiefly for daring experiments in reinforced concrete. The best known examples are the churches of St. Denis, Paris, Notre Dame, Raincy, and St. Thérèse, Montmagny, by the brothers Auguste and Gustave Perret, in which an attempt has been made to work out forms proceeding logically from the material itself, used constructively, with very slender internal supports, and an elaborate tracery—or rather trellis—of concrete at the windows. In the Byzantine church at Vincennes, by J. Marast, which is faced externally with brick, the vaulting is carried out with deep concrete ribs, dividing the roof into panels, and dispensing with intermediate supports. Other interesting examples of religious architecture in France are the church of St. François, St. Etienne, entirely of reinforced concrete, the columns being supported by screw-jacks to allow compensation for movements caused by mining operations below, and the tower of St. Louis, Villemomble, by Paul Tournon, with sculptured decoration in concrete.

In Germany also, the chief interest is in the use of concrete, as in the churches by Prof. Dominikus Böhm at Neu-Ulm and Bischofsheim, near Mainz. In them concrete has been employed more solidly than in the French examples, with more emphasis upon the plastic mass of concrete than upon the steel supports, in a system of parabolic vaulting which, with its projecting ribs, intersecting to form complicated patterns in the roof, suggests a true translation of Gothic principles into the new material. Other recent German churches to be noted are St. Gabriel's, Munich, by O. Kurz and E. Herbert, in Byzantine-Romanesque, and the Protestant church at Ellingen, by Bestelmeyer, which is octagonal in plan, with circular galleries, and has a bulb-domed minaret or campanile.

Common to all the countries of Europe is an attempt to recover a national style from the Gothic and Classic revivals, which all have experienced in some degree, embodying the principles of both without their stylish accidents; the energy of Gothic and the order and proportion of Classic. In Holland this takes the form of a development of the native brick construction, an excellent example being the church at Bussum, by Cuypers, a domed structure with round arches and vaulting ribs in brick. Other modern churches in Holland which call for mention as formal essays in brick construction are those at The Hague, by Kropholler, Bussum, by Rueter, and Utrecht, by Slothouwer.

In Scandanavia the modern impulse appears to have originated in Denmark, where there are several interesting new churches, a

stepped gable, on both tower and transepts, being a characteristic feature. The church of St. Hans Tveje, Odensee, and Grundtvig's church—associated with a housing scheme—Copenhagen, by P. V. J. Klint, are striking examples. With their tall fluted towers, ending in stepped gables, they have a curiously organ-like effect. Among smaller and simpler buildings may be named Gurre church, by Carl Brunner, the church at Aarhus, by K. Gottlieb and A. Frederiksen, and the church at Frederiksberg, by Hanning and Frederiksen.

In Sweden the national style that is emerging from the various "revivals" in response to the modern spirit appears to be —paradoxical as it may sound—a fusion of the Byzantine and the Baroque, at any rate in religious architecture, with a substitution of lean and angular forms for the full curves we associate with Baroque in the South. Two famous examples are the Saltsjöbaden church, by Ferdinand Boberg, and Högalid church, Stockholm, by Ivar Justus Tengbom. Both churches are without aisles, the Saltsjöbaden church, which contains interesting sculpture in bronze and alabaster by Carl Milles, having a polygonal apse and a single tower; while the other, which is vaulted internally, the ribs being rectangular in section, has twin towers, rather oriental in character, with bulbous domes. Masthuggs church, Gothenburg, by Sigfrid Ericson, with its massive tower and open timbered roof; Engelbrecht church, Stockholm, by L. T. Wahlman, a high-shouldered, cruciform edifice, vaulted in parabolic curves; and the small chapels by Gunnar E. Asplund and Sigurd Lerverentz, the one circular and the other like a little Corinthian temple, in the cemetery at Enskede, are other interesting buildings.

In Czechoslovakia there is a vigorous architectural revival, with such results as the Palladian basilica of St. Venceslaus, Smichov, by V. Barvitius, and the Romanesque church of Stechovice, by Kamil Hilbert.

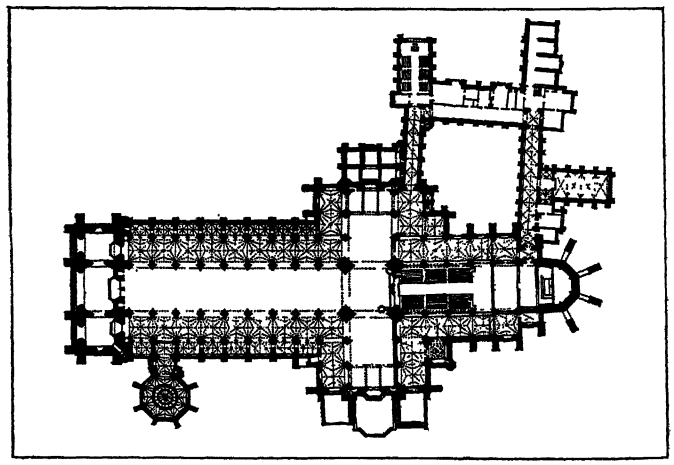
Italy and Spain, being Catholic countries, have kept more or less on traditional lines in their religious architecture. In Italy a revival of Byzantine-Romanesque was followed by a return to Roman, of a simple and massive character, and under the present régime the Roman tradition is likely to be emphasized. Spain's most striking contribution to the modern period is the fantastic church of the Sagrada Familia, Barcelona.

As regards memorial architecture Italy provides the most important example in Europe in the memorial to Victor Emmanuel II., Rome. Designed by Count G. Sacconi and begun in 1885, it takes the form of a great loggia, with columns 48 ft. high and end pavilions, with pediments, supporting sculptured groups. In front steps ascend to a platform bearing an equestrian statue of the king. Closing a vista at the end of the Corso Umberto, it is one of the most impressive monuments ever erected to one man. All the combatant countries of Europe have their share of war memorials, taking the forms already described and generally associated with sculpture. In Sweden note must be taken of the several recent memorials, mostly in the form of fountains, by Carl Milles. Though they are the work of a sculptor they are essentially architectural in general design.

The United States.—To an extent which does not prevail in any other country religious architecture in the United States of America is affected by two conditions: the upward growth of cities, and the shading off of religious beliefs into ethical systems. The first is leading inevitably to the incorporation of places of worship in sky-scraper buildings (*see* ARCHITECTURE) of which the other floors are used for commercial purposes, *e.g.*, the Broadway Temple, New York, begun by the late Doun Barber and now being carried on by Voorhees, Gmelin and Walker; the second creates an intermediate type of building, something between the church and the lecture or concert hall, of which the Christian Science Church may be quoted as an example. Allowing for these special conditions religious architecture in America during the last 50 years has developed on very much the same lines as in England. The "colonial" version of the type of church instituted by Wren has persisted in the Congregational and Unitarian communities, Roman Catholic churches incline to the Lombard, or Romanesque-Byzantine form, and Christian Science prefers Classic; but Episcopalians and Presbyterians generally prefer Gothic. To a certain extent, the broadening and simplification of Gothic associated in England with the names of Bodley, Temple Moore and Sir Giles Gilbert Scott, have been repeated in America, particularly by the late Bertram G. Goodhue and his associates Cram and Ferguson. Churches which may be named in this connection are St. Thomas', New York City; the chapel of the U.S. Military Academy, West Point; Emmanuel church, Cleveland, O.; and the First Baptist church, Pittsburgh, all by Cram, Goodhue and Ferguson; All Saints, Peterboro, N.H., by Cram and Ferguson; church of the Holy Innocents, Brooklyn, by Helmle and Corbett; and Washington Episcopal church, originally designed by Vaughan and Bodley and carried on by Frohman, Robb and Little.

The cathedral is a comparatively recent institution in the United States, and two important examples are now in course of construction.

In 1893 Congress granted a charter for the establishment and maintenance of a cathedral and institutions of learning within the District of Columbia for the promotion of religion, education and charity. Mt. Saint Alban, 400 ft. above the Potomac river, was chosen as the site for Washington cathedral; to-day the cathedral close occupies 67½ acres. Dr. George F. Bodley, of London, and Henry Vaughan, of Boston, his pupil, both of whom have since died, were the original architects chosen and their plan was accepted in 1907; the present architects are Frohman, Robb and Little, of Boston, with Cram and Ferguson, also of Boston, as consulting architects. The cathedral will be cruciform in shape with two impressive transepts, forming the arms of the cross. The total length will be 534 ft., the width at the transepts 215 ft., the area 71,000 square feet. The central tower will be 262 ft. and the western towers 195 ft. high. The entire foundation is now structurally complete. Three chapels in the crypt, together with the vaulted connecting passages, are now open. On the main floor the apse has risen, and the choir and crossing, including the great piers to support the central tower, are approaching completion. Through the western portal, the effect promises to be a vaulted vista of more than 500 ft., through the nave, the crossing and the choir to the sanctuary. The vaulting of the nave will rise 95 ft. from the floor, and the height of the inner aisles, flanking the nave, will be 45 feet. The nave will consist of nine bays and the choir of five. The plans call for more than 800 statues, some 300 stained



BY COURTESY OF THE WASHINGTON CATHEDRAL, MOUNT SAINT ALBAN, D.C.

FIG. 4.—PLAN OF THE WASHINGTON CATHEDRAL

glass windows and more than 1,000 sculptured bosses or keystones of the vaulted arches. The landscape work within the cathedral close combines two distinct elements: (1) that of the cathedral itself and its adjacent buildings, which is in the spirit of old world gardens; (2) that of the wooded slope of Mt. Saint Alban, preserving its natural beauty and increasing its dogwood, laurel, wild azalea and choice undergrowth. Ultimately the cathedral close will contain some 30 auxiliary buildings, harmonizing in design with the central edifice. Among these will be the chapter house, synod hall, cloisters, sacristy, choir rooms and administration

building, the dean's residence, six canons' and six minor canons' residences, 12 retired clergy residences, a library and librarian's residence, a guest house, additional buildings for St. Albans, the National Cathedral School for Boys, and the National Cathedral School for Girls, the College of Preachers and the lodges for the cathedral employees, an amphitheatre, a gymnasium and an athletic field. A stone wall with 12 gates, named after the 12 apostles, will ultimately surround the entire group.

The cathedral of St. John the Divine, on Morningside Heights, New York, when completed, will be third in area among the cathedrals of the world. Founded by the sixth bishop of New York, Bishop Horatio Potter, who obtained a charter to build it in 1873, the cathedral was originally designed by Heins and Le Farge, with a French Romanesque exterior and a Byzantine interior, the first corner stone being laid on St. John's day, 1892. Even during construction efforts were made at a greater unity of style, and the exterior of the choir was made Gothic; and when, in 1911, Dr. Ralph Adams Cram was appointed consulting architect, he reconsidered the whole design and recommended the adoption of French Gothic for both exterior and interior. In its final form St. John the Divine will be a five-aisled structure, three aisles being included within the clerestorey walls, the triforium and clerestorey being carried, not by the piers of the nave, but over those separating the inner from the outer aisles. The narrow outer aisles take the place of the chain of chapels to be found in most Continental cathedrals. There will be nine bays in the nave, with alternating large and small piers, but the roof vaulting will be in four huge bays, with internal buttressing by means of arches and wing-walls pierced by "roses" across the upper part of the inner side aisles. Owing to the narrowness of the outer aisles there will be no need for external flying buttresses. Externally St. John the Divine will have a central spire, or lantern, and twin west towers.

Other recent churches in the United States which deserve mention are Emmanuel church, Boston, Mass., by Allen and Collens; St. John's, Cambridge, Mass., by Maginnis and Walsh, and St. Bartholomew's, New York, by Goodhue, both Romanesque-Byzantine; the Renaissance Presbyterian church, Madison square, New York, by McKim, Mead and White; the Second Reformed Church, New Brunswick, N.J., by Ludlow and Peabody; and the Tabernacle Presbyterian church, Indianapolis, by J. W. C. Corbusier and R. F. Daggett. Synagogues naturally refer back to their Eastern origin, and the Byzantine Temple Tifereth Israel, Cleveland, O., by Charles R. Greco; Temple Ben Israel, Cincinnati, O., by Tietig and Lee; Temple Emanu-El, San Francisco, Cal., by Bakewell and Brown; and Isaiah temple, Chicago, Ill., by Alfred S. Abschuler, may be quoted as examples. The characteristic form and style of Christian Science churches in America is well illustrated by First Church of Christ, New York, by Carrère and Hastings, and Third Church of Christ, Park avenue, New York, by Delano and Aldrich. In California there have been some interesting experiments in concrete churches, without, however, any very determined attempt—as in France and Germany—to give formal expression to the method of construction, but rather a simplified imitation of bygone styles in the new material. Thus, the church of St. John, by Pierpont and Walter Davis, Wilshire Boulevard church, by Allison and Allison, and St. Paul's cathedral, by Johnson, Kauffman and Coate, all in Los Angeles, are Byzantine, while St. Vincent's church, by Albert C. Martin, in the same city, is in the Baroque of the Spanish mission. (C. MA.)

In the United States practically every kind of building has been erected as a memorial, but in such cases the design is governed largely by the practical uses for which the buildings are intended. Some purely memorial buildings of architectural interest have, however, been designed. Two outstanding examples of these are the Lincoln Memorial at Washington, D.C., Henry Bacon, architect, and the Washington Masonic Memorial under construction (1930) at Alexandria, Va., Corbett, Harrison and MacMurray, architects. The Lincoln Memorial, with its square, simple proportions, graceful colonnade and commanding location, is an impressive example of classic dignity in a splendid setting. The Washington Memorial on a hill on the Virginia side of the Potomac river has a simple base with classic portico and pediment; above that it is a stepped tower taking its inspiration from the ancient ziggurats; its landscaped grounds make an appropriate setting. Other examples are the Washington Monument, an obelisk of white marble, 555 feet high, designed by Robert Mills, and the Liberty Memorial at Kansas City, Mo., H. Van Buren Magonigle, architect. For the Liberty Memorial, *see* KANSAS CITY (MO.); for the Lincoln Memorial, *see* WASHINGTON.

See also ARCHITECTURE; PERIODS OF ART; and the various historic articles, as well as such shorter ones as TEMPLE, TOMB, etc., described in the article ARCHITECTURAL ARTICLES.

BIBLIOGRAPHY.—C. Marriott, *Modern English Architecture* (1924, bibl.); Hakon Ahlberg and F. R. Yerbury, *Modern Swedish Architecture* (1925); E. H. Short, *The House of God* (1926); J. P. Mieras and F. R. Yerbury, *Dutch Architecture of the 20th Century* (1926); K. Fisker and F. R. Yerbury, *Modern Danish Architecture* (1927); H. Robertson and F. R. Yerbury, *Examples of Modern French Architecture* (1928); Sir Banister Fletcher, *A History of Architecture* (8th ed., 1928, bibl.); G. H. Edgell, *The American Architecture of To-day* (1928). Periodicals: *The Architectural Review* and *The Architects' Journal* (England); *The Architectural Forum* (America); *Bauformen* (Germany).

REMAGEN, a town in the Prussian Rhine Province, on the left bank of the Rhine, 12 m. above Bonn, by the railway from Cologne to Coblenz, and at the junction of the railway to Adenau. Pop. (1925) 4,775. Its Roman name was Rigomagus and many Roman remains have been found here. It passed to Prussia from the duchy of Jülich. The (Roman Catholic) parish church is remarkable for a gate dating from the 12th century. Just below the town, on a height overlooking the Rhine, stands the Apollinaris church, built 1839–53 on the site of a chapel formerly dedicated to St. Martin.

REMAINDER, REVERSION. In the view of English law a remainder or reversion is classed either as an incorporeal hereditament or, with greater correctness, as an estate in expectancy. That is to say, it is a present interest subject to an existing estate in possession called the particular estate, which must determine before the estate in expectancy can become an estate in possession. A remainder or reversion is in strictness confined to real estate, whether legal or equitable, though a similar interest may exist in personalty. The particular estate and the remainder or reversion together make up the whole estate over which the grantor has power of disposition. Accordingly a remainder or reversion limited on an estate in fee simple is void. The difference between a remainder and a reversion, stated as simply as possible, is that the latter is that undisposed-of part of the estate which after the determination of the particular estate will fall into the possession of the original grantor or his representative, while a remainder is that part of the estate which under the same circumstances will fall into the possession of a person other than the original grantor or his representative. The subject is too technical for further treatment, for which reference must be made to legal text books.

The State laws of the United States affecting remainders will be found in Washburn, *Real Property,* ii. bk. ii. As a general rule contingent remainders have been rendered of little practical importance by enactments that they shall take effect as executory devises or shall not determine on determination of the particular estate.

REMAINDER THEOREM, a theorem of particular value in the study of polynomials and equations. If we divide

$$2x^2+3x+6 \text{ by } x-2,$$

for example, the quotient is $2x+7$ and the remainder is 20. The remainder, however, can be found by substituting 2 for x in the polynomial. This gives:

$$2\cdot 2^2+3\cdot 2+6=8+6+6=20.$$

More generally, to find the remainder arising from dividing $f(x)$ by $x-r$, substitute r for x in $f(x)$. This evidently amounts simply to evaluating $f(x)$ for some special value (r) of x. This is conveniently done by following the plan shown at the right. This work reveals not only the remainder (20) but also the coefficients ($2+7$) of the quotient ($2x+7$). When

$2+3+6$	2
$4\quad 14$	
$2+7;\ 20$	

used for this latter purpose it is known as synthetic division. This method of dividing is very helpful in finding the roots of numerical higher equations.

REMAND, a term of English law meaning the return of a prisoner by order of a court to the custody from which he came to the court. Where trials or indictments are not concluded at a single sitting the court of trial has power to remand the accused into proper custody during any necessary adjournment. If the remand is for more than three days the order must be in writing (Indictable Offences Act 1848). Similar powers of remand or committal to prison during adjournments are given to justices in the exercise of their summary criminal jurisdiction (Summary Jurisdiction Acts 1848 and 1879).

In the case of charges against children or young persons the remand must be to a "place of detention" unless released on bail or certified unfit for such a place of detention (Children Act 1908). For this purpose homes have been established under the act.

In the United States the term is used in two senses. The first is where a prisoner is returned to custody to await the resumption of the preliminary hearing or the commencement of the trial. The second is where a cause of action is returned to the original court after the same had been transferred or appealed.

REMBRANDT (1606–1669). REMBRANDT HARMENS VAN RIJN, Dutch painter, was born in Leyden on July 15, 1606. It is only within the past 50 years that we have come to know anything of his real history. A tissue of fables formerly represented him as ignorant, boorish and avaricious. These fictions, resting on the loose assertions of Houbraken (*De Groote Schouburgh,* 1718), have been cleared away by the untiring researches of Scheltema and other Dutchmen, notably by C. Vosmaer, whose elaborate work (*Rembrandt, sa vie et ses oeuvres,* 1868, 2nd ed., 1877) is the basis of our knowledge of the man and of the chronological development of the artist.

Rembrandt was born at No. 3 Weddesteg, on the rampart at Leyden overlooking the Rhine. He was the fourth son of Gerrit Harmens van Rijn, a well-to-do miller. His parents resolved that he should enter a learned profession. With this view he was sent to the Latin School and was enrolled on May 20, 1620, as a student of the University at Leyden, but the boy soon determined to be a painter. Accordingly he was placed for three years under Swanenburch, an architectural painter trained in Italy. He then went to Peter Lastman in Amsterdam for six months, after which time he returned to Leyden where he remained from 1626—the date on his earliest picture—to 1631. During the early years of his life at Leyden, Rembrandt seems to have devoted himself entirely to studies, painting and etching the people around him, every picturesque face and form he could get hold of. Life, character, and above all light were the aims of these studies. His mother was a frequent model, and we can trace in her features the strong likeness to her son, especially in the portraits of himself at an advanced age. Eleven portraits of his father are catalogued by Hofstede de Groot. One of his sisters also frequently sat to him. Hofstede de Groot catalogues also 62 existing portraits of himself, most of them painted in youth and in old age.

Rembrandt's earliest pictures were painted at Leyden, from 1627 to 1631. They are chiefly paintings of single figures, as "St. Paul in Prison" and "St. Jerome"; but now and then compositions of several, as "Samson in Prison" and "Presentation in the Temple." The prevailing tone of all these pictures is a greenish grey, the effect being somewhat cold and heavy. The gallery at Cassel gives us a typical example of his studies of the heads of old men, firm in workmanship and full of detail, the effects of light and shade being carefully thought out. His work was now attracting the attention of lovers of art in the great city of Amsterdam; and, urged by their calls, he removed about 1631 to live and die there. At one bound he leaped into the position of the first portrait painter of the city, and received numerous commissions. During the early years of his residence there are many portraits from his hand, firm and solid in manner and staid in expression. The excellent painter Thomas de Keyser was then in the height of his power, and his influence is to be traced in some of Rembrandt's smaller portraits. Pupils also now flocked to his house in the Bloemgracht, among them Gerard Douw, who was nearly of his own age. The first important work executed by Rembrandt in Amsterdam is "Simeon in the Temple," of The Hague museum, a fine early example of his treatment of light and shade and of his subtle colour. The concentrated light falls on the principal figures while the background is full of mystery The surface is smooth and enamel-like; the action of light on the mantle of Simeon shows how soon he had felt the magical effect of the play of colour. In the life-sized "Lesson in Anatomy" of 1632 we have the first of the great portrait subjects—Tulp the anatomist, the early friend of Rembrandt, discoursing to his seven associates, who are ranged with eager heads round the foreshortened body. The subject had been treated in former years by the Mierevelts, A. Pietersen and others, for the Hall of the Surgeons. But it was reserved for Rembrandt to make it a great picture by the grouping of the expressive portraits and by the completeness of the conception. The colour is quiet and the handling of the brush timid and precise, while the light and shade are somewhat harsh and abrupt. But it is a marvellous picture for a young man of twenty-five, and it is generally accepted as marking a new departure in the career of the painter.

In recent times the number of pictures painted by Rembrandt has been variously estimated. Smith, in his *Catalogue Raisonné* (1836) lists 614 pictures; Bode's *Catalogue* (Paris, 1897, *seq.*) lists some 550; Wurzbach's *Lexicon* (1910) has about 500; Hofstede de Groot's *Catalogue* (1916) has 988 numbers; and recently J. C. Van Dyke (*Rembrandt and his School,* New York, 1923) has reduced the number of undoubtedly genuine examples painted by the master's own hand to 48. It is impossible here to notice more than the prominent works. Besides the Pellicorne family portraits of 1632, now in the Wallace collection, we have the caligraphist Coppenol of the Cassel gallery, interesting in the first place as an early example of Rembrandt's method of giving permanent interest to a portrait by converting it into a picture. He invests it with a sense of life by a momentary expression as Coppenol raises his head towards the spectator while he is mending a quill. The same motive is to be found in the "Shipbuilder," 1633 (Buckingham Palace), who looks up from his work with a sense of interruption at the approach of his wife. Coppenol was painted and etched by the artist. The two small pictures of "The Philosopher" of the Louvre date from 1633, delicate in execution and full of mysterious effect.

In 1634 Rembrandt married Saskia van Uylenborch, a beautiful, fair-haired Frisian maiden of good connections. Till her death in 1642 she was the centre of his life and art. Saskia brought him a marriage portion of 40,000 guilders. She bore him four children, Rumbartus and two girls, successively named Cornelia after his mother, all of whom died in infancy, and Titus, named after Titia, a sister of Saskia. We have several noble portraits of Saskia, a good type of the beauty of Holland, all painted with the utmost love and care, at Cassel (1633), at Dresden (1641), and a posthumous one (1643) at Berlin.

One of Rembrandt's greatest portraits of 1634 is the superb full-length of Martin Daey, which, with that of Madame Daey, painted according to Vosmaer some years later, formed one of the ornaments of the Van Loon collection at Amsterdam. Both now belong to Baron Gustave de Rothschild. From the firm detailed execution of this portrait one turns with wonder to the broader handling of the "Old Woman" (Françoise van Wasserhoven), aged 83, in the National Gallery, of the same year, remarkable for the effect of reflected light and still more for the sympathetic rendering of character.

The life of Samson supplied many subjects in these early days. The "Samson Menacing his Father-in-Law" is forced and violent in its action. One of the prominent examples of Rembrandt's work is the "Marriage of Samson," of the Dresden gallery, painted in 1638. Here Rembrandt gives the rein to his imagination and makes the scene live before us. Except the bride (Saskia), who sits calm and grand on a dais in the centre of the feast, with the full light again playing on her flowing locks and wealth of jewels, all is animated and full of bustle. Samson, evi-

dently a Rembrandt of fantasy, leans over a chair propounding his riddle to the Philistine lords. In execution it is a great advance on former subject pictures; it is bolder in manner, and we have here signs of his approaching love of warmer tones.

The story of Susannah also occupied him in these early years, and he returned to the subject in 1641 and 1653. "The Bather" of the National Gallery may be another interpretation of the same theme. In all of these pictures the woman is coarse in type and lumpy in form, though the modelling is soft and round, the effect which Rembrandt always strove to gain. Beauty of form was outside his art. But the so-called "Danae" (1636) at Leningrad is a sufficient reply to those who deny his ability ever to appreciate the beauty of the nude female form. It glows with colour and life, and the blood seems to pulsate under the warm skin. In the picturesque story of Tobit Rembrandt found much to interest him, as we see in the beautiful small picture of the d'Arenberg Collection at Brussels. Sight is being restored to the aged Tobias, while with infinite tenderness his wife holds the old man's hand caressingly. In the Berlin gallery he paints the anxiety of the parents as they wait for the return of their son. In 1637 he painted the fine picture now in the Louvre of the "Flight of the Angel." Reverence and awe are shown in every attitude of the Tobit family. A similar lofty treatment is to be found in the "Christ as the Gardener," appearing to Mary, of 1638 (Buckingham Palace).

We have now arrived at the year 1640, the threshold of his second manner, which extended to 1654, the middle age of Rembrandt. During the latter part of the previous decade we find the shadows more transparent and the blending of light and shade more perfect. There is a growing power in every part of his art. The coldness of his first manner had disappeared, and the tones were gradually changing into golden-brown. He had attained to a truer, calmer form of dramatic expression, of which the "Manoah" of Dresden is a good example (1641). The portraits painted "to order" became more rare about this time, and those which we have are chiefly friends of his circle, such as the "Mennonite Preacher" (C. C. Ansloo) and the "Gilder," a fine example of his golden tone, in the Havemeyer collection, New York. His own splendid portrait (1640) in the National Gallery illustrates the change in his work. It describes the man well—strong and robust, with powerful head, firm and compressed lips and determined chin, with heavy eyebrows, separated by a deep vertical furrow, and with eyes of keen penetrating glance—altogether a self-reliant man. He has now many friends and pupils, and numerous commissions, even from the stadtholder; he has bought a large house in the Breedstraat, in which during the next 16 years of his life he gathers his large collection of paintings, engravings, armour and costume which figure afterwards in his inventory. His taste was wide and his purchases large, for he was joint owner with picture-dealers of paintings by Giorgione and Palma Vecchio, while for a high-priced Marcantonio Raimondi print he gave in exchange a fine impression of his "Christ Healing the Sick," which has since been known as the "Hundred Guilder Print." The stadtholder was not a prompt payer, and an interesting correspondence took place between Rembrandt and Constantin Huygens, the poet and secretary of the prince. The Rembrandt letters which have come down to us are few, and these are therefore of importance. Rembrandt puts a high value on the picture, which he says had been painted "with much care and zeal," but he is willing to take what the prince thinks proper; while to Huygens he sends a large picture as a present for his trouble in carrying through the business. There is here no sign of the grasping greed with which he has been charged, while his unselfish conduct is seen in the settlement of the family affairs at the death of his mother in 1640.

The year 1642 is remarkable for the great picture formerly known as the "Night Watch," but now more correctly as the "Sortie of the Banning Cock Company," in which 29 life-sized civic guards are introduced issuing pell-mell from their clubhouse. Such gilds of arquebusiers had been painted admirably before by Ravesteyn and notably by Frans Hals, but Rembrandt determined to throw life and animation into the scene. The dominant colour is the citron yellow uniform of the lieutenant, wearing a blue sash, while a Titian-like red dress of a musketeer, the black velvet dress of the captain, and the varied green of the girl and drummer, all produce a rich and harmonious effect. The background has become dark and heavy, and the scutcheon on which the names are painted is scarcely to be seen.

But this year of great achievement was also the year of his great loss, for Saskia died in 1642, leaving Rembrandt her sole trustee for her son Titus, but with full use of the money till he should marry again or till the marriage of Titus. The words of the will express her confidence in her husband. With her death his life was changed. There is a pathetic sadness in his pictures of the Holy Family—a favourite subject at this period of his life. All of these he treats with the naïve simplicity of Reformed Holland, giving us the real carpenter's shop and the mother watching over the Infant reverently and lovingly, with a fine union of realism and idealism.

The street in which he lived was full of Dutch and Portuguese Jews, and many a Jewish rabbi sat to him. He accepted or invented their turbans and local dress as characteristic of the people. But in his religious pictures it is not the costume we look at; what strikes us is the profound perception of the sentiment of the story, making them true to all time and independent of local circumstance. A notable example of this feeling is to be found in the "Woman Taken in Adultery" of the National Gallery, painted in 1644 in the manner of the "Simeon" of The Hague. It commands our attention from the grand conception of the painter who has invested Christ with majestic dignity. A similar lofty ideal is to be found in his various renderings of the "Pilgrims at Emmaus," notably in the Louvre picture of 1648. From the same year we have the "Good Samaritan" of the Louvre, the story of which is told with intense pathos. The helpless suffering of the wounded man, the curiosity of the boy on tiptoe, the excited faces at the upper window, are all conveyed with masterly skill. In these last two pictures we find a broader touch and freer handling, while the tones pass into a dull yellow and brown with a predilection for a note of deep rich red.

Rembrandt touched no side of art without setting his mark on it, whether in still life, as in his dead birds or the "Slaughtered Ox" of the Louvre (with its repetitions at Glasgow and Budapest), or in his drawings of elephants and lions, all of which are instinct with life. But at this period of his career we come upon a branch of his art on which he left, both in etching and in painting, the stamp of his genius, viz., landscape. Roeland Roghman, but ten years his senior, evidently influenced his style, for the resemblance between their works is so great that, as at Cassel, there has been confusion of authorship. Hercules Seghers also was much appreciated by Rembrandt, for at his sale eight pictures by this master figure in the inventory, and Vosmaer discovered that Rembrandt had worked on a plate by Seghers and had added figures to an etched "Flight into Egypt." The earliest pure landscape known to us from Rembrandt's hand is that at the Rijks museum (1637–38), followed in the latter year by those at Brunswick, Boston (U.S.A.) and "The River Scene," formerly in the collection of Marcus Kapfel, Berlin. Better known is the "Winter Scene" of Cassel (1646), silvery and delicate. As a rule in his painted landscape he aims at grandeur and poetical effect, as in the "Repose of the Holy Family" of 1647 in the National gallery, Dublin, a moonlight effect, clear even in the shadows. The "Canal" in the Rijks museum, Amsterdam, is also conceived in this spirit. A similar poetical vein runs through the "Landscape with Ruins" of Cassel, in which the beams of the setting sun strike on the ruins while the valley is sunk in the shades of approaching night. More powerful still is the weird effect of the "Windmill," with its glow of light and darkening shadows. In all these pictures light with its magical influences is the theme of the poet-painter. From the number of landscapes by himself in the inventory of his sale, it would appear that these grand works were not appreciated by his contemporaries. The last of the landscape series dates from 1655 or 1656, the close of the middle age or manhood of Rembrandt, a period of splendid power. In the "Joseph Accused by Potiphar's Wife" of 1655 we have great dramatic vigour and

perfect mastery of expression, while the brilliant colour and glowing effect of light and shade attest his strength. To this period also belongs the great portrait of himself in the Fitzwilliam museum at Cambridge.

But evil days were at hand. The long-continued wars and civil troubles had worn out the country, and money was scarce; and we find Rembrandt borrowing considerable sums of money on the security of his house. Then, in this year of 1654, we find him involved in the scandal of having a child by his servant Hendrickje Jagers or Stoffels, as appears by the books of the Reformed Church at Amsterdam. He recognized the child and gave it the name of Cornelia, after his mother, but there is no proof that he married Hendrickje, who seems to have continued to live with him, for we find her claiming a chest as her property at his sale in 1658.

The beautiful portrait of the "Lady" in the Salon Carré of the Louvre and the "Venus and Cupid" of the same gallery may represent Hendrickje and her child. Both pictures belong to this date, and by their treatment are removed from the category of Rembrandt's usual portraits. But if this is conjecture, we get nearer to fact when we look at the picture to which tradition has attached the name of "Rembrandt's Mistress," now in the Edinburgh National Gallery. At a glance one can see that it is not the mere head of a model, as she lies in bed raising herself to put aside a curtain. In 1654 he painted the famous "Portrait of Jan Six," the future burgomaster, consummate in its ease and character, as Six descends the steps of his house drawing on his glove. The connection between Rembrandt and the great family of Six was long and close. In 1641 the mother of Six, Anna Wymer, had been painted with consummate skill by Rembrandt, who also executed in 1647 the beautiful etching of Six standing by a window reading his tragedy of *Medea*, afterwards illustrated by Rembrandt. Now he paints his portrait in the prime of manhood. In 1656 Rembrandt's financial affairs became more involved, and the Orphan's Chamber transferred the house and ground to Titus, though Rembrandt was still allowed to take charge of Saskia's estate. Nothing, however, could avert the ruin of the painter, who was declared bankrupt in July 1656, an inventory of all his property being ordered by the Insolvency Chamber. The first sale took place in 1657 in the Keizerskroon hotel; and the second in 1658, when the larger part of the etchings and drawings were disposed of—"collected by Rembrandt himself with much love and care," says the catalogue. The sum realized, under 5,000 guilders, was but a fraction of their value. Driven thus from his house, stripped of everything he possessed, even to his table linen, Rembrandt took a modest lodging in the Keizerskroon hostelry (the amounts of his bills are on record), apparently without friends and thrown entirely on himself.

But this dark year of 1656 stands out prominently as one in which some of his greatest works were produced, as, for example, "Jacob blessing the Sons of Joseph" of the Cassel Gallery, and "John the Baptist Preaching" of the Berlin gallery, though this picture is sometimes ascribed to an earlier period of about 1635. Instead of the brilliancy of 1654 we have for two or three years a preference for dull yellows, reds and greys, with a certain uniformity of tone. The handling is broad and rapid. There is less caressing of colour for its own sake, even less straining after vigorous effect of light and shade. To the same year belongs the "Lesson in Anatomy of Johann Deyman," in the museum at Amsterdam. The subject is similar to the great Tulp of 1632, but his manner and power of colour had advanced so much that Sir Joshua Reynolds, on his visit to Holland in 1781, was reminded by it of Michelangelo and Titian. The same period gives us the "Adoration of the Magi" of Buckingham Palace.

After the sale of the house in the Breedstraat, Rembrandt retired to the Rosengracht, an obscure quarter at the west end of the city. We are now drawing to the splendid close of his career in his third manner, in which his touch became broader, his impasto more solid and his knowledge more complete. We may mention the "Old Man with the Grey Beard" of the National Gallery (1657) leading up to the great portraits of the "Syndics of the Cloth Hall" of 1661.

In his old age Rembrandt continued to paint his own portrait as assiduously as in his youthful days. Fine examples are in the Louvre, in the National Gallery, London, and in the Frick collection, New York. All show the same self-reliant expression, though broken down by age and the cares of a hard life.

About the year 1668, Rembrandt painted the (so-called) "Jewish Bride" of the Rijks museum in Amsterdam, and the "Family Group" of Brunswick, the last and perhaps the most brilliant works of his life, bold and rapid in execution and marvellous in the subtle mixture and play of colours in which he seems to revel.

In 1668 Titus, the only son of Rembrandt, died, leaving one child, and on Oct. 4, 1669, the great painter himself passed away, leaving two children, and was buried in the Wester Kerk. He had outlived his popularity, for his manner of painting was no longer in favour with a people who preferred the smooth trivialities of Van der Werff and the younger Mieris.

We must give but a short notice of Rembrandt's achievements in etching. Here he stands out by universal confession as first excelling by his unrivalled technical skill, his mastery of expression and the lofty conceptions of many of his great pieces, as in the "Death of the Virgin," the "Christ Preaching," the "Christ Healing the Sick" (the "Hundred Guilder Print"), the "Presentation to the People," the "Crucifixion" and others. So great is his skill simply as an etcher that one is apt to overlook the nobleness of the etcher's ideas, and this tendency has been doubtless confirmed by the enormous difference in money value between "states" of the same plate, rarity giving in many cases a factitious worth in the eyes of collectors. The points of difference between these states arise from the additions and changes made by Rembrandt on the plate; and the prints taken off by him have been subjected to the closest inspection by Bartsch, Gersaint, Wilson, Daulby, De Claussin, C. Blanc, Seymour Haden, Middleton, Dutuit, Rovinski, Singer, Hind and lately by J. C. Van Dyke and Coppier, who have described them, and to whom the reader is referred. The classification of Rembrandt's etchings adopted till lately was according to the subject, as biblical, portrait, landscape, and so on; until Vosmaer attempted the more scientific and interesting line of chronology. This method has been developed by Sir F. Seymour Haden and Middleton.

The great period of his etching lies between 1639 and 1661, after which the old painter seems to have renounced the needle. In these 20 years were produced his greatest works in portraiture, landscape and Bible story. They bear the impress of the genius of the man. Rembrandt's drawings are done almost exclusively in pen and wash, though he used red and black chalk sometimes in his early period. His line, apparently haphazard, is extremely suggestive, expressive and sure, and by a few strokes of the pen he suggests scenes full of life and feeling. The publication *Original Drawings by Rembrandt* (1888–1906) was issued in three series of eight volumes. The first series, with 200 drawings edited by F. Lippmann with the help of Bode, Colvin, Seymour Haden and Heseltine, contains the best drawings. The following two series completed by Hofstede de Groot contain many doubtful pieces. Recently attempts have been made to distinguish the master's work from that of his pupils by W. R. Valentiner and by J. C. Van Dyke (the *Rembrandt Drawings and Etchings*, New York, 1927). But agreement has not been reached.

For bibliography and general *see:* C. Vosmaer, *Rembrandt* (2nd ed., The Hague, 1877); W. Bode, *Studien zur Geschichte der Holländischen Malerei* (Brunswick, 1883); E. Michel, *Rembrandt* (Paris, 1893; London, 1906); W. Bode and C. H. de Groot, *Rembrandt* complete work 8 vols. (1897–1906); W. Bode, *Rembrandt und seine Zeitgenossen* (Leipzig, 1906); C. H. de Groot, *Die Urkunden* (The Hague, 1905); J. Baldwin Brown, *Rembrandt* (1907); W. R. Valentiner, *Rembrandt und seine Umgebung* (Strasbourg, 1905).

For reproductions of Rembrandt's work *see:* the monumental folios compiled by Dr. Bode, in smaller form the volume on Rembrandt in the series *Klassiker der Kunst* (3rd ed. by Dr. Valentiner, Stuttgart, 1908); with a supplementary volume of recently discovered Rembrandts issued in 1921; and the volumes of Rembrandt's etchings compiled by H. W. Singer (1906) and of Rembrandt's drawings compiled by W. R. Valentiner (1924–) in the same series; and the volumes of Rembrandt's etchings arranged by A. M. Hind (1912 and 1923).

For appreciations of Rembrandt's work *see* E. Fromentin, *Maîtres d'autrefois* (1904); D. Langbehn, *Rembrandt als Erzieher* (Leipzig, 1890); P. G. Hamerton, *Rembrandt's Etchings* (1894); W. Weisbach, *Rembrandt* (1926). (J. F. W.)

REMEMBRANCER, the name of certain officials who compiled the memoranda rolls and prepared the business for the barons of the exchequer, and so "reminded" them of the matter with which they must deal. There were at one time three clerks of the remembrance, styled king's remembrancer, lord treasurer's remembrancer and remembrancer of first-fruits. The latter two offices have become extinct. At the present moment (1929) the King's remembrancer is required to be a master of the court of exchequer, and by the Supreme Court of Judicature (Officers) Act, 1879, he is a master of the supreme court. The office is usually filled by the senior master. The king's remembrancer still assists at certain ceremonial functions. His duties are set out in the *Second Report of the Legal Departments Commission* (1874).

"Remembrancer" is also the title of an official of the corporation of the City of London, whose principal duty is to represent that body before parliamentary committees and at council and treasury boards.

REMIGIUS, ST. (*c.* 437–533), bishop of Reims and the friend of Clovis, whom he converted to Christianity. According to Gregory of Tours, 3,000 Franks were baptized with Clovis by Remigius on Christmas Day, 496, after the defeat of the Alamanni. A good many fictions grew up around his name, *e.g.*, that he anointed Clovis with oil from the sacred ampulla, and that Pope Hormisdas had recognized him as primate of France. The *Commentary on the Pauline Epistles* (ed. Villalpandus, 1699) is not his work, but that of Remigius of Auxerre.

For authorities *see* H. Jadart, *Bibliographie des ouvrages conc. la vie et le culte de S. Remi* . . . (Reims, 1891).

REMINGTON, FREDERICK (1861–1909), American artist, was born at Canton (N.Y.), on Oct. 4, 1861. He was a pupil of the Yale Art School, and of the Art Students' League, New York, and became known as an illustrator, painter and sculptor. Having spent much time in the West, where he went for his health, and having been with the United States troops in actual warfare, he made a specialty of rendering the North American Indian and the United States soldier as seen on the western plains. In the Spanish-American War he was with the army under General Shafter as war correspondent. He died Dec. 26, 1909, near Ridgefield (Conn.). His statuettes of soldiers, Indians, cowboys and trappers are full of character, while his paintings have been largely reproduced. He wrote several volumes of stories, including *Pony Tracks* (1895), *Crooked Trails* (1898), *Sundown Leflare* (1899), and *John Ermine of the Yellowstone* (1902).

REMIREMONT, a town of eastern France, in the department of Vosges, 17 m. S.S.E. of Épinal by rail, on the Moselle, below its confluence with the Moselotte. Pop. (1926) 8,552. Remiremont (*Romarici Mons*) is named after St. Romaric, a companion of St. Columban of Luxeuil, who in the 7th century founded a monastery and a convent on the hills above the present town. In 910 an invasion of the Hungarians drove the nuns to Remiremont, which had grown round a villa of the Frankish kings, and in the 11th century they settled there. Enriched by dukes of Lorraine, kings of France and emperors of Germany, the ladies of Remiremont attained great power. The abbess was a princess of the empire, and received consecration at the hands of the pope. The fifty canonesses were selected from the nobility. On Whit-Monday the neighbouring parishes paid homage to the chapter in a ceremony called the "Kyrioles"; and on their accession the dukes of Lorraine, the immediate suzerains of the abbey, had to come to Remiremont to swear to continue their protection. The "War of the Scutcheons" (Panonceaux) in 1566 between the duke and the abbess ended in favour of the duke, and terminated the abbess's power. The monastery and nunnery were both suppressed in the Revolution. Remiremont is surrounded by forest-clad mountains. The 13th cent. abbey church has a crypt of the 11th century. The abbatial residence (which now contains the *mairie*, the court-house and the public library) has been twice rebuilt in the original plan in modern times. Some of the houses of the canonesses (17th and 18th centuries) remain. Remiremont has a board of trade-arbitrators and a chamber of arts and manufactures. Its industries include cotton-spinning and weaving, the manufacture of embroidery, iron and copper founding and the manufacture of brushes.

REMIZOV, ALEXIS (1877–), Russian novelist, was born June 24, 1877, in Moscow and brought up amid factory surroundings and in the strict observance of Orthodox Church rites, with frequent pilgrimages to monasteries. He thus gained an intimate knowledge of national habits, monastic life and old religious legends. He studied natural science and economics at Moscow University, took part in revolutionary activities, and was imprisoned and spent years of exile in Vologda. He subsequently went to live in Paris. The influences of his varying surroundings contributed to the formation of his unique fantastic personality, uniting the whimsical mischievousness of some fairy-tale sprite with a deep spirit of pity. His literary life dates from 1902; from that time until 1920 he published 36 volumes of fiction: novels, tales, short stories and fairy-tales, miracle plays, etc.

The most remarkable of Remizov's novels are *The Pond* (1905), a powerful and gloomy picture of vulgarity, vice and crime among the Moscow bourgeoisie and the monasteries; *The Clock* (1908, Eng. trans. 1924); *The Fifth Pestilence,* two stories of provincial life (Eng. trans. by A. Brown 1927); *The Sisters of the Cross* (1910), a novel of St. Petersburg life; also *The Cockerel* and stories relating to the revolution of 1905, and several plays.

REMONSTRANTS, the name given to those Dutch Protestants who, after the death of Arminius (*q.v.*), maintained the views associated with his name, and in 1610 presented to the states of Holland and Friesland a "remonstrance" in five articles formulating their points of departure from stricter Calvinism. These were: (1) that the divine decree of predestination is conditional, not absolute; (2) that the Atonement is in intention universal; (3) that man cannot of himself exercise a saving faith; (4) that though the grace of God is a necessary condition of human effort it does not act irresistibly in man; (5) that believers are able to resist sin but are not beyond the possibility of falling from grace. The Remonstrants were assailed both by personal enemies and by the political weapons of Maurice of Orange, who executed and imprisoned their leaders for holding republican views. In 1618–19 the synod of Dort (*see* DORT, SYNOD OF), from which the thirteen Arminian pastors headed by Simon Episcopius (*q.v.*) were shut out, established the victory of the Calvinist school. The judgment of the synod was enforced by the deposition and in some cases the banishment of Remonstrant ministers; but the government soon became convinced that their party was not dangerous to the state, and in 1630 they were formally allowed liberty to reside in all parts of Holland and build churches and schools. Henceforth, however, their importance was more theological than ecclesiastical; and their liberal school of theology, which naturally grew more liberal and even rationalistic, has reacted powerfully on the state church and on other Christian denominations.

REMORA or **SUCKING-FISH,** a name given to fishes of the family Echeneididae, remarkable for having the spinous dorsal fin transformed into a transversely laminated suctorial disc, placed on top of the head. There are about a dozen species from warm seas; they attach themselves to sharks, turtles, and large fish, and are transported by them, but they detach themselves and swim when searching for food.

REMPHAN (in A.V., *Rephan* in R.V.) a word found in Acts vii. 43 (Ῥομφά, Westcott and Hort). The writer is quoting the Septuagint of Amos v. 26 (Ῥαιφάν), where the Hebrew has *Kiyyûn* (כִּיּוּן). This is probably a mistake for *Kewan,* the Babylonian name for the planet Saturn. The Greek form may be an error of the transliterator.

REMSCHEID, a town in the Prussian Rhine Province, 6 m. by rail S. of Barmen and 20 m. N.E. of Cologne. Pop. (1925) 77,257. Remscheid is a centre of the hardware industry, and large quantities of tools, scythes, drills and other small articles in iron, steel and brass are made for export to all parts.

REMSEN, IRA (1846–1927), American chemist, was born in New York city on Feb. 10, 1846, and educated at the College

of the City of New York (B.A., 1865), College of Physicians and Surgeons (Columbia—M.D., 1867) and at the Universities of Munich and Göttingen (Ph.D., 1870). He spent the two years 1870–72 at the University of Tübingen as assistant to Fittig and here began the investigations into pure chemistry upon which his later fame was chiefly based. He was professor of chemistry at Williams college in 1872–76 and in 1876 was one of the original faculty of the new Johns Hopkins university. Here he was professor of chemistry 1876–1913, director of the chemical laboratory 1876–1908, secretary of the Academic Council 1881–1901 and president of the university 1901–1913. He was president emeritus and professor emeritus 1913–1927, during which time he travelled widely and worked on government pure food commissions. He brought to Johns Hopkins many of the German laboratory methods and as a teacher he soon became famous. A long series of students trained in intimate association with him became widely scattered and influential. He founded the *American Chemical Journal* in 1879 and continued to edit it almost to the time of his death. In it most of his scientific papers were published. In the first volume he described the preparation and properties of a new compound, subsequently to become widely known as saccharine, which he and a pupil discovered. Another long series of studies led to the discovery and enunciation of Remsen's law. He also became widely known for his series of text-books, *Principles of Theoretical Chemistry* (1876) passing through five editions and being translated into German, Russian and Italian. Others of like popularity were *An Introduction to the Study of the Compounds of Carbon* (1885; 5th rev., 1922); *Elements of Chemistry* (1888); *Inorganic Chemistry* (1889); *A College Text-book of Chemistry* (1908). Remsen died at Carmel, Cal., on Mar. 5, 1927.

See B. Harrow, *Eminent Chemists of Our Time* (1920); "Impressions of Ira Remsen," in *Johns Hopkins Alumni Magazine,* vol. xvi. pp. 215–226 (1928); "Ira Remsen" in *Science,* N.S. vol. lxvi. (1927), pp. 243–246.

RÉMUSAT, CHARLES FRANÇOIS MARIE, Comte de (1797–1875), French politician and man of letters, was born in Paris on March 13, 1797. He was called to the bar, and became an active journalist. He signed the journalists' protest against the Ordinances of July 1830, and in October was elected deputy for Haute Garonne. He then ranked himself with the *doctrinaires,* and supported measures of restriction on popular liberty.

Rémusat held office under Thiers in the reign of Louis Philippe. He took no part in politics under the Empire until 1869. In Aug. 1871 he succeeded Favre as minister of foreign affairs. He died in Paris on Jan. 6, 1875.

His works include: *Abélard* (2 vols., 1845); *Saint Anselme de Cantorbéry* (1854); *L'Angleterre au XVIIIème siècle* in 1856 (2nd ed. enlarged, 1865); *Bacon, sa vie, son temps,* etc. (1858); *Channing, sa vie et ses oeuvres* (1862); *John Wesley* (1870); *Lord Herbert de Cherbury* (1874) *Histoire de la philosophie en Angleterre depuis Bacon jusqu'à Locke* (1875).

RÉMUSAT, JEAN PIERRE ABEL (1788–1832), French Chinese scholar, was born in Paris on Sept. 5, 1788. He was educated for the medical profession, but a Chinese herbal in the collection of the Abbé Tersan led him to study Chinese. His *Essai sur la langue et la littérature chinoises* (1811) won him the patronage of Silvestre de Sacy, and in 1814 he was appointed to the chair of Chinese founded in that year at the Collège de France. His contributions from Chinese sources to the history of the Tatar nations claims special notice. Rémusat became an editor of the *Journal des savants* in 1818, and founder and first secretary of the Paris Asiatic Society in 1822; he also held various Government appointments. He died at Paris on June 4, 1832. A list of his works is given in Quérard's *France littéraire* s.v. Rémusat.

RENAISSANCE, THE. The "Renaissance" or "Renascence" is a term used to indicate a well-known but indefinite space of time and a certain phase in the development of Europe. On the one hand it denotes the transition from that period of history which we call the middle ages (*q.v.*) to that which we call modern. On the other hand it implies those changes in the intellectual and moral attitude of the Western nations by which the transition was characterized. If we insist upon the literal and etymological meaning of the word, the Renaissance was a re-birth; and it is needful to inquire of what it was the re-birth. The metaphor of Renaissance may signify the entrance of the European nations upon a fresh stage of vital energy in general, implying a fuller consciousness and a freer exercise of faculties than had belonged to the mediaeval period. Or it may mean the resuscitation of simply intellectual activities, stimulated by the revival of antique learning and its application to the arts and literatures of modern peoples. Upon our choice between these two interpretations of the word depend important differences in any treatment of the subject. The former has the disadvantage of making it difficult to separate the Renaissance from other historical phases—the Reformation for example—with which it ought not to be confounded. The latter has the merit of assigning a specific name to a limited series of events and group of facts, which can be distinguished for the purpose of analysis from other events and facts with which they are intimately but not indissolubly connected. In other words, the one definition of Renaissance makes it denote the whole change which came over Europe at the close of the middle ages. The other confines it to what was known by our ancestors as the Revival of Learning. Yet, when we concentrate attention on the recovery of antique culture, we become aware that this was only one phenomenon or symptom of a far wider and more comprehensive alteration in the conditions of the European races. We find it needful to retain both terms, Renaissance and Revival of Learning, and to show the relations between the series of events and facts which they severally imply. The Revival of Learning must be regarded as a function of that vital energy, an organ of that mental evolution, which brought into existence the modern world, with its new conceptions of philosophy and religion, its reawakened arts and sciences, its firmer grasp on the realities of human nature and the world, its manifold inventions and discoveries, its altered political systems, its expansive and progressive forces. Important as the Revival of Learning undoubtedly was, there are essential factors in the complex called the Renaissance with which it can but remotely be connected. When we analyse the whole group of phenomena which have to be considered, we perceive that some of the most essential have nothing or little to do with the recovery of the classics. These are, briefly speaking, the decay of those great fabrics, church and empire, which ruled the middle ages both as ideas and as realities; the development of nationalities and languages; the enfeeblement of the feudal system throughout Europe; the invention and application of paper, the mariner's compass, gunpowder, and printing; the exploration of continents beyond the ocean; and the substitution of the Copernican for the Ptolemaic system of astronomy. Europe in fact had been prepared for a thorough-going metamorphosis before that new idea of human life and culture which the Revival of Learning brought to light had been made manifest. It had recovered from the confusion consequent upon the dissolution of the ancient Roman empire. The Teutonic tribes had been Christianized, civilized and assimilated to the previously Latinized races over whom they exercised the authority of conquerors. Comparative tranquillity and material comfort had succeeded to discord and rough living. Modern nationalities, defined as separate factors in a common system, were ready to co-operate upon the basis of European federation. The ideas of universal monarchy and of indivisible Christendom, incorporated in the Holy Roman empire and the Roman Church, had so far lost their hold that scope was offered for the introduction of new theories both of state and church which would have seemed visionary or impious to the mediaeval mind. It is, therefore, obvious that some term, wider than Revival of Learning, descriptive of the change which began to pass over Europe in the 14th and 15th centuries, has to be adopted. That of Renaissance, Rinascimento, or Renascence is sufficient for the purpose, though we have to guard against the tyranny of what is after all a metaphor. We must not suffer it to lead us into rhetoric about the deadness and the darkness of the middle ages, or hamper our inquiry with preconceived assumptions that the re-birth in question was in any true sense a return to the irrecoverable pagan past. Nor must we imagine that there was any abrupt break with the middle ages. On the contrary, the Renaissance was rather the last stage of the middle ages emerging

from ecclesiastical and feudal despotism, developing what was original in mediaeval ideas by the light of classic arts and letters, holding in itself the promise of the modern world. It was, therefore, a period and a process of transition, fusion, preparation, tentative endeavour. And just at this point the real importance of the Revival of Learning may be indicated. That rediscovery of the classic past restored the confidence in their own faculties to men striving after spiritual freedom; revealed the continuity of history and the identity of human nature in spite of diverse creeds and different customs; held up for emulation master-works of literature, philosophy and art; provoked inquiry; encouraged criticism; shattered the narrow mental barriers imposed by mediaeval orthodoxy. Humanism[1], a word which will often recur in the ensuing paragraphs, denotes a specific bias which the forces liberated in the Renaissance took from contact with the ancient world—the particular form assumed by human self-esteem at that epoch—the ideal of life and civilization evolved by the modern nations. It indicates the endeavour of man to reconstitute himself as a free being, not as the thrall of theological despotism, and the peculiar assistance he derived in this effort from Greek and Roman literature, the *litterae humaniores*, letters leaning rather to the side of man than of divinity.

In this article the Renaissance will be considered as implying a comprehensive movement of the European intellect and will toward self-emancipation, toward reassertion of the natural rights of the reason and the senses, toward the conquest of this planet as a place of human occupation, and toward the formation of regulative theories both for states and individuals differing from those of mediaeval times. The Revival of Learning will be treated as a decisive factor in this process of evolution on a new plan. To exclude the Reformation and the Counter-Reformation wholly from the survey is impossible. These terms indicate moments in the whole process of modern history which were opposed, each to the other, and both to the Renaissance; and it is needful to bear in mind that they have, scientifically speaking, a quite separate existence. Yet, if the history of Europe in the 16th century of our era came to be written with the brevity with which we write the history of Europe in the 6th century B.C., it would be difficult at the distance of time implied by that supposition to distinguish the Italian movement of the Renaissance in its origin from the German movement of the Reformation. Both would be seen to have a common starting-point in the reaction against long dominant ideas which were becoming obsolete, and also in the excitation of faculties which had during the same period been accumulating energy.

Chronology.—The Renaissance, if we try to regard it as a period, was essentially the transition from one historical stage to another. It cannot therefore be confined within strict chronological limits. There is one date, however, which may be remembered with advantage as the starting-point in time of the Renaissance, after the departure from the middle ages had been definitely and consciously made by the Italians. This is the year 1453, when Constantinople, chosen for his capital by the first Christian emperor of Rome, fell into the hands of the Turk.[2] One of the survivals of the old world, the shadow of what had been the Eastern empire, now passed suddenly away. Almost at the same date that visionary revival of the Western empire, which had imposed for six centuries upon the imagination of mediaeval Europe, hampering Italy and impeding the consolidation of Germany, ceased to reckon among political actualities; while its more robust rival, the Roman Church, seemed likely to sink into the rank of a petty Italian principality. It was demonstrated by the destruction of the Eastern and the dotage of the Western empire and by the new papal policy which Nicholas V. inaugurated, that the old order of society was about to be superseded. Nothing remained to check those centrifugal forces in state and church which substituted a confederation of rival European Powers for the earlier ideal of universal monarchy, and separate religious constitutions for the previous Catholic unity. At the same time the new learning introduced by the earlier humanists awakened free thought, encouraged curiosity, and prepared the best minds of Europe for speculative audacities from which the schoolmen would have shrunk, and which soon expressed themselves in acts of cosmopolitan importance. If we look a little forward to the years 1492–1500, we obtain a second date of great importance. In these years the expedition of Charles VIII. to Naples opened Italy to French, Spanish and German interference. The leading nations of Europe began to compete for the prize of the peninsula, and learned meanwhile that culture which the Italians had perfected. In these years the secularization of the papacy was carried to its final point by Alexander VI., and the Reformation became inevitable. The same period was marked by the discovery of America, the exploration of the Indian seas, and the consolidation of the Spanish nationality. It also witnessed the application of printing to the diffusion of knowledge. Thus, speaking roughly, the half-century between 1450 and 1500 may be termed the culminating point of the Renaissance. The transition of the mediaeval to the modern order was now secured if not accomplished, and a rubicon had been crossed from which no retrogression to the past was possible. Looking yet a little farther to the years 1527 and 1530 a third decisive date is reached. In the first of these years happened the sack of Rome, in the second the pacification of Italy by Charles V. under a Spanish hegemony. The age of the Renaissance was now closed for the land which gave it birth. The Reformation had taken firm hold on northern Europe. The Counter-Reformation was already imminent.

[1]To the humanists themselves "humanitas" meant nothing more nor less than "culture."

[2]Most scholars now deny that the fall of Constantinople had any appreciable influence on the culture of Western Europe. For Symonds' date of 1453 they would substitute the date of the invention of printing about 1440.

THE MIDDLE AGES

It must not be imagined that so great a change as that implied by the Renaissance was accomplished without premonitory symptoms and previous endeavours. In the main we mean by it the recovery of freedom for the human spirit after a long period of bondage to oppressive ecclesiastical and political orthodoxy—a return to the liberal and practical conceptions of the world which the nations of antiquity had enjoyed, but upon a new and enlarged platform. This being so, it was inevitable that the finally successful efforts after self-emancipation should have been anticipated from time to time by strivings within the ages that are known as dark and mediaeval. It is, therefore part of the present inquiry to pass in review some of the claimants to be considered precursors to the Renaissance.

First of all must be named the Frank in whose lifetime the dual conception of universal empire and universal church, divinely appointed sacred and inviolable, began to control the order of European society. Charles the Great (Charlemagne) lent his forces to the plan of resuscitating the Roman empire at a moment when his own power made him the arbiter of Western Europe, when the papacy needed his alliance, and when the Eastern empire had passed under the usurped regency of a female. He modelled an empire, Roman in name, but essentially Teutonic, since it owed such substance as its fabric possessed to Frankish armies and the sinews of the German people. As a structure composed of divers ill-connected parts it fell to pieces at its builder's death, leaving little but the incubus of a memory, the fascination of a mighty name, to dominate the mind of mediaeval Europe. As an idea, the Empire grew in visionary power, and remained one of the chief obstacles in the way of both Italian and German national coherence. Real force was not in it, but rather in that counterpart to its unlimited pretensions, the Church which had evolved it from barbarian night, and which used her own more vital energies for undermining the rival of her creation. Charles the Great, having proclaimed himself successor of the Caesars, was obscurely ambitious of imitating the Augusti also in the sphere of letters. He caused a scheme of humanistic education to be formulated, and gave employment at his court to rhetoricians of whom Alcuin was the most considerable. But very little came of the Revival of Learning which Charles is supposed to have encouraged; and the empire he restored was accepted by the mediaeval intellect in a crude theological and vaguely mystical spirit. We should, how-

ever, here remember that the study of Roman law, which was one important precursory symptom of the Renaissance, owed much to mediaeval respect for the empire as a divine institution. This, together with the municipal Italian intolerance of the Lombard and Frankish codes, kept alive the practice and revived the science of Latin jurisprudence at an early period.

Speculation and Heresy.—Philosophy had tried to free itself from the trammels of theological orthodoxy in the hardy speculations of some schoolmen, notably of Scotus Erigena and Abelard. These innovators found, however, small support, and were defeated by opponents who used the same logical weapons with authority to back them. Nor were the rationalistic opinions of the Averroists without their value, though the Church condemned these deviators from her discipline as heretics. Such mediaeval materialists, moreover, had but feeble hold upon the substance of real knowledge. Imperfect acquaintance with authors whom they had studied in Latin translations made by Jews from Arabic commentaries on Greek texts, together with almost total ignorance of natural laws, condemned them to sterility. Like the other schiomachists of their epoch, they fought with phantoms in a visionary realm. A similar judgment may be passed upon those Paulician, Albigensian, Paterine and Epicurean dissenters from the Catholic creed who opposed the phalanxes of orthodoxy with frail imaginative weapons, and alarmed established orders in the state by the audacity of their communistic opinions. Physical science struggled into feeble life in the cells of Gerbert and Roger Bacon. But these men were accounted magicians by the vulgar; and, while the one eventually assumed the tiara, the other was incarcerated in a dungeon. The schools meanwhile resounded still to the interminable dispute upon abstractions. Are only universals real, or has each name a corresponding entity? From the midst of the Franciscans who had persecuted Roger Bacon because he presumed to know more than was consistent with human humility arose John of Parma, adopting and popularizing the mystic prophecy of Joachim of Flora. The reign of the Father is past; the reign of the Son is passing; the reign of the Spirit is at hand. Such was the formula of the Eternal Gospel, which as an unconscious forecast of the Renaissance, has attracted retrospective students by its felicity of adaptation to their historical method. Yet we must remember that this bold intuition of the abbot Joachim indicated a monastic reaction against the tyrannies and corruptions of the Church, rather than a fertile philosophical conception. The Fraticelli spiritualists, and similar sects who fed their imagination with his doctrine, expired in the flames to which Fra Dolcino Longino and Margharita were consigned. To what extent the accusations of profligate morals brought against these reforming sectarians were justified remains doubtful; and the same uncertainty rests upon the alleged iniquities of the Templars. It is only certain that at this epoch the fabric of Catholic faith was threatened with various forms of prophetic and Oriental mysticism, symptomatic of a widespread desire to grasp at something simpler, purer and less rigid than Latin theology afforded. Devoid of criticism, devoid of sound learning, devoid of a firm hold on the realities of life, these heresies passed away without solid results and were forgotten.

Naturalism.—We are apt to take for granted that the men of the middle ages were immersed in meditations on the other world, and that their intellectual exercises were confined to abstractions of the schools, hallucinations of the fancy, allegories, visions. This assumption applies indeed in a broad sense to that period which was dominated by intolerant theology, and deprived of positive knowledge. Yet there are abundant signs that the native human instincts, the natural human appetities, remained unaltered and alive beneath the crust of orthodoxy. In the person of a pope like Boniface VIII. those ineradicable forces of the natural man assumed, if we may trust the depositions of ecclesiastics, well acquainted with his life, a form of brutal atheistic cynicism. In the person of an emperor, Frederick II., they emerged under the more agreeable garb of liberal culture and Epicurean scepticism. Frederick dreamed of remodelling society upon a mundane type, which anticipated the large toleration and cosmopolitan enlightenment of the actual Renaissance. But his efforts were defeated by the unrelenting hostility of the Church, and by the incapacity of his contemporaries to understand his aims. After being forced in his lifetime to submit to authority, he was consigned by Dante to hell. Frederick's ideal of civilization was derived in a large measure from Provence, where a beautiful culture had prematurely bloomed, filling southern Europe with the perfume of poetry and gentle living. Here, if anywhere, it seemed as though the ecclesiastical and feudal fetters of the middle ages might be broken, and humanity might enter on a new stage of joyous and unimpeded evolution. This was, however, not to be. The Church preached Simon de Montfort's crusade, and organized Dominic's Inquisition; what Quinet calls the "Renaissance sociale par l'Amour" was extirpated by sword, fire, famine and pestilence. Meanwhile the Provençal poets had developed their modern language with incomparable richness and dexterity, creating forms of verse and modes of emotional expression which determined the latest mediaeval phase of literature in Europe. The naturalism of which we have been speaking found free utterance now in the fabliaux of jongleurs, lyrics of minnesingers, tales of trouvères, romances of Arthur and his knights—compositions varied in type and tone, but in all of which sincere passion and real enjoyment of life pierce through the thin veil of chivalrous mysticism or of allegory with which they were sometimes conventionally draped. The tales of Lancelot and Tristram, the lives of the troubadours and the Wachtlieder of the minnesingers, sufficiently prove with what sensual freedom a knight loved the lady whom custom and art made him profess to worship as a saint. We do not need to be reminded that Beatrice's adorer had a wife and children, or that Laura's poet owned a son and daughter by a concubine, in order to perceive that the mystic passion of chivalry was compatible in the middle ages with commonplace matrimony or vulgar illegitimate connections. But perhaps the most convincing testimony to the presence of this ineradicable naturalism is afforded by the Latin songs of wandering students, known as Carmina Burama, written by the self-styled Goliardi. In these compositions, remarkable for their facile handling of mediaeval Latin rhymes and rhythms, the allegorizing mysticism which envelops chivalrous poetry is discarded. Love is treated from a frankly carnal point of view. Bacchus and Venus go hand in hand, as in the ancient ante-Christian age. The open-air enjoyments of the wood, the field, the dance upon the village green are sung with juvenile light-heartedness. No grave note, warning us that the pleasures of this earth are fleeting, that the visible world is but a symbol of the invisible, that human life is a probation for the life beyond, interrupts the tinkling music as of castanets and tripping feet which gives a novel charm to these unique relics of the 13th century. Goliardic poetry is further curious as showing how the classics even at that early period were a fountain-head of pagan inspiration. In the taverns and low places of amusement haunted by those lettered songsters, on the open road and in the forests trodden by their vagrant feet, the deities of Greece and Rome were not in exile, but at home within the hearts of living men. Thus, while Christendom was still preoccupied with the Crusades, two main forces of the Renaissance, naturalism and enthusiasm for antique modes of feeling, already brought their latent potency to light, prematurely indeed and precociously, yet with a promise that was destined to be kept.

The Mediaeval Attitude.—When due regard is paid to these miscellaneous evidences of intellectual and sensual freedom during the middle ages, it will be seen that there were by no means lacking elements of native vigour ready to burst forth. What was wanting was not vitality and licence, not audacity of speculation, not lawless instinct or rebellious impulse. It was rather the right touch on life, the right feeling for human independence, the right way of approaching the materials of philosophy, religion, scholarship and literature that failed. The courage that is born of knowledge, the calm strength begotten by a positive attitude of mind, face to face with the dominant over-shadowing sphinx of theology, were lacking. We may fairly say that natural and untaught people had more of the just intuition that was needed than learned folk trained in the schools. But these people were rendered licentious in revolt or impotent for salutary action by ignorance, by terror, by uneasy dread of the doom declared for heretics and rebels.

The massive vengeance of the Church hung over them, like a heavy sword suspended in the cloudy air. Superstition and stupidity hedged them in on every side, so that sorcery and magic seemed the only means of winning power over nature or insight into mysteries surrounding human life. The path from darkness to light was lost; thought was involved in allegory; the study of nature had been perverted into an inept system of grotesque and pious parable-mongering; the pursuit of truth had become a game of wordy dialectics. The other world, with its imagined heaven and hell, haunted the conscience like a nightmare. However sweet this world seemed, however fair the flesh, both world and flesh were theoretically given over to the devil. It was not worth while to master and economize the resources of this earth, to utilize the good and ameliorate the evils of this life, while every one agreed, in theory at any rate, that the present was but a bad prelude to an infinitely worse or infinitely better future. To escape from these preoccupations and prejudices except upon the path of conscious and deliberate sin was impossible for all but minds of rarest quality and courage; and these were too often reduced to the recantation of their supposed errors no less by some secret clinging sense of guilt than by the Church's iron hand. Man and the actual universe kept on reasserting their rights and claims, announcing their goodliness and delightfulness, in one way or another; but they were always being thrust back again into Cimmerian regions of abstractions, fictions, visions, spectral hopes and fears, in the midst of which the intellect somnambulistically moved upon an unknown way.

THE REVIVAL OF LEARNING IN ITALY

At this point the Revival of Learning intervened to determine the course of the Renaissance. Mediaeval students possessed a considerable portion of the Latin classics, though Greek had become in the fullest sense of the phrase a dead language. But what they retained of ancient literature they could not comprehend in the right spirit. Between them and the text of poet or historian hung a veil of mysticism, a vapour of misapprehension. The odour of unsanctity clung around those relics of the pagan past. Men bred in the cloister and the lecture-room of the logicians, trained in scholastic disputations, versed in allegorical interpretations of the plainest words and most apparent facts, could not find the key which might unlock those stores of wisdom and of beauty. Petrarch first opened a new method in scholarship, and revealed what we denote as humanism. In his teaching lay the twofold discovery of man and of the world. For humanism, which was the vital element in the Revival of Learning, consists mainly of a just perception of the dignity of man as a rational, volitional and sentient being, born upon this earth with a right to use it and enjoy it. Humanism implied the rejection of those visions of a future and imagined state of souls as the only absolute reality, which had fascinated the imagination of the middle ages. It involved a vivid recognition of the goodliness of man and nature, displayed in the great monuments of human power recovered from the past. It stimulated the curiosity of latent sensibilities, provoked fresh inquisition into the groundwork of existence and strengthened man's self-esteem by knowledge of what men had thought and felt and done in ages when Christianity was not. It roused a desire to reappropriate the whole abandoned provinces of mundane energy, and a hope to emulate antiquity in works of living loveliness and vigour. The Italians of the 14th century, more precocious than the other European races, were ripe for this emancipation of enslaved intelligence. In the classics they found the food which was required to nourish the new spirit; and a variety of circumstances among which must be reckoned the pride of a nation boasting of its descent from the Populus Romanus, rendered them apt to fling aside the obstacles that had impeded the free action of the mind through many centuries. Petrarch not only set his countrymen upon the right method of studying the Latin classics, but he also divined the importance of recovering a knowledge of Greek literature. To this task Boccaccio addressed himself; and he was followed by numerous Italian enthusiasts, who visited Byzantium before its fall as the sacred city of a new revelation. The next step was to collect mss., to hunt out, copy and preserve the precious relics of the past. In this work of accumulation Guarino and Filelfo, Aurispa and Poggio, took the chief part, aided by the wealth of Italian patricians, merchant-princes and despots, who were inspired by the sacred thirst for learning. Learning was then no mere pursuit of a special and recluse class. It was fashionable and it was passionate, pervading all society with the fervour of romance. For a generation nursed in decadent scholasticism and stereotyped theological formulae it was the fountain of renascent youth, beauty and freedom, the shape in which the Helen of art and poetry appeared to the ravished eyes of mediaeval Faustus. It was the resurrection of the mightiest spirits of the past. "I go," said Cyriac of Ancona, the indefatigable though uncritical explorer of antiquities, "I go to awake the dead!" This was the enthusiasm, this the vitalizing faith, which made the work of scholarship in the 15th century so highly strung and ardent. The men who followed it knew that they were restoring humanity to its birthright after the expatriation of ten centuries. They were instinctively aware that the effort was for liberty of action, thought and conscience in the future. This conviction made young men leave their loves and pleasures, grave men quit their counting-houses, churchmen desert their missals, to crowd the lecture-rooms of philologers and rhetoricians. When Greek had been acquired, mss. accumulated, libraries and museums formed, came the age of printers and expositors. Aldus Manutius in Italy, Froben in Basel, the Étiennes in Paris, committed to the press what the investigators had recovered. Nor were there wanting men who dedicated their powers to Hebrew and Oriental erudition, laying, together with the Grecians, a basis for those Biblical studies which advanced the Reformation. Meanwhile the languages of Greece and Rome had been so thoroughly appropriated that a final race of scholars, headed by Politian, Pontano, Valla, handled once again in verse and prose both antique dialects, and thrilled the ears of Europe with new-made pagan melodies. The Church itself at this epoch lent its influence to the prevalent enthusiasm. Nicholas V. and Leo X., not to mention intervening popes who showed themselves tolerant of humanistic culture, were heroes of the classical revival. Scholarship became the surest path of advancement to ecclesiastical and political honours. Italy was one great school of the new learning at the moment when the German, French and Spanish nations were invited to her feast.

It will be well to describe briefly, but in detail, what this meeting of the modern with the ancient mind effected over the whole field of intellectual interests. In doing so, we must be careful to remember that the study of the classics did but give a special impulse to pent-up energies which were bound in one way or another to assert their independence. Without the Revival of Learning the direction of those forces would have been different; but that novel intuition into the nature of the world and man which constitutes what we describe as Renaissance must have emerged. As the facts, however, stand before us, it is impossible to dissociate the rejection of the other world as the sole reality, the joyous acceptance of this world as a place to live in and act in, the conviction that "the proper study of mankind is man," from humanism. Humanism as it actually appeared in Italy was positive in its conception of the problems to be solved, pagan in its contempt for mediaeval mysticism, invigorated for sensuous enjoyment by contact with antiquity, yet holding in itself the germ of new religious aspirations, profounder science and sterner probings of the mysteries of life than had been attempted even by the ancients. The operation of this humanistic spirit has now to be traced.

Dante, Petrarch, Boccaccio, and Villani.—It is obvious that Italian literature owed little at the outset to the Revival of Learning. The *Divine Comedy*, the *Canzoniere* and the *Decameron* were works of monumental art, deriving neither form nor inspiration immediately from the classics but applying the originality of Italian genius to matter drawn from previous mediaeval sources. Dante showed both in his epic poem and in his lyrics that he had not abandoned the sphere of contemporary thought. Allegory and theology, the vision and the symbol, still determine the form of masterpieces which for perfection of workmanship and for emancipated force of intellect rank among the highest products of the

which displaced the mediaeval system of instruction and taking engagements as tutors in the families of despots, noblemen and wealthy merchants. The academy established by Vittorino da Feltre at Mantua under the protection of Gian Francesco Gonzaga, for the training of pupils of both sexes, might be chosen as the type of this Italian method. His scholars who were lodged in appropriate buildings met daily to hear the master read and comment on the classics. They learned portions of the best authors by heart, exercised themselves in translating from one language to another and practised composition in prose and verse. It was Vittorino's care to see that while their memories were duly stored with words and facts their judgment should be formed by a critical analysis, attention to style and comparison of the authors of a decadent age with those who were acknowledged classics. During the hours of recreation suitable physical exercises, as fencing, riding, and gymnastics, were conducted under qualified trainers. From this sketch it will be seen how closely the educational system which came into England during the reign of the Tudors, and which has prevailed until the present time, was modelled upon the Italian type. English youths who spend their time at Eton between athletic sports and Latin verse, and who take a first class in *Literae Humaniores* at Oxford are pursuing the same course of physical and mental discipline as the princes of Gonzaga or Montefeltro in the 15th century.

The humanists effected a deeply penetrating change in social manners. Through their influence as tutors, professors, orators and courtiers, society was permeated by a fresh ideal of culture. To be a gentleman in Italy meant at this epoch to be a man acquainted with the rudiments at least of scholarship, refined in diction, capable of corresponding or of speaking in choice phrases, open to the beauty of the arts, intelligently interested in archaeology, taking for his models of conduct the great men of antiquity, rather than the saints of the Church. He was also expected to prove himself an adept in physical exercises and in the courteous observances which survived from chivalry. The type is set before us by Castiglione in that book upon the courtier which went the round of Europe in the 16th century. It is further emphasized in a famous passage of the *Orlando Innamorato* where Boiardo compares the Italian ideal of an accomplished gentleman with the coarser type admired by nations of the north. To this point the awakened intelligence of the Renaissance, instructed by humanism, polished by the fine arts, expanding in genial conditions of diffused wealth, had brought the Italians at a period when the rest of Europe was comparatively barbarous.

Defects of the Renaissance.—This picture has undoubtedly a darker side. Humanism in its revolt against the middle ages was, as we have seen already, mundane, pagan, irreligious, positive[1]. The Renaissance can, after all, be regarded only as a period of transition in which much of the good of the past was sacrificed while some of the evil was retained, and neither the bad nor the good of the future was brought clearly into fact. Beneath the surface of brilliant social culture lurked gross appetites and savage passions, unrestrained by mediaeval piety, untutored by modern experience. Italian society exhibited an almost unexampled spectacle of literary, artistic and courtly refinement crossed by brutalities of lust, treasons, poisonings, assassinations, violence. A succession of worldly pontiffs brought the Church into flagrant discord with the principles of Christianity. Steeped in pagan learning, desirous of imitating the manners of the ancients, thinking and feeling in harmony with Ovid and Theocritus, and at the same time rendered cynical by the corruption of papal Rome, the educated classes lost their grasp upon morality. Political honesty ceased almost to have a name in Italy. The Christian virtues were scorned by the foremost actors and the ablest thinkers of the time, while the antique virtues were themes for rhetoric rather than moving springs of conduct. This is apparent to all students of Machiavelli and Guicciardini, the profoundest analysts of their age, the bitterest satirists of its vices, but themselves infected with its incapacity for moral goodness. The Italians were not only vitiated; they had also become impotent for action and resistance. At the height of the Renaissance the five great Powers in the peninsula formed a confederation of independent but mutually attractive and repellent states. Equilibrium was maintained by diplomacy, in which the humanists played a foremost part, casting a network of intrigue over the nation which helped in no small measure to stimulate intelligence and create a common medium of culture, but which accustomed statesmen to believe that everything could be achieved by wire-pulling. Wars were conducted on a showy system by means of mercenaries, who played a safe game in the field and developed a system of bloodless campaigns. Meanwhile the people grew up unused to arms. When Italy between the years 1494 and 1530 became the battlefield of French, German and Spanish forces, it was seen to what a point of helplessness the political, moral and social conditions of the Renaissance had brought the nation.

[1]But there was also a great school of Christian humanists intent upon reconciling the gospel with the Greek philosophers.

Spread of the New Learning.—It was needful to study at some length the main phenomena of the Renaissance in Italy, because the history of that phase of evolution in the other Western races turns almost entirely upon points in which they either adhered to or diverged from the type established there. Speaking broadly, what France, Germany, Spain and England assimilated from Italy at this epoch was in the first place the new learning as it was then called. This implied the new conception of human life, the new interest in the material universe, the new method of education, and the new manners, which we have seen to be inseparable from Italian humanism. Under these forms of intellectual enlightenment and polite culture the renascence of the human spirit had appeared in Italy, where it was more than elsewhere connected with the study of classical antiquity. But that audacious exploratory energy which formed the motive force of the Renaissance as distinguished from the Revival of Learning took, as we shall see, very different directions in the several nations who now were sending the flower of their youth to study at the feet of Italian rhetoricians.

The Renaissance ran its course in Italy with strange indifference to consequences. The five great Powers, held in equilibrium by Lorenzo de' Medici, dreamed that the peninsula could be maintained *in statu quo* by diplomacy. The Church saw no danger in encouraging a pseudo-pagan ideal of life, violating its own principle of existence by assuming the policy of an aggrandizing secular state, and outraging Christendom openly by its acts and utterances. Society at large was hardly aware that an intellectual force of stupendous magnitude and incalculable explosive power had been created by the new learning. Why should not established institutions proceed upon the customary and convenient methods of routine, while the delights of existence were augmented, manners polished, arts developed and a golden age of epicurean ease made decent by a state religion which no one cared to break with because no one was left to regard it seriously? This was the attitude of the Italians when the Renaissance, which they had initiated as a thing of beauty, began to operate as a thing of power beyond the Alps.

GERMANY

Germany was already provided with universities, seven of which had been founded between 1348 and 1409. In these haunts of learning the new studies took root after the year 1440, chiefly through the influence of travelling professors, Peter Luder and Samuel Karoch. German scholars made their way to Lombard and Tuscan lecture-rooms, bringing back the methods of the humanists. Greek, Latin and Hebrew erudition soon found itself at home on Teutonic soil. Like Italian men of letters, these pioneers of humanism gave a classic turn to their patronymics: unfamiliar names, Crotus Rubeanus and Pierius Graecus, Capnion and Lupambulus Ganymedes, Oecolampadius and Melanchthon, resounded on the Rhine. A few of the German princes, among whom Maximilian, the prince cardinal Albert of Mainz, Frederick the Wise of Saxony, and Eberhard of Württemberg deserve mention, exercised a not insignificant influence on letters by the foundation of new universities and the patronage of learned men. The cities of Strasbourg, Nuremberg, Augsburg, Basle, became centres of learned coteries which gathered round scholars like Wimphel-

ing. Brant, Peutinger, Schedel, and Pirckheimer, artists like Dürer and Holbein, painters of the eminence of Froben. Academies in imitation of Italian institutions came into existence, the two most conspicuous named after the Rhine and the Danube, holding their headquarters respectively at Heidelberg and Vienna. Crowned poets, of whom the most eminent was Conrad Celtes Protucius (Pickel!) emulated the fame of Politian and Pontano. Yet though the Renaissance was thus widely communicated to the centres of German intelligence, it displayed a different character from that which it assumed in Italy. Gothic art, which was indigenous in Germany, yielded but little to southern influences. Such work as that of Dürer, Vischer, Cranach, Schöngauer, Holbein, consummate as it was in technical excellence, did not assume Italian forms of loveliness, did not display the paganism of the Latin races. The modification of Gothic architecture by pseudo-Roman elements of style was incomplete. What Germany afterwards took of the Palladian manner was destined to reach it on a circuitous route from France. In like manner the new learning failed to penetrate all classes of society with the rapidity of its expansion in Italy, nor was the new ideal of life and customs so easily substituted for the mediaeval. The German aristocracy, as Aeneas Sylvius had noticed, remained for the most part barbarous, addicted to gross pleasures, contemptuous of culture. The German dialects were too rough to receive that artistic elaboration under antique influences which had been so facile in Tuscany. The doctors of the universities were too wedded to their antiquated manuals and methods, too satisfied with dullness, too proud of titles and diplomas, too anxious to preserve ecclesiastical discipline and to repress mental activity, for a genial spirit of humanism to spread freely. Not in Cologne or Tübingen but in Padua and Florence did the German pioneers of the Renaissance acquire their sense of liberal studies. And when they returned home they found themselves encumbered with stupidities, jealousies and rancours. Moreover the temper of these more enlightened men was itself opposed to Italian indifference and immorality; it was pugnacious and polemical, eager to beat down the arrogance of monks and theologians rather than to pursue an ideal of aesthetical self-culture. To a student of the origins of German humanism it is clear that something very different from the Renaissance of Lorenzo de' Medici and Leo X. was in preparation from the first upon Teutonic soil. Far less plastic and form-loving than the Italian, the German intelligence was more penetrative, earnest, disputative, occupied with substantial problems. Starting with theological criticism, proceeding to the stage of solid studies in the three learned languages, German humanism occupied the attention of a widely scattered sect of erudite scholars; but it did not arouse the interest of the whole nation until it was forced into a violently militant attitude by Pfefferkorn's attack on Reuchlin. That attempt to extinguish honest thought prepared the Reformation; and humanism after 1518 was absorbed in politico-religious warfare.

Humanism and the German Reformation.—The point of contact between humanism and the Reformation in Germany has to be insisted on; for it is just here that the relation of the Reformation to the Renaissance in general makes itself apparent. As the Renaissance had its precursory movements in the mediaeval period, so the German Reformation was preceded by Wycliffe and Huss, by the discontents of the Great Schism, and by the councils of Constance and Basel. These two main streams of modern progress had been proceeding upon different tracks to diverse issues, but they touched in the studies stimulated by the Revival, and they had a common origin in the struggle of the spirit after self-emancipation. Johann Reuchlin, who entered the lecture-room of Argyropoulos at Rome in 1482, Erasmus of Rotterdam, who once dwelt at Venice as the house guest of the Aldi, applied their critical knowledge of Hebrew and Greek to the elucidation and diffusion of the Bible. To the Germans, as to all nations of that epoch, the Bible came as a new book, because they now read it for the first time with eyes opened by humanism. The touch of the new spirit which had evolved literature, art and culture in Italy sufficed in Germany to recreate Christianity. This new spirit in Italy emancipated human intelligence by the classics; in Germany it emancipated the human conscience by the Bible. The indignation excited by Leo X.'s sale of indulgences, the moral rage stirred in Northern hearts by papal abominations in Rome were external causes which precipitated the schism between Teutonic and Latin Christianity. The Reformation, inspired by the same energy of resuscitated life as the Renaissance, assisted by the same engines of the printing-press and paper, using the same apparatus of scholarship, criticism, literary skill, being in truth another manifestation of the same world-movement under a diverse form, now posed itself as an irreconcilable antagonist to Renaissance Italy. It would be difficult to draw any comparison between German and Italian humanists to the disparagement of the former. Reuchlin was no less learned than Pico; Melanchthon no less humane than Ficino; Erasmus no less witty and far more trenchant than Petrarch; Ulrich von Hutten no less humorous than Folengo; Paracelsus no less fantastically learned than Cardano. But the cause in which German intellect and will were enlisted was so different that it is difficult not to make a formal separation between that movement which evolved culture in Italy and that which restored religion in Germany, establishing the freedom of intelligence in the one sphere and the freedom of conscience in the other. The truth is that the Reformation was the Teutonic Renaissance. It was the emancipation of the reason on a line neglected by the Italians, more important indeed in its political consequences, more weighty in its bearing on rationalistic developments than the Italian Renaissance, but none the less an outcome of the same ground-influences. We have already in this century reached a point at which, in spite of stubborn Protestant dogmatism and bitter Catholic reaction, we can perceive how the ultimate affranchisement of man will be the work of both.

The Counter-Reformation.—The German Reformation was incapable of propagating itself in Italy, chiefly for the reason that the intellectual forces which it represented and employed had already found specific outlet in that country. It was not in the nature of the Italians, sceptical and paganized by the revival, to be keenly interested about questions which seemed to revive the scholastic disputes of the middle ages. It was not in their external conditions, suffering as they were from invasions, enthralled by despots, to use the Reformation as a lever for political revolution. Yet when a tumultuary army of so-called Lutherans sacked Rome in 1527, no sober thinker doubted that a new agent had appeared in Europe which would alter the destinies of the peninsula. The Renaissance was virtually closed so far as it concerned Italy, when Clement VII. and Charles V. struck their compact at Bologna in 1530. This compact proclaimed the principle of monarchial absolutism, supported by papal authority, itself monarchially absolute, which influenced Europe until the outbreak of the Revolution. A reaction immediately set in both against the Renaissance and the Reformation. The Council of Trent, opened in 1545 and closed in 1563, decreed a formal purgation of the Church, affirmed the fundamental doctrines of Catholicism, strengthened the papal supremacy, and inaugurated that movement of resistance which is known as the Counter-Reformation. The complex onward effort of the modern nations, expressing itself in Italy as Renaissance, in Germany as Reformation, had aroused the forces of conservatism. The four main instruments of the reaction were the papacy, which had done so much by its sympathy with the revival to promote the humanistic spirit it now dreaded, the strength of Spain, and two Spanish institutions planted on Roman soil—the Inquisition and the Society of Jesus. The principle contended for and established by this reaction was absolutism as opposed to freedom—monarchial absolutism, papal absolutism, the suppression of energies liberated by the Renaissance and the Reformation. The partial triumph of this principle was secure, in as much as the majority of established powers in Church and State felt threatened by the revolutionary opinions afloat in Europe. Renaissance and Reformation were, moreover, already at strife. Both, too, were spiritual and elastic tendencies toward progress, ideals rather than solid organisms.

SPAIN

The part played by Spain in this period of history was deter-

externally they remained ruder and less polished. The relation between the crown and its great feudatories, the military bias of the aristocracy, and the marked distinction between classes which survived from the middle ages, rendered France in many vital points unlike Italy. Yet the annals of that age, and the anecdotes retailed by Brantôme, prove that the royalty and nobility of France had been largely Italianized.

Architecture.—It is said that Louis XII. brought Fra Giocondo of Verona back with him to France and founded a school of architects. But we need not have recourse to this legend for the explanation of such Italian influences as were already noticeable in the Renaissance buildings on the Loire. Without determining the French style, Italian intercourse helped to stimulate its formation and development. There are students of the 15th century in France who resent this intrusion of the Italian Renaissance. But they forget that France was bound by inexorable laws of human evolution to obey the impulse which communicated itself to every form of art in Europe. In the school of Fontainebleau, under the patronage of Francis I., that Italian influence made itself distinctly felt; yet a true French manner had been already formed, which, when it was subsequently applied at Paris, preserved a marked national quality. The characteristic of the style developed by Bullant, De l'Orme and Lescot, in the royal or princely palaces of Chenonceaux, Chambord, Anet, Écouen, Fontainebleau, the Louvre and elsewhere is a blending of capricious fancy and inventive richness of decoration with purity of outline and a large sense of the beauty of extended masses. Beginning with the older castles of Touraine, and passing onward to the Tuileries, we trace the passage from the mediaeval fortress to the modern pleasure-house, and note how architecture obeyed the special demands of that new phenomenon of Renaissance civilization, the court. In the general distribution of parts these monumental buildings express the peculiar conditions which French society assumed under the influence of Francis I. and Diane de Poitiers. In details of execution and harmonic combinations they illustrate the precision, logic, lucidity and cheerful spirit of the national genius. Here, as in Lombardy, a feeling for serene beauty derived from the study of the antique has not interrupted the evolution of a style indigenous to France and eminently characteristic of the French temperament.

Painting and Sculpture.—During the reign of Francis I. several Italian painters of eminence visited France. Among these Del Rosso, Primaticcio, Del Sarto and Da Vinci are the most famous. But their example was not productive of a really great school of French painting. It was left for the Poussins and Claude Lorraine in the next century, acting under mingled Italian and Flemish influences, to embody the still active spirit of the classical revival. These three masters were the contemporaries of Corneille, and do not belong to the Renaissance period. Sculpture, on the contrary, in which art, as in architecture, the mediaeval French had been surpassed by no other people of Europe, was practised with originality and power in the reigns of Henry II. and Francis I. Ponzio and Cellini, who quitted Italy for France, found themselves outrivalled in their own sphere by Jean Goujon, Cousin and Pilon. The decorative sculpture of this epoch, whether combined with architecture or isolated in monumental statuary, ranks for grace and suavity with the best of Sansovino's. At the same time it is unmistakably inspired by a sense of beauty different from the Italian—more piquant and pointed, less languorous, more mannered perhaps, but with less of empty rhythmical effect. All this while the minor arts of enamelling, miniature, glass-painting, goldsmith's work, jewellery, engraving, tapestry, wood-carving, pottery, etc., were cultivated with a spontaneity and freedom which proved that France, in the middle point between Flanders and Italy, was able to use both influences without a sacrifice of native taste. It may indeed be said in general that what is true of France is likewise true of all countries which felt the artistic impulses of the Renaissance. Whether we regard Spain, the Netherlands, or Germany at this epoch, we find a national impress stamped upon the products of the plastic and the decorative arts, notwithstanding the prevalence of certain forms derived from the antique and Italy. It was only at a later period that the formalism of pseudo-classic pedantry reduced natural and national originality to a dead unanimity.

Literature.—French literature was quick to respond to Renaissance influences. De Comines, the historian of Charles VIII.'s expedition to Naples, differs from the earlier French chroniclers in his way of regarding the world of men and affairs. He has the perspicuity and analytical penetration of a Venetian ambassador. Villon, his contemporary, may rather be ranked, so far as artistic form and use of knowledge are concerned, with poets of the middle ages, and in particular with the Goliardi. But he is essentially modern in the vividness of his self-portraiture, and in what we are wont to call realism. Both De Comines and Villon indicate the entrance of a new quality into literature. The Rhétoriqueurs, while protracting mediaeval traditions by their use of allegory and complicated metrical systems, sought to improve the French language by introducing Latinisms. Thus the Revival of Learning began to affect the vernacular in the last years of the 15th century. Marot and his school reacted against this pedantry. The Renaissance displayed itself in their effort to purify the form and diction of poetry. But the decisive revolution was effected by Ronsard and his comrades of the Pléiade. It was their professed object to raise French to a level with the classics, and to acclimatize Italian species of verse. The humanistic movement led these learned writers to engraft the graces of the antique upon their native literature, and to refine it by emulating the lucidity of Petrarch. The result of their endeavour was immediately apparent in the new force added to French rhythm, the new pomp, richness, colouring and polish conferred upon poetic diction. French style gradually attained to fixity, and the alexandrine came to be recognized as the standard line in poetry. D'Aubigné's invective and Régnier's satire, at the close of the 16th century, are as modern as Voltaire's. Meanwhile the drama was emerging from the mediaeval mysteries; and the classical type, made popular by Garnier's genius, was elaborated, as in Italy, upon the model of Seneca and the canons of the three unities. The tradition thus formed was continued and fortified by the illustrious playwrights of the 17th century. Translation from Greek and Latin into French progressed rapidly at the commencement of this period. It was a marked characteristic of the Renaissance in France to appropriate the spoils of Greece and Rome for the profit of the mother tongue. Amyot's *Plutarch* and his *Daphnis and Chloe* rank amongst the most exquisite examples of beautiful French prose. Prose had now the charm of simplicity combined with grace. To mention Brantôme is to mention the most entertaining of gossips. To speak of Montaigne is to speak of the best as well as the first of essayists. In all the literary work which has been mentioned, the originality and freshness of the French genius are no less conspicuous than its saturation with the new learning and with Italian studies. But the greatest name of the epoch, the name which is synonymous with the Renaissance in France, has yet to be uttered. That, of course, is Rabelais. His incommensurable and indescribable masterpiece of mingled humour, wisdom, satire, erudition, indecency, profundity, levity, imagination, realism, reflects the whole age in its mirror of hyper-Aristophanic farce. What Ariosto is for Italy, Cervantes for Spain, Erasmus for Holland, Luther for Germany, Shakespeare for England, that is Rabelais for France. The Renaissance cannot be comprehended in its true character without familiarity with these six representatives of its manifold and many-sided inspiration.

The Reformation.—The French Renaissance, so rich on the side of arts and letters, was hardly less rich on the side of classical studies. The Revival of Learning has a noble muster-roll of names in France: Turnebus, the patriarch of Hellenistic studies, the Étiennes of Paris, equalling in numbers, industry and learning their Venetian rivals; the two Scaligers; impassioned Dolet; eloquent Muret; learned Cujas; terrible Calvin; Ramus, the intrepid antagonist of Aristotle; De Thou and De Bèze; ponderous Casaubon; brilliant young Saumaise. The distinguishing characteristics of French humanism are vivid intelligence, critical audacity and polemical acumen, perspicuity of exposition, learning directed in its applications by logical sense rather than by artistic ideals of

taste. Some of the names just mentioned remind us that in France, as in Germany and Holland, the Reformation was closely connected with the revival of learning. Humanism has never been in the narrow sense of that term Protestant; still less has it been strictly Catholic. In Italy it fostered a temper of mind decidedly averse to theological speculation and religious earnestness. In Holland and Germany with Erasmus, Reuchlin and Melanchthon it developed types of character, urbane, reflective, pointedly or gently critical, which left to themselves would not have plunged the north of Europe into the whirlpool of belligerent reform. Yet none the less was the new learning, through the open spirit of inquiry it nourished, its vindication of the private reason, its enthusiasm for republican antiquity, and its proud assertion of the rights of human independence, linked by a strong and subtle chain to that turbid revolt of the individual consciousness against spiritual despotism draped in fallacies and throned upon abuses. To this rebellion we give the name of Reformation. But while the necessities of antagonism to papal Rome made it assume at first the form of narrow and sectarian opposition, it marked in fact a vital struggle of the intellect towards truth and freedom, involving future results of scepticism and rationalistic audacity from which its earlier champions would have shrunk. It marked, moreover, in the condition of armed resistance against established authority which was forced upon it by the Counter-Reformation, a firm resolve to assert political liberty, leading in the course of time to a revolution with which the rebellious spirit of the Revival was sympathetic. This being the relation of humanism in general to reform, French learning in particular displayed such innovating boldness as threw many of its most conspicuous professors into the camp at war with Rome. Calvin, a French student of Picard origin, created the type of Protestantism to which the majority of French Huguenots adhered. This too was a moment at which philosophical seclusion was hardly possible. In a nation so tumultuously agitated one side or the other had to be adopted. Those of the French humanists who did not proclaim Huguenot opinions found themselves obliged with Muret to lend their talents to the Counter-Reformation, or to suffer persecution for heterodoxy like Dolet. The Church, terrified and infuriated by the progress of reform, suspected learning on its own account. To be an eminent scholar was to be accused of immorality, heresy and atheism in a single indictment; and the defence of weaker minds lay in joining the Jesuits as Heinsius was fain to do. France had already absorbed the earlier Renaissance in an Italianizing spirit before the Reformation made itself felt as a political actuality. This fact, together with the strong Italian bias of the Valois, serves to explain in some degree the reason why the Counter-Reformation entailed those fierce entangled civil wars, massacres of St. Bartholomew, murders of the Guises, regicides, treasons and empoisonments, that terminated with the compromise of Henry IV. It is no part of the present subject to analyse the political, religious and social interests of that struggle. The upshot was the triumph of the Counter-Reformation, and the establishment of its principle, absolutism, as the basis of French government. It was a French king who, when the nation had been reduced to order, uttered the famous word of absolutism, *"L'État, c'est moi."*

THE NETHERLANDS

The Renaissance in the Low Countries, as elsewhere, had its brilliant age of arts and letters. During the middle ages the wealthy free towns of Flanders flourished under conditions not dissimilar to those of the Italian republics. They raised miracles of architectural beauty, which were modified in the 15th and 16th centuries by characteristic elements of the new style. The Van Eycks, followed by Memling, Metsys, Mabuse, Lucas van Leyden, struck out a new path in the revival of painting and taught Europe the secret of oil-colouring. But it was reserved for the 17th century to witness the flower and fruit time of this powerful art in the work of Porbus, Rubens and Vandyck, in the Dutch schools of landscape and home-life, and in the unique masterpieces of Rembrandt. We have a right to connect this later period with the Renaissance, because the distracted state of the Netherlands during the 16th century suspended, while it could not extinguish, their aesthetic development. The various schools of the 17th century, moreover, are animated with the Renaissance spirit no less surely than the Florentine school of the 15th or the Venetian of the 16th. The animal vigour and carnal enjoyment of Rubens the refined Italianizing beauty of Vandyck, the mystery of light and gloom on Rembrandt's panels, the love of nature in Ruysdael Cuyp and Van Hooghe, with their luminously misty skies, silvery daylight and broad expanse of landscape, the interest in common life displayed by Ter Borch, Van Steen, Douw, Ostade and Teniers, the instinct for the beauty of animals in Potter, the vast sea spaces of Vanderveldt, the grasp on reality, the acute intuition into character in portraits, the scientific study of the world and man, the robust sympathy with natural appetites, which distinguish the whole art of the Low Countries, are a direct emanation from the Renaissance.

The vernacular in the Netherlands profited at first but little by the impulse which raised Italian, Spanish, French and English to the rank of classic languages. But humanism, first of all in its protagonist Erasmus, afterwards in the long list of critical scholars and editors, Lipsius, Heinsius and Grotius, in the printers, Elzevir and Plantin, developed itself from the centre of the Leyden university with massive energy, and proved that it was still a motive force of intellectual progress. In the fields of classical learning the students of the Low Countries broke new ground chiefly by methodical collection, classification and comprehensive criticism of previously accumulated stores. Their works were solid and substantial edifices, forming the substratum for future scholarship. In addition to this they brought a philosophy and scientific thoroughness to bear on studies which had been pursued in a more literary spirit. It would, however, be uncritical to pursue this subject further; for the encyclopaedic labours of the Dutch philologers belong to a period when the Renaissance was overpast. For the same reason it is inadmissible to do more than mention the name of Spinoza here.

The Netherlands became the battlefield of Reformation and Counter-Reformation in even a stricter sense than France. Here the antagonistic principles were plainly posed in the course of struggle against foreign despotism. The conflict ended in the assertion of political independence, as opposed to absolute dominion. Europe in large measure owes the modern ideal of political liberty to that spirit of stubborn resistance which broke the power of Spain. Recent history, and, in particular, the history of democracy, claims for its province the several stages whereby this principle was developed in England and America, and its outburst in the frenzy of the French Revolution. It is enough here to have alluded to the part played by the Low Countries in the genesis of a motive force which may be described as the last manifestation of the Renaissance striving after self-emancipation.

ENGLAND

The insular position of England combined with the nature of the English has allowed the country to feel the vibration of European movements later and with less of shock than the continental nations. Before a wave of progress has reached its shores there has been the opportunity of watching it as spectators, and of considering how to receive it. Revolutions have passed from the tumultuous stages of their origin into some settled and recognizable state before we have been called upon to cope with them. It was thus that England took the influences of the Renaissance and Reformation simultaneously, and almost at the same time found herself engaged in that struggle with the Counter-Reformation which, crowned by the defeat of the Spanish Armada, stimulated the sense of nationality and developed the naval forces of the race. Both Renaissance and Reformation had been anticipated by at least a century in England. Chaucer's poetry, which owed so much to Italian examples, gave an early foretaste of the former. Wycliffe's teaching was a vital moment in the latter. But the French wars, the Wars of the Roses and the persecution of the Lollards deferred the coming of the new age; and the year 1536, when Henry VIII. passed the Act of Supremacy through parliament, may be fixed as the date when England entered definitely upon a career of intellectual development abreast

with the foremost nations of the continent. The circumstances just now insisted on explain the specific character of the English Renaissance. The Reformation had been adopted by consent of the king, lords and commons; and this change in the state religion, though it was not confirmed without reaction, agitation and bloodshed, cost the nation comparatively little disturbance. Humanism, before it affected the bulk of the English people, had already permeated Italian and French literature. Classical erudition had been adapted to the needs of modern thought. The hard work of collecting, printing, annotating and translating Greek and Latin authors had been accomplished. The masterpieces of antiquity had been interpreted and made intelligible. Much of the learning popularized by the poets and dramatists was derived at second hand from modern literature. This does not mean that England was deficient in ripe and sound scholars. More, Colet, Ascham, Cheke, Camden were men whose familiarity with the classics was both intimate and easy. Public schools and universities conformed to the modern methods of study; nor were there wanting opportunities for youths of humble origin to obtain an education which placed them on a level with Italian scholars. The single case of Ben Jonson sufficiently proves this. Yet learning did not at this epoch become a marked speciality in England. There was no class corresponding to the humanists. It should also be remembered that the best works of Italian literature were introduced into Great Britain together with the classics. Phaer's *Virgil,* Chapman's *Homer,* Harrington's *Orlando,* Marlowe's *Hero and Leander,* Fairfax's *Jerusalem Delivered,* North's *Plutarch,* Hoby's *Courtier* —to mention only a few examples—placed English readers simultaneously in possession of the most eminent and representative works of Greece, Rome and Italy. At the same time Spanish influences reached them through the imitators of Guevara and the dramatists; French influences in the versions of romances; German influences in popular translations of the Faust legend, *Eulenspiegel,* and similar productions. The authorized versions of the Bible had also been recently given to the people—so that almost at the same period of time England obtained in the vernacular an extensive library of ancient and modern authors. This was a privilege enjoyed in like measure by no other nation. It sufficiently accounts for the richness and variety of Elizabethan literature, and for the enthusiasm with which the English language was cultivated.

Art, Letters, and the Drama.—Speaking strictly, England borrowed little in the region of the arts from other nations, and developed still less that was original. What is called Jacobean architecture marks indeed an interesting stage in the transition from the Gothic style. But, compared with Italian, French, Spanish, German and Flemish work of a like period, it is both timid and dry. Sculpture was represented in London for a brief space by Torrigiani; painting by Holbein and Antonio More; music by Italians and Frenchmen of the Chapel Royal. But no Englishman rose to European eminence in these departments. With literature the case was very different. Wyat and Surrey began by engrafting the forms and graces of Italian poetry upon the native stock. They introduced the sonnet and blank verse. Sidney followed with the sestine and terza rima and with various experiments in classic metres, none of which took root on English soil. The translators handled the octave stanza. Marlowe gave new vigour to the couplet. The first period of the English Renaissance was one of imitation and assimilation. Academies after the Italian type were founded. Tragedies in the style of Seneca, rivalling Italian and French dramas of the epoch, were produced. Attempts to Latinize ancestral rhythms, similar to those which had failed in Italy and France, were made. Tentative essays in criticisms and dissertations on the art of poetry abounded. It seemed as though the Renaissance ran a risk of being throttled in its cradle by superfluity of foreign and pedantic nutriment. But the natural vigour of the English genius resisted influences alien to itself, and showed a robust capacity for digesting the varied diet offered to it. As there was nothing despotic in the temper of the ruling classes, nothing oppressive in English culture, the literature of that age evolved itself freely from the people. It was under these conditions that Spenser gave his romantic epic to the world, a poem which derived its allegory from the middle ages, its decorative richness from the Italian Renaissance, its sweetness, purity, harmony and imaginative splendour from the most poetic nation of the modern world. Under the same conditions, the Elizabethan drama, which in its totality is the real exponent of the English Renaissance, came into existence. This drama very early freed itself from the pseudo-classic mannerism which imposed on taste in Italy and France. Depicting feudalism in the vivid colours of an age at war with feudal institutions, breathing into antique histories the breath of actual life, embracing the romance of Italy and Spain, the mysteries of German legend, the fictions of poetic fancy and the facts of daily life, humours of the moment and abstractions of philosophical speculation, in one homogeneous amalgam instinct with intense vitality, this extraordinary birth of time, with Shakespeare for the master of all ages, left a monument of the Renaissance unrivalled for pure creative power by any other product of that epoch. To complete the sketch, we must set Bacon, the expositor of modern scientific method, beside Spenser and Shakespeare, as the third representative of the Renaissance in England. Nor should Raleigh, Drake, Hawkins, the semi-buccaneer explorers of the ocean, be omitted. They, following the lead of Portuguese and Spaniards, combating the Counter-Reformation on the seas, opened for England her career of colonization and plantation. All this while the political policy of Tudors and Stuarts tended towards monarchial absolutism, while the Reformation in England, modified by contact with the Low Countries during their struggles, was narrowing into strict reactionary intolerance. Puritanism indicated a revolt of the religious conscience of the nation against the arts and manners of the Renaissance, against the encroachments of belligerent Catholicism, against the corrupt and Italianated court of James I., against the absolutist pretensions of his son Charles. In its final manifestation during the Commonwealth, Puritanism won a transient victory over the mundane forces of both Reformation and Renaissance, as these had taken shape in England. It also secured the eventual triumph of constitutional independence. Milton, the greatest humanistic poet of the English race, lent his pen and moral energies during the best years of his life to securing that principle on which modern political systems at present rest. Thus the geographical isolation of England, and the comparatively late adoption by the English of matured Italian and German influences, give peculiar complexity to the phenomena of Reformation and Renaissance simultaneously developed on our island. The period of our history between 1536 and 1642 shows how difficult it is to separate these two factors in the re-birth of Europe, both of which contributed so powerfully to the formation of modern English nationality.

THE NEW EUROPE

It has been impossible to avoid an air of superficiality and the repetition of facts known to every schoolboy in this sketch of so complicated a subject as the Renaissance—embracing many nations, a great variety of topics, and an indefinite period of time. Yet no other treatment was possible upon the lines laid down at the outset, where it was explained why the term Renaissance cannot now be confined to the Revival of Learning and the effect of antique studies upon literary and artistic ideals. The purpose of this article has been to show that, while the Renaissance implied a new way of regarding the material world and human nature, a new conception of man's destiny and duties on this planet, a new culture and new intellectual perceptions penetrating every sphere of thought and energy, it also involved new reciprocal relations between the members of the European group of nations. The Renaissance closed the middle ages and opened the modern era—not merely because the mental and moral ideas which then sprang into activity and owed their force in large measure to the revival of classical learning were opposed to mediaeval modes of thinking and feeling, but also because the political and international relations specific to it as an age were at variance with fundamental theories of the past. Instead of empire and church, the sun and moon of the mediaeval system, a federation of peoples, separate in type, and divergent in interests, yet bound

together by common tendencies, common culture and common efforts came into existence. For obedience to central authority was substituted balance of power. Henceforth the hegemony of Europe attached to no crown, imperial or papal, but to the nation which was capable of winning it, in the spiritual region by mental ascendancy, and in the temporal by force.

That this is the right way of regarding the subject appears from the events of the first two decades of the 16th century, those years in which the humanistic revival attained its highest point in Italy. Luther published his thesis in 1517, 64 years after the fall of Constantinople, 23 years after the expedition of Charles VIII. to Naples, ten years before the sack of Rome, at a moment when France, Spain and England had felt the influences of Italian culture but feebly. From that date forward two parties wrestled for supremacy in Europe, to which may be given the familiar names of Liberalism and Conservatism, the party of progress and the party of established institutions. The triumph of the former was most signal among the Teutonic peoples. The Latin races championed by Spain and supported by the papacy fought the battle of the latter, and succeeded for a time in rolling back the tide of revolutionary conquest. Meanwhile that liberal culture which had been created for Europe by the Italians before the contest of the Reformation began continued to spread, although it was stifled in Italy and Spain, retarded in France and the Low Countries, well-nigh extirpated by wars in Germany and diverted from its course in England by the counter-movement of Puritanism. The *autos da fé* of Seville and Madrid, the flames to which Bruno, Dolet and Paleario were flung, the dungeon of Campanella and the seclusion of Galileo, the massacre of St. Bartholomew and the faggots of Smithfield, the desolated plains of Germany and the cruelties of Alva in the Netherlands, disillusioned Europe of those golden dreams which had arisen in the earlier days of humanism, and which had been so pleasantly indulged by Rabelais. In truth the Renaissance was ruled by no *Astrae redux* but rather by a severe spirit which brought no peace but a sword, reminding men of sternest duties, testing what of moral force and tenacity was in them, compelling them to strike for the old order or the new, suffering no lukewarm halting between two opinions. That, in spite of retardation and retrogression, the old order of ideas should have yielded to the new all over Europe—that science should have won firm standing-ground and political liberty should have struggled through those birth-throes of its origin—was in the nature of things. Had this not been, the Renaissance or re-birth of Europe would be a term without a meaning. (J. A. S.)

While Symonds' article on the Renaissance, originally contributed to the 9th edition of the *Encyclopædia Britannica* remains the classical exposition of a certain view of the subject, more recent research has brought out other aspects of the matter. It is noteworthy, however, that in some important points the very latest investigators have returned to Symonds' conception of the Renaissance, from which historians of the generation immediately following him had departed.

Our continually growing knowledge of the middle ages has thrown the Renaissance into a very different perspective from that in which it was once viewed. Less and less are the centuries preceding the 15th seen as the "Dark Ages" in contrast to the sudden sunrise of modern times. Indeed, many scholars now speak of a Carolingian Renaissance in the 8th century, an Ottonian Renaissance in the 10th, and of the Renaissance of the 12th century, in order to emphasize the constant stream of light and progress throughout the millennium once regarded as a long night of gloom and decadence. On the other hand, many scholars have emphasized even more than did Symonds the extreme gradualness of the efflorescence of the Italian Renaissance and the long persistence in it of mediaeval and Germanic elements. The extreme position is taken by Mr. Henry O. Taylor, who is so impressed by the slowness of the transition from mediaeval to modern times that he would abolish the term "Renaissance" altogether. This proposal, however, has commended itself to few other scholars; there *was* a re-birth of the human mind in the 15th century, though it was not so sudden and decisive as once thought.

In another way our view of the Renaissance has been greatly modified by the economic historians who have stressed the material antecedents of the great political and intellectual movement of the 14th, 15th and 16th centuries. Symonds, like nearly all his contemporaries, wrote almost as if the change in the mental habit of the race were a first cause, unexplained by any alteration in social conditions. But it is now generally accepted that the intellectual change was but the natural result of material conditions altered by the growth of wealth, of commerce, and of city communities. The humanists and artists were dwellers in the cities and in the marts of trade; their patrons were largely found in the newly powerful bourgeoisie of the Italian and German cities. Of course the Renaissance had its intellectual as well as its material antecedents; it was produced by the happy creation in the commercial revolution of a wealthy and leisured class just at a time when discoveries and inventions were thrilling the mind of Western Europe with interest and curiosity. It was no accident that individualism, humanism, and Italian painting attained their majority in the age which saw the invention of printing and the great geographical discoveries of Diaz, of Vasco da Gama, and of Columbus.

Of all the positions taken by Symonds that most subject to attack has been his assertion of the close connection and similar purpose of the Renaissance and Reformation. Like most historians of the 19th century, Symonds regarded them both as liberal movements, emancipations of reason so nearly alike that the Reformation might be called "the Teutonic Renaissance." Just as he was writing, however, Friedrich Nietzsche, basing his opinion on Janssen's *Geschichte des deutschen Volkes seit dem Ausgang des Mittelalters*, which represented the Reformation as a blight on German Catholic civilization, proclaimed that "the Reformation was a reaction of backward minds against the Italian Renaissance": and this view gained ground until it was adopted by Catholic historians like Lord Acton, Protestant historians like Ernst Troeltsch, and generally by the majority of scholars. They have pointed out that the humanists and Reformers came to blows, that the spirit of the Renaissance was largely secular and that of the Reformation intensely religious, that the former was tolerant and often indifferent and sceptical and that the latter was usually intolerant, devout, and sometimes superstitious, that the humanists were aristocratic and the Reformers democratic in method, and that Puritanism proved hostile to and often destructive of the artistic and pleasure-seeking interests of the Renaissance. In criticism of this view, however, it has been contended that the Renaissance was not, any more than the Reformation, consciously progressive; rather did both movements find their ideal in the past, the one in the golden age of Rome and the other in the primitive age of Christianity. It has been further shown that the humanists did little in principle to emancipate the reason from authority; they were closely bound by their own authorities in the classical poets and orators, and could only attack the schoolmen on the basis of the ancient pagans as the Reformers attacked them from the standpoint of the ancient Fathers. In conclusion one may say that neither movement was a conscious appeal to reason or an intentional step forward and away from the past, but that each accomplished, undesignedly, a great work of emancipation and that each created new cultural values.

BIBLIOGRAPHY.—The special articles on the several arts and literatures of modern Europe, and on the biographies of the great men mentioned in this essay, will give the details of necessity here omitted. Of general works, with bibliographies, may be mentioned Jakob Burckhardt, *Die Cultur der Renaissance in Italien*, called by Lord Acton, "the most penetrating and subtle treatise on the history of civilization that exists in literature" (Leipzig, 1st ed. 1860; 20th ed., revised by L. Geiger, 1919; Eng. trans. by S. G. C. Middlemore, 1875); W. H. Pater, *Studies in the History of the Renaissance* (1873); J. A. Symonds, *The Renaissance in Italy* (1875–88); *Cambridge Modern History*, vol. 1, "The Renaissance" (1902); A. Tilley, *The Literature of the French Renaissance* (1904); J. E. Sandys, *Harvard Lectures on the Revival of Learning* (1905) and a *History of Classical Scholarship*, vol. ii. (1908); W. H. Hudson, *The Story of the Renaissance* (1912); K. Burdach, *Reformation, Renaissance, Humanismus* (Berlin, 1918); H. O. Taylor, *Thought and Expression in the Sixteenth Century* (1920); P. Monnier, *Le Quattrocento: essai*

sur l'histoire littéraire due XVe siècle italien (2nd ed. 1920); F. J. Mather, *History of Italian Painting in the Renaissance* (1922); J. Huizinga, *The Waning of the Middle Ages* (1924); G. Scott, *The Architecture of Humanism* (2nd ed. 1924); F. J. C. Hearnshaw, *The Social and Political Ideas of some Great Thinkers of the Renaissance and Reformation* (1925); E. Troeltsch, "Renaissance und Reformation" in *Historische Zeitschrift* (Munich, vol. cx. pp. 519 ff.); F. Clement, ed., *Civilization of the Renaissance* (1929). (P. S.)

RENAISSANCE ARCHITECTURE. During the 15th, 16th and 17th centuries the structural and decorative elements of Roman architecture (*q.v.*), revived after long disuse, were adapted to the requirements of contemporary buildings throughout Europe. The column and the arch, the dome and groin vault, the arabesque and the rinceau, were conventions from which, in infinite combinations, architects developed their designs. The unity of centralized space and mass, the power of great scale and weight, the repose and completeness of definite and simple development of planes, passages and profiles, and the splendour of richly modelled and coloured surfaces, were the effects most often strived for. Yet Renaissance (*q.v.*) architects did not reproduce, even remotely, a single Roman building; the conditions of life had changed too much for Roman buildings to be practicable.

New Forms.—New and magnificent forms in structure, and in decoration applied to it, were developed. The dome raised on a drum, free from its abutments and crowned with a cupola, was one; when such a dome was raised, by means of pendentives, on four great arches, new and noble harmonies in spatial and mass composition resulted. Façades in which a classic ordinance is adapted to the basilican profile; barrel-vaulted or domed naves; campaniles which end in columned belfries; and vertical spires, encrusted with delicately modelled classic forms, are among the striking inventions of the period. The public buildings of the 15th and 16th centuries—the libraries, town halls, theatres and civic monuments—were utterly different from those of Rome. New combinations of the arch and the column, new rhythms in space, new arrangements in mass, new variations in ornament, had continually to be invented in order to fit the discovered architecture of ancient times to these new uses. Country houses—chateaux and villas, with their gardens—offered another field for adaptation and development; the design of public squares and streets and of buildings in ensembles another; and the vast palaces of the monarchs of France and Spain and England, and of the pope and the princes of the Church another. After three centuries of experiment and growth the Renaissance architect, in the façades of palaces, public buildings and houses, still expressed new ideas in the language of the column and the arch.

In the sixteenth century Europe was neither homogeneous nor centralized. Spain, Italy, Holland, England each had a native culture, a peculiar heritage from the mediaeval world, and each followed a course of development that was, at least in part, independent of all others. Spain, which had defended the Catholic faith against the Moors and which was flooded with the gold of Mexico and Peru, placed on her Renaissance forms a stamp very different from that of commercial and insular England. Monarchical France, rich with the heritage of the 13th century cathedrals, gave necessarily a different metamorphosis to the Italian tradition from Protestant and democratic Holland. Climate, building materials, prosperity, intellectual growth and inherited types of architecture such as the patio of Spain and the timber-roofed hall of England, the turreted chateau of the Loire and the balconied palace of Venice—these and many similar differences in civilization gave the Renaissance a distinctive colour, a special character in each locality.

Great Architects.—Finally there was the influence of individual genius. No period is so crowded with great architects and at no time have architects been so free to impress on their designs the imprint of a great personality. The Roman tradition has been called a tradition of formula and of precedent, yet no tradition has proved so flexible in the hands of a master. It lent itself with equal facility to the requirements of Bramante and of Bernini, of Christopher Wren and Juan de Herrera, of Mansart and of Alessi. It embraced within the limits of a single convention the delicate and gracious lyricism of Lescot, the agitated and passionate declamation of Churriguera, the clear and vigorous rhythms of Inigo Jones, and the mighty harmonies conceived in the illimitable imagination of Michelangelo.

See also ARCHITECTURE and PERIODS OF ART.

BIBLIOGRAPHY.—L. B. Alberti, *re edificatoria* (Architecture in Ten Books, 1726);* Andrea Palladio, *I Quattro Libri dell' architectura* (The Five Books of Architecture, 1740);* Giacomo Barozzi da Vignola, *Regola delle Cinque Ardini* (1742);* Sebastino Serlio, *I Cinque libri d'Architettura* (1770);* A. B. Scamozzi, *Le Fabbriche e i Desequi di Andrea Palladio* (1776);* Giorgio Vasari, *Lives of the Most Eminent Sculptors, Painters and Architects* (1778);* H. D'Espouy, *Fragments d'Architecture de la Renaissance* (1897); J. Buhlman, *Die Architektur der Renaissance* (1904); F. M. Simpson, *A History of Architectural Development*, vol. iii. (1911). (J. HUD.)

*The dates are those of first English editions.

I. RENAISSANCE ARCHITECTURE IN ITALY

Owing to the small hold which the principles of Gothic architecture (*q.v.*) were able to obtain in Italy it is a fair generalization to look upon the architecture of that country from the 3rd century A.D. to the beginning of the 15th as a gradually failing struggle of the builders to retain Roman order and dignity in their undertakings. The early Christian period (*see* BYZANTINE AND ROMANESQUE ARCHITECTURE), no doubt produced, largely through the influence of Byzantine, much brilliant craftsmanship and a great deal of beautiful decoration, but on the whole it is safe to say that all this was applied to buildings in which the structure was decadent Roman. Later on, in what is generally called the Romanesque period the problems of Roman vaulting, now that the art of making concrete was lost, were solved by what to the Romans would have seemed the makeshift arrangement of surface ribs of stone in place of their own buried reinforcements. The clearness of the lines and surfaces of the Roman vaults were thereby interrupted, as were the wall surfaces, by a decoration of pilaster strips and thin arcading. It was the function then of the Renaissance builders—architects we may call them because they did their work with a greater foresight and seriousness of purpose—to bring back the Roman orderliness and precision. In the process they became no mere copiers of the antique. They invented many lovely forms and motives which had, as far as we know, no Roman precedents. As has often been pointed out there is far more difference between a Renaissance church and a Roman temple than between a Roman temple and a Greek one. On the other hand it must be admitted that, even more than in the other arts, there was a strong determination to recover Roman methods both of design and construction. Once the possibility of this was realized the remains of Roman buildings and monuments must have produced a great effect on the imagination. With their far greater scale, if not always greater mass, they must have seemed like the work of a race of giants, no longer to be shunned as something evil but instead, with the striking ambition of a time that produced figures like Galileo and Christopher Columbus, to be equalled and surpassed. The serious study of actual Roman buildings, which was started with Brunelleschi in 1403, gradually gave place, however, after the discovery of the works of Vitruvius, and their dissemination in numberless editions, to an academic interest in his system of proportions for columns, cornices and other details, which stifled real design until the latter was rescued and revivified by Michelangelo and the other giants of the Baroque movement (*see* BAROQUE ARCHITECTURE). The history of the Italian Renaissance, as far as architecture is concerned, is the history of a school of ordered design, which receiving its initial impetus from the antique set out on a new and adventurous career of its own until it was finally bogged by misapplied scholarship.

Brunelleschi.—An appropriate date from which to start is therefore 1403 when Filippo Brunelleschi, a Florentine metal worker by trade and some 26 years of age, having failed in the competition for the bronze doors of the baptistery, left his native town for Rome with the express purpose of studying the Roman remains in that city. The young Donatello, then 16, afterwards to be the famous sculptor, accompanied him "to hold the other end of the tape" as we should say to-day. They stayed away four years and on his return Brunelleschi, with the reputation his knowledge of Roman work gave him, persuaded the council to allow him to

finish the Duomo, which still lacked a covering to the great crossing. For this he designed his famous dome, the first great dome to be raised on a drum. A dome raised on a drum was not a Roman form; neither was Roman construction used; which shows that Brunelleschi's Roman studies had not fettered his imagination. The great raised dome, like that of St. Peter's at Rome, was to become one of the most magnificent and distinctive products of the Renaissance and this Florentine one at the start was one of the largest and boldest.

The more distinctive work of Brunelleschi in the new manner, however, is to be found in the smaller buildings that he carried on at the same time, such as the Pazzi chapel in the cloister of Santa Croce—the first completed ecclesiastical building of the Renaissance. It is a small structure, some 70 ft. square, containing an open loggia, an oblong main compartment (60 by 30 ft., approximately) and a square chancel with a square sacristy on either side. The loggia is a Roman barrel vault with coffering carried on six lofty Corinthian columns the centre bay of which is larger than the rest and the vault is there carried up on pendentives as a small dome. Above the entablature of the columns the exterior consists of a broad panelled surface and it and the entablature alike are boldly broken by a semi-circular arch joining the two groups of columns. Above this again is an open belvedere under the eaves of an overhanging tile roof and above again the main dome of the chapel. This composition then has no likeness to the façade of a Roman temple although in size it equals many of them. While using elements derived from Rome it is a light and graceful structure in which all the ordered parts of the design are made subservient to the main climax of the great central arch. The same remarks apply to the interior. The construction is very like that of the loggia, a dome intersecting a barrel vault. It is in white plaster, dark stone pilasters and entablatures outlining the architectural forms. Its note, like that of the façade, is lightness and elegance in which Roman forms and details have been used with a new delicacy. In place of the heavy tramp of Romanesque bays and piers we have here a building unified by its central dome and by its orderly arrangement of columns and pilasters, spiritualized and made light and beautiful by the purity of its lines and the delicacy and charm of its detail. It is a new thing neither Roman nor Romanesque, but nevertheless with Roman completeness and unity. The Pazzi chapel has been dealt with at this length because probably more than any other building of its time it gives the Renaissance outlook with its modern feeling for orderliness and perfection combined with the suggestion of Roman grandeur.

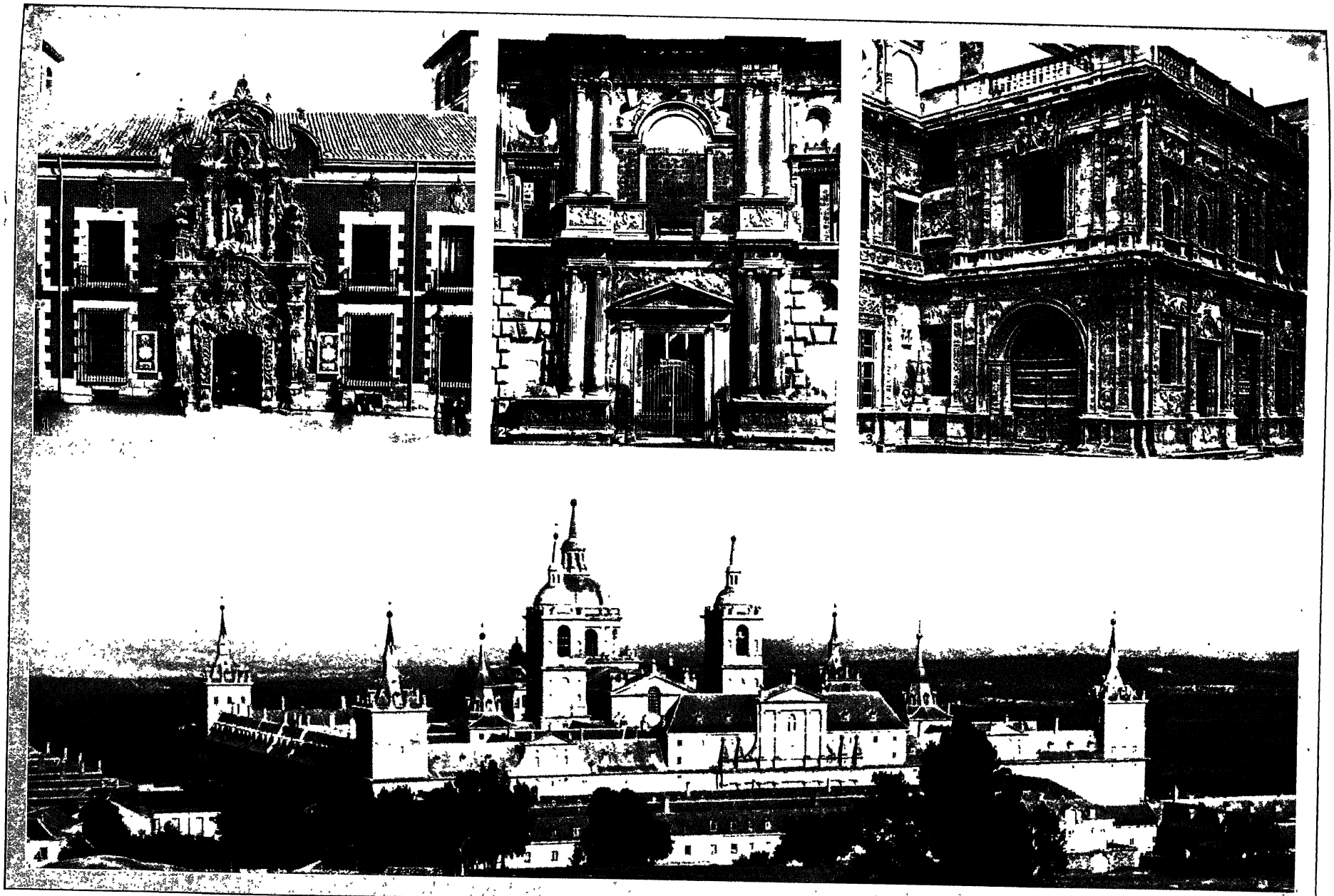
Types of Building.—The two chief types of building on which the Italian Renaissance was to found itself were palaces and churches. In mediaeval times the Italian cities were full of lofty stone palaces presenting cliff-like walls to the streets and surrounding central, arcaded courts. They were a feature of Italian urban civilization with its city states. Buildings with flat street façades almost necessarily have an orderly arrangement of windows. To such buildings, therefore, it was easy for the Renaissance architect, thinking in a Roman system of units, based on the regular setting out of colonnades and their super-imposition, to apply his new ideas. The great overhanging eaves of the roof could be transformed to a crowning cornice, the pointed windows turned to semi-circular ones, the rough stonework reduced to a graded system of storeys, gradually approaching a clear ashlar face from which the main cornice could spring. Order was there already. All that had to be done was to introduce a higher sense of unity by seeing that every part bore some tangible relation to the whole. In this way we get palaces like Michelozzi's Riccardi and Majano and Cronaca's Strozzi in Florence in which the strength of the cliff wall is enhanced by contrast with fine detail and a higher sense of unity and power is reached.

The next stage in the development was the actual application to the wall surface of a series of pilasters recalling the Roman system of super-imposed colonnades. These were first used at the Rucellai palace in Florence by Alberti. The columns and their entablatures are here very tentative and are planted on top of the strong stone jointed face, which still dominates. A next step would be the grouping of such pilasters in pairs as at the Palazzo Giraud or the Cancellaria in Rome, both by Bramante. Following this idea through we have, in the more luxurious atmosphere of Venice, columns at each storey taking the place of pilasters and used in great profusion either singly or in pairs with one quarter of their thickness apparently buried in the wall. The palaces on the Grand canal offer many examples, but it will be noticed that even in the richest the wall plane is carefully preserved and the cliff-like face, however articulated, remains. Florentine palaces, however, were never to go beyond applied pilasters until the Baroque period (*see* BAROQUE ARCHITECTURE) arrived. Indeed, it shed even them and produced in the 16th century the astylar palace in which all orders or columns, apart from those to windows or doors, are implicit. A Florentine architect, Antonio Sangallo, carried the idea to Rome with the Farnese palace from whence it has spread over the world.

The architectural quality of orderliness which produced the great palaces and stately churches of the Renaissance did not for a long time, however, destroy the lightness and fancy which the carvers, goldsmiths and painters who turned their attention to building brought to their new task. The smaller details of all early Renaissance buildings, such as wall monuments, balconies and screens in the churches, the furniture in the palaces, show, not only in Florence but in most towns in the north of Italy, a profusion of exquisitely drawn and modelled ornament based on classical motives but used with great freshness and originality. A Renaissance doorway would be applied to, or carved on, a Gothic church, as at Como cathedral, and it would not only form a delightful composition in itself, often in several planes, but would make an extraordinarily rich and delicate piece of decoration against its coarser surroundings. In such work, especially in Lombardy, pilasters and architraves were filled with delicate arabesques. Indeed, in many minds this rich highly carved detail constitutes the chief characteristic of Renaissance work. Those who think this, however, mistake the flower for the tree. The organic relation of all parts to each other and to the whole, based on the Roman system of axial relationship while making use of simple Roman shapes, is the essential trait.

Development.—From Florence the movement of architecture "in the antique manner" spread to every town in Italy and, as in painting, each town produced its school centred round one or two first-rate artists. In Milan, Bramante carried out his early but very accomplished work before Rome absorbed him for St. Peter's. His church of Santa Maria delle Grazie piles up in the simple logical way of applied masses, which the Renaissance always implied, while its detail remains fanciful and in parts Romanesque in character. A great difference between Renaissance architecture in Italy and similar work in France or England is that in the former country the movement attacked from the beginning the plan forms and the structural shape of buildings, whereas in the latter countries it began by an application of the new fashioned detail to buildings which remained Gothic both in plan and structure.

The first half of the 16th century saw the migration to Rome of the best artists from Florence, Milan and other centres attracted by the superior opportunities that city offered under such patrons of the arts as Popes Julius II. and Leo X. Even the sack of Rome in 1527 did not stay building activities. It was there, under the shadow of the great monuments of antiquity, that the full use of the Roman orders (*see* ORDER) was recovered but without any attempt at imitating Roman buildings. This culminating period produced no Parthenon as a climax. The great scheme for St. Peter's, however, started on its career at this time with magnificent and entirely novel plans for the Greek cross building piling up to a great central dome. Bramante laid down the general lines and began the actual structure. Sangallo and Peruzzi followed with modifications of his plan and finally after further vicissitudes Michelangelo took hold of the work and carried it through. His great structure rightly belongs to the Baroque period, though the basic idea on which he worked was that of Bramante and the earlier architects mentioned, and though the building as far as its orderly procession of parts both in plan and section is a Renaissance structure. If, however, St.

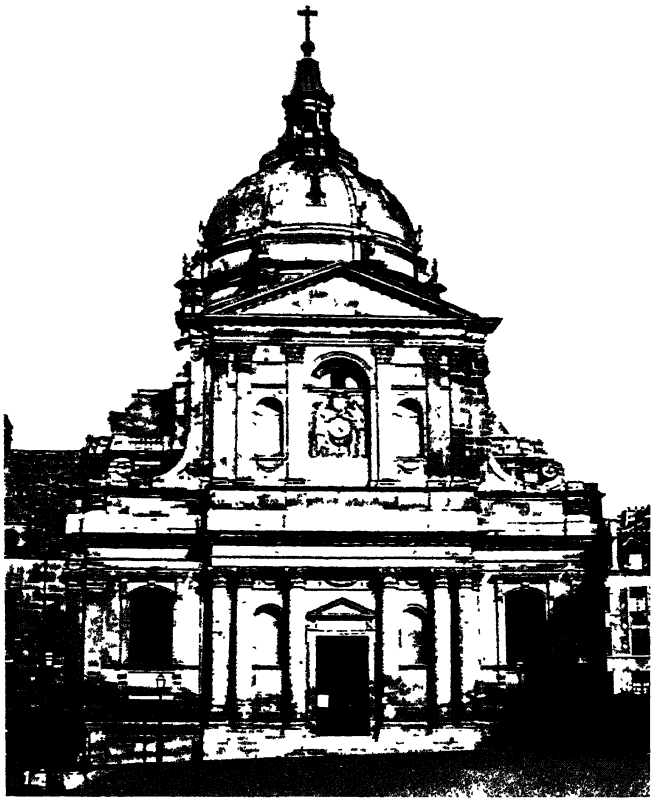


PHOTOGRAPHS, (1, 2, 3) E.N.A., (4) EWING GALLOWAY

RENAISSANCE ARCHITECTURE OF SPAIN

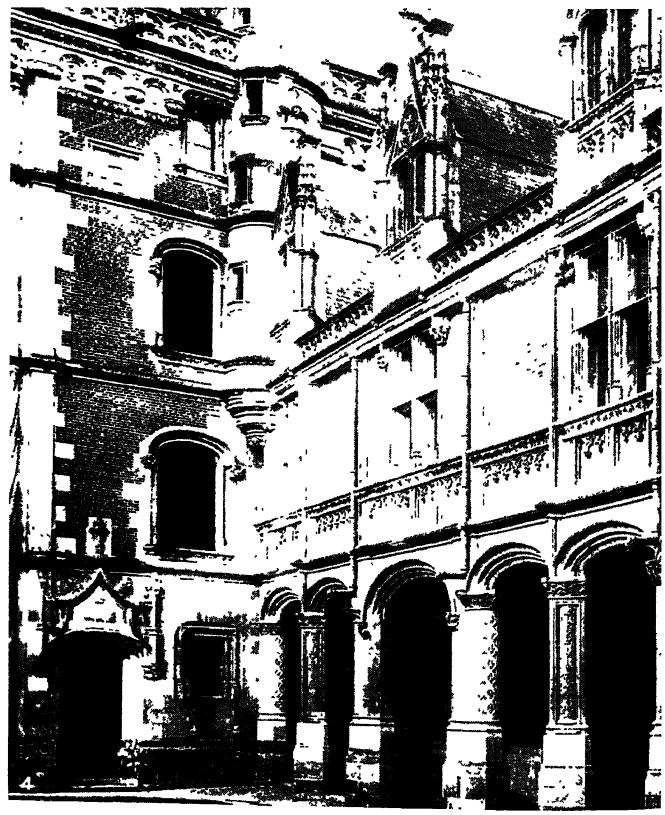
1. Façade of the Hospicio Provincial, Madrid
2. Detail of the Palace of Charles V. near the Alhambra. Granada
3. The Ayuntiamento, or the town hall, of Seville (1527–32), designed by Diego de Riano and Martín Garuza
4. The Escorial, near Madrid; built 1563–93 by Philip II. Juan Bautista de Toledo, architect. The building comprises a palace, a church, a monastery, and a mausoleum

RENAISSANCE ARCHITECTURE









PHOTOGRAPHS, (1, 3, 4) COLLECTION ARCHIVES PHOTOGRAPHIQUES, (2) F. FRITH AND COMPANY, LTD.

RENAISSANCE ARCHITECTURE OF FRANCE AND ENGLAND

1. The church of the Sorbonne, Paris. 18th century
2. St. Paul's Cathedral, London, built 1675–1710, Sir Christopher Wren, architect
3. Ecole Militaire, Paris. Façade on the Champs de Mars. Built 1752; Jacques IV. Ange Gabriel, architect
4. The Château at Blois, showing a gallery of the Louis XII. wing facing the courtyard (late 15th century)

Peter's, by the majestic simplicity of its major parts and by its great dome—the best example of the finest architectural invention of the Renaissance—has a claim to a place in that movement it is in smaller buildings in Rome like the Farnese and Massimi palaces, by Antonio Sangallo and Baldassare Peruzzi respectively, that the full flavour of the culminating period is to be tasted. In them is to be found not only complete mastery of plan, by which all apartments flow together to make a whole out of well-shaped units, but both exteriors and interiors that show a similar mastery of classical detail while maintaining the traditional form and expression of an Italian nobleman's house.

From Rome this mastery of classical forms and their adaptation to modern purposes, which makes Italian Renaissance architecture of importance to us to-day, flowed back to the provincial towns. In Bologna, his native city, Peruzzi built a number of astylar houses simple in composition yet completely unified and with detail almost Greek in its refinement. In Verona, Sanmichele, architect and military engineer, fortified the town, his birthplace, and gave to the palaces he built in it and in Venice qualities of strength and scale which are unsurpassed in the works of any master. Through his military engineering work he apparently learnt economy of means in obtaining his effects; for instance, in his series of great gateways through the walls of Verona he reduced cornices to mere bands except in the central portion of his design in order to enforce his climax. His work shows a strength, grandeur and scale that surpasses in its finest qualities Roman work itself. His Grimani palace on the Grand canal at Venice is the strongest and most impressive of those built during the Renaissance.

In the library of St. Mark's at Venice, by Jacopo Sansovino, architect and sculptor, who like so many of his profession started life in Florence, the culminating period of the Renaissance reaches a note of greater richness if not greater grandeur. In its façades of two main storeys, each with fully developed order and arch in the Roman manner, Sansovino succeeded in combining these storeys into one whole by means of an enlarged frieze to the upper order, by low thin steps to the lower and by a crowning balustrade with statues. By the depth of his reveals and the doubling of his subsidiary order in the thickness of the wall, by his overlay of rich, sculptured ornament, he produced here perhaps the richest building before the full advent of the Baroque period. The building, nevertheless, with the assistance of the broad surfaces of its unfluted columns, carries its richness with complete assurance and dignity. There is no feeling that it is overloaded. It is no wonder, therefore, that its façades have formed the main motives of many an opera house and theatre throughout the world, including the most famous, Garnier's great opera house in Paris.

Palladio and Vignola.—The freer use of the orders was carried a step further still by Andrea Palladio who practised chiefly in the small town of Vicenza in the second half of the 16th century but whose name nevertheless became more widely known than that of any of his contemporaries. Indeed, his use in his later buildings of a single order of columns or pilasters as the governing motive for a façade gave rise to the term Palladian in English architecture. So great was his fame, assisted by his book, that Vicenza became a centre of pilgrimage for English architects in the 17th and 18th centuries from Inigo Jones onwards. His written work like that of Serlio, Vignola and other Italian architects who wrote on their art, followed Vitruvius and was largely concerned in establishing a system of proportions for the orders and their accessories. Palladio's buildings, however, are better than his writing. The Palazzo Consiglio, for instance, facing his more famous basilica, where he used a powerful Corinthian order of four columns running up the face of the building, with the cornice returned round each column as in the form of Nerva, shows the hand of the master in the modelling of his small building so that its scale throughout lives up to the giant size set by his columns. In the comparatively poor town of Vicenza to obtain the great effects he sought he was reduced to building in brick covered with stucco and no doubt it was the fluidity of this latter material which gave to his buildings their slight sense of unreality. His stone churches in Venice including the great composition of St. Georgio Maggiore with church, campanile, monastery, harbour and lighthouses in one scheme, facing the town across the lagoon, are sounder architecture because they are sounder building.

Giaconio Barozzi da Vignola, commonly called Vignola, was much the same type of architect as Palladio and, like him, published his designs and his rules of proportion. As Palladio ruled in England so Vignola did in France. Working chiefly in Rome and the neighbourhood during the latter half of the 16th century he stood like Palladio as a bulwark against the increasing power of the Baroque. Michelangelo seems to have little influence upon him, except perhaps in the dramatic quality of his compositions, such as that of his great pentagonal villa at Capzarola and the magnificent climax achieved in his small one for Pope Julius III. in the Borghese gardens.

With these two men, Palladio and Vignola, the work of the Italian Renaissance may be said to have reached the utmost limit of revived and revivified Roman architecture. The motives and orders of the Romans could be exploited no further. For fresh advance it required the genius of Michelangelo and the other founders of the Baroque, who, lifting Italian architecture from its orderly Roman basis of assembled units in plan and elevation, gave it new freedom by considering structure rather as so much plastic material for the fancies of the modeller than so much cubic content in rooms and walls for the imagination of the architect. While, however, the Baroque for a time conquered the known world, with perhaps the single exception of England, as new problems arose in later centuries calling for new solutions the whole of the Western world, including America, turned again to the architecture of the Italian Renaissance, for refreshment, for guidance and, most important of all, for sanity and clearness of expression.

BIBLIOGRAPHY.—L. B. Alberti, *De re aedificatoria,* or *I dieci Libri de l'architetturra* (1458, trans. by Leoni as *Architecture in Ten Books,* 3 vols., 1726); L. Gruner, *Fresco Decorations and Stuccoes of Churches and Palaces of Italy,* 2 vols., plates in folio and text in 4to. (1854); H. G. Nicolai, *Das Ornament der Italienischen Kunst des XV. Jahrhunderts* (1882); W. J. Anderson, *Architectural Studies in Italy* (1890); A. Schutz, *Die Renaissance in Italien,* 4 vols. (1891–95); W. J. Anderson, *The Architecture of the Renaissance in Italy* (1927); J. Burckhardt, *Geschichte der Renaissance in Italien* (1912); G. Gromort, *Histoire abregée de l'architecture de la Renaissance en Italien* (1912); J. Durm, *Baukunst der Renaissance in Italien* (Handbuch der Architektur, 1914); H. Willich, *Baukunst der Renaissance in Italien* (1914); G. Biagi, *The Architecture of the Renaissance in Italy;* H. Strack, *Central- und Kuppelkirchen der Renaissance in Italien,* 2 vols.

Florence: F. Ruggieri, *Scelti di Architèttura della Citta di Firenze,* 4 vols. (1738); A. H. V. Grandjean de Montigny et A. Famin, *Architecture Toscane* (1874); H. von Geymuller and A. Widman, *Die Architektur der Renaissance in Toscana* (1885–1908); J. C. Raschdorff, *Toscana* (1888).

Milan and Genoa: M. P. Gauthier, *Les Plus beaux édifices de la ville de Gênes,* 2 vols. (1818); G. and F. Durelli, *La Certosa di Pavia* (1853); F. Callet et J. B. C. Lesueur, *Architecture italienne: édifices publics et particuliers de Turin et Milan* (1855); T. V. Paravicini, *Die Renaissance Architektur der Lombardei* (1878); R. Reinhardt, *Genua* (1886); O. Grosso, *Portali e Palazzi di Genova.*

Rome: A. Palladio, *I Quattro Libri dell' Architecttura* (1570. The best English editions are those of Leoni and Ware); D. de Rossi, *Studio d'Architettura Civile della Citta di Roma,* 3 vols. (1720–21); O. B. Scamozzi, *Fabbriche e Disegni di Andrea Palladio,* 4 vols. (1776–83); C. Percier and P. F. L. Fontaine, *Choix de plus Célèbres Maisons de Plaisance de Rome et de ses Environs* (1809); T. F. Suys et L. P. Haudebourt, *Palais Massimi à Rome* (1818); H. von Geymuller, *Les Projets primitifs pour la Basilique de St. Pierre de Rome,* 2 vols. (1875–80); Letarouilly, *Le Vatican et la Basilique de Saint Pierre de Rome,* 2 vols. (1882); H. von Geymuller, *The School of Bramante* (trans. 1891); H. Strack, *Baudenkmaeler Roms des XV.–XIX. Jahrhunderts* (1891); C. Ricci, *Baroque Architecture and Sculpture in Italy* (1912); M. S. Briggs, *Baroque Architecture* (1913).

Venice: G. Leoni, *The Architecture of Andrea Palladio* (1715, 1721, 1742); P. Paoletti, *L'Architettura e la Scultura del Rinascimento in Venezia,* 3 vols. (1893); O. Raschdorff, *Palast-architektur von Ober-Italien und Toscans-Venedig* (1903); A. Haupt, *Palast-architektur von Ober-Italien und Toscana* (1908). (C. H. R.)

II. RENAISSANCE ARCHITECTURE IN SPAIN

Towards the latter part of the 15th century, the decorative motives of the Italian Renaissance began to make their appear-

ance in the ornamentation of Spanish buildings. The prosperity which followed the conquests of Peru and Mexico and the national exaltation which accompanied the end of the long wars with the Moors had found expression in the construction of great Gothic cathedrals, but for the decoration of these, and especially for the construction of minor works of architecture such as tombs, altars, retablos and rejeria (iron screens), Italian artisans were employed. These artisans, bringing with them many examples of Renaissance design, taught their art to the Spanish and Moorish craftsmen. The patronage of wealthy ecclesiastics who, travelling in Italy on some business of the Church, had fallen under the spell of Italian art, gave an added impetus to this new school of ornamentalists. From the chapels of the cathedrals the new style was introduced into the palaces of the archbishops and into the universities and hospitals established by the Church; the wealthy families of Burgos, Toledo and Salamanca soon adopted it for the decoration of their patios and the façades of their houses; and by the second decade of the 17th century it had become the accepted style of ornament throughout Spain, profoundly modifying the character of Spanish architecture.

Plateresque.—This decoration, which in its delicacy of scale and the exquisite perfection of its workmanship resembles silversmith's work—the work of artisans rather than of architects—has been called Plateresque (from *platero,* silversmith). The motives used are the arabesque, the rinceau, the grotesque, the candelabrum shaft, the panelled pilaster and the richly moulded entablature; and with these Italian forms there are mingled the geometric patterns inherited from the Moors and, not infrequently, Gothic forms such as the pinnacle, the crocket, cresting and the pierced balustrade. Moorish influence is felt, also, in the use of elaborate wood carvings, especially on the ceilings which are splendidly enriched with carved ornament and colour, and in the use of tiles, in superb coloured patterns, for walls and for stairs. Gothic influence survives in the occasional use of the ribbed vault. The use of the undraped human figure is infrequent except in the forms of children, but representations of animals in action, accurately observed and vigorously executed, are used in great profusion. Heraldry is also a source of many ornamental enrichments.

The exuberance of ornament, the fine craftsmanship and the refinement in modelling, in line and in the distribution of light and shade, are the architectural expression of a wealthy and proud aristocracy, which had discovered in Italy a new vocabulary of pleasure-giving forms. These forms were employed, oftentimes, with little understanding of their relation to structure; nor were they used, as in Italy, to give accent and significance to a composition in mass or space. They were used rather to enliven and enrich the textures of walls—an embroidery applied to surfaces—as if the house, or the tomb, were an added garment worn by its owner to express his taste and his importance. Like the costumes of the time, the buildings are embellished with rich patterns, applied with an exquisite tact and with a fine feeling for rhythm and contrast in spacing. The masterpiece of the period is undoubtedly the Ayuntamiento, or city hall, of Seville (1527–35), a building whose ornament is not excelled in Europe in fertility of invention or in facility of execution.

Second Phase.—The Plateresque architecture in Spain resembles the 15th century architecture of Lombardy and Venetia, and, like it, was succeeded by a colder and more monumental manner of building more correctly based upon Roman precedents. This change was due in part to the increasing knowledge of Roman art and to an admiration for the splendid monumental achievements of the 16th century masters, Bramante, Sangallo and Sanmichele, newly revealed to Spain. Her armies had overrun Italy; she had taken, and sacked, the city of Rome itself. But the change is also due to a change in the temper of the Spanish aristocracy. An architecture that was merely an embroidery applied to buildings could not, however lovely in itself, satisfy men who were masters of the world and who desired to express in an enduring form the grandeur and permanence of the political fabric that they had created. The colder and more abstract architecture of ancient Rome, vast in scale and in weight, an architecture, not of ornament but of mass and of proportion, seemed more in keeping with the arrogant imperialism of Charles and Philip.

At any rate when these monarchs had extended their power over Spain, the Empire, Holland, Naples, Burgundy and America, Renaissance architecture in Spain entered, quite abruptly, its second phase. Monumental building succeeded ornamental. Architecture became once more a form-giving art. Buildings seem no longer to have been addressed to the social spirit of man, to seek to charm, to become a pleasing amenity in civic and ecclesiastical life; rather they seem to have been intended to overawe, to express in plastic form the energy and might of a stupendous Government. The palace built by Charles V. at Granada is a fine example of this political architecture. A part of the Alhambra was destroyed to make room for it. One regrets, of course, the oriental palace, full of sensuous charm and aristocratic loveliness, but the newer palace is not less beautiful. Still more impressive is the great Escorial (1560–84), a vast monastery built around a votive church and a mausoleum. This granite pile, which measures 675 ft. by 530 ft., achieves a majestic and awe-inspiring character by sheer size and weight. The grandeur and consistency of the remarkably unified design, the dramatic setting against the mountains and above the plain of Madrid, make of this monument a sublime symbol of the union of Spanish power and Catholic faith. The interior of the great cathedral of Granada, the Lonja, or exchange of Seville, and the hospital of San Juan Bautista, Toledo, are other examples of this second phase of the Spanish Renaissance, which are not unworthy of comparison with the best work of contemporary Italy. This phase did not last long beyond the close of the 16th century. (*See* BAROQUE ARCHITECTURE.)

Churrigueresque.—An architecture more congenial to the artistic spirit of Spain and derived from that of Fontana and Borromini appeared in the early part of the 17th century. It is characterized by a free plastic handling of masses, a broken or undulating skyline, an irregular, capricious distribution of light and shade, and a vast profusion of ornament; structure, geometric form and classic precedent are smothered under a lavish encrustation of luxuriant detail. At times this detail recalls that of the Plateresque; more often it differs from it altogether. It is bolder with far greater depths of broken shadow and vigorous projections; it is more fluid, the forms and planes melting into each other in rounded forms and an intricacy of curved lines; and there is lacking altogether the delicacy of line and shadow and the exquisite refinement in modelling that give distinction to the plateresque. The joyousness, the youth, of the early 16th century was replaced by a self-conscious and sophisticated spirit. Architecture was not, as in the Plateresque, a source of direct sensuous enjoyment; it was a language that attempted to translate passion and mysticism into plastic forms. The vocabulary of this new language is like that of Baroque Italy: there is the same prodigal use of volutes and consoles, of broken and scrolled pediments, of twisted columns, of reversed balusters and of elaborately modelled finials. The cartouche, enmeshed in a fantastic frame of volutes and scrolls, and the human figure, emotionally rendered and set in a niche, are characteristic forms of ornament, and there is a lavish abundance of flowers, of modelled draperies, shells and festoons, often executed (in an altar or retablo) in onyx, lapis lazuli, bronze or some other richly coloured material. This Baroque style in Spain is often called the Churrigueresque, from the name of its most successful practitioner, José Churriguera. It reaches its fullest development in altar-pieces and in the decoration of doorways. The west front of the Cathedral of Marcia, although not completed until the 18th century, is a characteristic example of the Spanish Baroque.

BIBLIOGRAPHY.—*Monumentos arquitectónicos de España* (1859–81); Andrew Prentice, *Renaissance Architecture and Ornament in Spain* (1890); C. Uhde, *Baudenkmaler in Spanien und Portugal* (1892); M. Junghandel, *Die Baukunst Spaniens* (1898); A. Shubert, *Der Barock in Spanien* (1908); A. Byne and M. Stapley, *Spanish Architecture in the Sixteenth Century* (1917); C. Moncanut (editor), *Arte y Decoración en España* (1922); A. Whittlesey, *Architecture of Southern Spain and Architecture of Northern Spain* (1922); Vicente Lampérez Romea, *Arquitectura Civil Española* (1922). (J. HUD.)

III. RENAISSANCE ARCHITECTURE IN FRANCE

It has become customary to include under the classification of Renaissance architecture all the architecture produced in a country after the Graeco-Roman revival in Italy from the 15th century to the end of the 18th. In the course of three centuries, as must be clear, the types of buildings, their planning and their construction—*i.e.*, all that is vital and fundamental in the character of architecture—must vary widely, to meet the demands of changing social systems; and thus the only characteristic common to such dissimilar types of architecture as, for instance, that of the time of Francis I. and that of the period of 1750, is the employment of the classic orders as elements of the decorative design. Bearing this in mind, then, the following divisions for the periods of French Renaissance architecture are essential:

Renaissance Proper (*1475–1610*).—Covering the period from the introduction of the Italian-revival classicism through the reigns of Charles VIII., Louis XII., Francis I., Henry II. and his successors, up to 1589, and including, as a transitional period, the period of reconstruction, after the religious wars, of Henry IV. (1589–1610).

Seventeenth Century Renaissance.—Covering the period of the development of French classic art, from its formation in the first half of the century (reign of Louis XIII., 1610–43) through 1660, when the personal influence of Louis XIV. (1643–1715) was dominant, and up to about 1700.

Eighteenth Century Renaissance.—Covering the last phase of the Louis XIV. period, the Regency, and the return, in the second half of the century, to the more academic style which terminated at the Revolution.

Renaissance Proper (1475–1610).—In the last quarter of the 15th century the importations of Italian works of art increased steadily; the French nobles ordered funeral monuments and cabinet work in Italy, and brought over skilled Italian workmen; the military expeditions into Italy had familiarized many Frenchmen with the Italian Renaissance and created the desire to produce at home the masterpieces admired abroad. But the Gothic art (*see* GOTHIC ARCHITECTURE), though dying, was by no means dead, and Gothic edifices continued to be built as late as the 17th century. The Italian influence, therefore, did not find a clear course, but asserted itself simply in the replacement of certain Gothic forms of decoration by Renaissance details. A compromise was thus effected between the old and new traditions, and the work of building went on as before under the guidance of the French master-builders (heads of the various gilds). The plan of a building, and its vaults, high roofs, dormer windows and decorative chimneys followed the Gothic tradition; while on every space suitable for carving appeared the arabesques of the Italian pilaster, the medallions with profiles of the Caesars, and the capitals, mouldings and ornaments inspired by Roman precedent. This dualism of structure and ornament is the essential characteristic of French Renaissance architecture.

Authorship of Buildings.—The authorship of the principal buildings of this first period has been the subject of long and violent controversies; but the argument of those who attribute it almost exclusively to Italian architects is not overwhelmingly convincing. This argument runs to the effect that "the ignorant master-builders whose names appear on the records were incapable of producing the work of the early Renaissance." But these same "ignorant" master-builders had been, and were still, building masterpieces of Gothic architecture. The work of French designers is clearly marked by its *fluency* in the prevailing Gothic construction, and its *uncertainty* in the Italian vocabulary of ornamentation. To ascribe it, therefore, to Italian builders, compels the strange assumption that the Italian, in crossing the Alps, had forgotten the very rudiments of forms of which his knowledge was regarded as authoritative, while acquiring with the same miraculous suddenness a complete knowledge of French Gothic forms!

Buildings.—From the end of the 15th century to the reign of Francis I., the buildings—late Gothic in everything but the introduction of Italian ornamental detail—are the work of a transitional period. Then, in the reign of Francis I., the Gothic elements of the façade were supplanted by new features. As yet there was no clear understanding of the essence of classic architecture, *i.e.*, unity and purity of form, and a definite relationship of all the elements of a composition to a common standard of measure, but there was an effort to attain harmonious distribution of these elements. The king was building, or remodelling, Villers-Cotteret, Fontainebleau, Chambord, Madrid, St. Germain, La Muette and Blois, and, at his example, Renaissance forms were adopted for Écouen, Ancy-le-Franc, St. Pierre at Caen, St. Eustache and St. Étienne du Mont. The nobles, with the necessity for security decreasing as the king's power grew, abandoned their old fortresses or transformed their family seats by large windows pierced in the towers, and by the addition of new wings. The plan of city residences remained Gothic, however, with the master's dwelling standing between the garden and the courtyard in front; the services were arranged at the sides of the courtyard, and the house faced the garden side; this disposition *entre cour et jardin* remained a favourite in France as late as the 19th century. Within the dwelling, the walls—unless covered with tapestries—still showed their masonry, and the rooms still had Gothic timber-work ceilings, but the huge fireplaces were adorned, on their pilasters and niches, with the new arabesques (*e.g.*, chimneys of Blois and Hôtel D'Alluye).

By the middle of the 16th century, the Gothic finally disappeared from domestic architecture, although in religious architecture—where evolution is always slower—the planning still remained flamboyant Gothic (*e.g.*, Brou, Troyes, transepts of Beauvais, and St. Nizier at Lyons). Then, in the period from 1547 to the beginning of the reign of Henry IV. (1589) there was an amazing development—the antique system of proportions was mastered. The use of the Roman orders became general, but they were adapted to conditions so different from those prevailing in Italy that they acquired a character peculiarly French. Such innovations as open stair-wells, alternation of ordinances of pilasters and projecting columnated motives, and the French order of Philibert de l'Orme, are contributions to the architectural repertory that were widely used later. The *giant order,* embracing two storeys, was developed simultaneously in France and in Rome.

The names of three architects dominate this period: Philibert de l'Orme (1510–70), who built the Château d'Anet, part of Chenonceau and the earliest portion of the Tuileries; Pierre Lescot (1510?–78), who built a portion of the Cour du Louvre; and Jean Bullant (1525–78), who built at Fère-en-Tardenois, at Chantilly (Châtelet), additions to Écouen, and a part of the Tuileries. With the passing of this generation of great architects, the brilliant period closes,—having lasted for only 20 years,—and is succeeded by a period of sterility, due to religious wars and anarchy.

Reign of Henry IV. (1589–1610).—The architecture of the short interval between the time of the entrance of Henry IV. into Paris and his death (1595–1610), may be called the architecture of a reconstruction period. It is characterized by a simplicity and effectiveness attained, not by the use of expensive ornament, but by brick and stone employed in the old French tradition, the façades being decorated by quoins of rustication instead of by the orders—a somewhat severe treatment which was softened by the mellow colour of the walls under the firm silhouette of the slate roofs. The outstanding contribution to architecture, however, was the king's great undertaking to remodel the city, which had grown up haphazardly—an undertaking such as had not been attempted since the days of imperial Rome. To achieve his end, he made laws regulating the heights of buildings and the paving and widening of streets, and prohibiting the overhanging upper stories of the middle ages. Finally, by the contribution of such schemes of civic planning as the place Royale (now the place des Vosges) and the place Dauphine, he inaugurated a school which, after reaching its apogee in the 18th century, furnishes models for city-development to-day. Examples of this period are the important additions to Fontainebleau, the château of St. Germain en Laye and portions of the Louvre.

Seventeenth Century.—At the beginning of the century, there was an unprecedented activity in building; the long period of wars had brought about the usual changes in private fortunes, and the "nouveaux riches" had to provide themselves

with splendid habitations. The architecture of this time excels in the planning of town residences (hôtels), with their admirable arrangements of the cour d'honneur, service courts and noble garden elevations. The larger houses retained the "galeries" of the earlier Renaissance for the display of art treasures. The country estates are notable for their fine gardens, decorated with statues, basins and balustrades. In ecclesiastical architecture, the Jesuits cast the weight of their influence in favour of the adoption of Renaissance forms, and the churches and chapels designed by members of their order are inspired by the Gesu and the 16th century Italian examples (*e.g.*, St. Paul and the Novitiate in Paris). To the influence of the Jesuit architecture and that of the Italian Baroque, rather than to the Flemish, may be ascribed the exuberant ornamentation prevalent in the early part of the century. Architects of the first rank were numerous, among whom the first is François Mansart (1598–1666), by far the greatest architect of his time, and, according to Blondel (a competent critic of the 18th century), "the most skillful architect France has ever produced." Among other notable works he designed the wing added by Gaston d'Orléans at Blois, with its magnificent stairway, the additions to the Hôtel Carnavalet with their exquisite refinement of detail, the Château de Maisons and the Val de Grâce, a masterpiece which one has only to compare to St. Eustache, built 50 years before, to realize that French architecture had reached maturity. The palace of the Luxembourg, by Salomon de Brosse, the magnificent composition of the town and palace of Richelieu, the chapel of the Sorbonne, by Le Mercier, the Château of Tanlay (Burgundy), by Pierre le Muet, with its beautiful park, antedating the compositions of Le Nôtre, and finally the work of Louis Le Vau, who created the style of Versailles and Vaux-le-Vicomte, of the hôtel Lambert and the collège des Quatre Nations, and who represents the transition from the period of Louis XIII. to that of Louis XIV., are some of the outstanding compositions of the early 17th century.

Louis XIV. Period.—The *grand monarque* placed the artists of his time under a strict administrative discipline. The Académie de France was founded in 1666—five years after the king assumed full authority—and the Academy of Architecture in 1671. There followed a reaction from the empiricism of the preceding period, strengthened by the reverence of the academies for their classic doctrines, and by the king's disdain of foreign influences. The academies were as suspicious of artistic independence as the king of political heterodoxy. The striking feature of this period is a curious contrast between the classic composition of exteriors, free from the earlier experimental fantasies, and the elaborate ornamentation of interiors. There was a simplification both of the masses of a building, and of outward ornament, even to the silhouette of the roofs. The combining of few elements with unerring taste resulted in a stately dignity of proportion that lends even to the most unambitious work in provincial towns the noblesse of the greater constructions. On the other hand, the interiors were often overloaded with decoration. Le Brun, the court painter from 1664 to 1683, was in full authority at Versailles; a great decorator, he had the weaknesses of this aspect of his talent. Thus, refinement and intensity of expression were often sacrificed in the attempt to combine architecture, painting and sculpture into a single homogeneous effect.

Among the principal architects of the time, are Claude Perrault (1613–83), who, besides the Porte St. Antoine, and the Observatoire, designed the three façades of the Louvre which have been praised and attacked beyond all measure, and the excellence of which is readily seen by a comparison with Bernini's project for the same work; François Blondel (1618–86), who designed the beautiful Porte St. Denis; Jules Hardouin Mansart (1646–1708), architect of Marly, the Grand Trianon, Place Vendôme, Place des Victoires and the "Dome des Invalides," and who designed all the work at Versailles after 1676; and Liberal Bruant (1637–97), whose simple, powerful architecture may be seen in the Hôtel des Invalides and La Salpêtrière. A resumé of 17th century architecture would hardly be complete without a mention of Le Nôtre (1613–1700), who brought to its highest development the composition of the formal garden.

Eighteenth Century.—The change that began to make itself perceptible in the last period of the reign of Louis XIV. and up through the first half of the succeeding century, is the further simplification of exteriors, coupled with a still more striking change of interiors. The classic doctrine, with the orders, is still asserted in the designs of the façades; but there appeared a bolder use of blank surfaces, relieved by chains of rustication, and more restraint in the use of mouldings. Thousands of houses of this period are still to be seen, with quiet elevations whose harmonious proportions are their only bid to attract attention, and with skilful interior planning which still serves as a model. The treatment of these 18th century interiors forms a striking contrast with the oppressive splendours of the heyday of Louis XIV. A reaction had set in against the conservatism, and the theatrical pomp of the 17th century, in which people moved like actors on a stage; the new tendency was toward greater freedom in the adaptation of the classic formulas, and lightness and elegance of effect, and *intimacy*. Even at Versailles, stately apartments were broken up into groups of smaller rooms, and houses were planned with corridors and an arrangement of rooms convenient to their uses. The wood panelling, which replaced the marble inlay of palaces or the bare walls of simpler dwellings, was treated as woodwork, with a scale of moulding and decoration suitable to the material and without imitation of stone architecture motives. Fabric and paper were introduced as wall coverings; the ceilings were no longer designed to imitate vaulting—the open beams and joists disappeared and plasterwork was treated frankly as such. The stairways were decorated only by their railings of admirably wrought ironwork. In these interiors there is a complete emancipation from the Greco-Roman decorations of pilasters, cornices, etc.

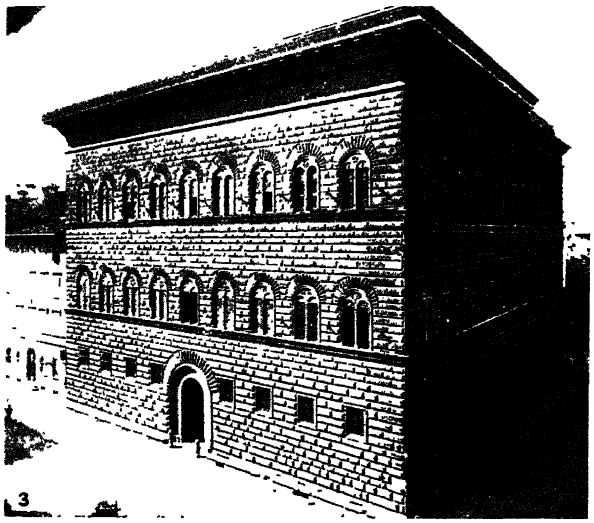
The examples of the architecture of this period are so numerous that only a few can be mentioned here: *e.g.*, the stables of Chantilly, and the hôtel Biron by Albert, la Malgrange (Nancy) and the hôtel d'Amelot by Boffrand, the Palais Bourbon, by Giardini and l'Assurance. The work of public buildings and city planning counts in its first ranks the admirable ensemble at Nancy (places Stanislas, de la Carrière and du Gouvernement) by Boffrand and Héré de Corny, the bridges at Nantes and Blois by J. J. Gabriel, the place Royale at Bordeaux (Gabriel), and the place Bellecour at Lyons (De Cotte). The religious architecture is exemplified by some imposing monasteries, which acquire with the excellent qualities of the domestic designing a certain touch of worldliness. Examples are St. Étienne at Caen, St. Ouen at Rouen, and the bishops' palaces of Toul, Verdun and Strasbourg.

Second Period.—Madame de Pompadour and her artistic advisers, such as Cochin and M. de Caylus, the archaeologists, and the architects Gabriel and Blondel had never looked with favour upon the infringements of the antique formulas that were committed in the Louis XV. period, and the new discovery of antiquities at Herculaneum and Pompeii infused the supporters of the classic doctrine with fresh conviction. Toward 1750, then, the fashion reverted to the close imitation of a Graeco-Roman style, newly baptized "a la Grecque." De Caylus's *"Recueil d'Antiquités,"* published in 1762, Leroy's *"Ruines des plus beaux Monuments de la Grece"* (1754), Soufflot's work on Paestum, and Piranesi's engravings, encouraged and facilitated the return to antique example by giving more precise documentation. Among the representative works of the architecture of the time are the Petit Trianon, the École Militaire, the wings of the entrance court and the opera at Versailles, and the place de la Concorde, by J. A. Gabriel, the Hôtel-Dieu at Lyon, the church of Ste. Geneviève at Paris, the Pantheon, etc., by Soufflot, and the works of Antoine, Mique, Ledoux, Victor Louis, Rousseau, (theatre of Bordeaux, mint and Palais de Justice at Paris).

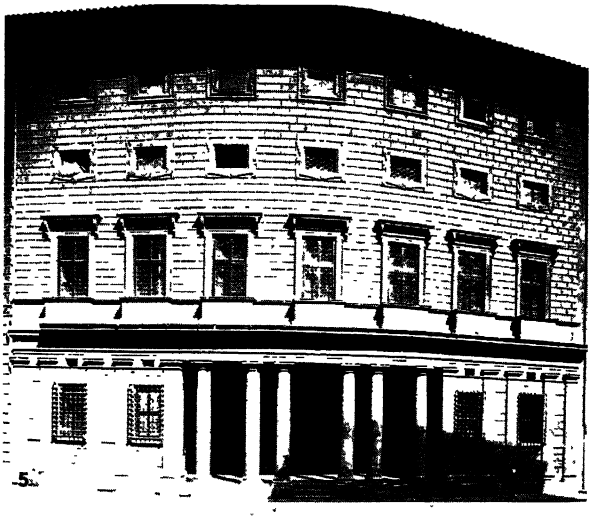
BIBLIOGRAPHY.—C. Daly, *Motifs Historiques* (1870); L. Palustre, *La Renaissance en France* (1881); H. von Geymuller, *Baukunst der Renaissance in Frankreich* (1898); M. Fonquier, *Les Grand Chateaux de France* (1907); M. Vachon, *Les Grand Maitres Macons* (1910); C. Martin, *La Renaissance en France* (1911); W. H. Ward, *Architecture of the Renaissance in France* (1911); P. Vitry, *Hôtels et Maisons de la Renaissance Française* (1912); Reginald Blomfield, *A History of French Architecture—1494 to 1661* (1912), and *A History of French*

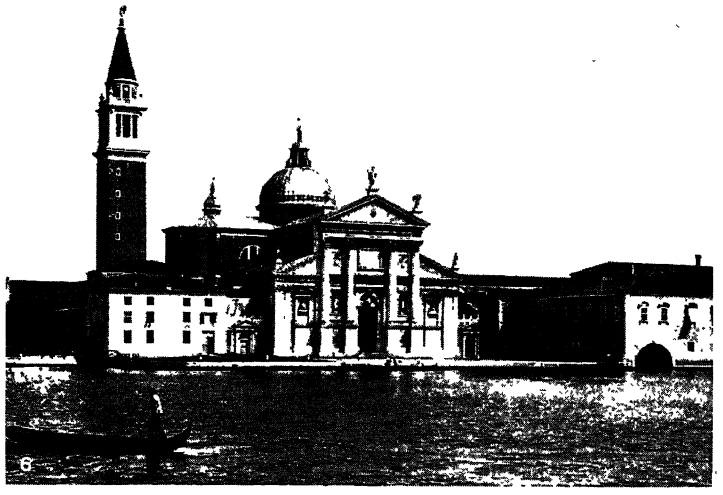












PHOTOGRAPHS, (1) F. R. YERBURY, (2-6) ALINARI

ARCHITECTURE OF THE ITALIAN RENAISSANCE

1. The Cathedral of Florence, showing the dome (1420–61) designed by Filippo Brunelleschi, and at the left the Campanile, or bell-tower, begun by Giotto in 1334. and continued by Andrea Pisano and by Fr. Talenti
2. The Pazzi Chapel (1429) in the cloister of Santa Croce, Florence, designed by Filippo Brunelleschi
3. The Palazzo Strozzi, Florence, begun in 1489 by Benedetto da Maiano, and continued by Cronaca
4. Cancelleria Palace, Rome, early 16th century, designed by Bramante and others
5. The Palazzo Massimi alle Colonne, Rome, 1532, with convex façade; designed by Baldassare Peruzzi
6. The church of San Giorgio Maggiore, Venice, rebuilt by Palladio in 1565–80, and completed by Scamozzi in 1610

RENAISSANCE ARCHITECTURE

PHOTOGRAPHS, (1, 3) ALINARI, (2) F. R. YERBURY

ARCHITECTURE OF THE ITALIAN RENAISSANCE

1. The Libreria Vecchia, or old library of St. Mark's, opposite the Doge's palace, Venice. Built 1536–82; one of the greatest works of the architect Sansovino
2. Courtyard of the Farnese palace, Rome, erected early 16th century, by Antonio da Sangallo, the Younger, and completed by Michelangelo
3. Palazzo Grimani, Venice (c. 1550), designed by Michele Sanmichele, one of the greatest designs of the Renaissance

Architecture, 1661 to 1774 (1921). (P. P. Cr.)

IV. RENAISSANCE ARCHITECTURE IN GERMANY, FLANDERS AND HOLLAND

In the 16th century, Germany resisted, more than France or Spain, the Italian influence. The classic spirit in art was apparently less congenial to her civilization, which lacked the Latin basis, and she had not suffered, like France and Spain, the disintegrating influences of a long destructive war which, by weakening the mediaeval and national traditions, had prepared the way for a new and alien art. The Italian motives appeared sporadically—for example, in a Florentine belvedere built in Prague in 1536 and in the Lombardesque wing of the castle at Heidelberg, built in 1556—but the Renaissance had to await the end of the 16th century to win a wide acceptance north of the Alps.

About 1580 the Baroque forms of Alessi were introduced into Germany. These forms, which were understood more as a system of decoration than as elements in mass composition, became immediately popular in the South German cities: broken pediments, scrolls, consoles, cartouches, the human figure placed in a niche, began to appear in profusion on the façades of churches and houses which in composition were still mediaeval. This fusion of Gothic picturesqueness with the sophisticated Baroque ornament gave to this first phase of German Renaissance an altogether unique character. The great stepped gables of town houses and the transept ends or façades of churches, wholly mediaeval in mass and line, flower out at the top into a rich encrustation of modelled form in which all the elements of classic architecture seem to be melted together. Examples of such designs are the Merienkirche, at Wolfenbuttel, the Gewendhaus at Brunswick (1592) and the Pellerhaus, in Nuremberg (1625).

After the Thirty Years' War, which ended in 1648 and devastated the greater part of the Rhine countries, German Renaissance architecture entered a new phase. The Baroque spirit gained a more complete ascendancy and in many localities mediaevalism entirely disappeared. Naturally the Baroque was more completely accepted in the southern and Catholic countries where Italian architects, brought into Germany by the Jesuits, built, or helped to build, many churches and palaces. Along the Rhine the French influence was felt, but it was not until the 18th century (*see* Modern Architecture: *18th and 19th Centuries*) that Germany turned directly to France for artistic inspiration. In that century the architecture of Versailles was widely imitated in the German courts, achieving there a compromise, or fusion, with the Italian Baroque. The result was a vigorous and original style, often piquant and full of that element of "surprise" which is a result of Baroque freedom and movement.

Germany, having a larger number of capital cities—there were more than 300 in the 16th century—developed a greater variety of local styles than any other country. Vienna was of course the most important centre. The relief that was felt when in 1685 the Turks were driven from before her walls, the prosperity fostered by Leopold I. and Charles VI., and the renewed faith of the Catholic reaction, found expression there in a series of remarkable monuments. Fischer von Erlach and Lukas von Hildebrandt, the two great architects of Vienna, transformed the mediaeval city, as Bernini had transformed Rome, with fountains and public places, with majestic churches, vast palaces and astonishing gardens. In their hands the exuberant Baroque, touched with an oriental fantasy, reached a magnificence altogether consonant with the gorgeous imperialism and the fervid piety of the times. The Karlskirche (1717–37) and the Hofbibliothek (1736), by von Erlach, and the Belvedere (1713–16), by Hildebrandt, are the most famous and perhaps most characteristic examples of this Viennese Renaissance.

After Vienna, the smaller courts of Dresden and Munich furnished important opportunities for the Renaissance architect. In Dresden, Pöpplemann (1662–1736) built the court of the Zwinger palace (1711–22), an extraordinary assembly of fantastic pavilion, bizarre planting and agitated sculpture. The Frauenkirche, in Dresden (1726–43), by George Bähr, is an original, free and virile design, perhaps the greatest achievement of the German Renaissance. In Munich, where the Italian architect Agostino Barelli had built a Neapolitan church, the Theatinerkirche (1667–75), the Wittelsbachs employed the French architect, François Cuvilliers, to add to their somewhat grandiose palace the altogether delightful Residenz-theatre (1752–60). Salzburg, with its cathedral (1614–34), its University church, and its Mirabel-Schloss, is one of the loveliest of Baroque towns; Prague has the great Wallenstein palace (1673–1730), the work of the Italian Marini, as well as the more Teutonic Kinsky palace, the work of the talented architect Kilian Ignaz Dientzenhofer; and in Potsdam, where, under Frederick the Great, French influence is most felt, the palace of Sans Souci (1716) achieves a delicacy and graceful freedom certainly not excelled in contemporary France.

To this architecture of the city and court there is added the architecture of the monasteries. Placed picturesquely among the hills of the Danube or the Rhine, these vast buildings offered opportunities most congenial to the spirit of 17th century architecture. Melk (1707–36) is perhaps the most impressive; a colossal mass which commands the Danube from the top of a mighty cliff and throws against the sky a superb tangle of modelled spire and dome.

In Flanders and Holland the development of architecture in the Renaissance was not essentially different from that of North Germany. The Jesuit influence was felt in Flanders and the development of churches of the Il Gesu type, such as the church of St. Michael, in Louvain (1650) was parallel to the contemporary development in South Germany and France. In Holland, as in Germany, the stepped gables of the town houses were transformed by the addition of Baroque detail but the use of brick and of quoins and the need of economy often gave them a more sober aspect than their Germanic cousins. At times the French influence was felt, as, for example, in the Hôtel de Ville in Antwerp (1561), a design in which superimposed columns enframe round-arched windows with a gracefulness and distinction in detail that recalls the work of Lescot.

Bibliography.—W. Lubke, *Geschichte der Renaissance in Deutschland* (1882); A. Ortwein and A. Scheffer, *Deutsche Renaissance* (1871–88); K. E. O. Fritsch, *Denkmaler deutsche Renaissance* (1891); Gron Bezold, *Die Baukunst der Renaissance in Deutschland, Holland, Belgien, und Dänemark* (1908); Herman Popp, *Der Architektur der Barock in Deutschland und in der Schweiz* (1913); Karl Horst, *Der Architektur der Deutschen Renaissance* (1928). (J. Hud.)

V. RENAISSANCE ARCHITECTURE IN ENGLAND

The Renaissance architecture of England may be conveniently divided into two phases which correspond roughly to the 17th and 18th centuries, to the period of the Stuarts and the period of the Georges. In the first phase the genius of two great architects, Inigo Jones and Christopher Wren, created for England a new system of design, based upon elements imported from Italy. In the second phase a host of other architects, highly talented but less original, imitated and developed the architecture formulated by Jones and Wren. The 17th century supplied a mine of architectural motives and enriched England with a few supremely great masterpieces; the 18th century made use of that mine to create a great number of brilliant designs, no one of which quite achieves greatness. (*See* Modern Architecture: *18th and 19th Centuries*.)

There are not lacking in England many examples of the use of Renaissance forms before the 17th century, but the spirit of her architecture remained essentially mediaeval. In the Tudor period, when the cathedral-building impulse had come to an end, when the monasteries ceased to exist and when the building of great country houses had become the chief preoccupation of architects, there grew up a certain simplicity and breadth of handling, a horizontal tendency in composition, which presaged the Renaissance. At the same time the ornamental motives of Italy appeared on the mantelpieces and around the doorways of the Elizabethan houses; and the craftsmen of Flanders, then numerous in England, employed these motives in their decorative work in plaster or carved wood.

Inigo Jones.—The failure of the national style of England to resist the imported Italian style is one of the remarkable

circumstances of Renaissance architecture. Travel in Italy, where the cultivated Englishman might compare the masterpieces of Bramante and Michelangelo with the formless Tudor of his own land, and the importation of Italian books, prepared the way no doubt for the new architecture, but they do not explain its immediate success. That success appears to have been due to the genius and force of one man: Inigo Jones. Jones, almost single-handed, put an end to the mediaeval tradition and set up a national movement that rescued English architecture from the Tudor chaos and brought it back to the Roman road along which progress was possible. His supreme accomplishment was to revive in England the conception of architecture as a form-giving art, having an academic and intellectual basis, and to get this accepted as the foundation of a new, national development.

This conception of architecture, rigorously developed by the somewhat intransigent architects of the 18th century, brought into English architecture a certain artificiality which is no doubt the cause of much that is deplorable in the English tradition. A lack of vitality and saliency results when architecture becomes, as it did in Georgian England, a wholly academic art, when the authority of books and of the Italian masters replaces a tradition in building to which the usages of the people, the needs of institutions, the climate and the temper of the nation have contributed. Nor did England develop great sculptors and mural painters to soften, as in France, the austerity of the Roman column and vault. The traditions of fine craftsmanship in plaster and in wood carving remained but they did not suffice to give English Renaissance architecture the warmth, the feeling of having become wholly assimilated, wholly expressive of a national temperament, that one finds in the Renaissance of Italy or Spain.

The reputation of Inigo Jones rests in no small degree on the designs that he made for the great palace at Whitehall in the years 1619–25. This palace is comparable in size to the great projects of the Louvre and the Vatican. The design is splendid and monumental and the palace, had it been erected, would without doubt have been unrivalled, except perhaps by the Escorial, in grandeur of effect. The façades of its seven courts abound in original motives, in which Palladian architecture is skilfully made comformable to English needs. In this, as in all his designs, Jones displays the correctness in proportion and the vigorous and unaffected handling of space and detail, that give his style a nobility and strength excelling that of any other English architect. The Banqueting hall, which is the only part of the palace of Whitehall actually executed, is an embodiment of these qualities.

Christopher Wren.—On the foundation laid by Jones, Sir Christopher Wren built the great masterpieces of English architecture. To the strength and sensitive feeling for proportion possessed by Jones, he added one of the most active and resourceful imaginations in the history of architecture. To a solid basis of Palladianism—that is to say, to correctness in academic design—Wren added the freedom and movement, the piquancy and drama, of the Baroque. He could unite in one ensemble the two currents into which architecture had divided in the 17th century, the academic and the ingenious, so that they flowed together into a reservoir of original and expressive motives that the 18th century was to find inexhaustible. Very characteristic of this compromise are the 51 parish churches that Wren built in London after the great fire of 1666. Among his secular buildings are important additions to Hampton Court, the library of Trinity college, Cambridge, and the great hospital at Greenwich.

In the city churches Wren created a wholly new type. Built for congregational use, with galleries, shallow chancels and meagre provision for services, they occupy irregular congested sites in the midst of crowded streets. The exteriors had to be severely plain, since funds were scarce; red brick and plaster for the interior were the materials employed. Yet with all these discouragements Wren produced interiors oftentimes full of charm, and exteriors that play a commanding part in their civic environment. These exteriors, plain and even box-like, have slender towers so placed as to be most effective in the street-picture and modelled at the top into delicate spires or lanterns over which there is an encrustation of classic forms.

The secular buildings were more conventional in character, The additions made to Hampton Court (*c.* 1690) constitute a sober essay in brick-and-stone architecture, somewhat crowded in effect and lacking the repose that marks their Italian prototypes. The Cambridge library (1678) follows the lines of the library at Venice, but is without the piquant proportion and wealth of sculptured ornament that give the Venetian façades so much distinction and grace. Greenwich hospital is more imaginative, having a masterly plan in which four palatial masses are grouped on an axis about two courts. Two domed pavilions are introduced to give the design unity and add life to the façades.

All of these buildings, although exceedingly diverse and original, are of less importance than the great cathedral of London. The ruins of the Gothic cathedral having been cleared away after the Great Fire, Wren was commissioned in 1668 to construct a new St. Paul's in accordance with a Renaissance design that he submitted. During the period from 1675, when the first stone was laid, to 1710, when the work was completed, Wren made many departures from this accepted design, which grew steadily in imaginative power and monumental unity, but at no time did he abandon his central idea, a classic monument contrasted with forms taken from the Baroque. The greatness of St. Paul's is derived, not from the perfection of detail, which is frequently open to criticism, but from the consistency and grandeur with which it realized this idea. The central dome, definite and geometric in mass and in silhouette, imposing in scale, rises from a wide podium and is preceded, at the western end, by two spirited campaniles whose modelled surfaces, profuse shadow and broken silhouette contrast dramatically with the simpler forms with which they are associated.

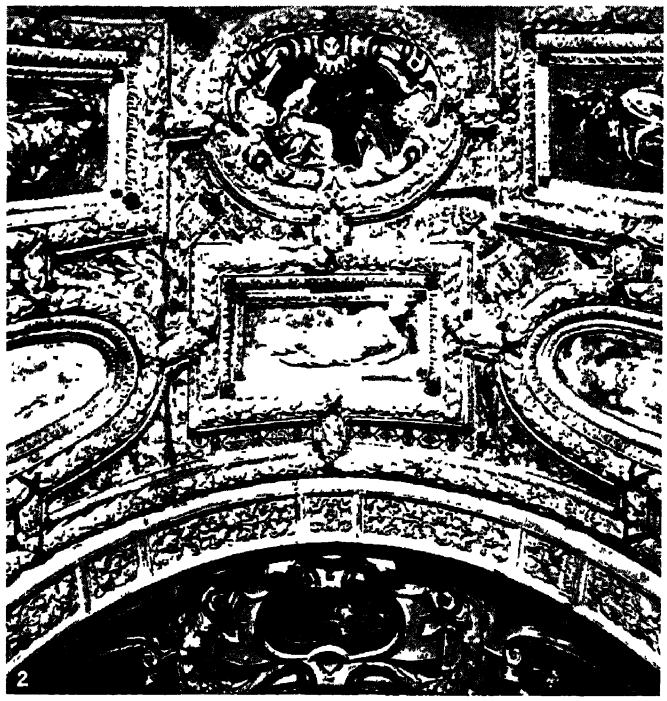
Eighteenth Century.—After the death of Wren there remained the academic basis which Jones had established for English architecture and the compromise which Wren had brought about between the Palladianism and the virile and free Baroque. These two traditions dominated English architecture and gave direction, in more or less equal degree, to its development during the 18th century. But gradually the academic triumphed. The largeness of conception, the grandiose effect, is forsaken towards the middle of the century in favour of purity and repose.

John Vanbrugh (1666–1726), who did not begin to practice architecture until after the age of 35, was the most robust and daring of Wren's successors and most resembled him in the power and breadth of his imagination. He was the builder of vast country houses, such as Blenheim (1710), 856 ft. long, and Castle Howard (1702), a private dwelling with a dome 100 ft. high. These are monstrous buildings, with innumerable faults of technique and propriety, but magnificent in conception, piling up huge geometric masses around the perimeters of immense courts in a kind of intoxication of architecture.

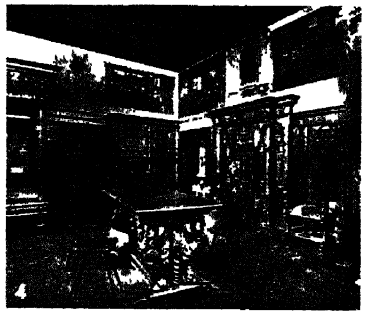
Nicholas Hawksmoor (1661–1736), a pupil of Wren, and an assistant of Vanbrugh, found fewer opportunities than either. For his fine Christ church, Spitalfields, he combined the most original and spirited tower in England with an interior almost unrivalled in formal elegance and classic beauty. The façade that he built for Westminster Abbey is more successful than might have been expected from an age so out of tune with the mediaeval spirit. His rugged and simple work contrasts strangely with that of his more successful and versatile contemporary, James Gibbs (1682–1754). Gibbs, like Hawksmoor, a builder of churches in the Wren tradition, shows great facility in adapting and developing motifs taken from Wren; but his care for correct detail and for elegance in technique oftentimes lessens the breadth and virility of his work. The church of St. Mary-le-Strand, in London, is a good example of his style. The Radcliffe library, Oxford, is a more monumental building, but executed with less *address*. St. Martins-in-the-Fields, London, has a magnificent spire thrust through the roof of a Roman portico; a conception worthy of the greatest Baroque designers, boldly carried out and combined with an interior full of dignity and feeling.

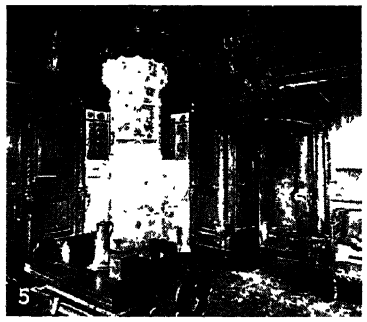
Gibbs was a scholarly architect, possessing that thorough training in Palladian design which is characteristic of the 18th century designers, but he found in Wren a source of vitality which counter-

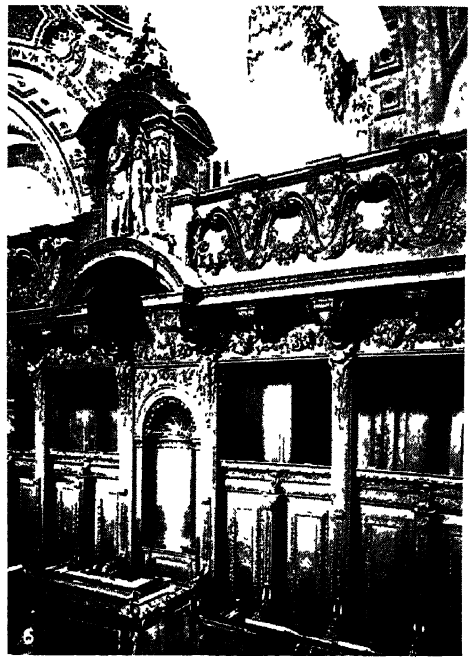












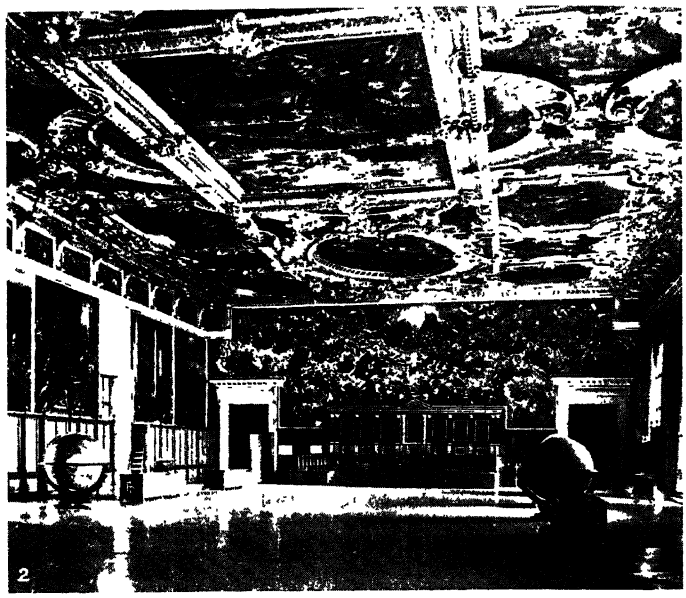
BY COURTESY OF (3, 5) THE METROPOLITAN MUSEUM OF ART, NEW YORK, (4) THE DIRECTOR OF THE BERNE MUSEUM, (6) A. E. BULLOCK FROM "GRINLING GIBBONS AND HIS COMPEERS" (JOHN TIRANTI AND CO.); PHOTOGRAPHS, (1) ANDERSON, (2) ALINARI

DECORATIVE DETAILS OF THE RENAISSANCE

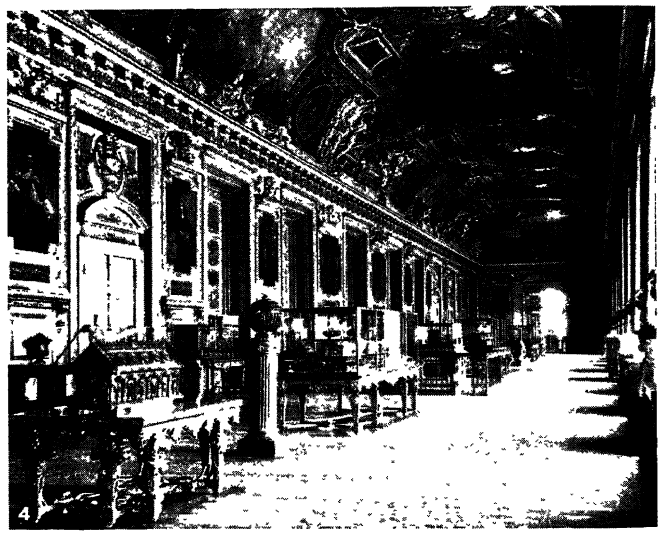
1. "The creation of Adam and Eve and their expulsion from Paradise," a panel in bronze by Lorenzo Ghiberti (1378–1455) in the famous east door made for the Baptistery in Florence between 1425 and 1452, a masterwork of early Renaissance decorative sculpture
2. Vault of the Scala d'Oro in the Doges' Palace, Venice, designed by Jacopo Sansovino (1486–1570)
3. Glazed polychrome terra cotta, "Assumption of the Virgin" by Luca della Robbia (1400–82), characteristic of the early Florentine Renaissance in its perfect blend of architecture and sculpture as well as in the exquisite delicacy of its modelling. In the Metropolitan Museum of Art, New York
4. Swiss room, 17th century, the woodwork characteristic in its free handling of Baroque motives. Now in the Berne Museum
5. Swiss panelled room, 17th century, with rich Baroque woodwork and a magnificent porcelain stove. Now in the Metropolitan Museum of Art, New York
6. The seat for the Archbishop of Canterbury incorporated in the choir stalls of St. Paul's cathedral, London, executed by the wood carver Grinling Gibbons (1648–1720) in collaboration with the architect Sir Christopher Wren (1632–1723). It is characteristic in its dignified combination of restrained Baroque forms with figures, heads and naturalistic foliage

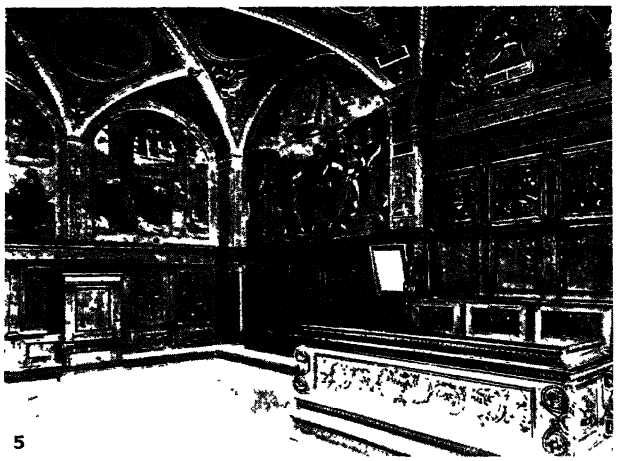
RENAISSANCE ART









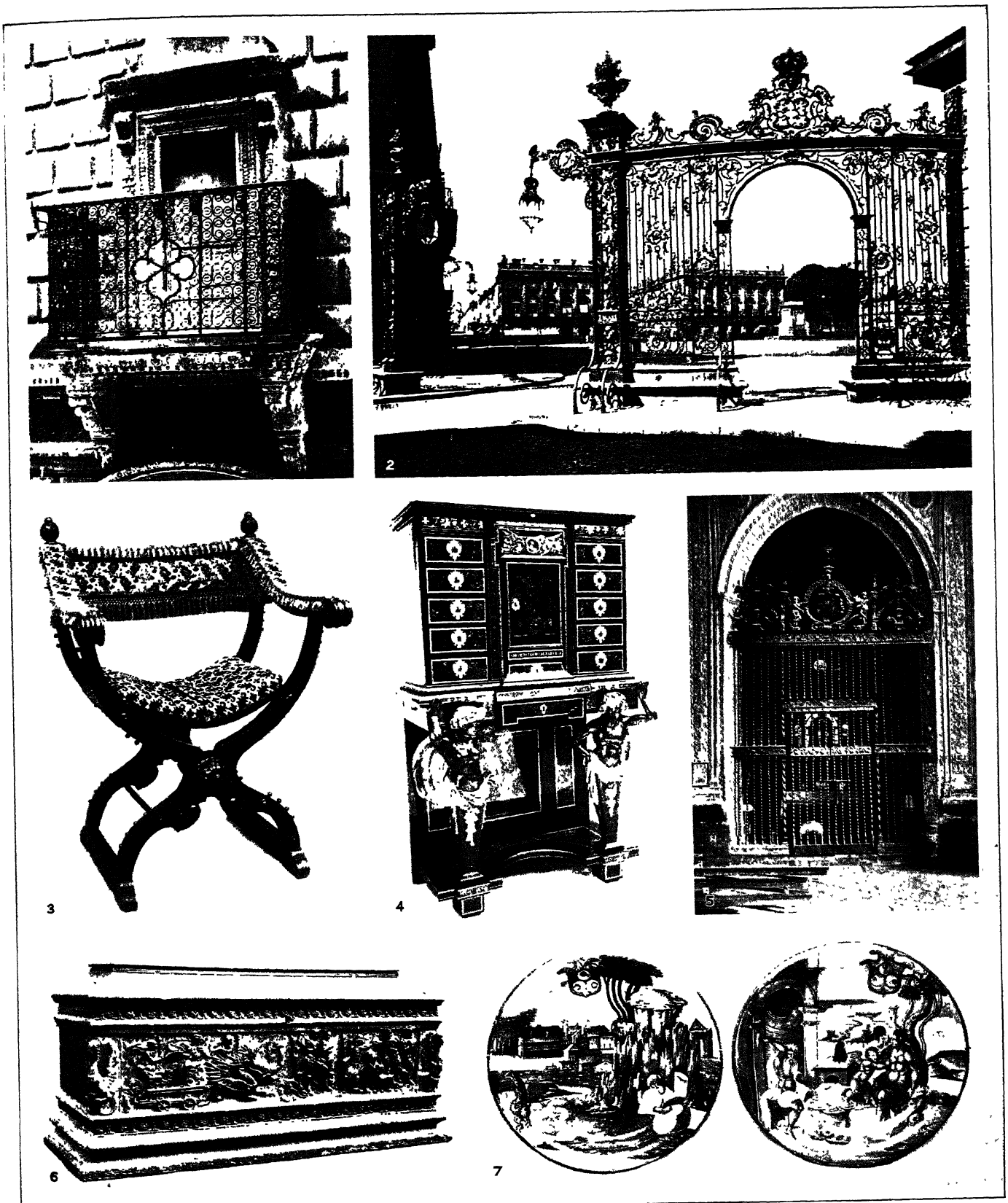




PHOTOGRAPHS, (1, 3, 4) BURTON HOLMES FROM EWING GALLOWAY, (2) PUBLISHERS' PHOTO SERVICE, (5, 6) ALINARI

INTERIOR DESIGN IN FRANCE AND ITALY

1. Gallery of Francis I., Fontainebleau palace, France, begun 1528; its present form is largely due to the Italian painters Primaticcio (1490–1570) and Il Rosso (1496–1541). Serlio (1475–1552) may have collaborated in the design. 2. Hall of the Great Council in the Doges' Palace at Venice; Venetian early Baroque design with paintings by Veronese (1528–88) and Tintoretto (1518–94). 3. The gallery of Henry II., Fontainebleau, decorated by him for Diane de Poitiers, with frescoes by Niccolo dell' Abbato (1512–71) and Primaticcio. 4. Gallery of Apollo, the Louvre, Paris, designed by Charles Le Brun (1619–90) for Louis XIV. 5. Interior of the Collegio del Cambio (the hall of the bankers' guild), typical of the early north Italian Renaissance of the last half of the 15th century, decorated in 1500 with paintings by Perugino (1446–1524) and his pupils. 6. A detail of one of the ceiling panels from the Collegio del Cambio showing delicate architectural forms and grotesques of classic inspiration

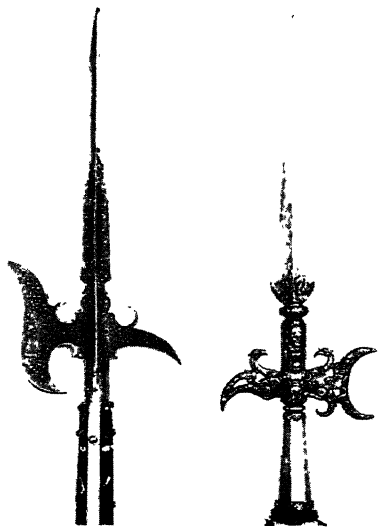


BY COURTESY OF (3, 6) THE METROPOLITAN MUSEUM OF ART, NEW YORK, (4) THE KEEPER OF THE WALLACE COLLECTION, (7) THE DIRECTOR OF THE VICTORIA AND ALBERT MUSEUM, PHOTOGRAPHS, (1) PAPPI, FROM ALONZO ZAGNOLI, (2) LEVY AND NEURDEIN

APPLIED ARTS OF THE RENAISSANCE

1. Wrought iron balcony from the Palazzo Bevilacqua, at Bologna, Italy, 1481–84. 2. Wrought iron gates in the Place Stanislas, Nancy, France, 1752–55, style of Louis XV., by E. Héré de Corny. 3. Italian carved walnut folding arm chair of the High Renaissance, 16th century. 4. Inlaid ebony cabinet with marquetry of many woods and inlaid brass and tortoise shell, of the type known as Boulle work; style of Louis XIV., last half of the 17th century, probably from the ateliers of André Charles Boulle (1642–1732). 5. Spanish Renaissance, 16th century *rejeria*, or bronze and iron screen, from Alcalá de Henares, Spain. 6. Italian carved wooden chest, with reliefs portraying a Bacchic procession, High Renaissance. 7. Plates of enamelled earthenware with paintings of an astrologer (left) and of Vulcan forging Cupid's arrows (right), painted by Francesco Xanto Avelli da Rovigo after engravings by Marc Antonio Raimondi. From Urbino, Italy, about 1532

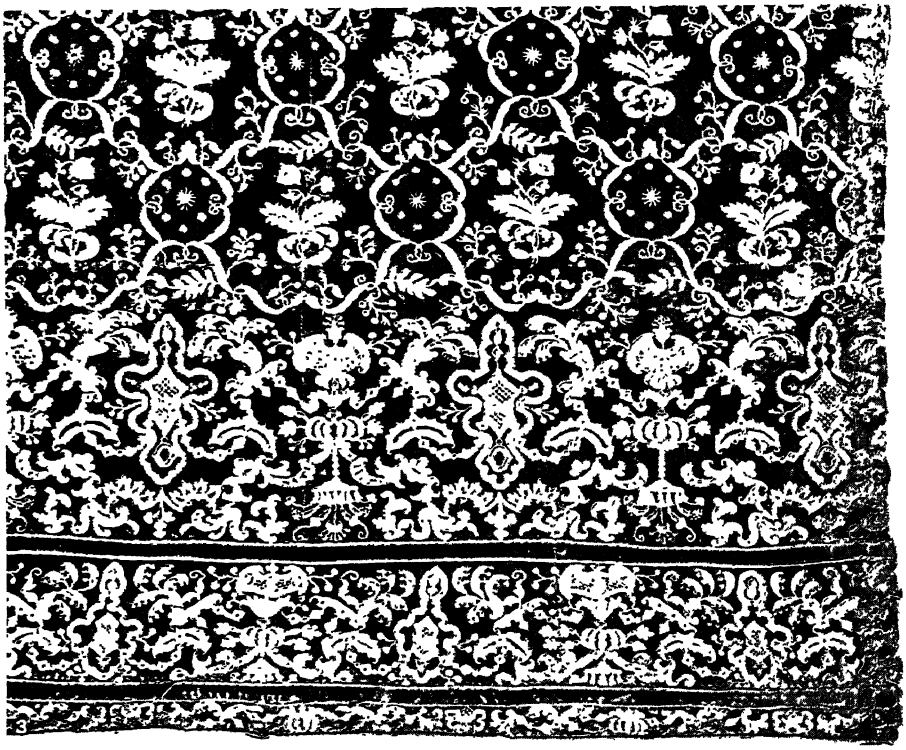
RENAISSANCE ART



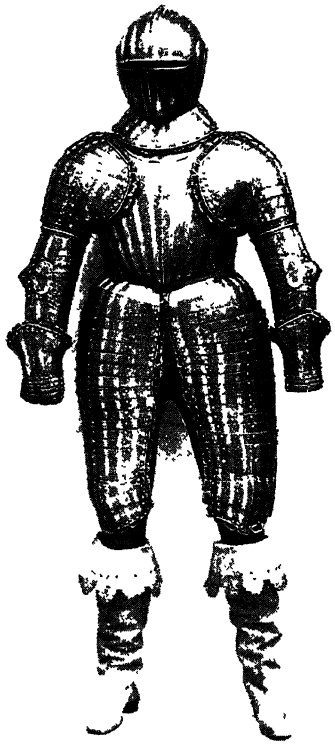
1



2



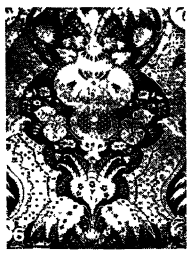
3



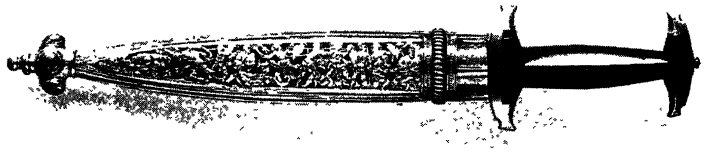
4



5



6



7

BY COURTESY OF THE METROPOLITAN MUSEUM OF ART, NEW YORK

APPLIED ARTS OF THE RENAISSANCE

1. Halberds: left, German, 16th century, characteristic in its fine decoration on the surface of the metal; right, Italian, 16th century, showing greater amount of modelling in the round and strong Baroque elements. 2. Louis XIV. tapestry, French, of the last half of the 17th century, showing the return of the Sabine women with the Roman soldiers; probably one of a set woven at the royal looms of the Gobelins. 3. Embroidered Italian altar frontal, with touches of naturalistic ornament, in the manner of Louis XIII. and early Louis XIV. textiles. 4. A three-quarter suit of Italian armour, etched and gilded, and showing the arms of the Barberini family, probably once the property of Taddeo Barberini, middle 17th century. It illustrates the lavishness of ornament applied to arms and armour in the Baroque period. 5. French Renaissance helmets: on the left, period of Henry II., showing the strong classic influence; on the right, period of Louis XIV. with typically fantastic outline. 6. French silk brocade of about 1700, showing a characteristic Louis XIV. mixture of Baroque line and naturalistic detail. 7. A dagger and scabbard, dated 1567, of Swiss manufacture

acted, to some extent at least, the frigidity of the master of Vincenza. Gibbs' contemporaries were often less fortunate: Lord Burlington, a wealthy amateur whose actual accomplishments are still a subject of controversy; Colin Campbell (d. 1734), his protégé and the author of the *Vitruvius Britannicus;* and William Kent (1684–1748), who resided in Burlington House, form a group of academic architects to whom adherence to the Italian model seemed more to be desired than individuality of manner or a continuation of the English tradition of Wren. All were builders of great country houses.

Kedleston Hall, by James Paine (1716–89), recovers to some extent the spirit of Vanbrugh, speaking the language of abstract architectonic form, rather than that of ornament. It is planned in the grand manner, with a porticoed central block flanked by smaller blocks, in which all the parts echo those of the centre. On the major axis are two Roman rooms, one peristyled and one domed. Harewood House, Yorkshire, by Carr of York (1723–80), in which there is, as at Kedleston, a central block flanked by wings, illustrates further the rigid purity of the classic taste of the middle of the century, when the tradition of Wren was disappearing and correct proportion was allowed to take the place of inspiration. The Palladian bridge at Wilton, by Robert Morris, and the house at Prior park, Bath, by John Wood, are other examples.

The last of the Renaissance architects were William Chambers (1726–86) and Robert Adam (1728–92). To the former fell the greatest opportunity of the century, the building of the immense Somerset palace in London. A man of pure taste and of unusual executive powers, he succeeded in creating one of the finest palatial façades in Europe; a façade, however, which has the excellence of scholarliness and of technique rather than that of inspiration and power. Adams, who practised in partnership with his brother James, was even more academic in his outlook; his style is, on his exterior designs, simple, tenuous and dry in the extreme. His interiors, which often take unusual shapes in plan and in the modelling of ceilings, are enriched by a delicate and graceful system of decoration which, when skilfully executed, attains a unique loveliness. His influence was enormous and under his leadership the architecture of the Renaissance came to an end.

BIBLIOGRAPHY.—J. A. Gotch, *Renaissance Architecture in England* (1894); Belcher and MacCartney, *Later Renaissance Architecture in England* (1897); R. Bloomfield, *History of Renaissance Architecture in England* (1897); H. Field and M. Bunny, *English Domestic Architecture of the 17th and 18th Centuries* (1904); J. A. Gotch, *The Growth of the English House* (1908); MacCartney, *English Houses and Gardens of the 17th and 18th Centuries* (1908); J. A. Gotch, *Early Renaissance Architecture in England* (1914); P. L. Dickensen, *Georgian Mansions in Ireland* (1915); S. A. Ramsay, *Small Georgian Houses* (1919). (J. HUD.)

RENAISSANCE ART. The revival of classic learning in Italy, which was so marked a feature of Italian culture during the 15th century, was paralleled by an equal passion for the beauty of classic design in all the artistic fields; and when this eager delight in the then fresh and sensuous graciousness that is the mark of much classic work—to the Italians of that time, seemingly the expression of a golden age—became universal, complete domination of the classic ideal in art was inevitable.

This turning to classic models was less sudden and revolutionary than it seemed. Throughout the history of Romanesque and Gothic Italian art, the tradition of classic structure and ornament still remained alive; again and again, in the 12th and 13th centuries classic forms—the acanthus leaf, moulding ornaments, the treatment of drapery in a relief—are imitated, often with crudeness, to be sure, but with a basic sympathy for the old imperial Roman methods of design. (*See* GOTHIC ART; ROMANESQUE ART.) How much more at home seems the mediaeval Italian artist, who carved the spiralling acanthus leaves on the doors of Pisa cathedral (11th century) than the designer of the laboured and stupid, crocketted capitals of the cathedral in Florence (14th century), or the contorted and unconvincing buttress pinnacles of Milan cathedral (begun 1386). The best of Italian Gothic art is always that which is least like northern Gothic, and is usually dominated by ideals, essentially those of earlier Italian building, like the Byzantinesque palaces of Venice. Niccolo Pisano (*c.* 1206–1280) was but the first of many Italian artists, particularly sculptors, to turn definitely to Roman sculpture for inspiration.

It was therefore only natural that Brunelleschi (1377–1476) should study the ruins of ancient Rome, and that, following his example, the whole artistic world of Florence turned to the same source of inspiration almost unanimously. Brunelleschi's famous cupola over the cathedral of Florence completes the work of the preceding age and is not yet a Renaissance manifestation. The new style was displayed in the Pazzi chapel and in the plans for San Lorenzo and San Spirito.

Florence was the great centre of this early Renaissance; whence it spread throughout Italy in the 15th century; the greater number of artists were Florence-trained. The enthusiastic patronage of art of the new type by Cosimo dei Medici (1389–1464), and Lorenzo dei Medici (1449–1492), who founded the famous Platonic Academy, gave a tremendous impetus to the movement, and the general Florentine method of art training, through *bottege,* or craftsman shops, assured the fact that the Renaissance was not confined to architecture and sculpture, but spread to all the industrial arts as well.

Another element besides the influence of ancient Rome becomes evident as the Renaissance matured in such of the minor arts as textiles, pottery and metal work. This was the influence of the Near East. Commerce between Italy and the Turkish dominions was constant and large in amount, and Oriental pottery and textiles were much sought after. When the Italians started manufacturing their own goods to compete with this foreign source, limitation and adaptation of the Oriental patterns was natural. Thus the controlling designs of Venetian velvets and brocades, down to the 18th century, owe much to the carnation and the palmette of Persia, and in 16th and 17th century armour and silver-ware, there occur the spear-head shapes and bifurcated leaves and intricate interlaces of fine lines which characterize the inlaid brass, copper and steel of Damascus or Constantinople.

By the beginning of the 16th century the tentative and experimental characteristics of the earlier Renaissance had, in Italy, given way to the mature, knowing, and facile use of classic forms which constitutes the High Renaissance or cinquecento (*q.v.*). In architecture, the orders were used with entire command; in the minor arts the decorative exuberance of the 15th century was yielding to sounder and more dignified conceptions. Yet the development of this polished classicism was limited and eager; creative imaginations refused to be bound by it. The result was the resurgence of untrammelled and, at times, unlicensed individualism in design, which is known as the Baroque or late Renaissance. Already, in the work of Michelangelo, 1474–1564, and Cellini, 1500–71 (*see* SILVERSMITHS' AND GOLDSMITHS' WORK), Baroque elements are obvious, and by the year 1600 the ideals of climax, broken curves, magnificent composition and dynamic contrasts, which constitute the Baroque movement, were universally accepted, and the classic forms became merely an inspirational frame-work for individual development and creation. The Baroque was a style curiously turgid, often gigantesque, theatrical, often denying or falsifying structural frame-work, yet magnificently alive; producing alike such over lavish and ill considered decorations as those of Andrea Pozzo (1642–1709) for the church of S. Ignazio in Rome and the dignified and monumental colonnades of the Piazza of S. Peter's, by Bernini (1598–1680). During the 18th century the vitality of the Baroque degenerated into a chaos of contorted forms, to be in turn replaced, at the end of the century, by a recrudescence of stern, cold and rather sterile classicism. Yet the Renaissance in Spain was no mere copy of the Italian.

Renaissance feeling was introduced into Spain during the latter years of the 15th century by wandering Italian sculptors, but a school of native artists soon developed, and during the 16th century an individual school of Renaissance dominance was complete, despite the Italian impetus given by the campaign of Charles V., 1500–58, and the fanatical Romanism of his son Philip II., 1527–1598, whose palace monastery, the Escorial, by Juan Bautista (16th century) and Juan de Herrera (1530–97), is a stark and lonely monument to Philip II.'s Italian taste. Else-

where, the Moorish influence was so strong as to modify the Italian forms profoundly; Moorish craftsmen controlled the potteries and often built the buildings. Moreover, perhaps due to the bleak and sombre character of so large a part of the Spanish territory, the emotional quality of the Spanish Renaissance work has a sharp pungency quite different from the usual graciousness of the Italian feeling. The style in Spain may be divided into three parts—the early Renaissance, or Plateresque (*q.v.*), in which Moorish influence is marked; the classic or Griego-Romano, a short and sterile attempt to introduce strict Italian classicism; and the Baroque or Churrigueresque, so-called from one of its main exponents, Jose Churriguera (died 1725). It was in this final style that the Spanish temperament found itself most at home. Particularly characteristic of the Spanish Renaissance is the work in certain of the minor arts, especially in iron work, as shown in the magnificent church screens, or rejeria (*q.v.*); in furniture, in which iron and wood were frequently combined; and in stamped leather, for which Spain was famous.

In France, the history of the early Renaissance shows a style originally essentially an imported court fashion, gradually permeating all French life. The Italian campaigns of Charles VIII., 1470–1498, Louis XII., 1462–1515, and Francis I., 1494–1547, had given the French court an intimate knowledge of the comparative luxury, cleanliness and monumentality of the Italian cities. Italian artists were invited to the court; Italian decorators and architects helped Francis I. in his great building schemes. Yet this court fashion had to compete with a vivid and vital flamboyant, late Gothic style, and much of the charm of the early French Renaissance results from the naive, yet brilliantly executed combinations of the two influences. During the reign of Henry II., 1519–1559, the classic ideal was dominant, though Gothic forms were still in use. Under Henry IV., 1553–1610, though the Gothic had at last passed away, Baroque freedom controlled design, and under Louis XIII., Louis XIV., Louis XV., and Louis XVI. whose reigns stretched from 1610 to 1793, there was a continual see-saw between academic classicism and imaginative freedom. (*See* Louis Styles.)

From the beginning a court style, the French Renaissance remained essentially a luxurious style. All of the arts of luxury flourished. Rich textiles—tapestries and brocades—are characteristic, and the lavish furniture was copied all over Europe, especially during the 18th century. The development of pottery, first privately, and later under government auspices, culminated in the magnificent porcelains of Sèvres.

The development of the Renaissance in the rest of Europe was marked by common features. In England and the Teutonic countries, there was not only a late vital Gothic style, but definite characteristics of national taste and vastly different climatic and geographical conditions. Yet the humanistic impetus of the Renaissance existed almost everywhere and the beauty of the naturalistic painting and sculpture, as well as the exquisite productions of Italian goldsmiths, formed a continual invitation toward a change in artistic ideals. Thus, despite occasional purely classic work by Italian artists, such as Torregiano's tomb of Henry VII. in Westminster Abbey, London (1515), the early Renaissance in north Europe is chiefly characterized by the gradual creeping in of misunderstood classic decorative forms, often caricatured. In none of these countries did classicism become dominant until the 17th century, and even then it is coloured by local taste. Thus in Germany, the picturesqueness of late Gothic decorative design controlled all of the arts down to the 18th century and even the pseudo-classic of the French inspired Rococo embodied many picturesque elements. In England, due to the influence of Inigo Jones, 1572–1652, and Sir Christopher Wren, 1632–1723, at least in architecture, classic forms were used with purity and unusual correctness. In Germany and Flanders, on the other hand, Baroque elements were favoured, especially in woodcarving and the minor arts generally; and through the diffusion of Flemish craftsmen consequent upon the confused religious and political conditions during the 17th century, these northern varieties of Baroque forms were broadcast over Europe, influencing markedly the later Renaissance work in England and recognizably, though to a less extent, that of France and Spain.

This confusion of international influences marked the Renaissance of the 18th century, the style movements in France being generally paralleled by those in other countries. Yet the erratic swing between license and classicism was indicative of a decaying style vitality, and new archaeological discoveries were giving to the classicism of the end of the century a motivation quite different from the simpler Renaissance tradition that was dying. With the fall of the French court, in the French revolution, more than a political system was swept away, for with it went the last vestiges of Renaissance tradition. *See* Baroque Architecture; Bronze and Brass; Interior Decoration; Painting; Potteries and Porcelains; Renaissance Architecture; Rococo, Louis Styles; Rugs and Carpets; Silversmiths' and Goldsmiths' Work; Tapestry. (T. F. H.)

RENAIX, town, province of East Flanders, Belgium, 8 m. S. of Oudenarde, at the foot of the hills of Flanders. It has yielded many pre-Roman and Roman finds. There are manufactories for woollen and linen goods. Pop. (1925), 22,669.

RENAN, ERNEST (1823–1892), French philosopher and Orientalist, was born on Feb. 27, 1823, at Tréguier. His father's people were of the fisher-clan of Renans or Ronans. He was only five years old when his father died, and his sister Henriette, twelve years older than Ernest, a girl of remarkable character, was henceforth morally the head of the household. Ernest was educated in the ecclesiastical college at Tréguier. In the summer of 1838 he carried off all the prizes at the college. Through his sister, who was teaching in Paris, Dupanloup heard of him, and sent for him at once, and placed him in the new ecclesiastical college of St. Nicolas du Chardonnet. He then proceeded to study for the priesthood at the Seminary of Issy, then at St. Sulpice, and finally he found his way to Stavistas, a lay college of the Oratorians. He soon found himself torn between his desire to lead the life of a Catholic priest and his intellectual inability to accept in its entirety the ordinary presentation of Catholic doctrine, or to submit to ecclesiastical authority. Even at Stavistas he found himself too much under the domination of the Church, and, after a few weeks there, he reluctantly broke the last tie which bound him to the religious life, and entered M. Crouzet's school for boys as an usher. There he made the acquaintance, in 1846, of the chemist Marcellin Berthelot, then a boy of eighteen. To the day of Renan's death their friendship continued. Renan was occupied as usher only in the evenings. In the daytime he continued his researches in Semitic philology. In 1847 he obtained the Prix Volney for his "General History of Semitic Languages."

The revolution of 1848 confronted him with the problems of Democracy. The result was an immense volume, *The Future of Science,* which remained in manuscript until 1890. *L'Avenir de la science* is an attempt to conciliate the privileges of a necessary *élite* with the diffusion of the greatest good of the greatest number. In 1849 the French government sent him to Italy on a scientific mission. In Italy the artist in him awoke and triumphed over the savant and the reformer. On his return to Paris Renan lived with his sister Henriette. A small post at the National Library, together with his sister's savings, furnished him with the means of livelihood. In the evenings he wrote for the *Revue des deux mondes* and the *Débats* the exquisite essays which appeared in 1857 and 1859 under the titles *Études d'histoire religieuse* and *Essais de morale et de critique.* In 1852 his book on *Averroès* had brought him not only his doctor's degree, but his first reputation as a thinker. In his two volumes of essays Renan shows himself a Liberal, but no longer a Democrat. Nothing, according to his philosophy, is less important than prosperity. The greatest good of the greatest number is a theory as dangerous as it is illusory. Man is not born to be prosperous, but to realize, in a little vanguard of chosen spirits, an ideal superior to the ideal of yesterday. Only the few can attain a complete development. Yet there is a solidarity between the chosen few and the masses which produce them; each has a duty to the other. The acceptance of this duty is the only foundation for a moral and just society. The aristocratic idea has seldom been better stated.

Renan now began to frequent more than one Parisian salon, and especially the studio of Ary Scheffer, whose niece and adopted daughter, Cornélie, he proposed to marry in 1856. Henriette consented not only to the marriage, but to make her home with the young couple, whose housekeeping depended on the sum that she could contribute. The history has been told by Renan in the memorial essay, *Ma Soeur Henriette*. In 1859 appeared his translation of the *Book of Job* with an introductory essay, followed in 1859 by the *Song of Songs*.

Renan was now a candidate for the chair of Hebrew and Chaldaic languages at the Collège de France. The Catholic party, upheld by the empress, would not appoint an unfrocked seminarist, a notorious heretic, to a chair of Biblical exegesis. Yet the emperor wished to conciliate Ernest Renan. He offered to send him on an archaeological mission to Phoenicia. Leaving his wife at home with their baby son, Renan left France, accompanied by his sister, in the summer of 1860. Madame Renan joined them in January 1861, returning to France in July. The mission proved fruitful in Phoenician inscriptions which Renan published in his *Mission de Phénicie*. They form the base of his *Corpus Inscriptionum Semiticarum*. At Amshit, near Byblos, Henriette Renan died of intermittent fever on Sept. 24, 1861. Her brother, himself at death's door, was carried unconscious on board a ship waiting in harbour and bound for France. On Jan. 11, 1862, the Minister of Public Instruction ratified Renan's election to the chair of Hebrew. But his opening lecture, in which, amid the applause of the students, Renan declared Jesus Christ "an incomparable Man," alarmed the Catholic party. Renan's lectures were pronounced a disturbance of the public peace, and he was suspended. He refused the librarian's post he was offered in exchange, and thenceforth lived by his pen.

Vie de Jésus.—Henriette had told him to write the life of Jesus. They had begun it together in Syria, she copying the pages as he wrote them, with a New Testament and a *Josephus* for all his library. The book is filled with the atmosphere of the East. It is the work of a man familiar with the Bible and theology, and no less acquainted with the inscriptions, monuments, types and landscapes of Syria. But it is scarcely the work of a great scholar. Renan still used his literary gifts to pursue a scientific ideal. He produced the *Apostles* in 1866, and *St. Paul* in 1869, after having visited Asia Minor with his wife. His object was "to evoke from the past the origins of Christianity." In *St. Paul*, as in the *Apostles*, Renan shows his concern with the larger social life, his sense of fraternity, and a revival of the democratic sentiment which had inspired *L'Avenir de la science*.

The Franco-German War was a turning-point in Renan's history. Germany had always been to him the asylum of thought and disinterested science. Now his heart turned to France. In *La Réforme intellectuelle et morale* (1871) he endeavoured at least to bind her wounds, to safeguard her future. At the same time the irony always perceptible in his work grows more bitter. His *Dialogues philosophiques*, written in 1871, his *Ecclesiastes* (1882) and his *Antichrist* (1876) (the fourth volume of the *Origins of Christianity*, dealing with the reign of Nero) show a disenchanted and sceptical temper. Gradually he aroused himself from his disillusioned mood, and observed with genuine interest the struggle for justice and liberty of a democratic society. The fifth and sixth volumes of the *Origins of Christianity* (the *Christian Church* and *Marcus Aurelius*) show him reconciled with democracy, confident in the gradual ascent of man.

Later Works and Death.—In 1883 he published *Souvenirs d'enfance et de jeunesse*, which have the Celtic magic of ancient romance and the simplicity, naturalness and veracity prized in the 19th century. But his *Ecclesiastes*, published a few months earlier, his *Drames philosophiques*, collected in 1888, give a more adequate image of his fastidious, critical, disenchanted, yet not unhopeful spirit. They show the attitude towards uncultured Socialism of a philosopher liberal by conviction, by temperament an aristocrat. We learn in them how Caliban (democracy), the mindless brute, educated to his own responsibility, makes after all an adequate ruler; how Prospero (the aristocratic principle, or, if we will, the mind) accepts his dethronement for the sake of greater liberty in the intellectual world, since Caliban proves an effective policeman, and leaves his superiors a free hand in the laboratory; how Ariel (the religious principle) acquires a firmer hold on life, and no longer gives up the ghost at the faintest hint of change. Religion and knowledge are as imperishable as the world they dignify. Thus out of the depths rises unvanquished the essential idealism of Ernest Renan.

At sixty years of age, having finished the *Origins of Christianity*, Renan began his *History of Israel* (3 vols., 1887–91) based on a lifelong study of the Old Testament and on the *Corpus Inscriptionum Semiticarum*, published by the Académie des Inscriptions under his direction from the year 1881 till the end of his life. He died on Oct. 12, 1892.

There is no collected edition of Renan's works. There is an English translation of the *Vie de Jésus* in Everyman's Library (1927). His *Correspondance* has been edited in 2 vols. (Paris, 1926–28). For Henriette Renan *see* Prof. Giraud, *Soeurs de grands hommes* (1926) and Renan's *Lettres Intimes* (1923).

See Desportes and Bournand, *E. Renan, sa vie et son oeuvre* (1892); E. Grant Duff, *Ernest Renan, in memoriam* (1893); Séailles, *E. Renan, essai de biographie psychologique* (1894); G. Monod, *Les maîtres de l'histoire* (1894); Allier, *La Philosophie d'E. Renan* (1895); M. J. Darmesteter, *La vie de E. R.* (1898); Platzhoff, *E. Renan, ein Lebensbild* (1900); Brauer, *Philosophy of Ernest Renan* (1904); W. Barry, *Renan* (1905); Sorel, *Le Système historique de R.* (1905–06); J. M. Robertson, *Ernest Renan* (1924).

RENARD, ALPHONSE FRANÇOIS (1842–1903), Belgian geologist, was born at Renaix on Sept. 27, 1842.

His first work (with Charles de la Vallée-Poussin, 1827–1904), was the *Mémoire sur les caractères mineralogiques et stratigraphiques des roches dites plutoniennes de la Belgique et de l'Ardenne française* (1876). In later essays and papers he dealt with the structure and mineral composition of many igneous and sedimentary rocks, and with the phenomena of metamorphism in Belgium and other countries. Still more important were his later researches connected with the Challenger Expedition. The various rock specimens and oceanic deposits were submitted to him for examination in association with Sir John Murray, and their detailed observations were embodied in the *Report on the Scientific Results of the Voyage of H.M.S. "Challenger." Deep Sea Deposits* (1891). The more striking additions to our knowledge included "the detection and description of cosmic dust, which as fine rain slowly accumulates on the ocean floor; the development of zeolitic crystals on the sea-bottom at temperatures of 32° and under; and the distribution and mode of occurrence of manganiferous concretions and of phosphatic and glauconite deposits on the bed of the ocean" (Geikie). Renard was professor at the Jesuit College of Louvain and then at the University of Ghent. He died at Brussels on July 9, 1903.

Obituary by Sir A. Geikie in *Quart. Journ. Geol. Soc.*, lx. 1904.

RENARD THE FOX: *see* REYNARD THE FOX.

RENAUD DE MONTAUBAN (Rinaldo di Montalbano), one of the most famous figures of French and Italian romance. His story was attached to the *geste* of Doon of Mayence by the 13th-century *trouvère* who wrote the *chanson de geste* of *Renaus de Montauban*, better known perhaps as *Les quatre fils Aymon*. The four sons of Aymon give their name to inns and streets in nearly every town of France, and Renaud's sword Floberge, and his horse Bayard passed with him into popular legend. The poem opens with the dissensions between Charlemagne and the sons of Doon of Mayence, Beuves d'Aigremont, Doon de Nanteuil and Aymon de Dordone. The rebellious vassals are defeated by the imperial army near Troyes, and, peace established, Aymon rises in favour at court, and supports the emperor, even in his persecution of his four sons, Renaud, Alard, Guichard and Richard. At the end of the usual series of violent adventures and catastrophes, Renaud gives himself up to religion, working as a mason on the church of St. Peter at Cologne, where he receives martyrdom at the hands of his jealous fellow-labourers.

The connection of the four brothers with Montessor, Dortmund, Mayence and Cologne, and the abundant local tradition, mark the heroes as originating from the region between the Rhine and the Meuse. Nevertheless, their adventures in Gascony, with the king of which they take service against the Saracens, are

corroborated by historical evidence, and this section of the poem is the oldest. The enemy of Renaud was Charles Martel, not Charlemagne; King Yon was Odo of Gascony; the victory over the Saracens at Toulouse, in which the brothers are alleged to have taken part, was won by him in 721, and in 719 he sheltered refugees from the dominions of Charles Martel, Chilperic II., king of Neustria, and his mayor of the palace, Raginfred, whom he was compelled to abandon. In a local chronicle of Cologne it is stated that St. Reinoldus died in 697, and in the Latin rhythmical *Vita* his martyrdom is said to have taken place under Bishop Agilolf (d. 717). Thus the romance was evidently composite before it took its place in the Carolingian cycle.

In Italy Renaud had his greatest vogue, and many episodes were added, as well as the personage of the hero's sister, Bradamante. Rinaldo di Montalbano had been the subject of many Italian poems before *Il Rinaldo* of Tasso.

BIBLIOGRAPHY.—The *chanson* of *Maugis d'Aigremont* and the prose romance of the *Conqueste de Trebizonde* belong to the same cycle. The prose *Ystoire de Regnault de Montauban* (Lyons, *c.* 1480) had a great vogue. It was generally printed as *Les quatre fils Aymon*, and was published in English, *The Foure Sonnes of Aymon*, by William Caxton, and subsequently by Wynkyn de Worde and William Copland. See *Hist. litt. de la France*, xxii., analysis by Paulin Paris; *Renaus de Montauban* (Stuttgart, 1862), ed. H. Michelant; *Storia di Rinaldino*, ed. C. Minutoli (Bologna, 1865); F. Wulff, *Recherches sur les sagas de Magus et de Geirard* (Lund, 1873); *Renout von Montalbaen*, ed. J. C. Matthis (Groningen, 1873); *Magus saga*, ed. G. Cederschiöld (Lund, 1876); A. Longnon, in *Revue des questions historiques* (1879); R. Zwick, *Über die Sprache des Renaut von Montauban* (Halle, 1884); *The Four Sonnes of Aimon* (E. E. Text Soc., ed. Octavia Richardson, 1884); F. Pfaff, *Das deutsche Volksbuch von den Heymonskindern* (Freiburg in Breisgau, 1887), with a general introduction to the study of the saga; a special bibliography of the printed editions of the prose romance in L. Gautier's *Bibl. des chansons de geste* (1897); rejuvenations of the story by Karl Simrock (Frankfort, 1845), and by Richard Steele (1897).

RENAUDOT, THÉOPHRASTE (1586–1653), French physician and philanthropist, was born at Loudun (Vienne), and studied surgery in Paris. He was only nineteen when he received, by favour apparently, the degree of doctor at Montpellier. After some time spent in travel he began to practise in his native town. In 1612 he was summoned to Paris by Richelieu, received the titles of physician and councillor to the king, and was desired to organize a scheme of public assistance. Many difficulties were put in his way, however, and he returned until 1624 to Poitou, where Richelieu made him "commissary general of the poor." But in 1630 he opened an information bureau in Paris at the sign of the Grand Coq near the Pont Saint-Michel. This *bureau d'adresse* was labour bureau, intelligence department, exchange and charity organization in one; and the sick were directed to doctors prepared to give them free treatment. Presently he established a free dispensary in the teeth of the opposition of the faculty in Paris. The Paris faculty refused to accept the new medicaments proposed by the heretic from Montpellier, restricting themselves to the old prescriptions of blood-letting and purgation. Under the protection of Richelieu Renaudot started the first French newspaper, the *Gazette* (1631), which appeared weekly; he also edited the *Mercure français*. In 1637 he opened in Paris the first Mont de Piété, an institution of which he had seen the advantages in Italy. In 1640 the medical faculty, headed by Guy Patin, started a campaign against the innovator of the Grand Coq. After the death of Richelieu and of Louis XIII. the parlement of Paris ordered him to return the letters patent for the establishment of his bureau and his Mont de Piété, and refused to allow him to practise medicine in Paris. The *Gazette* remained, and in 1646 Renaudot was appointed by Mazarin historiographer to the king. He died on Oct. 25, 1653.

See E. Hatin, *Théophraste Renaudot* (Poitiers, 1883), and *La Maison du Coq* (Paris, 1885); Michel Emery, *Renaudot et l'introduction de la médication chimique* (Paris, 1889); and G. Bonnefont, *Un Oublié, Théophraste Renaudot* (Limoges, n.d.).

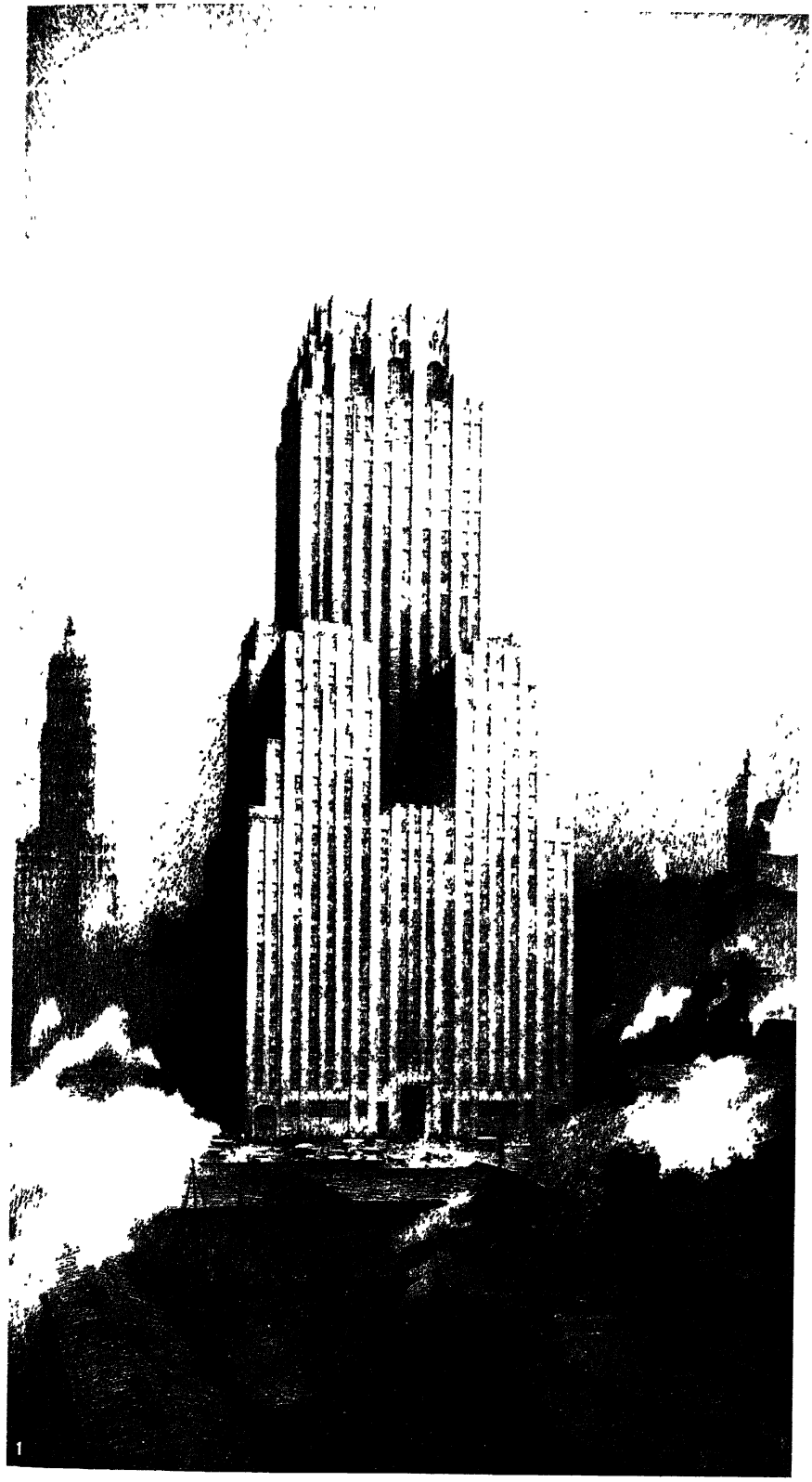
RENDERING, ARCHITECTURAL. Architectural rendering is a pictorial art whose object is to visualize architectural conceptions. When an architect is employed to design a building, it is desirable that he provide his client, in advance, with an accurate impression of the appearance of the proposed structure. Since words cannot adequately convey the architectural story, paintings or drawings are employed to render it, as it were, clear to the eye; they serve as a kind of communication. This is the most familiar application of the art; and, when so used, rendering may be defined as the medium whereby the renderer communicates a sense of the reality of a structure in advance of its concrete materialization. Occasionally, however, the architect has a rendering made in the course of his own work and as an aid to his own study. When an architectural conception first forms in the background of his mind, it has, of necessity, a certain nebulous character. But with the effort of expressing it on paper, in actual lines and tone values, it emerges, so to speak, and crystallizes. When so employed, rendering serves as a definite step in the evolution of architectural conceptions.

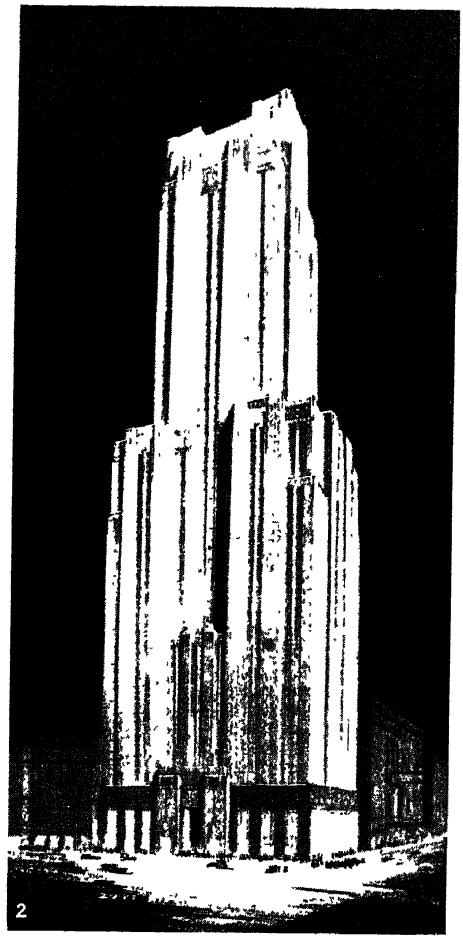
Rendering has a third use; viz., in connection with already existing buildings. When so used, renderings—as distinguished from the miscellaneous paintings and drawings that refer only incidentally to architecture—have, as their chief or sole concern, to render clear the strictly architectural nature of the subject. By this selection of architectural factors, they may enable the layman to grasp the significance of a building more readily than when faced by its multitudinous and irrelevant details. At the same time, they may serve as a faithful record of the historic course of architectural design. In these three ways, rendering fulfills a recognized function, and has done so over a long period.

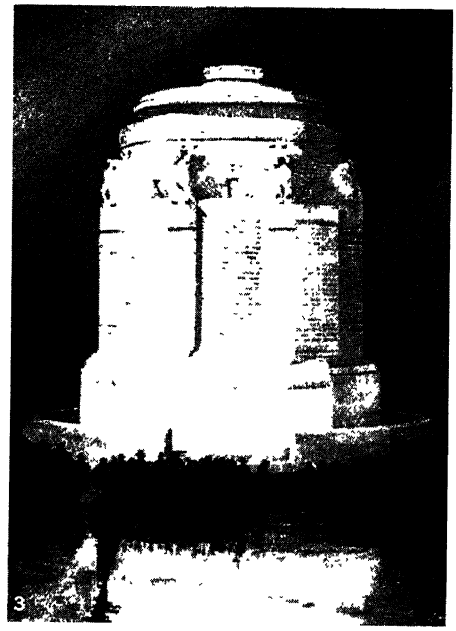
In the last quarter of a century, there has developed an aspect of architectural and engineering practice that involves rendering on a more extended scale—town and city planning (*q.v.*). A comprehensive plan for the future building development of any large community is never the conception of a single mind; many minds must collaborate in it. Nor is it materialized in a few years, but in many years. In these circumstances, it becomes impractical for its whole purport to be carried only in any single given mind, or for an accurate image to be postponed until the whole long scheme has been consummated. The various contributory ideas and suggestions must be assembled, in definitive terms, on the paper or canvas of the rendering, in order that the prophecy may assume sufficient reality to serve as a criterion and a guide.

Another factor, which more clearly reveals the contemporary field of rendering, is that Western architecture, as a whole, is passing through a period of transition and, therefore, of experiment (*see* ARCHITECTURE). It is true that the practice of many of the most prominent architects is to continue constructing mere copies, or very slightly modified copies, of those classic styles which, in their impressionable years, they were led to regard as being the very body of architectural culture; their effort is to emulate the classic designers in all respects, save, perhaps, the latter's logic, sense of congruity and ability to fashion novel forms. Their public, accordingly, has been wont to feel the presence of architecture only in a building to which the architect has added a Greek colonnade, a Roman dome or a Gothic spire. In all this, professional rendering has been able to play but a small part, since the picture has been regarded as an end in itself simply to be made as attractive as possible; it could scarcely be employed as a means of rendering forth a new truth, more especially as the appearance of these styles of architecture has been known for centuries.

In recent years, however, definite changes have occurred in methods of construction and the manufacture of materials, as well as in the general social and economic situation; and one notices that in the larger centres of Western civilization a distinct type of designer is making his presence in the architectural profession more and more strongly felt. These designers are inspired not so much by the traits of an architectural heredity as by the needs of contemporary environment. For them, the tremendous environmental changes that have occurred imply and demand a corresponding change in the architectural approach. They do not—to choose one example—employ a new material, steel, to support façades, which have developed in other materials and can be logical only therein. They are engaged, briefly, in developing new types of architecture. Certain limitations lie upon these practising





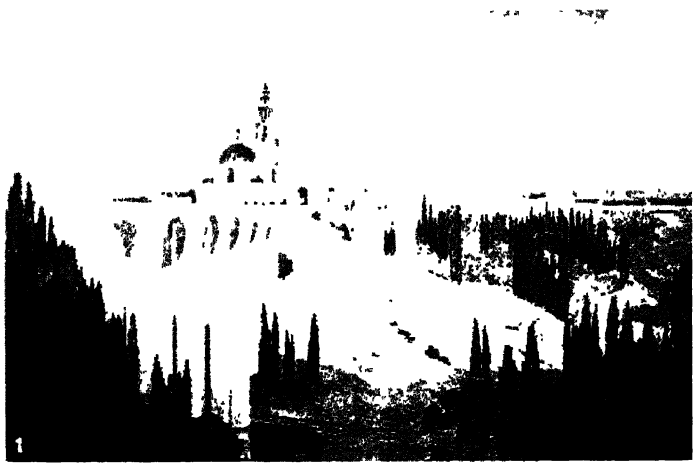


BY COURTESY OF (2) HOLABIRD AND ROCHE, ARCHITECTS

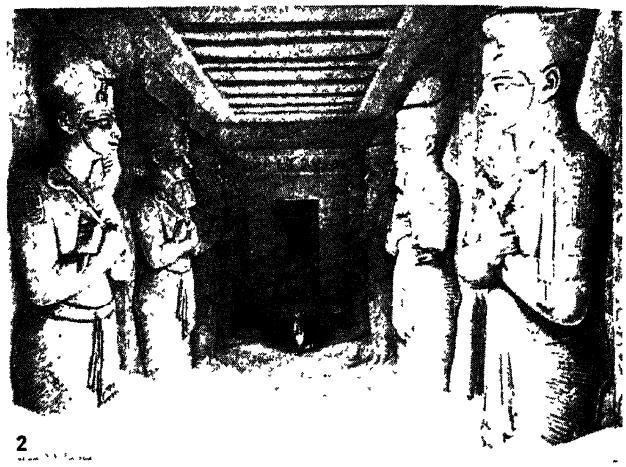
EXAMPLES OF VARIOUS TYPES OF RENDERINGS

1. Carbon pencil drawing on cameo paper: made to visualize a proposed structure; effect of mass remaining dominant in spite of thoughtful delineation of detail; sense of relation to surroundings. By Chester B. Price. 2. Crayon drawing: made to visualize proposed structure; arbitrary handling of tone values, details and entourage resulting in an unusual impression of mass. By Gilbert P. Hall. 3. Wash: made to visualize a proposed structure; grasp of architectural factors, sensitive feeling, conveyed through a cultured technique. By H. VanBuren Magonigle

RENDERING, ARCHITECTURAL



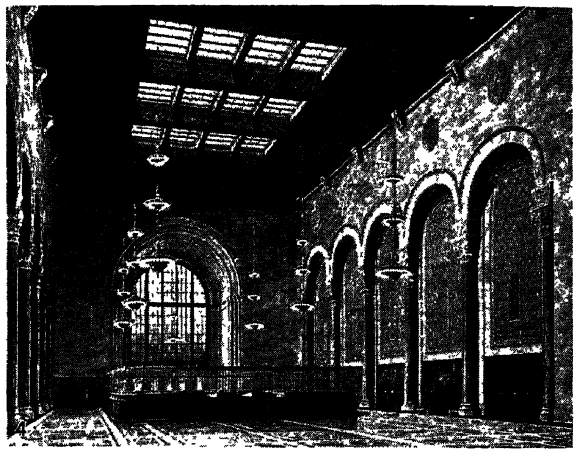
1

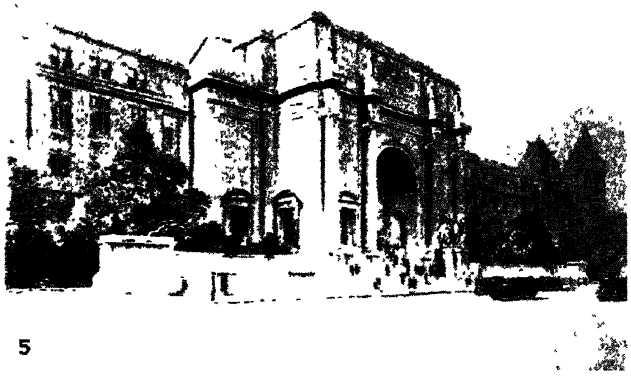


2

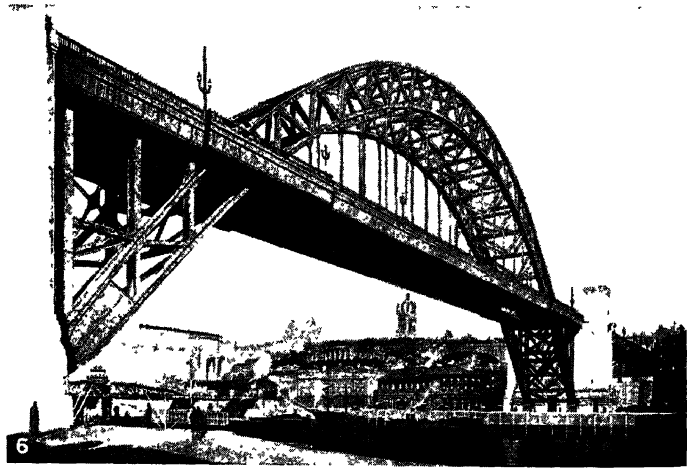


3





5



6

BY COURTESY OF (1) B G. GOODHUE

EXAMPLES OF RENDERINGS, VARIOUS AS TO MEDIUM, USE, CONTENT AND STYLE

1. Water colour: made to convey general impression of a proposed structure in relation to its natural surroundings; adequate consideration of material reality of the general scene; architectural elements handled impressionistically with detail omitted; pictorial values predominating; emphasis on atmosphere and colour. By Birch Burdette Long
2. Lithograph: made to vivify an historical subject; cautious delineation of material facts; intelligent exaggeration of scale, conveying emotion of dignity, mystery, spaciousness. By David Roberts (1796–1864)
3. Pencil drawing, with wash: made to visualize proposed structures; fine discrimination between essentials and details, resulting in a convincing sense of reality both as to structural and human factors. By Thomas R. Johnson
4. Water colour over pencil layout: made to visualize proposed interior; fidelity to material detail. By Houghson Hawley
5. Pencil drawing on tracing paper with water colour used after mounting: made to visualize proposed addition to existing structure; complete comprehension of architectural factors conveyed by a perfected technique. By Otto Eggers
6. Water colour and pencil: straightforward sensing of material facts, intelligent subduing of detail to dominant, absence of emotional bias resulting in credible visualization. By Cyril Farey

and experimental architects. It is sometimes too hazardous to test a novel conception by actually carrying it out in a building which, whether a success or a failure, must stand for many years. But the conception may be quite thoroughly tested in a series of conscientious renderings. For example, the modern American zoning laws involved a radical departure in the general forms of buildings, and into the strange spaces created by these laws some architects proceeded without pause to force the classical images with which their minds were filled. More cautious architects sought to discover the basic structural types that the laws admitted; for this purpose, renderings were employed. Another limitation is that the projects of architects are practically bound by the ideas and the financial resources of their clients; they cannot actually build in advance of their clients' prepossessions. In renderings, however, they may freely express their real intentions, and these renderings, when duly exhibited can, and in fact do, make a distinct contribution to the progress of architectural design. A third limitation is that no practising architect, however fortunate, has time to build more than a very few influential buildings during his lifetime. He may, however, record himself in soundly fashioned drawings and paintings whose content, though at first existing in only two dimensions, may, in due time, be realized in three.

In addition to the functions thus far mentioned, rendering has a rôle to play in what is doubtless the greatest concern of architecture—the psychological influence it exerts on human life. A few people, it is true, are fully conscious of the impressions that they receive in the face of noble buildings; the more pertinent and important fact is that the vast majority of human beings are continually, if unconsciously, influenced by the architectural forms and spaces with which they come in contact. Architects themselves are often unaware of the extent of this influence; that is to say, the influence which is unconsciously received is unconsciously initiated. Perhaps it is in consequence of this that the haphazard and miscellaneous architectural scene which is presented by most modern cities, and which is constantly before the population, is left to impress the corresponding qualities upon the human psyche. On the other hand, there have been periods in the past—the "great periods" of architecture—when the designers must have been quite aware of the influence, and utilized it for conscious purposes. In the Gothic cathedrals, for example, there is embodied, in terms of form and space (terms safely beyond the vicissitudes of any particular church) a potent and lasting influence for the betterment of mankind. Buildings of the first category—depressing or distracting buildings—are legion; those of the second—buildings which arrest or elevate—are rare. But the more significant forms may be repeatedly delineated and interpreted in drawings and paintings by whose agency they may be widely exhibited, published and, so to speak, broadcast. Rendering, in short, by allying itself with the conscious and objective forces in architectural work, may serve, by paraphrase, to bring home the laconic message of architecture.

To sum up, rendering has six principal objects. The first three have long been recognized: to convey advance realizations of proposed structures, to aid in crystallizing ideas in the architect's mind and to interpret the architectural significance of existing structures. The other three remain largely for future development: to serve as criterion and guide in city planning, to assist in evolving new types of architecture and to strengthen the psychological influence of architecture on human values.

Whichever of these objects a given rendering is to serve, the renderer—having comprehended *why* the drawing is being made—is faced with two fundamental considerations. The first is to grasp *what* is the nature of the architectural subject to be rendered, to so ponder it as to exclude non-essentials. The second is *how* to employ the various devices of draughtsmanship so as to communicate this realization to others. Between these two items—the nature of the subject and the process of rendering—there exists the distinction between ends and means, and it is important that the renderer have this distinction clearly in mind at the outset.

As a matter of common practice, this distinction is often not made. The painting or drawing is often regarded as being an end in itself, and discussion of it centres, in consequence, on purely technical questions: interest of composition, nicety of line, cleverness of brushwork, etc. Many such works are contributions to the subject of technique and justify the enthusiasm of technicians; but, lacking architectural significance, they are not, strictly speaking, architectural renderings.

It is also a common practice to regard rendering as indeed a means but to substitute for its authentic and natural ends, ends that are special or perverted. For example,—as in the Beaux Arts curriculum—projects are often rendered in elevation (*i.e.*, the representation is of but one façade of the building as this would appear were the eye directly opposite each and every point thereon). This, obviously, produces a form which can exist only on paper; it is not the form which the human eye would perceive in the building itself. Such a treatment serves a purpose, in that an architect, when reading its conventionalized and inexact statement, can translate it, in his trained mind, into at least an approximation of the truth. But just because it requires a translation, and is, in itself, foreign to reality, it may be classified as a special practice.

Another common practice, of a different category, is to accomplish, by means of a picture, an end which is positively opposed to architectural fact. The renderer may be called on to exaggerate certain aspects of a proposed building in order to create a more favourable advance impression; or to exaggerate certain factors of an existing building in a way to advertise them. The architect or advertiser may wish such a rendering as a result of deliberate calculation or because his personal interest in particulars is so great as to obscure from his view the real appearance of the building in its entirety. In any case, the executing of such commissions falls rather into the class of commercialized art and may be excluded from a discussion on rendering.

The twofold criterion of values remains to be applied to all renderings: first, comprehension of the architectural essentials involved in the subject; second, effectiveness in pictorial communication.

ESSENTIALS TO BE RENDERED

Mass.—From the renderer's point of view a building is, in the first place, a material mass. While it is not, in actuality, a mass in the sense that a mountain is a mass, *i.e.*, it is not a solid, nevertheless the effect of solidity is essential to it. And while, in constructing a building, this effect may be the last to be realized, in drawing a building it is logically the first. The renderer must realize the presence of mass before he can fully realize the presence of any appurtenant form. It may be likened to the clay which a sculptor must grasp before any particular shape can be given or any details modelled. The first necessary attribute of a convincing architectural rendering is, correspondingly, an adequate suggestion of mass. Without this primary effect of solidity, all details which may be delineated later must appear without body and the presentation as a whole must lack substance.

Form.—Being imbued with a sense of the substantial nature that his subject, in general, possesses, the renderer addresses himself to a study of its particular form. It is generally taken for granted that if accurate floor plans and elevations are available, an accurate image of the building can be produced by following the rules of perspective draughtsmanship—those rules are said to have originated with Leonardo and are commonly accepted as being correct and comprehensive. The fact is, however, that there is considerable question as to how forms really look. It is quite doubtful if the system of perspective draughtsmanship which we accept as a science, is more than a convention—a convention which, indeed, is usually of great help to accurate representation and yet, in numerous instances, is a specific hindrance. The forming, in the human eye of images of buildings appears, in fact, to involve factors with which we, as renderers, have not yet adequately dealt (*see* PERSPECTIVE).

The Single Viewpoint.—One item to be considered in this connection is that, in laying out perspectives the draughtsman habitually assumes that the subject is being viewed from a single viewpoint. He establishes, on his draughting board, a specific

point, termed the "viewpoint" and his operations proceed from this base. But this assumption is inadequate to the extent that the appearance which a building actually produces on a one-eyed man is inadequate as compared to that produced on a two-eyed man. In some cases, the discrepancy is not remarkable—as, for example, small forms viewed at considerable distances. But, in forms which are closely scrutinized, the discrepancy becomes pronounced; there is a definite lack of the three-dimensional quality to the single-eyed vision, and there is a corresponding flatness to the general run of perspectives laid out from the single viewpoint.

The Stationary Viewpoint.—A second item is that a draughtsman in laying out his perspective assumes, according to the convention, that his single viewpoint is stationary. In reality, however, an observer in forming his image of a building, assumes a series of viewpoints. In seriously studying a building, one will purposefully view it from many different angles; but even if the interest is only casual one will instinctively look at it more than once—always from a viewpoint which is, of necessity, slightly altered. In all cases, it may be said that the image which the observer takes away with him is not the single first impression received from a literally stationary viewpoint, but is a composite of several distinct impressions. This composite quality of the image is an essential which demands the renderer's attention: how he may, by a cunning draughtsmanship, convey this aspect of the case is considered in this article under the heading of "Procedure."

The foregoing consideration involves a problem that often appears in rendering; viz., one is often faced with the necessity of choosing between a truthful pictorial statement of the building which is being drawn and a truthful statement of the viewpoint which happens to have been chosen.

It is usually held that when a viewpoint has once been selected, it is demanded by honesty that all items of the scene (including adjoining buildings) must be delineated exactly as they appear; that if one arbitrarily makes alterations (as, for example, showing adjoining buildings less prominently than they actually are) he is guilty of "faking." Undeniably, many renderings are "faked"; at the same time, there is a distinction to be made. If the alteration has been made for the purpose of conveying a more favourable impression than the actual scene, then the charge of misrepresentation is, obviously, sustained. It often happens, however, that a building possesses a very important feature which, while entirely visible from many points of view, may happen to be screened from the particular point of view that has been chosen. For instance, a building may possess a certain buttressing member which gives its tower integrity, and which may be visible from many viewpoints, but this member may be hidden from the chosen viewpoint by some extraneous and perhaps temporary obstruction. We may assume at the same time, that the renderer's commission is to depict the building as truthfully and completely as possible in a single drawing. In such a case, it would appear that he is not so much permitted as actually required to slight incidental facts of his viewpoint in favour of the essential facts of the subject which he is viewing.

Perspective of Vertical Lines.—Another item demanding the renderer's attention is that all effects of perspective which a building presents to the human eye apply to its vertical as well as to its horizontal extension. Although this is obviously so, the current convention of perspective generally disregards it, the horizontal lines, only, being drawn to meet in a "vanishing point," but the vertical lines being arbitrarily drawn parallel to each other. In the case of very low buildings, the discrepancy is not important; but in the cases, now so numerous, of very tall buildings, the inaccuracy is serious. The convention not only produces distorted drawings, but so habituates onlookers to distortion that they become disinclined to recognize normal appearances.

Method of Construction.—The renderer may, to a considerable degree, express in his drawing such differences of appearance as exist, for example, between a building of solid masonry and one of steel grille construction. His medium allows considerable variety of indication of texture characteristic of stone, brick, terra-

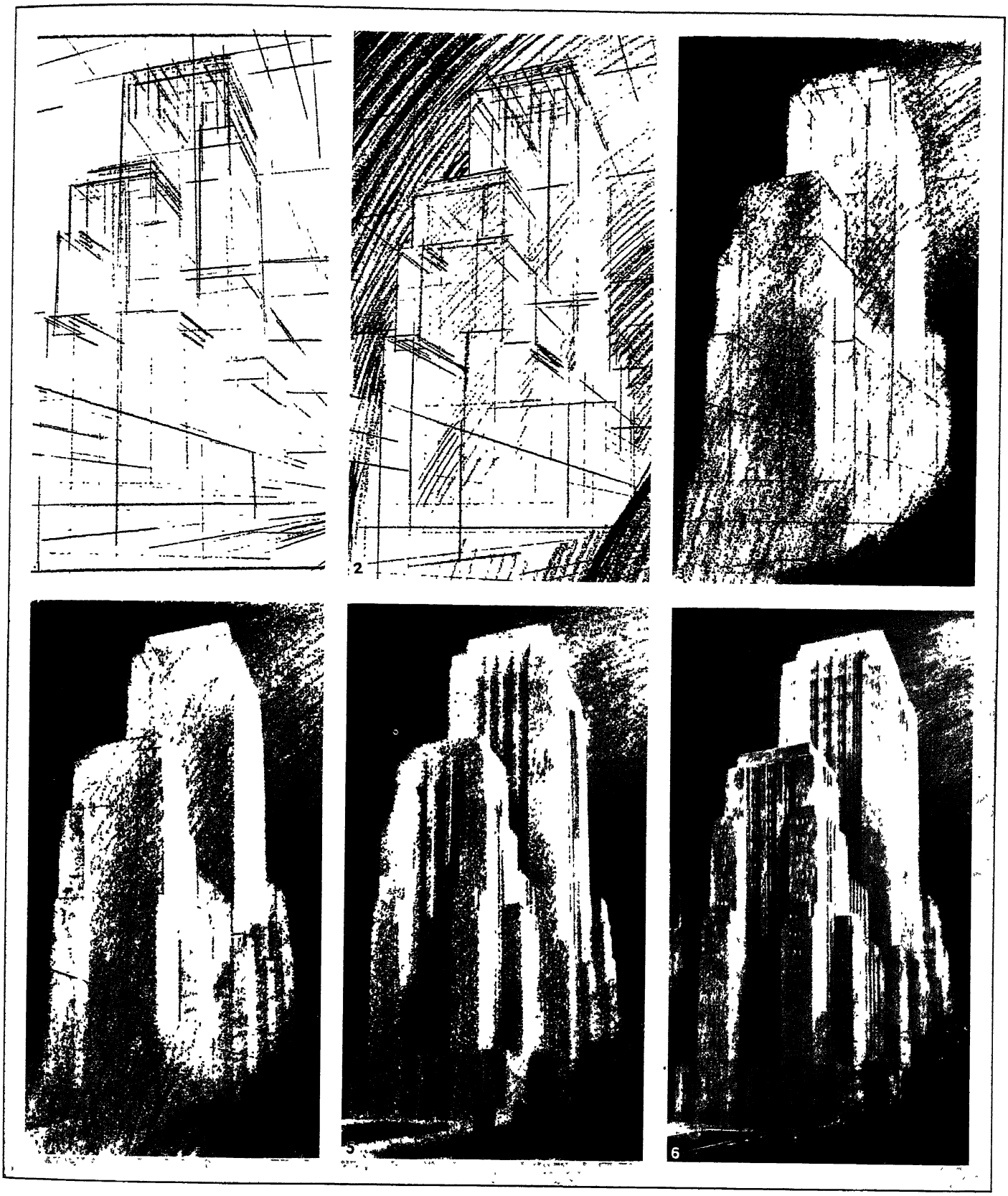
Atmospheric Conditions.—Buildings are, of necessity, seen through a physical atmosphere and a suggestion of reality obviously cannot be conveyed in a drawing in which an atmospheric condition is not convincingly suggested; some renderings, for instance, fail by conveying the suggestion that the subject was viewed through a vacuum.

The important question of colour belongs to a general study of the painter's art (*see* PAINTING; WATERCOLOUR PAINTING).

In addition to these material factors, an architectural subject presents others of a psychological nature. A realistic rendering may, indeed, be produced by dealing honestly with only the physical facts; an authentic rendering, however, demands a realistic treatment of intellectual and emotional aspects as well. In this connection, the following experiment is illustrative. An exact perspective was laid out of the form of the Woolworth building, using the architect's blue prints as a basis. A second study was made, sketching from the building itself from an exactly corresponding viewpoint. The building was then photographed from this viewpoint. On comparing the three results it was found that the principal proportions were different in each case. The more striking conclusion was that none of them conveyed the sense of structural logic which the disposition of the steel members themselves conveys to the thoughtful observer; none of them suggested the emotion of soaring aspiration which the form itself suggests to the human onlooker. It becomes, indeed, one of the chief concerns of the renderer to comprehend the nature of the architectural idea which his subject embodies, the trend of thought the architect has expressed. Similarly, the renderer must especially aim to appreciate the emotional tone, the particular mood, of his subject. On entering these outlying psychological domains rendering, like the other arts, may attain its happiest freedom of movement. Yet just here, unfortunately, it must evade competent technical guidance. We have many paintings and drawings which succeed in conveying an isolated thought or an isolated emotion; but too often we find that the renderings which have attained this success have paid in distorted material proportions.

Viewed in this way, renderings as a whole fall into certain rather well-defined groups. The largest, and most familiar, includes those in which the renderer has made a competent presentation of the material facts, but has failed to include any of those elements which, in architecture, stimulate the mind and arouse the emotions. It is as though he worked only with his hands, neither his thought nor feeling having been involved. The result is correct but chilling. A second group is that in which only an emotional aspect of the subject has been fully rendered, just as a third is that in which only an intellectual aspect has been emphasized. Such works, generally labelled "impressionistic," "futuristic," etc., often convey what was intended yet fail of permanent value in that they distort or omit the physical facts of the case. If, for example, the subject be a mausoleum which has, in actuality, an atmosphere of solemnity, such a rendering may—perhaps in a few dark washes—convey an emotion of solemnity but leave the mausoleum itself in doubt. Or, if the subject be a tower notable for its logical growth, the rendering may—perhaps in a few cold lines—suggest logical growth but refer to no particular tower. There follow, naturally, three further groups in which the result is more appealing or convincing: that in which the material facts have been accurately presented in a thoughtful manner; that in which they have been presented with appreciable emotion; and that in which, while the material facts have been presented inexactly, a clear architectural thought appears accompanied by deep feeling. The ideal, which would constitute a seventh group, would be to convey the material, the emotional and the intellectual facts in the same rendering.

Why renderings should fall into these various groups is probably not difficult to ascertain: they do so by following the various personalities of the renderers. A draughtsman naturally draws that aspect of a building which he is by habit inclined to appreciate. From one renderer, we shall almost always get a very correct and cold drawing; from another a very bold and incorrect drawing. This suggests the reason why a perfectly balanced rendering has

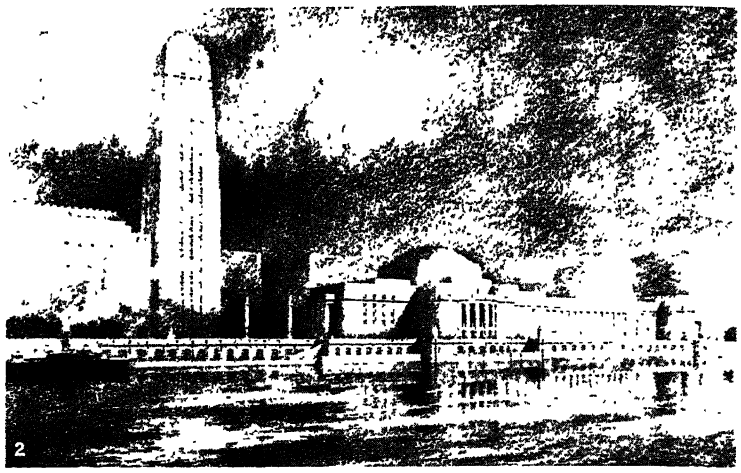


PROGRESSIVE VIEWS OF A RENDERING

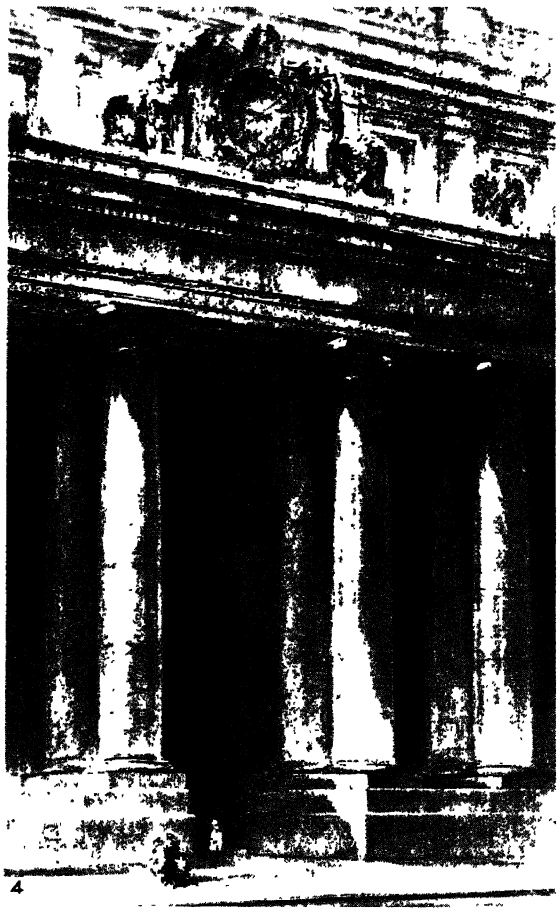
A rendering by Hugh Ferriss, showing: 1. Lines drawn, tentatively suggesting a mass in space. 2. Additional lines added as material for tone values. 3. Lines rubbed together with paper stump, producing tone values to confirm indication of mass. 4. The form further modelled by use of kneaded eraser on right hand planes. 5. Principal subdivisions of the mass delineated, also by use of (1) pencil, (2) paper stump and (3) kneaded eraser. 6. Minor items introduced, same process. (*See* section of article on *Procedure.*)

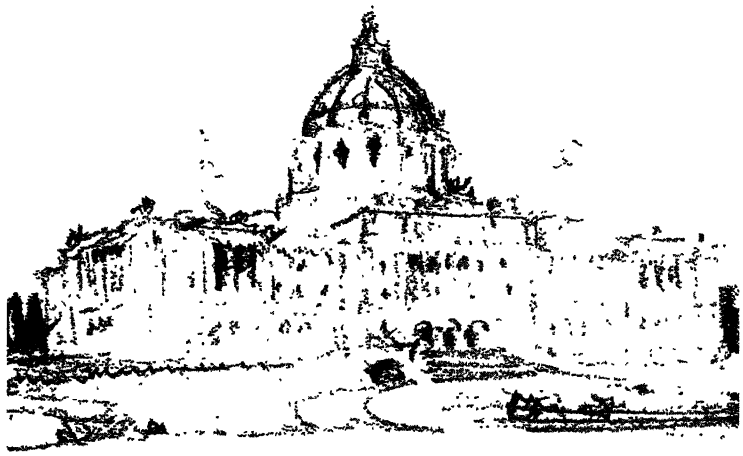
RENDERING, ARCHITECTURAL











RENDERINGS IN VARIOUS MEDIUMS

1. Engraving: structural factors, accurately sensed, recomposed with a virile imagination, conveying powerful emotional impression. By Piranesi (1720–76). 2. Pencil drawing, coffee wash: made to visualize a civic project; primarily concerned with the architectural conception, yet adequate attention given to pictorial values. By Eliel Saarinen. 3. Etching: imaginary composition on historical motif; highly stimulating impressions. By William Walcot. 4. Pastel: selection of architectural factors from an existing building; thoughtful composition of subject matter, affectionate attention to technique. By T. de Postels. 5. Pencil: example of a one minute sketch made to convey an architect's conception to his assistants; attention centred on essentials of the design (which were later constructed as sketched). By Cass Gilbert

student of rendering. It may well be that he will develop his art not simply by cultivating whatever tendency he happened to exhibit in the beginning, but, rather, by seeking to add to his forces some tendency which was not habitual to him. For example, if he is in the way of being an excellent draughtsman, he might seek to acquire an emotional appreciation of architecture in addition; just as, if he has always had strong feelings about buildings, he might seek to comprehend the pure logic by which all architectural masterpieces are given form. When thus regarded, rendering becomes, for the renderer himself, not so much a matter of self-expression as of self-development.

PROCEDURE

To answer the remaining question—*how* to make a rendering—it is necessary, since there are numerous equally promising methods of procedure, to describe the method employed in a specific case. In the case of the rendering reproduced in fig. 1–6 of Plate III. the procedure was as follows:—

A sheet of mounted Whatman paper 27 by 40 in. was tacked to a slightly larger drawing board and placed on a vertical easel. The draughtsman standing before the easel, made the assumption that, for the moment, the paper represented *space*. With the intention of introducing into this space, the presence of *mass*, a number of lines were lightly sketched in, using a 3B Wolff crayon (*see* fig. 1). These lines fall into three groups, according to their direction; they proceed, respectively, from three previously assumed "vanishing points" (*see* PERSPECTIVE). They serve the draughtsman as an adequate notation of the three-dimensionality which characterizes any mass in space. While sketching these generalized lines, he emphasized such as would tentatively indicate the particular form that he intended to give the mass—the form which, until now, had existed only in his mind. The next step was to confirm and solidify these outlines by introducing tone values—produced by drawing, rapidly, a number of freehand lines across the areas to be shaded (*see* fig. 2) and rubbing these lines together into a tone with a gloved finger or a paper "stump" (*see* fig. 3). In the rendering now under consideration, the degree of solidity which was desired at this stage was effected by producing three general tones—the background being the darkest, the planes of the building which face toward the left being intermediary, and the planes which face toward the right being the lightest. The last tone was produced by cleaning the areas with a "kneaded" eraser (*see* fig. 4).

At this point, the draughtsman had before him a visualization, vivid enough for his own purposes, of the basic form of the building. His next step was to identify, in his mind, the principal subdivisions of his preconceived design and to indicate, on the paper, these modifications of the basic form. This involved a repetition, at a smaller scale, of his previous procedure; that is to say, he first sketched in the minor forms in line and then solidified them with tone values, using glove, stump and eraser. At this point another tone value was added to contribute further to the effect of solidity; *i.e.*, the cast shadows (*see* fig. 5). The same process of indicating form in line was repeated again and again—each time dealing with a category of smaller forms—until the building appeared in that degree of detail which seemed best calculated to serve the purposes for which the drawing was undertaken (*see* fig. 6).

Of renderings of this sort, it might be said that the draughtsman begins his task in this spirit: he is, metaphorically, facing a building which, although it exists in its entirety, is completely hidden from him in a mist or fog. As he approaches his subject, however, he begins to discern the principal outlines of its mass. Soon its secondary and tertiary features appear. He is free to continue his approach until the most minute details have become plain. Nevertheless, it is important that he halt at that point where his subject has revealed all that is essential to his inquiry.

The numerous other methods of rendering, all equally useful, can best be studied in reproductions of actual renderings; such material, with explanatory notes, is shown in the accompanying plates. They all point to the same conclusion—the draughtsman's best procedure is first to delineate the essentials of his subject, then to build all indication of detail on this foundation.

BIBLIOGRAPHY.—David A. Gregg, *Architectural Rendering in Pen and Ink* (1891); F. F. Frederick, *Architectural Rendering in Sepia* (1892); Frank A. Hays, ed., *Architectural Rendering in Pen and Ink* (1915); A. L. Guptill, *Sketching and Rendering in Pencil* (1922); H. V. Magonigle, *Architectural Rendering in Wash* (1926); A. L. Guptill, *Drawing with Pen and Ink* (1928). Articles on architectural rendering have also appeared in the following magazines during the years indicated: *Arts and Decoration* (New York, 1920); *Pencil Points* (New York, 1921–25); *Architecture* (New York, 1923). (H. FE.)

RENDSBURG, a town in the Prussian province of Schleswig-Holstein, situated on the Eider and on the Kaiser Wilhelm canal, 20 m. W. of Kiel, on the Altona-Flensburg railway. Pop. (1925) 17,036. Rendsburg came into existence under the shelter of a castle founded by the Danes about the year 1100 and was an object of dispute between the Danish kings and the counts of Holstein. In 1252 it was adjudged to the latter and the town was surrounded with ramparts in 1539. The war of 1848–50 began with the capture of Rendsburg by the Holsteiners and it formed the centre of the German operations. In Nov. 1863 the town was occupied by the Saxon troops acting as the executive of the German Confederation, and it was the base of the operations of the Austrians and Prussians against Schleswig in the spring of the following year. Rendsburg was jointly occupied by Austrian and Prussian military until 1866, when it fell to Prussia. It consists of three parts—the crowded Altstadt, on an island in the Eider; and new towns on the north and south banks of the river. Its importance rests on the commercial facilities afforded by its connection with the North sea and the Baltic through the Kaiser Wilhelm canal, by which transit trade is carried on in grain, timber, Swedish iron and coals. The principal products are dyes, iron, artificial manures, machines and tobacco.

RENÉ I. (1409–1480), duke of Anjou, of Lorraine and Bar, count of Provence and of Piedmont, king of Naples, Sicily and Jerusalem, was born at Angers on Jan. 16, 1409, the second son of Louis II., king of Sicily, duke of Anjou, count of Provence, and of Yolande of Aragon. By his marriage treaty (1419) with Isabel, elder daughter of Charles II., duke of Lorraine, the comte de Guise, as he then was, became heir to the duchy of Bar, which was claimed as the inheritance of his mother Yolande, and, in right of his wife, heir to the duchy of Lorraine. René, then only ten, was to be brought up in Lorraine under the guardianship of Charles II. and Louis, cardinal of Bar, both of whom were attached to the Burgundian party, but he retained the right to bear the arms of Anjou. When Louis of Bar died in 1430 René came into sole possession of his duchy, and in the next year, on his father-in-law's death, he succeeded to the duchy of Lorraine. But the inheritance was claimed by the heir-male, Antoine de Vaudémont, who with Burgundian help defeated René at Bulgnéville in July 1431. The Duchess Isabel effected a truce with Antoine de Vaudémont, but the duke remained a prisoner of the Burgundians until April 1432, when he recovered his liberty on parole on yielding up as hostages his two sons, Jean and Louis of Anjou. His title as duke of Lorraine was confirmed by his suzerain, the Emperor Sigismund, at Basel in 1434. This proceeding roused the anger of the Burgundian duke, Philip the Good, who required him early in the next year to return to his prison, from which he was released two years later on payment of a heavy ransom. He had succeeded to the kingdom of Naples through the deaths of his brother Louis III. and of Jeanne II. de Duras, queen of Naples, the last heir of the earlier dynasty. Louis had been adopted by her in 1431, and she now left her inheritance to René. The marriage of Marie de Bourbon, niece of Philip of Burgundy, with John, duke of Calabria, René's eldest son, cemented peace between the two princes. After appointing a regency in Bar and Lorraine, he visited his provinces of Anjou and Provence, and in 1438 set sail for Naples, which had been held for him by the Duchess Isabel. In 1441 Alphonso of Aragon laid siege to Naples, which he sacked after a six months' siege. René returned to France in the same year, and though he retained the title of king of Naples his effective rule was never recovered. René took part in the negotiations with the English at Tours in 1444, and peace was consolidated by the marriage of his younger daughter, Margaret, with Henry VI. at Nancy. René

now made over the government of Lorraine to John, duke of Calabria, who was, however, only formally installed as duke of Lorraine on the death of Queen Isabel in 1453. René had the confidence of Charles VII., and is said to have initiated the reduction of the men-at-arms set on foot by the king, with whose military operations against the English he was closely associated. He entered Rouen with him in November 1449, and was also with him at Formigny and Caen. After his second marriage with Jeanne de Laval, daughter of Guy XIV., count of Laval, and Isabel of Brittany, René took a less active part in public affairs, and devoted himself more to artistic and literary pursuits. The fortunes of his house declined in his old age. *See* ANJOU.

The king of Sicily's fame as an amateur of painting has led to the attribution to him of many old paintings in Anjou and Provence, in many cases simply because they bear his arms. These works are generally in the Flemish style, and were probably executed under his patronage and direction, so that he may be said to have formed a school of the fine arts in sculpture, painting, gold work and tapestry. Two of the most famous works formerly attributed to René are the triptych, the "Burning Bush," in the cathedral of Aix, showing portraits of René and his second wife, Jeanne de Laval, and an illuminated Book of Hours in the Bibliothèque nationale, Paris. The "Burning Bush" was in fact the work of Nicolas Froment, a painter of Avignon. Among the men of letters attached to his court was Antoine de la Sale, whom he made tutor to his son, the duke of Calabria. He encouraged the performance of mystery plays; on the performance of a mystery of the Passion at Saumur in 1462 he remitted four years of taxes to the town, and the representations of the Passion at Angers were carried out under his auspices. He exchanged verses with his kinsman, the poet Charles of Orleans. The best of his poems is the idyl of Regnault and Jeanneton, representing his own courtship of Jeanne de Laval. *Le Livre des tournois,* a book of ceremonial, and the allegorical romance, *Conqueste qu'un chevalier nommé le Cuer d'amour espris feist d'une dame appelée Doulce Mercy,* with other works ascribed to him, were perhaps dictated to his secretaries, or at least compiled under his direction. His *Oeuvres* were published by the comte de Quatrebarbes (4 vols., Paris and Angers, 1845–46). He died on July 10, 1480.

See A. Lecoy de la Marche, *Le Roi René* (2 vols., 1875); A. Vallet de Viriville, in the *Nouvelle Biographie générale,* where there is some account of the mss. of his works; and J. Renouvier, *Les Peintres et enlumineurs du roi René* (Montpellier, 1857).

RENÉE OF FRANCE (1510–1575), second daughter of Louis XII. and Anne of Brittany, was born at Blois on Oct. 25, 1510. After being betrothed successively to Gaston de Foix, Charles of Austria (the future emperor Charles V.), his brother Ferdinand, Henry VIII. of England, and the elector Joachim II. of Brandenburg, she married in 1528 Hercules of Este, son of the duke of Ferrara, who succeeded his father six years later. Renée's court became a rendezvous of men of letters and a refuge for the persecuted French Calvinists. She received Clément Marot and Calvin at Ferrara, and finally embraced the reformed religion. Her husband, however, who viewed these proceedings with disfavour, banished her friends, took her children from her, threw her into prison, and eventually made her abandon at any rate the outward forms of Calvinism. After his death in 1559, Renée returned to France and turned her duchy of Montargis into a centre of Protestant propaganda. During the wars of religion she was several times molested by the Catholic troops, and in 1562 her château was besieged by her son-in-law, the duke of Guise. She died at Montargis.

See B. Fontana, *Renata di Francia* (Rome, 1889 *seq.*); and E. Rodocanachi, *Renée de France* (Paris, 1896).

RENFREW, royal, municipal and police burgh and county town of Renfrewshire, Scotland, near the southern bank of the Clyde, 7 m. W. by N. of Glasgow, via Cardonald, by the L.M.S. railway. A small part of the burgh is in the parish of Govan, Lanarkshire. Pop. (1931) 14,986. Industries include large shipbuilding works, engineering, weaving, and the manufacture of hosiery, rubber and soap. The Clyde Trust has constructed a large dock here, and there is a ferry to Yoker. Robert III. gave a charter in 1396, but it was a burgh (Renifry) at least 250 years earlier. Close to the town, on the site of Elderslie House, Somerled, lord of the Isles, was defeated and slain in 1164 by the forces of Malcolm IV., against whom he had rebelled. In 1404 Robert II. bestowed upon his son James (afterwards James I. of Scotland) the title of Baron of Renfrew, still borne by the Prince of Wales.

RENFREWSHIRE, south-western county, Scotland, bounded north by the river and Firth of Clyde, east by Lanarkshire, south and south-west by Ayrshire and west by the Firth of Clyde. A small detached portion of the parish of Renfrew, situated on the northern bank of the Clyde, is surrounded on the landward side by Dumbartonshire. The county has an area of 151,431 acres (excluding water). The surface is low and undulating, except towards the Ayrshire border on the south-west, where the principal height is Hill of Stake (1,711 ft.), and the confines of Lanarkshire on the south-east, where a few points attain a height of 1,200 ft. The south-western hills are formed of volcanic rocks, basalts, porphyrites, tuffs and agglomerates of the age of the Calciferous Sandstone series. Practically all the area west of these rocks is occupied by the Carboniferous Limestone series. Boulder clays and glacial gravels and sands cover considerable areas. Much of the higher land in the centre is well wooded. The Clyde forms part of the northern boundary of the shire. In the north-west Loch Thom and Gryfe Reservoir provide Greenock with water, and Balgray Reservoir and Glen Reservoir reinforce the water-supply of a portion of the Glasgow area. Castle Semple Loch and other lakes are situated in the south and south-east. The Glasgow, Paisley and Johnstone canal was converted after 1882 into the track of the Glasgow & South-Western (now L.M.S.) railway. Strathgryfe is the only considerable vale in the shire. The scenery at its head is wild and bleak, but the lower reaches are pasture land. The wooded ravine of Glenkillock, to the south of Paisley, is watered by Killock Burn, on which are three falls.

Agriculture and Industries.—The hilly tract contains much peat-moss and moorland, but over those areas which are not thus covered the soil, which is a light earth on a substratum of gravel, is deep enough to produce good pasture. In the undulating central region the soil is better, particularly in the basins of the streams, while on the flat lands adjoining the Clyde there is a rich alluvium which, except when soured by excessive rain, yields heavy crops. Of the total area over half is under cultivation, considerably more than half of this being permanent pasture. Oats are grown extensively, and wheat is also cultivated. Potatoes, turnips and mangolds are the leading green crops. Near the populous centres orchards and market gardens are found, and an increasing acreage is under wood. Horses are kept mostly for farming operations, and the bulk of the cattle are maintained in connection with dairying. Sheep-farming, though on the increase, is not prosecuted so vigorously as in the other southern counties of Scotland, and pig-rearing is on the decline.

Coal, iron and fireclay are the principal minerals of Renfrewshire. Granite, limestone and sandstone are quarried. The thread industry at Paisley is very extensive. Cotton and flax spinning, printing, bleaching and dyeing are carried on at Paisley, Renfrew, Barrhead and elsewhere; woollens and worsteds are produced at Greenock and Renfrew. Engineering works and iron foundries are found at Greenock, Port Glasgow, Paisley, Renfrew, Barrhead and Johnstone. Sugar is a staple article of trade in Greenock and there are chemical works at Cathcart, Paisley, Hurlet and Nitshill. Brewing and distilling are carried on at Greenock and other places. Shipbuilding is especially important at Greenock and Port Glasgow. Paper mills are established in Greenock, Cathcart and Johnstone. Numerous miscellaneous industries—such as the making of starch, cornflour, earthenware and soap are important in Paisley and elsewhere. Trade and fisheries are centred at Greenock.

The L.M.S. railway runs westwards from Glasgow by Paisley to Greenock, Gourock and Wemyss Bay; south-westwards to Barrhead and other stations; and southwards to Busby. Other lines run to Greenock by Paisley, Johnstone and Kilmalcolm; to Nitshill and other places south-westwards; by Lochwinnoch

(for Dalry and Ardrossan in Ayrshire); and to Renfrew jointly with the Caledonian.

Population and Administration.—In 1931 the population numbered 288.575; 5 persons spoke Gaelic only and 3,042 Gaelic and English. Thus though the shire is but twenty-seventh in point of size of the 33 Scottish counties, it is fourth in respect of population. The chief towns are Paisley (pop. 86,441), Greenock (78,948). Port Glasgow (19,580), Johnstone (12,837), Barrhead (12,308), Renfrew (14,971 in Renfrewshire), Gourock (8,844). The shire returns one member to parliament for the eastern, and another for the western division. Paisley and Greenock return each one member. Renfrewshire forms a sheriffdom with Bute, and there is a resident sheriff-substitute at Paisley and one at Greenock. The county is under school-board jurisdiction. For secondary and specialized education there are an academy high school at Greenock and a grammar school and technical school at Paisley.

History.—At the time of the Roman advance from the Solway the land was peopled by the British tribe of Damnonii. To hold the natives in check the conquerors built in 84 the fort of Vanduara on high ground now covered by houses and streets in Paisley; but after the Romans retired (410) the territory was overrun by Cumbrian Britons and formed part of the kingdom of Strathclyde, the capital of which was situated at Alclyde, the modern Dumbarton. In the 7th and 8th centuries the region practically passed under the supremacy of Northumbria, but in the reign of Malcolm Canmore became incorporated with the rest of Scotland. During the first half of the 12th century, Walter Fitzalan, high steward of Scotland, ancestor of the royal house of Stuart, settled in Renfrewshire on an estate granted to him by David I. Till their accession to the throne the Stuarts identified themselves with the district, which, however, was only disjoined from Lanarkshire in 1404. In that year Robert III. erected the barony of Renfrew and the Stuart estates into a separate county, which, along with the earldom of Carrick and the barony of King's Kyle (both in Ayrshire), was bestowed upon his son, afterwards James I. From their grant are derived the titles of earl of Carrick and baron of Renfrew, borne by the eldest son of the sovereign. Apart from such isolated incidents as the defeat of Somerled near Renfrew in 1164, the battle of Langside in 1568 and the capture of the 9th earl of Argyll at Inchinnan in 1685, the history of the shire is scarcely separable from that of Paisley or the neighbouring county of Lanark.

RENNENKAMPF, PAUL (1854–1918), Russian general, was born in 1854 and entered the army in 1873. In 1882 he was appointed to the General Staff. Promoted to the rank of general in 1900, he distinguished himself in the Russo-Japanese war (1904–05). In 1913 he was appointed to command of the troops in the Vilna Military District. In Aug. 1914 he commanded the I. Army which invaded Eastern Prussia. His inaction during the battle of Tannenberg, where the neighbouring army of Samsonov was destroyed on Aug. 26–29 was a bitter disappointment, and he was even suspected of treachery. Personally brave, Rennenkampf, as an army commander, showed himself in the strategic sphere alternately rash and timid, owing to his inability to grasp the situation as a whole. At the beginning of 1915 he was recalled, and later under the pressure of public indignation, dismissed from the service. In 1918 he was killed by the Bolsheviks.

RENNER, KARL (1870–), Austrian politician, was born on Dec. 14, 1870, the son of a peasant, at Dolní-Dunajovice, Moravia. He studied law at the university of Vienna, and early attached himself to the Social Democratic party. He became a leader of Neo-Marxism. He was a deputy from 1907, and, as leader of the Social Democrat party, he repeatedly attacked the Government. He deeply influenced the movement which preceded the fall of the monarchy. After the collapse he became head of the Government, and after the elections had given the Social Democrats and Christian Socialists an overwhelming majority, he formed a coalition ministry, as the leader of which he became the first chancellor of the Austrian republic.

Renner was largely responsible for the decrees of the national assembly which called for the dethronement of the dynasty of Habsburg-Lorraine and the banishment of all members of this house if they did not submit entirely to the laws of the republic, and he was in charge of the negotiations which led to the ex-emperor Charles leaving Austria in March 1919. He was responsible for thwarting the separatist endeavours of the different provinces and the demands which the Communists, supported by their partisans in foreign countries, made with the object of overthrowing the Government. On May 12, 1919, he went to Paris as head of the Austrian delegation to receive the conditions of peace. As the foreign minister, Otto Bauer (*q.v.*), resigned rather than take the responsibility for certain provisions of the treaty, Renner took over the conduct of foreign affairs and signed the Treaty of St. Germaine-en-Laye of Sept. 10, 1919. In Dec. 1919 he visited Paris again to depict Austria's miserable situation to her former enemies and to beg, not without success, for help.

Meanwhile, the first coalition ministry had been succeeded in Oct. 1919 by a second, in which Renner was again chancellor and secretary for foreign affairs. Relations between the Austrian Government and Hungary, which since the régime of the revolution had been succeeded by a reaction, were very strained. Renner, who, as a Social Democrat, was inimical to the reactionary Hungarian Government, refused to grant demands put forward to extradite the Hungarian revolutionaries who had fled to Vienna. This brought him into conflict with the Christian Socialists and their representatives in the Cabinet. The coalition broke up in June; but Renner remained in charge of foreign affairs in the so-called "proportional cabinet," only resigning in Oct. 1920. He continued to take part in the parliamentary debates and the enterprises of the Social Democrat party; but his influence rapidly declined.

His principal works are *Grundlagen und Entwicklungsziele der Österreichisch-ungarischen Monarchie* (1906); *Oesterreichs Erneuerung* (1919); *Die Wirtschaft als Gesamtprozess und die Sozialisierung* (1924). (A. F. P.)

RENNES, a town of western France, formerly the capital of Brittany and now the chief town of the department of Ille-et-Vilaine. Pop. 73,866. Rennes is situated at the meeting of the Ille and the Vilaine and at the junction of several lines of railway connecting it with Paris (232 m. E.N.E.), St. Malo (51 m. N.N.W.), Brest (155 m. W.N.W.). Rennes, the chief city of the Redones, was formerly (like some other places in Gaul) called Condate (hence *Condat*, Condé), probably from its position at the confluence of two streams. In Roman times it was in Lugdunensis Tertia, and became the centre of Roman roads. The oldest chronicles named it *Urbs Rubra* from the bands of red brick in the foundations of its first circuit of walls. Conan le Tort, count of Rennes (late 10th century), subdued the whole province, and his son and successor Geoffrey first took the title duke of Brittany. The dukes were crowned at Rennes, and before entering the city by the Mordelaise gate they had to swear to preserve the privileges of the church, the nobles and the commons of Brittany. In 1356–57 Bertrand du Guesclin saved it from capture by the English. The parlement of Brittany, founded in 1551, held its sessions at Rennes from 1561, they having been previously shared with Nantes. Henry IV. entered the city in state on May 9, 1598. In 1675 an insurrection at Rennes, caused by the taxes imposed by Louis XIV. was cruelly suppressed. The parlement was banished to Vannes till 1689, and the inhabitants punished. At the beginning of the Revolution Rennes was again the scene of bloodshed, caused by the discussion about doubling the third estate for the convocation of the states-general. In Jan. 1789 Jean Victor Moreau (afterwards general) led the law-students in their demonstrations on behalf of the parlement against the royal government. It was the centre of the operations of the Republican army against the Vendeans. The bishopric, founded in the 5th century, in 1859 became an archbishopric, a rank to which it had previously been raised from 1790 to 1802.

The town was for the most part rebuilt of dark granite on a regular plan after the seven days' fire of 1720. The old town or Ville-Haute occupies a hill bounded on the south by the Vilaine, on the west by the canalized Ille. The Vilaine flows in a deep

hollow bordered with quays and crossed by six bridges leading to the new town or Ville-Basse on its left bank. The cathedral of Rennes was rebuilt between 1787 and 1844 on the site of two churches dating from the 4th century. The Renaissance west façade has twin towers. The archbishop's palace occupies in part the site of the abbey of St. Melaine. The Mordelaise gate is a curious example of 15th-century architecture, and preserves a Latin inscription of the 3rd century, a dedication by the Redones to the emperor Gordianus. The finest building in Rennes is the 17th century parliament house, now the law-court.

Rennes is the seat of an archbishop and a prefect, headquarters of the X. army corps and centre of an *académie* (educational division). Its university has faculties of law, science and letters, and a preparatory school of medicine and pharmacy. The town is also the seat of a court of appeal, of a court of assizes, of tribunals of first instance and commerce, of a board of trade-arbitrators and of a chamber of commerce. Tanning, iron-founding, timber-sawing and the production of furniture and wooden goods, flax-spinning and the manufacture of tenting and other coarse fabrics, bleaching and various smaller industries are carried on. Trade is chiefly in butter made in the neighbourhood, and in grain, flour, leather, poultry, eggs and honey.

RENNET: *see* CHEESE; DAIRY FARMING.

RENNIE, JOHN (1761–1821), British engineer, was the youngest son of James Rennie, a farmer at Phantassie, Haddingtonshire, where he was born on June 7, 1761. His first engineering work was the erection of flour mills, but his fame chiefly rests on his achievements in civil engineering. His skill solved the problem of draining and reclaiming extensive tracts of marsh in the eastern counties and on the Solway Firth. As a bridge engineer he built Waterloo, Southwark and London bridges—the last of which he did not live to see completed (*see* BRIDGES: *Construction*). A noteworthy feature in many of his designs was the flat roadway. Among the harbours and docks in the construction of which he was concerned are those at Wick, Torquay, Grimsby, Holyhead, Howth, Kingstown and Hull, together with the London dock and the East India dock on the Thames, and he was consulted by the government in respect of improvements at the dockyards of Portsmouth, Sheerness, Chatham and Plymouth, where the breakwater was built from his plans. He died in London on Oct. 4, 1821, and was buried in St. Paul's.

RENO, the largest city of Nevada, U.S.A., and the county seat of Washoe county; on the Truckee river, 14 m. from the western boundary of the State. It is on Federal highways 40 and 50; has a municipal airport of 160 ac. and is a station on the transcontinental air-mail route; and is served by the Southern Pacific, the Virginia and Truckee, and the Western Pacific railways, and ten motor-stage lines. The population was 12,016 in 1920 (80% native white) and was 18,529 in 1930 by the Federal census. The city covers 3 sq.m., at an altitude of 4,500 ft., near the foot of the Sierra Nevada mountains, amid magnificent and varied scenery. It is the financial, educational and professional centre of the State, and the commercial centre for the adjacent districts of California as well as for Nevada. Manufacturing is relatively unimportant, but the 57 plants in the city in 1926 had an output valued at $4,500,000. In the suburb of Sparks, 2·5 m. E. (pop. in 1920: 3,238), are extensive shops of the Southern Pacific railroad. The banking business is large in proportion to the size of the city. Clearings in 1927 amounted to $35,368,959, and debits to individual accounts totalled $112,269,224. The University of Nevada (opened at Elko in 1873 and moved to Reno in 1885) occupies a 60-acre campus on a low plateau overlooking the city. Adjoining the campus is the 60-acre farm of the agricultural experiment station, given by the citizens of Washoe county in 1899, and 4 m. S. of the city is the university stock-farm of 213 acres. The Mackay school of mines was founded in 1907 by Mrs. John W. Mackay and Clarence H. Mackay in memory of John W. Mackay, one of the pioneers of the Comstock lode. Affiliated with the university are the Nevada Agricultural Experiment station (1887), the State Analytical laboratory (1895), the State Hygienic laboratory (1909), the State Laboratory for Pure Food and Drugs and Weights and Measures (1909), the State Veterinary Control Service (1915), and one of the 12 experiment stations of the United States Bureau of Mines, handling all the investigations for the United States on gold, silver, platinum, and the rare metals (1919). Reno is the seat also of the State Hospital for Mental Diseases (1882) and of a general hospital serving a wide area. Because of the relative ease with which a divorce may be secured in Nevada (the law recognizing seven grounds for an absolute decree and requiring only three months' residence before bringing suit) Reno is the temporary residence of many persons from New York and other States with less liberal laws on the subject. About 25 m. S.E. of the city are the famous mining camps of Virginia City and Gold Hill, on the Comstock lode. In 1859 (the year the Comstock lode was discovered) a roadhouse was built on the site of Reno for the accommodation of travellers and freight-teams on the Overland Route and to the goldfields. By 1863 the place had become known as Lake's Crossing, and five years later it was chosen for a station on the Central (now the Southern) Pacific railroad, then building through the Truckee valley. It was named after General Jesse Lee Reno (1823–62), a Federal officer in the Civil War. The town was incorporated in 1879, and was chartered as a city in 1899 and again in 1903. In 1873 and in 1879 it suffered from destructive fires.

RENOIR, PIERRE AUGUSTE (1841–1919), French painter, was born at Limoges on Feb. 25, 1841. He was the son of a tailor. At 13 he was apprenticed to a manufacturer of porcelain, and in painting on china he acquired a taste for pure and transparent colour and subtle brushwork. After earning some money in painting fans and blinds he entered the studio of Gleyre, where he became the friend of Sisley and Monet. He was inspired by Courbet to study nature; he was interested in Delacroix's colour technique; and the work of Monet and Corot appealed to him. In his early work he followed, with pronounced modern modifications, certain traditions of the French 18th century school. In the work of a later period colour was made subservient to form under the influence of Ingres, and his search for volume and form induced him at the end of his life to take up modelling. In the '70s he threw himself into the impressionist movement and became one of its leaders. Renoir tried his skill in almost every genre—in portraiture, landscape, flower-painting, scenes of modern life and figure subject; he excelled in painting nude figures of women. His art breathes sensuality, transfigured by lyrical feeling and plastic sense. His finest works rank among the masterpieces of the modern French school. Among these are some of his nude "Bathers," the "Rowers' Luncheon," the "Ball at the Moulin de la Galette," "The Box," "The Terrace," "*La Pensée*," and the portrait of "Jeanne Samary." He is represented in the Caillebotte room at the Luxembourg, in the collection of M. Durand-Ruel, and in most of the collections of impressionist paintings in France, in the United States, in Germany and in the Tate gallery, London. Renoir died on Dec. 17, 1919, at Cagnes in Provence, where he had settled in 1900. *See* PAINTING, Pl. XXV.

See A. Vollard, *La Vie et L'oeuvre de Pierre-Auguste Renoir* (1919) and *Impressionism;* F. Fosca, *Renoir* (Eng. trans., 1924).

RENOUF, SIR PETER LE PAGE (1822–1897), Egyptologist, was born in Guernsey, on Aug. 23, 1822. He was educated at Elizabeth College there, and proceeded to Oxford, which, upon his becoming a Roman Catholic, under the influence of Dr. Newman, he quitted without taking a degree. He took an active part in church controversy, and his treatise (1868) upon the condemnation of Pope Honorius for heresy by the council of Constantinople in A.D. 680 was placed upon the index of prohibited books. After holding various educational posts he became in 1866 Keeper of Oriental Antiquities in the British Museum, in succession to Samuel Birch. He was also elected in 1887 president of the Society of Biblical Archaeology, to whose *Proceedings* he contributed, among other important papers, the translation of *The Book of the Dead*, with a commentary. He retired in 1891, and died in London on Oct. 14, 1897.

RENOUVIER, CHARLES BERNARD (1815–1903), French philosopher, was born at Montpellier on Jan. 1, 1815, and died on Sept. 1, 1903. His two leading ideas are a dislike for the Unknowable, and a reliance on the validity of personal experience.

The former accounts for his acceptance of Kant's phenomenalism, combined with rejection of the "thing in itself." It accounts, too, for his polemic on the one hand against a Substantial Soul, a Buddhistic Absolute, an Infinite Spiritual Substance; on the other hand against the no less mysterious material or dynamic substratum by which naturalistic Monism explains the world. He holds that nothing exists except presentations, which are not merely sensational, and have an objective aspect no less than a subjective. To explain the formal organization of our experience he adopts a modified version of the Kantian categories. The insistence on the validity of personal experience leads Renouvier to a yet more important divergence from Kant in his treatment of volition. Liberty, he says, in a much wider sense than Kant, is man's fundamental characteristic. Human freedom acts in the phenomenal, not in an imaginary noumenal sphere. Belief is not intellectual merely, but is determined by an act of will affirming what we hold to be morally good. In his religious views Renouvier makes a considerable approximation to Leibnitz. He holds that we are rationally justified in affirming human immortality and the existence of a finite God who is to be a constitutional ruler, but not a despot, over the souls of men. He would, however, regard atheism as preferable to a belief in an infinite Deity. His chief works are: *Essais de critique générale* (1854–64); *Science de la morale* (1869); *Uchronie* (1876); *Esquisse d'une classification systématique des doctrines philosophiques* (1885–86); *Philosophie analytique de l'histoire* (1896–97); *Histoire et solution des problèmes métaphysiques* (1901); *Victor Hugo: Le Poète* (1893); *Le Philosophe* (1900); *Les Dilemmes de la métaphysique pure* (1901); *Le Personnalisme* (1903); *Critique de la doctrine de Kant* (1906, published by L. Prat).

See L. Prat, *Les Derniers entretiens de Charles Renouvier* (1904); M. Ascher, *Renouvier und der französische Neu-Kriticismus* (1900); E. Janssens, *Le Néocriticisme de C. R.* (1904); A. Darlu, *La Morale de Renouvier* (1904); G. Séailles, *La Philosophie de C. R.* (1905); A. Arnal, *La Philosophie religieuse de C. R.* (1907).

RENSSELAER, a city of Rensselaer county, New York, U.S.A., on the east bank of the Hudson river, opposite Albany. It is served directly by the Boston and Albany and the New York Central railways, is a part of the deep-water port of Albany (under development, 1928) and shares in the other transportation facilities of Albany (*q.v.*). Pop. (1920) 10,823; 1930 it was 11,223. It has large railroad shops and other important manufacturing industries, with an output in 1927 valued at $11,900,055. Among the leading manufactures are felts and blankets, shoddy, aspirin and other pharmaceutical products, dyes, size and chemicals. A settlement called Greenbush was established here in 1631, on the large tract known as Rensselaerwyck. In 1810 a square mile of land within the present city limits was acquired by a speculator, who divided it into lots and offered them for sale, and in 1815 the village was incorporated. In 1897 it was chartered as a city under its present name.

RENT. Various species of rent appear in Roman law (*q.v.*). In English law rent is a certain and periodical payment or service made or rendered by the tenant of a corporeal hereditament and issuing out of (the property of) such hereditament. Its characteristics, therefore, are (1) certainty in amount; (2) periodicity in payment or rendering; (3) the fact that rent is *yielded* and is, therefore, said "to lie in *render*," as distinguished from *profits à prendre* in general, which are taken, and are, therefore, said to lie in *prendre;* (4) that it must issue out of (the profits of) a corporeal hereditament. A rent cannot be reserved out of incorporeal hereditaments such as advowsons (Co. *Litt.* 47a, 142a). But rent may be reserved out of estates in reversion or remainder (*see* REAL PROPERTY) which are not purely incorporeal. It is not essential that rent should consist in a payment of money. Apart from the rendering of services, the delivery of hens, horses, wheat, etc., may constitute a rent. But at the present day, rent is generally a sum of money paid for the occupation of land. It is important to notice that this conception of rent was attained at a comparatively late period in the history of the law. The earliest rent seems to have been a form of personal service, and was fixed by custom. Rent service is the oldest kind of existing rent. It is the only one to which the power of distress attaches at common law, giving the landlord a preferential right over other creditors exercisable without the intervention of judicial authority (*see* DISTRESS). The increasing importance of socage tenure, arising in part from the convenience of paying a certain amount, whether in money or kind, rather than comparatively uncertain services, led to the gradual evolution of the modern view of rent as a sum due by contract between two independent persons.

Classes of Rents.—Rents, as they now exist in England, are divided into two great classes—rent service and rent charge. A rent service is so called because by it a tenure by means of service is created between the landlord and the tenant. The service is now represented by fealty, and is nothing more than nominal. Rent service is said to be incident to the reversion—that is, a grant of the reversion carries the rent with it (*see* REMAINDER). A power of distress is incident at common law to this form of rent. A rent charge is a grant of an annual sum payable out of lands in which the grantor has an estate. It may be in fee, in tail, for life—the most common form—or for years. A rent charge may also be granted out of another rent charge (Law of Property Act, 1925, s. 7, 122 [1]). A rent charge must be created by deed or will, and might be either at common law or under the Statute of Uses (1536). As from Jan. 1, 1926, a rent charge may be created or reserved without the intervention of a use (Law of Property Act, 1925, ss. 65, 187). The grantor has no reversion, and the grantee had at common law no power of distress, though such power was given him by the instrument creating the rent charge. Annual sums charged on land by way of rent charge may be recovered (*a*) if unpaid for 21 days, by distress; (*b*) if unpaid for 40 days, by entry into possession of the land and appropriation of income, and/or demise. By s. 45 of the Conveyancing Act, 1881, a power of redemption of certain perpetual rents in the nature of rent charges is given to the owner of the land out of which the rent issues. Rent charges granted since April 26, 1855, otherwise than by marriage settlement or will for a life or lives or for any estate determinable on a life or lives were required, in order to bind lands against purchasers, mortgagees or creditors, to have been registered in the Land Registry in Lincoln's Inn Fields (Judgments Act, 1855). After 1925, however, rent charges of this character became equitable interests only, and as such are overreached by conveyances to purchasers of a legal estate in lands (Law of Property Act, 1925, s. 2). There was no need, therefore, to provide for the registration of such rent charges, and the Land Charges Act, 1925, enacted that after Jan. 1, 1926, they should not be entered in the register of annuities (s. 4 [1]). Rent charges in possession charged on land perpetually or for a term of years absolute are "legal estates," registrable as such under the Land Registration Act, 1925 (ss. 2, 3, viii., xxv.); and certain classes of rent charge may be entered in the register of land charges under the Land Charges Act, 1925 (s. 10). Rent charges are barred by nonpayment or non-acknowledgment for 12 years (Limitation Act, 1874). The period of limitation for arrears of rent is six years. As to the colonies *see* Burge, *Col. and For. Laws* (by Bewes, iv., pt. 2, 460).

Forms of rent charge of special interest are *tithe rent charge* (*see* TITHES), and the rent charges formerly used for the purpose of creating "faggot votes." The device was adopted of creating parliamentary voters by splitting up freehold interests into a number of rent charges of the annual value of 40s., so as to satisfy the freeholders' franchise. But such rent charges were rendered ineffective by the Representation of the People Act, 1884, s. 4, which enacted (subject to a saving for existing rights and an exception in favour of owners of tithe rent charge) that a man should not be entitled to be registered as a voter in respect of the ownership of any rent charge.

A rent charge reserved without power of distress is termed a *rent-seck* (*reditus siccus*) or "dry rent," from the absence of the power of distress. But, as power of distress for *rents-seck* was given by the Landlord and Tenant Act, 1730, the legal effect of such rents has been since the act the same as that of a rent charge.

Other Varieties of Rent.—*Rents of assize* or *quit rents* are a

relic of the old customary rents. They are presumed to have been established by usage, and cannot be increased or diminished. Provision was made in 1922 for the extinction after 1925 of quit rents and other manorial incidents (Law of Property Act, 1922, ss. 138, 144).

Fee farm rents are rents reserved on grants in fee. They, like quit rents, now occur only in manors, unless existing before the statute of *Quia Emptores* or created by the Crown (*see* REAL PROPERTY). A rent which is equivalent or nearly equivalent in amount to the full annual value of the land is a *rack rent*. As to ground rent, *see* GROUND RENT. A *dead rent* is a fixed annual sum paid by a person working a mine or quarry, in addition to royalties varying according to the amount of minerals taken.

The object of a dead rent is twofold—first, to provide a specified income on which the lessor can rely; secondly (and this is the more important reason), as a security that the mine will be worked, and worked with reasonable rapidity. *Rents in kind* still exist to a limited extent. All *peppercorn*, or nominal, rents seem to fall under this head. The object of the peppercorn rent is to secure the acknowledgment by the tenant of the landlord's right. In modern building leases a peppercorn rent is sometimes reserved as the rent for the first few years. *Labour rents* are represented by those cases, not unfrequent in agricultural leases, where the tenant is bound to render the landlord a certain amount of team work or other labour as a part of his rent.

As to the apportionment of rents, *see* APPORTIONMENT, and as to the rent of apartments, etc., *see* LODGER AND LODGINGS.

Payment of Rent.—Rent is due in the morning of the day appointed for payment, but a tenant is not in arrears until after midnight on that day. Rent made payable in advance by agreement between a landlord and his tenant is called *forehand rent*. It is not uncommon in letting a furnished house, or as to the last quarter of the term of a lease of unfurnished premises, to stipulate that the rent shall be paid in advance. As soon as such rent is payable under the agreement the landlord has the same rights in regard to it as he has in the case of ordinary rent. Where a cheque in payment of rent is lost in the course of transmission through the post, the loss falls on the tenant, unless the landlord has expressly or impliedly authorized it to be forwarded in that way: and the landlord's consent to take the risk of such transmission will not be inferred from the fact that payments were ordinarily made in this manner in the dealings between the parties. A tenant may deduct from his rent (i.) the "landlord's property tax" (on the annual value of the premises for income tax purposes), which is paid by the tenant, if the statute imposing the tax authorizes the deduction (which should be made from the rent next due after the payment); (ii.) taxes or rates which the landlord had undertaken to pay but had not paid, payment having thereupon been made by the tenant; (iii.) payments made by the tenant which ought to have been made by the landlord, *e.g.*, rent due to a superior landlord; (iv.) compensation under the Agricultural Holdings Act, 1923 (s. 37), and Landlord and Tenant Act, 1927 (s. 11 [2]).

A landlord's main remedy for non-payment of rent is *distress* (*q.v.*). Besides distress the landlord has his ordinary remedy by action. In addition, special statutory remedies are given in the case of tenants holding over after the expiration of their tenancy (*see* EJECTMENT). Under the Rent Restriction Acts, 1920–25, landlords of dwelling houses to which these statutes apply were prevented during their continuance from effectually raising the rents above specified limits, and except in certain cases from recovering possession on the termination of the tenancy. The act of 1920 expired in England on Dec. 25, 1927, and in Scotland on May 28, 1928. The provisions of Pt. II. of the act of 1923 continue in force for five years from the expiration of the act of 1920. (*See* further LANDLORD AND TENANT.)

Under the Landlord and Tenant Act, 1927, the landlord of trade premises may offer a renewal of the tenancy at such rent as, failing agreement, the statutory tribunal may consider reasonable, as an alternative to compensation for improvements (s. 2 [1] [d]) or goodwill (s. 4 [1]). The tenant of such premises may also apply for a new lease at a rent similarly approved (s. 5).

Scotland.—Rent is properly the payment made by the tenant to the landlord for the use of lands held under lease (*see* LANDLORD AND TENANT). In agricultural tenancies the legal terms for the payment of rent are at Whit Sunday after the crop has been sown, and at Martinmas after it has been reaped. But a landlord and tenant may substitute conventional terms of payment, either anticipating (*fore* or *forehand rent*) or postponing (*back* or *backhand rent*) the legal term. The rent paid by vassal to superior is called *feu-duty* (*see* FEU). Its nearest English equivalent is the *fee farm rent*. The remedy of distress does not exist in Scots law. Rents are recovered (i.) by summary diligence, proceeding on a clause, in the lease, of consent to registration for execution; (ii.) by an ordinary petitory action; (iii.) by an action of "maills and duties" (the rents of an estate in money or grain: "maills" was a coin at one time current in Scotland) in the Sheriff Court or the Court of Session; and (iv.) in non-agricultural tenancies by procedure under the right of hypothec, where that still exists; the right of hypothec over land exceeding two acres in extent let for agriculture or pasture was abolished as from Nov. 11, 1881; it was also excluded, by the House-letting and Rating (Scotland) Act, 1911 (s. 10), in lets to which that act applies, from all bedding material and all implements of trade used by the occupier and his family and from furniture selected by him up to £10 value (*see* DISTRESS; HYPOTHEC); (v.) by action of removing (*see* EJECTMENT). Arrears of rent prescribe after the expiration of a period of five years reckoned from the time of the tenant's removal from the land.

Labour or service rents were at one time very frequent in Scotland. The events of 1715 and 1745 showed the vast influence over the tenantry that the great proprietors acquired by such means. Accordingly acts of 1716 and 1746 provided for the commutation of services into money rents. Such services may still be created by agreement, subject to the summary power of commutation by the sheriff given by the Conveyancing Act, 1874 (ss. 20, 21). They will no longer be eligible from and after Jan. 1, 1935 (Conveyancing [Scotland] Act, 1924, s. 12 [7]). The Conveyancing (Scotland) Act, 1924, provides (s. 12) for the abolition or commutation of feu-duties payable in grain or other fungibles.

United States.—The law is in general accordance with that of England, apart from statute. The tendency of modern State legislation is unfavourable to the continuance of distress as a remedy. In the New England States, attachment on mesne process has, to a large extent, superseded it. Alabama, Colorado, Missouri, Montana, North Carolina and Oklahoma have refused to recognize the right of distress upon the ground that the landlord's rights have been secured by the substitution of other remedies. In the District of Columbia, Indiana, Minnesota, New York and Wisconsin it has been abolished by statute. "In those (states) in which it still exists, it has been modified by statutes, the general tendency of which is more or less to withdraw the control of the proceedings from the landlord and to rest it in public officials, thus assimilating it to the process of attachment." (2 Tiffany, Landlord and Tenant, section 325.)

Other Countries.—Under the French Code Civil (art. 2,102) the landlord is a privileged creditor for his rent. If the lease is by authentic act, or under private signature for a fixed term, he has a right over the year's harvest and produce, the furniture of the house and everything employed to keep it up, and (if a farm) to work it, in order to satisfy all rent due up to the end of the term. If the lease is not by authentic act nor for a specified term, the landlord's claim is limited to the current year and the year next following (*see* law of Feb. 12, 1872). The goods of a sub-lessee are protected: and goods bailed or deposited with the tenant are in general not liable to be seized. The French law is in force in Mauritius, and has been reproduced in substance in the Civil Codes of Quebec (arts. 2,005 *seq.*) and St. Lucia (arts. 1,888 *seq.*). There are analogous provisions in the Spanish Civil Code (art. 1,922). The subject of privileges and hypothecs is regulated in Belgium by a special law of Dec. 16, 1851; and in Germany by ss. 1,113 *seq.* of the Civil Code. The law of British India as to rent (Transfer and Property Act, 1882) and distress

(*cf.*, *e.g.*, Act 15 of 1882) is similar to English law. The British dominions generally tend in the same direction. See, *e.g.*, New South Wales (the consolidating Landlord and Tenant Act, 1899, and Act 66 of 1915); Union of South Africa (Act 30 of 1921); Newfoundland (Act 4 of 1899); Ontario (Act 1 of 1902, s. 22, giving a tenant five days for tender of rent and expenses after distress); Jamaica (Law 17 of 1900, certification of landlord's bailiffs); Queensland (Act 15 of 1904). English rent restriction legislation was followed in British India (*e.g.*, Bombay, No. 3 of 1925; Burma, No. 1 of 1925) and in many of the colonies and dominions (*e.g.*, Hongkong, No. 8 of 1925; Malta, No. 1 of 1925; New Zealand, No. 3 of 1925).

BIBLIOGRAPHY.—English Law: W. M. Fawcett, *A Concise Treatise on the Law of Landlord and Tenant* (3rd ed., 1905); E. Foà, *Landlord and Tenant* (6th ed., 1924); W. Woodfall, *Treatise on the Law of Landlord and Tenant* (21st ed., 1924). Scots Law: R. Hunter, *A Treatise on the Law of Landlord and Tenant* (4th ed., 1876); J. Erskine, *Principles of the Law of Scotland* (21st ed., 1911); Sir J. Rankine, *Law of Landownership in Scotland* (4th ed., 1909) and *A Treatise on the Law of Leases in Scotland* (3rd ed., 1916); W. M. Gloag and R. C. Henderson, *Introduction to the Law of Scotland* (1927). American Law: Herbert Thorndike Tiffany, *Landlord and Tenant* (1910); John N. Taylor, *The American Law of Landlord and Tenant* (9th ed., 1904); D. MacAdam, *The Rights, Remedies and Liabilities of Landlord and Tenant* (4th ed., 1910). (A. W. R.)

RENT: IN ECONOMICS. In economics, rent is the name given to the income which the owner of a productive instrument gets by using it himself or by exacting a payment from another user. Much of the importance of the general theory of rent in economics comes from its application to the special case of income derived from land ownership. In the case of the incomes yielded by the ownership of reproducible instruments of production the principle of rent is subordinate, in the long run, to the principles which govern the rate of interest on capital, for the supply of such instruments will be maintained and increased if, but only if, the prospective return is sufficient to induce the investment of capital. At any given time, however, the income-yielding power of reproducible instruments of production is determined, not by what they cost, but by the value of their productive uses. That is, it is governed by the laws of rent. The specific hypothesis upon which the significance of the principle of rent depends is that the supply of the productive instruments which yield rent may be assumed to be given or fixed, so that the question remains only of how they may best be used.

Rent is generally held to have two distinguishing characteristics: first, it is a differential or graded return; second it is a surplus above costs. That it is a differential return depends upon the circumstance that productive instruments are described or measured in units (*e.g.*, acres) which are not themselves units of productive efficiency. It is obvious that if one acre of agricultural land is better (more fertile or nearer to the market) than another it will command a larger rent. It is also obvious that the rent which any given piece of land commands may be taken to be a measure of its differential superiority over land which just falls short of being good enough to be worth using. That rent may be regarded as a surplus over costs is a consequence of the circumstance that the supply of rent-yielding instruments is taken as given. Even if they were produced or improved (as land is improved) at a cost in the past, their past costs have no relevance to the practical question of how and for what purposes the instruments shall be used. The only costs which need to be taken into account are the costs of using them.

Rent's Relation to Product.—Why, then, should rent be paid? The reason is that rent-yielding productive instruments, including rent-yielding land, exist in limited quantities, in the sense that if any one unit of them were withdrawn from use the aggregate product would be smaller. The rent of a given piece of land or of a given farm tends to be approximately equal to the value of the amount of product which is dependent upon using it. This amount can be determined by comparing the product which the given piece of land or farm will yield under proper cultivation with the product which could be got by employing the same amount of capital and labour on the best land which is not good enough to yield a rent (*i.e.*, at the "extensive margin of cultivation") or by employing it in cultivating rent-yielding lands more intensively (*i.e.*, at the "intensive margin of cultivation"). When the supply of a particular class of rent-yielding productive agents cannot be increased as rapidly as the demand for the products which they yield increases, they will command higher rents. Furthermore, unless there are compensating improvements in productive technique, production can be increased under such circumstances only by using instruments which had previously been below the level of profitable use or by making more intensive use of the latter instruments, *i.e.*, by increasing the labour and other types of instruments used in conjunction with them. Whichever method is followed, increasing costs are encountered. This circumstance is the basis of the doctrine that with a fixed supply of land an increased agricultural product can be had only at the expense of a more than proportionate outlay of labour and capital—a doctrine to which the name, "law of diminishing returns," has been given.

When economists refer to some other form of income or gain, not derived from the ownership of land or of other productive instruments, as rent, they generally mean either that it may be looked upon as a differential return or that it may be conceived to be a surplus above costs. Thus, "rent of ability" is a name sometimes given to the differential element in personal earnings. "Entrepreneur's rent" denotes the profits of an ably-managed and successful enterprise, conceived of as a differential above the return secured by a marginal undertaking which is barely able to meet its costs. "Consumer's rent" is the difference between the amount which the consumer pays and the value which he attaches to what he buys, as measured by the maximum amount which he would have been willing to pay if required. Similarly, "producer's rent" is the difference between what the state of the market enables the producer to get for his goods and the amount which would have sufficed to induce him to produce them. (*See* also ECONOMICS and LAND.) (A. Yo.)

RENTON, a manufacturing town of Dumbartonshire, Scotland. Pop. (1921) 4,996. It is situated on the Leven, 2 m. N.N.W. of Dumbarton by the L.M.S. & L.N.E. railways. The leading industry is Turkey red dyeing, and calico-printing and bleaching are also carried on. The town was founded in 1782 by Mrs. Smollett (sister of Tobias Smollet); it was named after Cecilia Renton who became her daughter-in-law.

RENWICK, JAMES (1662–1688), Scottish covenanting leader, was born at Moniaive, Dumfriesshire, on Feb. 15, 1662, the son of a weaver. Educated at Edinburgh University, he joined the Cameronians about 1681. After studying theology at Groningen he was ordained a minister in 1683. Returning to Scotland, he became one of the field-preachers and was declared a rebel by the privy council. He was largely responsible for the "apologetical declaration" of 1684 by which he and his followers disowned the authority of Charles II.; the privy council replied by ordering every one to abjure this declaration on pain of death. Renwick refused to join the rising under the earl of Argyll in 1685; in 1687, when the declarations of indulgence allowed some liberty of worship to the Presbyterians, he and his followers, often called Renwickites, continued to hold meetings in the fields, which were still illegal. A reward was offered for his capture, and early in 1688 he was seized in Edinburgh. He refused to apply for a pardon and was hanged on Feb. 17, 1688. Renwick was the last of the covenanting martyrs.

See R. Wodrow, *History of the Sufferings of the Church of Scotland*, vol. iv. (Glasgow, 1838); and A. Smellie, *Men of the Covenant* (1904); also Renwick's life by Alexander Shields in the *Biographia Presbyteriana* (1827).

REP, REPP or **REPS,** cloth made of silk, wool or cotton. The name is said to have been adopted from the French *reps*, a word of unknown origin; it has also been suggested that it is a corruption of "rib." It is woven in fine cords or ribs across the width of the piece. In various forms it is used for dresses, and to some extent for ecclesiastical vestments. In wool and cotton it is also used for upholstery purposes.

REPARATIONS AND THE DAWES PLAN. The Treaty of Versailles in June 1919 did not directly deal with the

question of reparations in its financial aspects. It placed on Germany the moral responsibility for all damage done to the population of the Allied countries (*see* VERSAILLES, TREATY OF). It set up a Reparation Commission to translate the treaty into actual figures by assessing the damage, to lay down the method and times of payment, and to come to its determination by May 1921.

I. FROM THE TREATY TO THE LONDON CONFERENCE

San Remo to Spa.—In April and May 1920 the Allies (Great Britain, Belgium, France, Italy and Japan) met in conferences at San Remo and Hythe, and discussed the methods of computing the liability of the enemy countries and also of sharing the proceeds. The Supreme Council had their own experts making computations, the Reparation Commission in the meantime continuing their investigation of the damages and mode of collection. (At this stage there was a tentative agreement for France to pay her debt as and when she received payment from Germany.) In June 1920 at Boulogne, statements of actual amounts emerged. A minimum annuity of 3,000 million gold marks for 35 years, with a maximum aggregate of 269,000 million, was proposed; the actual amount to be settled by economic conditions. The costs of military occupation were to be a first charge on the "deliveries in kind," of which coal was the chief, and customs and natural resources were to be employed as guarantees. At the important Spa Conference—July 1920 (following a meeting of experts at Brussels) and with Germany and Portugal represented, they discussed proposals for Germany to pay 42 annuities aggregating 240,000 million gold marks; coal deliveries were fixed at two million tons monthly forthwith. There was an actual agreement, which has survived, as to the division of the proceeds as follows:—

	%		%
France	52	Belgium	8
British empire	22	Japan and Portugal	1.50
Italy	10	Others (Greece, Rumania, etc.)	6.50

A priority for 2,000 million gold marks was given to Belgium. At this conference the Germans expressed their views on the importance of territorial integrity, and the necessity for first securing an "export surplus" before making any payment in cash or kind.

The Paris Decisions.—In Dec. 1920 financial experts met in Brussels and made recommendations to the Supreme Council, and on Jan. 29, 1921, the Allies reached the "Paris decisions." The fixed annuities were to be:—

(*a*) 2 annuities of 2 milliard gold marks.
(*b*) 3 annuities of 3 milliard gold marks.
(*c*) 3 annuities of 4 milliard gold marks.
(*d*) 3 annuities of 5 milliard gold marks reached by May 1932.
(*e*) 31 annuities of 6 milliard gold marks reached by May 1963.

These 42 annuities were to be paid from 1921 equal to 12% of the value of Germany's exports. Supervision of Customs and occupation of the Ruhr in event of failure were discussed. In Feb. 1921 the various Allies had submitted their "claim" to the Reparation Commission. For damages alone the claims totalled about 100 milliard gold marks (1 milliard gold marks = 50 million sterling), but including other claims the total was about 225 milliard gold marks, or, say 11,600 million sterling. In March 1921 at the first London Conference, Germany proposed 1,500 million pounds in cash over 30 years, with credit for 1,000 millions already paid. In April through the United States a vastly increased offer was made with stipulations about the return of surrendered territory.

II. FROM THE LONDON CONFERENCE TO THE DAWES COMMITTEE

The London Ultimatum.—On April 27, 1921, the Reparation Commission announced their "assessment" as 132 milliard gold marks (6,600 million sterling, or 58% of the claim). The decision did not refer to Germany's "capacity to pay" at all—it was a computation of legal liability, on the terms of the treaty. The Allies decided that this was to be paid in annuities of £100,000,000, plus 26% of German exports. Three series of bonds were to be issued, two in 1921, (*a*) 600 million pounds, (*b*) 1,900 million, and the balance as series (*c*) 4,100 million at such time as the Reparation Commission might determine. These bonds were to bear 5% interest, and 1% amortisation.

Upon this report the London Conference issued an ultimatum (May 5, 1921), giving effect to those decisions and also deciding that deliveries of coal and materials, etc., were to continue, Germany being given credit for the appropriate values. A Committee of Guarantees was to be set up to report upon the German fiscal revenues and to supervise the actual machinery for delivering funds, etc. Occupation of the Ruhr Valley and penalties in regard to customs and other revenues were proposed in case Germany failed to accept the terms.

The first payment of one milliard gold marks due by Sept. 1, 1921, was actually paid over, partly out of foreign balances which had accumulated prior to May, partly by sales of paper marks on the Exchange, and partly by temporary advances from an international group of banks. Deliveries in kind after May covered the Nov. instalment. The export tax, a quarter of a milliard, was paid for the first quarter.

In Oct. certain details were agreed between the French and German ministers at Wiesbaden in regard to deliveries in kind for France, in place of the 26% export tax, and the practical details of these agreements were subsequently accepted by the other Governments concerned.

Difficulties began to arise almost immediately in regard to the payment of the annuities. In Aug. 1921, Mr. J. M. Keynes first published his famous prediction that the instalments of Jan. and Feb. 1922 might be covered out of further "deliveries," temporary advances and foreign assets of German industrialists. But the payment of April 1922 would present more difficulty. "Sometime between Feb. and Aug. 1922 Germany will succumb to an inevitable default. This is the maximum extent of our breathing space." In Dec. 1921 the German Government notified the Reparation Commission that their attempt to raise a foreign loan having been abortive, they could not raise in addition to deliveries in kind, more than 200 million gold marks on account of the payments for Jan. and Feb. 1922. There were conferences of the Allied prime ministers at London in Dec. 1921 and Cannes in Jan. 1922, as a result of which the Commission granted a moratorium to Germany from the amounts due under the schedule of payments, accepting payments of 31 million gold marks every ten days. It was laid down that Germany was to present plans for balancing the budget, stabilizing the currency and preventing exports of capital. Shortly after, Germany made an offer of 720 million gold marks per annum in addition to 1,450 million by deliveries in kind, agreeing to balance the budget, increase the coal and sales tax and check inflation by a compulsory loan. Germany asked for a reduction of the treaty payments to an amount within her capacity.

At the Paris Conference in March (March 11, 1922) the Reparation Commission was asked to consider the possibility of an external loan, but an international committee of bankers, which met at the end of May, concluded that such a loan was impossible so long as Germany's external liabilities remained at the figure arranged. Meanwhile in March 1922 the Reparation Commission agreed to a payment of 720 million gold marks inclusive, as the cash payment, suspending the schedule of payments in the meantime, and laying down that Germany should impose her new taxation at once or be exposed to the "sanctions" of the London Agreement.

In Aug. 1922, after Germany had asked for 2½ years' moratorium, the third London Conference and the Reparation Commission suspended cash payments, and agreed to accept the balance of instalments for 1922 in six months' bills at 4½%. It was laid down that further default would bring about the seizure of productive guarantees. In Nov. the German Government replied requesting a definite moratorium and the revision of the total payments. They asked for time to carry out the plans for stabilization recommended by the currency experts.

The British Proposals of Jan. 1923.—In Jan. 1923 there

was a Conference in Paris of the prime ministers, when a somewhat complicated proposal was put forward by Britain for an issue of 50 milliards of "A" bonds maturing in 1954, with interest deferred entirely for the first four years, and 1% for the next four down to the end of 1930. There was to be an issue of "B" bonds, to be definitive unless Germany proved to a tribunal before April 1933 her inability to meet the payment, and deliveries in kind were to be continued for determined amounts, with any excess to be set off against the bond interest. This plan was linked up with the question of inter-Allied debts and their cancellation. Germany was to agree to the currency stabilization plan recommended by the foreign experts a few weeks previously. She was to balance her budget within two years and accept a foreign finance supervision which should supersede the Reparation Commission in all executive functions. There were also conditions as to Germany's forfeiture of customs and the allocation of loans, issued in the Allied markets, to the redemption of the bonds.

At the same time the French prime minister put forward a proposal to adhere to the capital sums determined in May 1921, with a moratorium of two years, giving Germany the power to repay under discount. The customs were to be retained as productive pledges, and the Reparation Commission were to take control of German finance. France agreed that if any of her debts to the Allies were remitted, she would be prepared to consider the question of reducing Germany's total indebtedness.

The Ruhr Occupation.—During the comparative deadlock that followed, France began to carry out her proposals for the occupation of the Ruhr. In the immediate ensuing period considerable doubt existed as to the effect of the occupation upon reparations, but by May and June the Germans had become thoroughly alarmed, and their proposals for the evacuation of the Ruhr Valley and the restoration of Germany's economic freedom, were contained in special German notes the net effect of which was that the capital debt should be fixed at 30 milliard gold marks, of which 20 milliards would be covered by an international loan in July 1927, 5 milliards two years later, and 5 milliards by July 1931, the proceeds to be given over to the Reparation Commission. As guarantees for the service of these loans they were to mortgage the railways for 10 milliards, yielding 500 million gold marks per year; 500 million from the general mortgage on the industries and natural resources of Germany and, thirdly, the pledge of their consumption taxes, *i.e.*, luxury, tobacco, beer, wine and sugar, to an amount probably exceeding 200 million gold marks.

Germany suggested an international conference to determine her capacity to make further payments. The effect of inflation and the general disintegration of German finance, became very marked, and Germany's whole constitutional fabric was in grave danger. (*See* GERMANY: *Economic and Social Conditions.*)

Appointment of the Dawes Committee.—Towards the end of the year active steps were being taken to set up an international committee of experts to consider Germany's position, and to make proposals for stabilizing the currency and balancing the budget. The credit for this proposal has been variously assigned to Mr. Hughes of the United States, to Sir John (afterwards Lord) Bradbury on the Reparation Commission, and to the International Chamber of Commerce Conference at Rome. The representatives of this Committee were in form chosen by the Reparation Committee and appointed by them. But their selection was made a matter of Government interest in each country, there being two representatives from France, Belgium, Italy, Great Britain and the United States respectively. The chairmanship was put into the hands of the United States in the person of General Dawes, and this Commission became afterwards known as the "Dawes Committee," and its report as the "Dawes report." The personnel of the Committee was as follows: United States—General Charles G. Dawes, Owen D. Young; Great Britain—Sir Robert Kindersley, G.B.E., Sir Josiah Stamp, K.B.E.; France—J. Parmentier, Professor Alex; Italy—Dr. Alberto Pirelli, Professor Flora; Belgium—E. Franqui, Baron Houtart. (There was a second committee, under the chairmanship of the Rt. Hon. Reginald McKenna, set up "to consider the means of estimating the amount of German exported capital and of bringing it back to Germany.")

III. THE DAWES REPORT

The Dawes Committee began its meetings in Paris on Jan. 14, 1924, and reported on April 9, 1924. Although neither the evacuation of the Ruhr nor the question of reparations was mentioned in the terms of reference they really were in the forefront of the task. In the first place, so long as the occupation of the Ruhr continued and Germany was not a complete fiscal unit, she had not entire control of her receipts and expenditure, and there could be no guarantee of a balanced budget. In the second place, the reparation liabilities under the treaty figured amongst the budgetary expenses, and if in excess of budgetary possibilities, made it impossible to guarantee that steps taken for the stability of the currency would be permanent and effective. The question of reparations, therefore, figured prominently in the report.

General Principles.—The report adopted a business attitude and considered political factors only in so far as they affect the practicability of the plan. It sought the recovery of debt, not the imposition of penalties, regarding the payment of that debt by Germany as her necessary contribution to repairing the damage of the war. The committee recommended it as in the interest of all parties to carry out this plan in good faith, these assurances being paramount having regard to the temper ruling at that time, and the suspicion of motives. They avoided the political guarantees which had been so prominent hitherto and proposed only economic ones. They were emphatic that for success in stabilizing currency and balancing budgets, Germany needed the resources of German territory as defined by the Treaty of Versailles, and free economic activity therein. On the vexed question of military "sanctions" and occupation which were strictly beyond their terms of reference, they confined themselves to stating "within the unified territory, the plan requires that, when it is in effective operation:—

1. If any military organization exists, it must not impede the free exercise of economic activities;
2. There shall be no foreign economic control or interference other than that proposed by the plan."

The report treated stabilization of currency and the balancing of budgets as interdependent, though provisionally separable for examination, and insisted that currency stability could only be maintained if the budget were normally balanced; while the budget could only be balanced if a stable and reliable currency existed. Both were needed to enable Germany to meet her internal requirements and treaty payments. They laid stress upon Germany's economic future as indicated by her productive power, plant capacity, increasing population, technical skill, material resources and eminence in industrial science.

Organization of the Reichsbank.—In their proposal for the stabilizing of the currency they suggested that a new bank be set up or the Reichsbank reorganized. The main characteristics of the bank were given:—

1. To issue notes on a basis stable in relation to gold, with an exclusive privilege;
2. To serve as a bankers' bank, establishing the official rate of discount;
3. To act as the Government banker, but free of Government control;
4. Advances to Government to be strictly limited;
5. To hold on deposit reparation payments;
6. The capital of the bank will be 400 million gold marks;
7. It will be directed by a German president and managing board, who can be assisted by a German consultative committee;
8. The due observance of its statutes will be further safeguarded by a General Board, of which half of the members, including a commissioner, will be foreign.

They were emphatic that even granted full economic and fiscal sovereignty, balancing the budget would necessitate a period of relief from reparation payments, though the pressure of political interests was too great to allow of a complete suspension of deliveries in kind.

Although the budget might be balanced without the total *capital* debt of Germany being fixed, they maintained it could not be

continuously balanced if there were any uncertainty as to the maximum *annual* charge that would fall upon it for some years, on a basis clearly prescribed in advance. The report deferred to the principle that the German people ought to bear a burden commensurate with that in the Allied countries, and they claimed to apply the principle "to the full limit of practicability."

The Transfer Committee.—A transfer committee of an international constitution was set up to control the "delivery" programme, to receive the payments in marks in Germany, and to be responsible for the extent to which, and the way in which, these sums were transferred abroad in foreign currencies. Thus the mistake of forcing Germany beyond the economic point in the purchase of foreign currencies, which had been made in the past, was guarded against for the future. No attempt was made, as it was outside the terms of reference, to assess the *length* of time during which these payments should be made, or the total amount of the Reparation debt, but it was clear that the amount to be paid in the standard year, viz., 2½ milliards, would not do more than pay the interest on a portion of the liability imputed under the treaty. It was provided, however, that the payments in the standard year should be increased with the increasing prosperity of Germany, the measure to be determined by an "Index of Prosperity" based upon comparative statistics of imports, exports, public revenues, population, consumption of sugar, etc. In this way it was at least possible that the sums ultimately payable annually would be greatly in excess of the 2½ milliards in the standard year. In the event of the economic circumstances of Germany's foreign trade being such that the transfer committee could not succeed in transferring the whole sum to the Allies, it was provided that there should be an accumulation in Germany up to a limit of 5 milliards, at which point, if necessary, the payment should be reduced.

The report set out the varying economic principles underlying the payment of reparations—principles which, up to that time, had not been generally recognized by the public or acted upon by politicians. In this connection it was laid down, for example, that:

> There has been a tendency in the past to confuse two distinct though related questions, *i.e.*, first the amount of revenue which Germany can raise available for reparation account, and, second, the amount which can be transferred to foreign countries. The funds raised and transferred to the Allies on reparation account cannot, in the long run, exceed the sums which the balance of payments makes it possible to transfer without currency and budget instability ensuing. But it is quite obvious that the amount of budget surplus which can be raised by taxation is not limited by the entirely distinct question of the condition of external transfer. We propose to distinguish sharply between the two problems, and first deal with the problem of the maximum budget of surplus and afterwards with the problem of payment to the Allies. In the past, the varying conclusions formed as to Germany's "capacity" have often depended upon which of these two methods has been chosen.

Schedule of Payments.—The provisions made for payment under the treaty were as follows:—

Budget; Moratorium Period:	Million gold marks
First year: from foreign loan and part interest (200 millions) on railway bonds; Total of	1,000
Second year: from interest on railway bonds (including 130 millions balance from first year) and interest on industrial debentures and budget contribution, including sale of railway shares; Total of	1,220
Transition Period:	
Third year: from interest on railway bonds and industrial debentures, from transport tax and from budget; Total of	1,200
Subject to contingent addition or reduction not exceeding 250 million gold marks.*	
Fourth year: from interest on railway bonds and industrial debentures, from transport tax and from budget; Total of	1,750
Subject to contingent addition or reduction not exceeding 250 million marks.*	
Standard Year:	
Fifth year: from interest on railway bonds and industrial debentures, from transport tax and from budget; Total of	2,500

*By subsequent agreement, Sept. 8, 1926, these two contingent payments were replaced by a *single* definite payment of 300 million gold marks during the third Annuity year.

The first year was to begin to run from the date when the Plan should have been accepted and made effective. These payments were to be absolutely inclusive of all the various expenses for military purposes that were being thrown upon Germany. They were also to include the value of deliveries in kind.

Securities for Payment.—The "securities" proposed were of three kinds: Taxes, railways and industrial debentures. As regards railways, the whole system was to be made over to a company and be no longer directly under the Reich. Railway bonds were to be set up. Eleven milliards of first mortgage railway bonds against a capital cost of 26 milliards to be created for reparations; these bonds to bear 5% interest and 1% sinking fund per annum; in view of reorganization, interest to be accepted as follows:—

1924–5	330 million gold marks.
1925–6	465 million gold marks.
1926–7	550 million gold marks.
1927–8	and thereafter: 660 million gold marks.

Behind the bonds there were to be created:—

2 milliards of preference shares to be reserved for sale to the public and

13 milliards of common stock.

Three-fourths of the proceeds of the preference shares was to be applied, as required, to the payment of debt and for capital expenditure of the railways. The remaining 500 millions of preference shares and all the common shares were to go to the German Government. They assigned the Transport Tax to the extent of the first 290 million gold marks for reparations. Industrial debentures were recommended: Five milliards of industrial debentures were to be provided for reparation; these bonds to bear 5% interest and 1% sinking fund, *i.e.*, 300 million gold marks per annum. Pending economic restoration, interest and sinking fund were to be accepted as follows:—

First year	Nothing.
Second year	125 million gold marks.
Third year	250 million gold marks.
Thereafter	300 million gold marks.

As further guarantee, they proposed to pledge certain revenues as collateral security, *i.e.*, the taxes on alcohol, tobacco, beer and sugar, and the customs, but only up to definite limits. An arrangement for control, simple in the ordinary course, but becoming drastic if circumstances demanded, was recommended. The new organization therefore required a trustee for railway and industrial bonds, three commissioners of (1) railways, (2) the bank, (3) controlled revenues, and they recommended an agent for reparation payments to co-ordinate the activities of the above and to preside over the transfer committee. The feature of the plan on which its whole inception depended was the raising of a foreign loan of 800 million gold marks, which had to serve the double purpose of a gold reserve and also financing the internal payment for the treaty in 1924–25. The report claimed to take the question of "what Germany can pay" out of the field of speculation and put it in the field of practical demonstration.

IV. ADOPTION OF THE REPORT

The reception of the report was immediately favourable, and it was finally adopted by the Governments concerned in the London Agreement on Aug. 30, 1924. Steps were immediately taken to put it into operation. So far as all formal acts and the setting-up of the machinery for the future working of the Plan were concerned, it may be said that everything went satisfactorily. The Reparation Commission officially stated: "Germany is faithfully fulfilling her reparation obligations as far as they are at present fixed." The actual test of the working of the full apparatus would come later, since the reparation payments to be

made by Germany in its early stages were comparatively negligible. That a new spirit was secured is beyond question. The first report of the Agent-General, Mr. S. Parker Gilbert, said:

It is too early to draw conclusions regarding the ultimate effects of the Plan. Broadly, it is an endeavour to stimulate confidence among peoples and to apply principles of reason and justice to a difficult, vital problem. The success of the Plan will be measured not alone in terms of payments effected. It will be determined also by the extent to which it helps to replace distrust and discord with confidence and conciliation. Its early operation has fulfilled expectations.

In his report during the third year he said:

The execution of the Plan is proceeding normally. Germany has made all the payments required of her during the first nine months of the third Annuity year, and deliveries and payments for the benefit of the creditor Powers have gone forward regularly and without interfering with the stability of the Exchange.

The pivot of the whole Plan for the first year was the German External Loan of 40 millions sterling or 800 million gold marks. In the words of the report, this was necessary to assure currency stability and financing essential deliveries in kind during the preliminary period of economic rehabilitation.

It enabled the Allies to receive something on account of reparations without, at the same time, any burden being placed upon the German budget. Negotiations were completed on Oct. 10, 1924, and on Oct. 13 the Reparation Commission constituted the service of the loan as a first charge on all the payments provided for under the Plan, and also on the collateral security of the controlled revenues and any other assets or revenues of Germany to which the powers of the Commission extended under the treaty. The transfer committee at its first meeting recognized the priority of the loan, and gave it an absolute right of remittance irrespective of the effects upon the exchange. This loan provided 800 million gold marks out of the total of 1,000 million gold marks, which constituted the first year's annuity, and the balance of 200 million gold marks came from the German Railway Company as interest on the bonds. Apart from this 200 millions, there was no drain whatever on the current resources of Germany for the first year.

Receipts.	Million gold marks.	Payments.	Million gold marks.
Cash withdrawn from proceeds of German External Loan, 1924	800·0	Payment to various Allied countries	789·0
Interest on railway bonds	200·0	Expenses of:	
		Reparation Commission . . 5·6	
		Rhineland High Com. . . . . 9·4	
Exchange differences and Interest received	0·5	Military Com. of Control . . . 7·7	
		Naval Com. of Control . . . 0·07	22·8
		European Commission of the Danube	0·2
		Service of German External Loan	77·5
		On account of administration cost of office for reparation payments, and discount on railway payments in advance	3·9
		Cash in hand, Aug. 31, 1925	107·0
Total	1,000·5		1,000·5

The Working of the Plan.—The first complete year of the Dawes scheme is shown in the preceding table of receipts and payments.

The revised distribution of the third Annuity (year to Aug. 31, 1927) showing the shares of the respective Powers is given in the table in the next column.

The transfer committee had time to examine their problem before having to take any executive action on its chief difficulties. They were not called upon to decide delicate questions of exchange priority or pressure. Their first years were taken up in making arrangements for deliveries in kind and Reparation Recovery Acts. The latter in particular presented difficult questions which were described by the Agent General in his report. By forcing the German exporter to look to the German Government or Agent General for the deductions made by the British Government in respect of a total which had no relation to the Dawes Plan or to the sums transferable by the transfer committee, the British Government could virtually ride around the powers of the committee, "confronting them with an accomplished fact."

REVISED DISTRIBUTION OF THIRD ANNUITY—SHOWING SHARES OF THE RESPECTIVE POWERS

(In Millions of Gold Marks)

	Army costs.	Belgian war debt.	Restitution.	American mixed claims.	Reparations.	Total share.
France	114·2	26·8	7·2	..	596·5	744·7
British empire	35·7	23·0	·2	..	251·3	310·2
Italy	..	..	·1	..	96·6	96·7
Belgium	16·0	8·6	3·6	..	48·3	76·5
United States	55·0	..	..	24·7	..	79·7
Other countries	..	..	·6	..	80·7	81·3
Totals	221·0	58·4	11·7	24·7	1,073·4	1,389·2
	Service of German External Loan					91·6
	Costs of Inter-Allied Commissions					12·8
	Discount on Railway Interest					6·4
	Total of Third Annuity					1,500

In the report of the negotiations between the British Treasury and the Agent General, it was arranged for the German exporters as a whole to deliver to the Reichsbank monthly 30% of the sterling proceeds of their exports to Great Britain. Deposits are made at the Bank of England for credit to the Agent General's account. The transfer committee regains control and the system adjusts itself automatically to the British Government's share in the available annuity.

Towards the end of 1925 Germany passed from a stage of comparatively easy conditions into an industrial crisis which retarded the full development of her fiscal resources towards the position demanded by the final scale of the Plan, but her subsequent recovery was satisfactory from that point of view.

V. THE INDUSTRIAL ASPECTS OF REPARATIONS

It has been increasingly realized by the industrialists of the Allied nations that, just as the payment of reparations by Germany involved the necessity for her to maintain an export surplus, so the recipient countries may derive all they need of the goods involved by imports from Germany at the expense of the competing industries in the Allied countries, and that even if the surplus of German goods should go to neutral markets they may serve only to displace similar goods hitherto exported from the Allied countries. Hence the anomalous situation has arisen that reparation payments, speaking generally, have been ardently desired by the creditor Governments, but, speaking particularly, have been feared and resisted by the business men in the same countries.

Balance of Trade Problem.—The Committee on Economic Restoration of the International Chamber of Commerce in Nov. 1924 set up a sub-committee (Sir Josiah Stamp, Dr. Alberto Pirelli and Count André De Chalendar) to study the question of international transfers of reparation payment. One report signed by all three, and a supplementary one by the English member, were presented in May 1925, and adopted at the conference in Brussels in June 1925. The chief items and recommendations were:—

The solution of the "balance of trade" problem, in relation to the liabilities under the Dawes Plan, is to be found in the following order:—

1. By a considerable expansion of German exports to general world markets in the ordinary course and under those conditions normal to Germany without any special overhead organization or effort. This carries with itself the possibility of cash payments to the Allied Governments which is, of course, the ideal form for the latter of receiving reparation payments.

2. By arrangements between each Allied creditor country and Germany with a view of developing, in the widest possible manner compatible with national interests and the obligations of the transfer committee, deliveries in kind or services. This, though possibly in the long run not a major part of the total, is important. Serbia may want locomotives which she does not produce. Italy may want coal which she may not possess, France or Great Britain may want dyestuffs or potash. These are merely examples of a wide range of goods which Germany can probably deliver without difficulty.

3. By the operation of certain international co-ordination in enterprise and public works, by research and study and practical action, of which we have in this report given an illustration called "Assisted Schemes."

4. Where the three foregoing still leave a gap between the accumulation of reparation marks and their effective transmutation into external values, it may be possible to gain time and to defer the greater difficulties of forcing the Plan by two methods: (*a*) The sale of railway, industrial and eventually other German bonds on the international markets and (*b*) by making permanent investments in Germany which will belong to non-Allied or neutral holders. The method (*a*) above may play a very important part, either as redemption of capital debt or for the balance of the annuities. It must not be forgotten, however, that the extensive use of the plan throws a burden upon the future export surplus in addition to the fixed annuities. The system under (*b*) finds certain limitations under the Dawes Plan and in practice, but it may be *e.g.*, that an Argentine resident or a Brazilian will become the owner of property in Germany, or of shares in German companies, by means of the export of food or raw materials to Allied individuals. These sales, as also these loans, are not an immediate method of externalizing German wealth, but they, so to speak, stave off the day of difficulty and gain time. The difficulty of exporting £1,000 outright is transmuted into the smaller difficulty of transferring £50 or £60 interest thereon annually in perpetuity, a difficulty capable of retransmutation into capital at some distant date after the export surplus is no longer monopolized by reparation payments, by Germans buying in the investments held by foreigners in their own country.

While theoretically the "demand" of individuals in the Allied countries will be so increased by relief in taxation that it could, ***in amount,*** absorb a new supply of German goods, the demand will not fully coincide ***in kind*** with the goods which are offered. There may be, in consequence of this maladjustment, important reactions in price which will make the burden greater for Germany to discharge, make full transfers difficult, and induce unduly severe competition in certain markets. Moreover, vested industrial interests in both capital and labour in the Allied countries may be adversely affected, and, for various reasons, if the whole question is left to uncontrolled economic forces political difficulties will arise.

We have certain suggestions to make for co-ordinated and systematic international action which, while it may not affect a large sum in relation to the whole reparation annuity, may be of great importance in assisting a settlement of this *residual problem.* We conceive that there is everything to be gained by systematic study and the existence of a "safety valve" in the event of normal channels being inadequate for the purpose, to relieve the concentrated competition, and also to prevent the consequences of accumulation of reparation payments in Germany. Our proposal would tend to prevent existing channels of German trade being flooded by excessive supplies and by a prepared plan irrigate, without disaster and with ultimate profit to the world, a wider area than could otherwise be open.

The International Chamber decided to prosecute the idea of assisted schemes, but formed no organization to aid them. (J. S.)

VI Final Settlement.

The Dawes plan did not settle the total amount to be demanded from Germany in the form of Reparations, nor did it fix the duration of annuity payments. It was simply an arrangement which permitted the beginning of payments at once without waiting for a final solution of an extremely complicated problem. However, to postpone a final settlement for long was impossible. Under a decision taken at Geneva in 1928 a new commission of experts was appointed. Owen D. Young (*q.v.*), one of the two unofficial representatives from the United States was appointed chairman. Hjalmer Schacht (*q.v.*), head of the Reichsbank, was the chief German negotiator. The committee began its meetings at Paris in Feb., 1929, and brought them to a successful close early in June. Ratification of the Paris agreement by the parliaments of the various nations concerned still remained necessary.

The new annuities are less than under the Dawes Plan and payments are limited to a fixed number of years so that the highest amount for which Germany is to be held responsible is therefore fixed. The Dawes Plan annuities had reached £123,000,000 at which level they were to continue. The Young Plan calls for annuities averaging £101,000,000 for 37 years, and then for annuities averaging £85,700,000 until the 59th year when all payments are to cease. With the adoption of the new program the machinery of the Dawes Plan is to be discarded, and the Reparations Commission will cease to exist. To supersede the commission plans were worked out for a Bank for International Settlements (*q.v.*) to handle all Reparations transactions. The bank will be governed by a board with representatives from each nation.

BIBLIOGRAPHY.—J. M. Keynes, *The Economic Consequences of the Peace* (1919); J. M. Keynes, *A Revision of the Treaty* (1922); H. G. Moulton and C. E. MacGuire, *Germany's Capacity to Pay* (1923); H. G. Moulton, *The Reparation Plan* (1924); G. Calmette, *Recueil de Documents sur l'histoire de la Question des Réparations, 1919–5 Mai 1921* (1924); *Reports of the Expert Committee appointed by the Reparation Commission* (1924); *Report submitted to the Committee on Economic Restoration of the International Chamber of Commerce* (1925); Carl Bergmann, *The History of Reparations,* with an introduction by Sir Josiah Stamp (1927); successive *Reports by the Agent General for Reparation Payment,* S. Parker Gilbert (Berlin). Various pamphlets on the Dawes Plan and kindred matters have been published by the World Peace Foundation.

REPEAL, the abrogation, revocation or annulling of a law. (*See* ABROGATION and STATUTE.) The word is particularly used in English history of the movement led by Daniel O'Connell (*q.v.*) for the repeal of the act of Union between Great Britain and Ireland. (*See* IRELAND: *History.*)

REPERTORY THEATRE: *see* DRAMA.

REPIN, ILYA YEFIMOVICH (1844–1930), Russian painter, was born in 1844 at Tschuguev in the department of Kharkov, the son of parents in straitened circumstances. He learned the rudiments of art under a painter of saints named Bunakov, for three years gaining his living at this humble craft. In 1863 he obtained a studentship at the Academy of Fine Arts of St. Petersburg (Leningrad), where he remained for six years, winning the gold medal and a travelling scholarship which enabled him to visit France and Italy. He returned to Russia after a short absence, and devoted himself exclusively to subjects having strong national characteristics. In 1894 he became professor of historical painting at the St. Petersburg academy. Repin's paintings are powerfully drawn, with not a little imagination and with strong dramatic force and characterization. He died at Kuokkala in Finland on Sept. 29, 1930.

His chief pictures are "Procession in the Government of Kiev," "The Arrest," "Ivan the Terrible's murder of his Son," and, best known, "The Reply of the Cossacks to Sultan Mahmoud IV."

REPINGTON, CHARLES A'COURT (1858–1925), British military critic, was born on Jan. 29, 1858, and commissioned in the Rifle Brigade in 1878. After serving with distinction in the Afghan War, the Sudan and South Africa, he was appointed military attaché at Brussels and The Hague in 1900, being then a lieutenant-colonel. Two years later his military career ended abruptly through domestic causes, and he took up journalism, becoming military correspondent of *The Times* in 1904. In 1915, after staying with the British commander-in-chief in France, he came home to call attention to the shell shortage. In Jan. 1918 a divergence of views caused him to leave *The Times* for *The Morning Post,* and after the War he became military correspondent of *The Daily Telegraph,* a post which he held till his death at Hove, Sussex, on May 25, 1925.

His works include *Vestigia* (1919); *The First World War, 1914–18; Personal Experiences* (1920); *After the War; A Diary* (1922); *Policy and Arms* (1924).

REPLEVIN, a term in English law signifying the recovery by a person of goods unlawfully taken out of his possession by means of a special form of legal process; this falls into two divisions—(1) the "replevy," the steps which the owner takes to secure the physical possession of the goods, by giving security for prosecuting the action and for the return of the goods if the case goes against him, and (2) the "action of replevin" itself. The jurisdiction in the first case is in the county court (*q.v.*); in the second case the supreme court has also jurisdiction in certain circumstances. At common law, the ordinary action for the recovery of goods wrongfully taken would be one of detinue (*q.v.*); but no means of immediate recovery was possible till the action was tried, and until the Common Law Procedure Act 1854 the defendant

might exercise an option of paying damages instead of restoring the actual goods.

United States.—In the United States the action of replevin is almost entirely regulated by statute in each jurisdiction, and is materially different from the use and construction of the common law action of replevin in England. The action is laid upon a wrongful taking and a wrongful detaining or a wrongful detaining alone. It is a proceeding *in rem* to recover goods and chattels, *i.e.*, every kind of personal property to which the plaintiff has the right to present possession, and also, by statute, a proceeding *in personam*, to recover damages for either the detention or both the caption and detention, according to the wording of the statute. It is a possessory action, the gist of which is the right of possession in the plaintiff, but in nearly all cases the title is determined since the owner is entitled to possession, and possession by verdict where the title is in question awards title. It will not lie to recover real property or fixtures attached to the freehold, nor can it be maintained in any case in which the object sought is the determination of title to land. In some jurisdictions all damages growing out of the wrongful taking and detention may be assessed in the replevin action; in others, where the statute limits the recovery of damages to detention only, a separate subsequent action may be brought to recover compensatory and punitive damages sustained by a malicious wrongful taking (*Crockett* v. *Miller*, 112 Federal 729; *Petrie* v. *Wardman-Justice Motors*, Sup. Ct. D. C. No. 71,338). This is a rule peculiar to replevin, where so regulated by statute, and is at variance with the general rule of law requiring the adjudication in one cause of action of all claims and demands growing out of a single tort.

REPNIN, ANIKITA IVANOVICH, Prince (1668–1726), Russian general, and one of the collaborators of Peter the Great. He took part in all the principal engagements of the Great Northern War. Defeated by Charles XII. at Holowczyn, he was degraded to the ranks, but was pardoned as a reward for his valour at Lyesna and recovered all his lost dignities. At Poltava he commanded the centre. From the Ukraine he was transferred to the Baltic Provinces and was made the first governor-general of Riga after its capture in 1710. In 1724 he succeeded the temporarily disgraced favourite, Menshikov, as war minister. Catherine I. created him a field-marshal.

See A. Bauman, *Russian Statesmen of the Olden Time* (Rus.), vol. i. (St. Petersburg, 1877).

REPNIN, NIKOLAI VASILIEVICH, Prince (1734–1801), Russian statesman and general, grandson of the preceding, served during the Rhenish campaign of 1748 and subsequently studied in Germany. Peter III. sent him as ambassador in 1763 to Berlin. The same year Catherine transferred him to Warsaw, with instructions to form a Russian party in Poland from among the dissidents, who were to receive equal rights with the Catholics. Repnin convinced himself that the dissidents were too poor and insignificant to be of any real support to Russia, and that the whole agitation in their favour was factitious. At last, indeed, the dissidents themselves even petitioned the empress to leave them alone. The attempt had failed, and Repnin went to fight the Turks. At the head of an independent command in Moldavia and Walachia, he prevented a large Turkish army from crossing the Pruth (1770); distinguished himself at the actions of Larga and Kagula; and captured Izmail and Kilia. In 1771 he received the supreme command in Walachia and routed the Turks at Bucharest. A quarrel with the commander-in-chief, Rumyantsev, then induced him to send in his resignation, but in 1774 he participated in the capture of Silistria and in the negotiations which led to the peace of Kuchuk-Kainarji. In 1775–76 he was ambassador at the Porte. On the outbreak of the war of the Bavarian Succession he led 30,000 men to Breslau, and at the subsequent congress of Teschen, where he was Russian plenipotentiary, compelled Austria to make peace with Prussia. During the second Turkish war (1787–92) Repnin was, after Suvarov, the most successful of the Russian commanders. He defeated the Turks at Salcha, captured the whole camp of the *seraskier*, Hassan Pasha, shut him up in Izmail, and was preparing to reduce the place when he was forbidden to do so by Potemkin (1789). On the retirement of Potemkin (*q.v.*) in 1791, Repnin succeeded him as commander-in-chief, and immediately routed the grand vizier at Machin, a victory which compelled the Turks to accept the truce of Galatz (July 31, 1791). In 1794 he was made governor-general of the newly acquired Lithuanian provinces. The emperor Paul raised him to the rank of field-marshal (1796), and, in 1798, sent him on a diplomatic mission to Berlin and Vienna in order to detach Prussia from France and unite both Austria and Prussia against the Jacobins. He was unsuccessful, and on his return was dismissed from the service.

See A. Kraushar, *Prince Repnin in Poland, 1764–8* (Pol.) (Warsaw, 1900); "Correspondence with Frederick the Great and others" (Rus. and Fr.), in *Russky Arkhiv* (1865, 1869, 1874, Petersburg); M. Longinov, *True Anecdotes of Prince Repnin* (Rus.) (St. Petersburg, 1865).

REPORTING, the business of reproducing, mainly for newspapers, but also for such publications as the *Parliamentary* or *Law Reports*, the words of speeches, or of describing the events in contemporary history by means of the notes made by persons known generally as reporters. There was no systematic reporting until the beginning of the 19th century, though there was parliamentary reporting of a kind almost from the time when parliaments began, just as law reporting (which goes back to 1292) began in the form of notes taken by lawyers of discussions in court. The first attempts at parliamentary reporting, in the sense of seeking to make known to the public what was done and said in parliament, were made by the *Gentleman's Magazine* in 1736. Access to the houses of parliament was obtained by Edward Cave (*q.v.*), the publisher of this magazine, and some of his friends, and they took surreptitiously what notes they could. These were subsequently put into shape for publication by another hand. Such reporting was a violation of the standing order of the House, passed in 1728, declaring the publication of any of its proceedings to be a breach of privilege, and on the attention of the House being called in 1738 to the reports in the *Gentleman's Magazine* it threatened to proceed with the utmost severity against the offenders. Thereupon Cave published his reports as "Debates in the Senate of Lilliput," and instead of giving the first and last letters of each speaker's name, employed such barbaric terms as "Wingul Pulnub" for William Pulteney. Dr. Johnson composed the speeches for the *Gentleman's Magazine* from 1740 to 1743, the names of the speakers being given in full. Though he said he took care not to let the "Whig dogs" get the best of it, he really dealt out argument and eloquence with equal hand to both political parties.

In the latter half of the century the newspapers began to report parliamentary debates more fully, with the result that, in 1771, several printers, including those of the *Morning Chronicle* and the *London Evening Post*, were ordered into custody for publishing debates of the House of Commons. A long and bitter struggle between the House and the public ensued. John Wilkes took part in it. The lord mayor of London and an alderman were sent to the Tower for refusing to recognize the Speaker's warrant for the arrest of certain printers of parliamentary reports. But the House of Commons was beaten. In 1772 the newspapers published the reports as usual; and their right to do so has never since been really questioned. Early in the 19th century, greater freedom of access to both Houses was given to newspaper reporters. By the middle of the century special galleries for their accommodation were provided in the legislative chambers of the new palace of Westminster erected in place of the old which was burned down in 1834. The press gallery of the House of Lords was first used in 1847, and the press gallery of the House of Commons in 1852. At this time the London newspapers had a monopoly of parliamentary reporting. Only their representatives were admitted to the galleries, which secured them this virtual monopoly.

The Times established a supremacy for the best parliamentary report, which has never been shaken. The other London papers, however, gave less and less attention to the debates while at the same time the public throughout the country wanted to know more fully what their representatives were saying in parliament. Gradually the leading provincial newspapers adopted the

practice of employing reporters in the service of the London journals to report debates on subjects of special interest in localities; and these reports, forwarded by train or by post, were printed in full, but of course a day late. The London papers paid little attention to debates of local interest, and thus the provincial papers had parliamentary reporting which was not to be found elsewhere. Bit by bit this feature was developed. It was greatly accelerated by the arrangement of placing telegraphic wires from London at the disposal of provincial newspapers—of course on payment of a large subscription—from six o'clock at night till three o'clock in the morning. This was the beginning of the "special wire" which now plays so important a part in the production of almost all newspapers. The arrangement was first made by the *Scotsman* and by other newspapers in Scotland in the 'sixties. The special wires were used to their utmost capacity to convey reports of the speeches of leading statesmen and politicians; and, instead of bare summaries of what had been done, the newspapers contained pretty full reports. When the telegraphs were taken over by the State in 1870 the facilities for reporting were increased in every direction. News agencies undertook to supply the provincial papers. These agencies were admitted to the reporters' galleries in the houses of parliament, but the reports which any agency supplied were identical; that is to say, all the newspapers taking a particular class of report had exactly the same material supplied to them—the reporter producing the number of copies required by means of manifold copying paper. Accordingly attempts were made by leading provincial newspapers to get separate reports by engaging the services of some of the reporters employed by the London papers. The "gallery" continued to be shut to all save the London papers and the news agencies. The *Scotsman* sought in vain to break through this exclusiveness. The line, it was said, must be drawn somewhere, and the proper place to draw it was at the London press. But in 1880 a select committee of the House of Commons was appointed to consider the question. It took evidence, and it reported in favour of the extension of the gallery and of the admission of provincial papers. The press gallery of the House of Commons was accordingly enlarged and representatives of the leading provincial newspapers were admitted at the opening of the session of 1881.

What is commonly called "descriptive reporting" has in some cases nearly shouldered the reporting of speeches out of newspapers. The special correspondent or the war correspondent is a "descriptive reporter." The "interviewer" came into great prominence during the 'eighties and 'nineties. The variety of work open to reporting causes considerable difference, of course, in the professional status of the journalists who do such work. This subject generally is discussed in the article NEWSPAPERS, but one instance of the recognition of the modern reporter's responsibility is worth special mention. In the year 1900, in the English case of *Walter* v. *Lane* (*see* COPYRIGHT), it was decided, on the final appeal to the House of Lords, that the reporter of a speech, printed verbatim in a newspaper, was under the Copyright Act of 1842 to be considered the "author." Absurd as it might seem to call the reporter the author of another man's speech, the decision gave effect to the fact that it is his labour and skill which bring into existence the "copy" to which alone can right of property attach. Strictly speaking, he is the author of the *report* of the speech; but for literary purposes the report *is* the speech. It must, however, be borne in mind that there may be more than one verbatim report, and therefore more than one "author." *See* also NEWSPAPERS; SHORTHAND; PRESS LAWS; TELEGRAPH.

(X.; M. MACD.)

UNITED STATES

The system of newspaper reporting developed in America responds to a code of ethics which, although unwritten and without centralized machinery to enforce it, is, nevertheless, a potent influence throughout journalism. These governing rules naturally arise from newspaper experience and legends, and increasingly take concrete form, somewhat by reason of the fact that 80 professional schools of journalism have in recent years sprung up in the United States, most of them being departments of established colleges or universities. It may in general be said that the reporter, whether instructed as a "cub" in the newspaper office or as a student in a professional school, learns that the newspaper, while privately owned and published for profit, is in fact quasi-public in that it possesses a constitutional guarantee of freedom and owes to society commensurate responsibility to ventilate news which concerns public welfare. News is variously described, but it is generally held to be written record of any event of public interest, reported either on evidential authority of the writer or authenticated by a credited witness. It is assumed that the newspaper may freely publish any news which may be discussed in decent society, which is true, which is not forbidden by law and which serves the public interest. This, of course, means that the reporter must use his powers to ascertain the truth and state it fairly in his report, guard against injustice or harm to individuals or institutions written about, avoid promotion of any private interest, keep confidences that are imparted to him, refuse to serve partisanship by exaggerating the favourable and suppressing the unfavourable factors in news columns and in every way write as considerately and fairly of strangers or antagonists as of protagonists and acquaintances. The reporter is called upon to keep faith both with those concerning whom he writes and those who buy and read his accounts. In modern practice the publication of the news writers' opinion is prohibited, the newspaper reserving the editorial page for the purpose of expressing views, as distinguished from news. The rule is to avoid trespass upon private rights or feelings, except when such course is dictated by certain knowledge that the ends of justice or the welfare of the social order demand such action. A newspaper may not publish advertising in its news columns, without designation. The reporter and his newspaper are called upon by custom to make proper, full and free correction of errors previously made in print. These, sketchily, are the canons of American journalism. The nearest approach to a written code which has general acceptance is that of the American Society of Newspaper Editors, composed of the editors of many of the country's leading newspapers.

Organization.—The organization of the average American newspaper's editorial department is as follows: editor-in-chief, directing policy; managing editor, in control of the writing staff and the composing room; chief editorial writer, conducting the editorial page; city editor, controlling the local staff of reporters, photographers and, perhaps, artists; head of copy-desk, directing the actual preparation of the news as it will appear in print; rewriters, graduate reporters held in the office to write the news that reporters transmit by telephone or rewrite their reports to meet the exigencies of the edition; foreman of the composing-room, responsible to the managing editor or editor-in-chief for the setting of type and delivery of forms of type to the stereotype and press rooms; telegraph editor, responsible for the editing of news which comes by wire, product of the press associations and services and the newspaper's special out-of-town correspondents. Such departments as sports, financial, commodity markets, woman's page, religion, humour and the Sunday edition, if any, are conducted by editors appointed by the managing editor or the editor-in-chief. The three great sources of information are (1) material written by the local staff; (2) news coming by wire; (3) feature material delivered by syndicates, of which there are more than 200 in the United States competing for newspaper patronage. In New York and Chicago local newspapers have established co-operative news organizations through which the routine reports of courts, police headquarters, city hall and such public offices are supplied by a single reporter for all newspapers, although all important events are covered by staff reporters assigned by city editors.

The rank and file of reporters are young men, or occasionally women, who have received public school and college education, perhaps 15 or 20% of them having matriculated in journalism. Those who are talented as fact-finders and as writers usually receive quick promotion, such recognition giving them higher salaries than is usually paid to young people in the professions or the fields of finance, commerce or education. Reporting, in the matter of compensation, ranks with the arts and while true genius

reaps a quick and ample reward mediocre talent is only fairly paid and the mere drudgery of reporting is as poorly paid as clerkships or common labour. (M. E. P.)

REPOUSSÉ (Fr. "driven back"), the art of raising designs upon metal by hammering from the back, while the "ground" is left relatively untouched. The term is often loosely used, being applied indifferently to "embossing." Embossing is also called *repoussé sur coquille* and *estampage,* but the latter consists of embossing by mechanical means and is therefore not to be considered as an art process. Moreover, it reverses the method of repoussé, the work being done from the front, and by driving down the ground leaving the design in relief.

Repoussé—a term of relatively recent adoption, employed to differentiate the process from embossing—has been known from remote antiquity. Nothing has ever excelled, and little has ever approached, the perfection of the bronzes of Siris (4th century B.C., in the British Museum), of which the armour-plate—especially the shoulder-pieces—presents heroic figure-groups beaten up from behind with punches from the flat plate until the heads and other portions are wholly detached—that is to say, in high relief from the ground of which they form a part. Yet the metal, almost as thin as paper, is practically of constant thickness, and nowhere is there any sign of puncture.

The art was not only Greek and Graeco-Roman in its early practice; it was pursued also by the Assyrians, the Phoenicians, and other oriental peoples, as well as in Cyprus and elsewhere, and was carried forward, almost without a break, although with much depreciation of style and execution, into mediaeval times. In the 11th century the emperor Henry II. presented as a thank-offering to the Basle cathedral the altar-piece, in the Byzantine style, decorated with fine repoussé panels of gold (representing Jesus Christ with two angels and two saints), which is now in the Cluny Museum in Paris. Up to this time, also, repoussé instead of casting in metal was practised for large work, and Limoges became a centre for the manufacture and exportation of sepulchral figures in repoussé bronze. These were affixed to wooden cores. By the time of Benvenuto Cellini the art was confined almost entirely to goldsmiths and silversmiths (who, except Cellini himself, rarely cast their work); and to them the sculptors and artists of to-day are still content to relegate it.

The elementary principle of the method, after the due preparation and annealing of the plate, was to trace on the back of it the design to be beaten up, and to place it face downwards upon a stiff yet not entirely unresisting ground (in the primitive stage of development this was wood), and then with hammers and punches to beat up the design into relief. According to Cellini, his master Caradosso da Milano would beat up his plate on a metal casting obtained from a pattern he had previously modelled in wax; but he is not sufficiently explicit to enable us to judge whether this casting was a hollow mould, which would result in true repoussé, or in the round, which is tantamount to *repoussé sur coquille,* or embossing.

Nowadays the plate is laid upon and affixed to a "pitchblock," a resinous ground docile to heat, usually composed of pitch mixed with pounded fire-brick, or, for coarser work such as brass, with white sand, with a little tallow and resin. This compound, while being sufficiently hard, is elastic, solid, adhesive and easy to apply and remove. Gold and silver are not only the densest and most workable but the most ductile metals, admitting of great expansion without cracking if properly annealed. The tools include hammers, punches (in numerous shapes for tracing, raising, grounding, chasing and texturing the surfaces), together with a special anvil called in French a *recingle* or *ressing,* in English "snarl." The *recingle,* or small anvil with projecting upturned point, was known in the 16th century. This point is introduced into the hollow of the vase or other vessel such as punch and hammer cannot freely enter, which it is desired to ornament with reliefs. A blow of a hammer on that part of the anvil where the prolongation first projects from it, produces, by the return spring, a corresponding blow at the point which the operator desires to apply within the vase. The same effect is produced by the modern "snarl" or "snarling iron"—a bar of steel, with an inch or two of the smaller end upturned and ending in a knob—held firmly in a tightly screwed-up vice, whereby the blow is similarly repeated or echoed by vibration. The repoussé work, when complete, is afterwards finished at the front and chased up. (*See* also EMBOSSING; BRONZE; SILVERSMITHS AND GOLDSMITHS WORK.)

(M. H. S.)

REPRESENTATION, a term used in various senses in different connections, but particularly in a political meaning, which has developed out of the others. The word "represent" comes from Lat. *re-praesentare,* to "make present again," or "bring back into presence," and its history in English may be traced fairly well by the citations given in the *New English Dictionary* of its earliest uses in literature in senses which are still common. Thus we find the verb meaning (1380) simply to "bring into presence," and Barbour uses it (1375) in the sense of bringing clearly before the mind, whence the common sense of "explain," "exhibit," "portray." In 1513 it is used as synonymous with "describe," or "allege to be." In 1460 we find it employed for the performance of a play or a part in a play, whence comes the sense of symbolizing, standing in the place of some one, or corresponding to something; and in 1655 for acting as authorized agent or deputy of some one. This is a notable point in the development of the word. In Cromwell's speech to the parliament, Jan. 22, 1655, he says: "I have been careful of your safety, and the safety of those you represented." This strictly political use of the verb developed, it will be seen, comparatively late.

The noun "representation" passed through similar stages. In 1624 it comes to mean "substitution of one thing or person for another," "substituted presence" as opposed to "actual presence," or "the fact of standing for, or in place of, some other thing or person," especially with a right or authority to act on their account. Its application to a political assembly then becomes natural, but for some time it is not so found in literature, the sense remaining rather formal. In Scots law (1693) it obtains the technical meaning of the assumption by an heir of his predecessor's rights and obligations.

The term "representative," now specially applied to an elected member of a national or other assembly, deriving his authority from the constituency which returns him, appears to have been first used to denote not the member but the assembly itself. In the Act abolishing the office of king, after Charles I.'s execution, 1649, s. iv. runs: "And whereas by the abolition of the kingly office provided for in this Act, a most happy way is made for this nation (if God see it good) to return to its just and ancient right of being governed by its own Representatives or national meetings in council, from time to time chosen and entrusted for that purpose by the people, it is therefore resolved and declared by the Commons assembled in Parliament," etc., "and that they will carefully provide for the certain choosing, meeting and sitting of the next and future Representatives," etc. But the application of the term to the persons who sat in parliament was at all events very soon made, for in 1651 Isaac Penington the younger published a pamphlet entitled "The fundamental right, safety and liberty of the People; which is radically in themselves, derivatively in the Parliament, their substitutes or representatives."

It is worth while to dwell on the historical evolution of the various meanings of "represent," "representation" and "representative," because it is at least curious that it was not till the 17th century that the modern political or parliamentary sense became attached to them; and it is well to remember that though the idea of political representation is older and thus afterwards is expressed by the later meaning of the word, the actual use of "representation" in such a sense is as modern as that. In Burke's speeches of 1769 and 1774–75, relating to taxation, we find the word in this sense already in common use, but the familiar modern doctrine of "no taxation without representation," however far back the idea may be traced, is not to be found in Burke in those very words. The "originator of that immortal dogma of our (*i.e.,* American) national greatness" was, according to the American writer M. C. Tyler (*Amer. Lit.* i. 154), the politician and philanthropist Daniel Gookin (1612–87), an Irish settler in Virginia, who, moving to Boston and becoming speaker of the Massa-

chusetts legislature, became prominent in standing up for popular rights in the agitation which resulted in the withdrawal of the colonial charter (1686). But it was the vogue of the "dogma" in America, not its phrase, that he seems to have originated; and while the precise form of the phrase does not appear to be attributable to any single author, the principle itself was asserted in England long before the word "representation," in a political sense, was current. In English constitutional history the principle was substantially established in 1297 by the declaration *De Tallagio non concedendo,* confirmed by the Petition of Right in 1628.

Political Representation.—The growth of the parliamentary system in England is traced in the article PARLIAMENT. Under Henry III., in 1254, we have the writ requiring the sheriff of each county to "cause to come before the King's Council two good and discreet Knights of the Shire, whom the men of the county shall have chosen for this purpose in the stead of all and of each of them, to consider along with knights of other shires what aid they will grant the king." But the definite establishment of the principle of political representation, in a shape from which the later English system of representation lineally descended, may be traced rather to the year 1295, in Edward I.'s famous writ of summons to parliament, of which the following is the important part. In the volume of *Select Documents of English Constitutional History* (1901), selected by G. B. Adams and H. M. Stephens, whose version from the Latin we quote, the section is headed (antedating the use of the vital word), "Summons of representatives of the counties and boroughs":—

> The king to the sheriff of Northamptonshire. Since we intend to have a consultation and meeting with the earls, barons and other principal men of our kingdom with regard to providing remedies against the dangers which are in these days threatening the same kingdom; and on that account have commanded them to be with us on the Lord's Day next after the feast of St. Martin in the approaching winter, at Westminster, to consider, ordain and do as may be necessary for the avoidance of these dangers: we strictly require you to cause two knights from the aforesaid county, two citizens from each city in the same county and two burgesses from each borough, of those who are especially discreet and capable of labouring, to be elected without delay, and to cause them to come to us at the aforesaid time and place. Moreover, the said knights are to have full and sufficient power for themselves and for the community of the aforesaid county, and the said citizens and burgesses for themselves and the communities of the aforesaid cities and boroughs separately, then and there, for doing what shall then be ordained according to the Common Council in the premises, so that the aforesaid business shall not remain unfinished in any way for defect of this power. And you shall have there the names of the knights, citizens and burgesses, and this writ.

The words "Elegi facias," instead of "venire facias" (which were retained in 1275; *see* PARLIAMENT), still appear to make the parliament of 1295 the model, rather than that of 1275, though in other respects the latter appears now to have established the summoning of county and borough representatives.

In this summoning by the king of the two knights and two burgesses with full and sufficient power *for themselves and for the community,* we find therefore the origin of political representation of the commons, as opposed to the actual presence and personal attendance of the peers. But it must always be remembered that the idea of "majority rule," *i.e.,* that an assembly of persons could bind a minority of its members, is a conception of slow growth. The "Common Council" of Magna Carta was far from holding that it had any right to bind any dissentient members. As McKechnie, in his "Commentary on Magna Carta" (1914), aptly observes, " 'No new exactions without the consent of the *individual* taxed' was nearer the ideals of 1215 than 'no taxation without the consent of parliament'." Indeed in 1221, a member, the bishop of Winchester, of a council, summoned to consent to a scutage tax, refused to pay, after the council had made the grant, on the ground that he dissented and the Exchequer upheld his plea. In the case of the Commons, where each individual "represented" other persons besides himself, such an attitude was, of course, absent—the very fact of their *election* discountenanced it. But, as Gierke says (*Political Theories of the Middle Age,* pp. 64 and 166), the idea of old Germanic law was that, even in a more or less "representative" assembly, "unanimity is requisite," although "a minority ought to, and can be, compelled to give way." The idea of representation and with it, majority rule, makes its way into the political sphere through the church councils who adopted it from the law of corporation (Gierke, p. 64). But even in the church the canonists held that minorities had certain irrefragable rights and that matters of faith could not be decided by mere majorities.

The Theory of Representation.—The idea of "representation" as opposed to "presence in person" was applied to the English parliament, so as to give the commons a proper voice in it as well as the lords. It is unnecessary here to trace further the gradual increase in power of the House of Commons till it became the predominant partner in the English bicameral constitution. (*See* PARLIAMENT.) But from the point of view of historical theory it is important to note that its representative character does not essentially depend upon the particular method (election *by vote*) by which its members have for so long been chosen. It is a common error to regard the House of Commons as having a national authority higher than that of the House of Lords merely on the ground that it is composed of elected members, and to stigmatize the House of Lords as "unrepresentative" because it is not elected. But in strictness the question of election, as such, has nothing to do with the matter. The proper distinction (ignoring for the moment the later inclusion in the House of Lords of a certain representative element—strictly so regarded—in the Scotch and Irish peers) is that the House of Lords, as still constituted in 1910, remained a *presentative* chamber, while the House of Commons was essentially a *representative* one; in the former the members, summoned personally as individuals, were entitled to speak in the great council of the nation, while in the latter the members were returned as the mouthpieces of whole *communitates,* to whom, in the person of the sheriffs, the summons had been directed to send persons to speak for them.

The preponderant authority of the House of Commons is due not to its members being elected—that is only one way of settling who the mouthpieces of the commons shall be—but to the progress of popular government. The two British houses have historically existed as assemblies of the separate estates of the realm—the House of Lords of the two estates of lords spiritual and temporal, and the House of Commons of the commons. The third estate has so increased in power as to become predominant in the country; but the authority of its own assembly simply depends on the powers of those it represents. If the balance of political power had not been shifted in the country itself, the authority and competence of the peers, speaking for themselves in a primary assembly, would in theory actually appear higher, so far as their order is concerned, than that of members of the House of Commons, who can only "represent" the popular constituencies. Moreover, the fact that most members of the House of Commons are elected by a party vote is apt to make them very often even less authoritative spokesmen of their constituencies—the *communitates*—than if they were selected by some method which would indicate that they had the full confidence of the whole body they "represent."

It is notorious that many members of a modern House of Commons, or of any other "representative" assembly, have only been elected by the votes of a minority of their constituency, or (where there have been more than two candidates) a minority even of those who voted; and there always comes a time when it is certain that if a representative has to come again before the electorate for their votes he will be defeated; he, in fact, no longer reflects their views, while he still sits and legislates. The real desires of the commons in a certain British constituency may even be more faithfully, even if only accidentally, reflected by a local peer whose only right to speak in parliament is technically presentative. In his *Vindication of the British Constitution* (1835), Disraeli, writing of the Reform Bill of 1832, observed that "in the effort to get rid of representation without election, it will be well if eventually we do not discover that we have only obtained election without representation." A truer word was never spoken. A man may be representative, practically *consensu omnium,* although no vote, resulting from a division of opinion, has been

taken for the purpose of selecting him. The vote is merely a method of selection when there is a definite division of opinion involving an uncertainty; and even in the modern House of Commons many members are returned "unopposed," no actual voting taking place. A well-recognized representative character (as regards the functions involved) attaches, for instance, in British public life to other persons in whose selection the method of popular voting has had no place; such as the king himself, the Cabinet (in relation to the political party in power), or the bishops (as regards the Church of England).

Expression of the "Will of the People."—It remains nevertheless the fact that, in politics, "representative" government means not so much government by men really representative of the nation as government in the name of the whole body of citizens (and predominantly the estate of the commons) through a chamber or chambers composed of elected deputies. The object in view is the expression of the "will of the people"—the people, that is, who are sovereign. Clearly the only pure case of such government can be in a republic, where there is only one "estate," the free citizens. The home and historical type of representative government, the United Kingdom, is strictly no such case, since the monarchy and the House of Lords exist and work on lines constitutionally independent of any direct contact with the electorate. British practice, however, is of vital importance for the theory of representative institutions, and it is worth while to point out that the "will of the people" may even so be effectively expressed—some people may think even more effectively expressed than in a pure republic. The king and the House of Lords are just as much part of "the people," in the widest sense, as "the commons" are; they are an integral part of the nation. Until 1911 they remained entitled and expected to use their historic method of playing a part in the government of the State. They assist to constitute "the people" in the wider sense, and in the narrower sense "the people" (*i.e.*, the commons) know it and rely on it.

Under the British constitution the commons have habitually relied on the monarchy and the House of Lords to play their part in the State, and on many occasions it has been proved, by various methods by which it is open to the commons themselves to show their real feeling, that action on the part of the monarch (*e.g.*, in foreign affairs) or the House of Lords (in rejecting or modifying bills sent up by the House of Commons), in which a popular vote has played no initiating or controlling part, is welcomed and ratified, by consent of a large majority, on the part of the nation at large. But the Parliament Act of 1911 has changed all that by reducing the function of the House of Lords to a purely suspensory veto on legislation, a veto the exercise of which may be automatically terminated in three sessions by the will of the Commons without any appeal to the electorate. It is notorious, in the case of the House of Lords, that elected members of the House of Commons, tied by purely party allegiance and pledges, have constantly voted for a measure they did not want to see passed, relying on the House of Lords to throw it out.

Ultimately, no doubt, the reconciliation of this "presentative" element in the British form of constitution with the growth of democracy and the predominance of the "representative" system depends purely on the waiving of historical theory both by king and peers, and its adaptation to the fact of popular government through the recognition that their action rests for its efficient authority upon conformity with the "will of the people." Thus it became an established maxim in England that while it was the proper function of the House of Lords to reject a measure which in their opinion is not in accordance with the wishes of the nation, they could not repeat such a rejection after a general election had shown that its authors in the House of Commons were supported by the country. The experience of politics from 1832 to 1910 gave abundant justification to the House of Lords for supposing that in such cases they were interpreting the desire of the country better than the House of Commons; the case of the Irish Home Rule bill of 1893 is, of course, the classical example. The violent attacks made on the House of Lords by the Liberal Party, on occasions when that party has had a majority in the commons and has had its measures rejected or distastefully amended, have always been open to the criticism that if the majority in the House of Commons were really supported by the electorate in the country they had the remedy in their own hands.

The Suffrage.—The immense extension of the "representative principle" in government, by means of popular election, and its adaptation to municipal as well as national councils, has in recent times resulted in attracting much attention to the problem of making such elected bodies more accurately representative of public opinion than they frequently are. There are three distinct problems involved—(1) that of making the number of enfranchised citizens correspond to a real embodiment of the nation; (2) that of getting candidates to stand for the office of representative who are competent and incorruptible exponents of the national will, and (3) that of adopting a system of voting which shall result in the elected representatives forming an assembly which shall adequately reflect the balance of opinion in the electorate.

There are various interesting questions as to the principles which should govern the extension of the suffrage and its limitations, to which a brief reference may here be made. It is noteworthy that John Stuart Mill, the philosophical radical whose work on *Representative Government* (first published in 1861) is a classic on the subject, and who regarded the representative system as the highest ideal of polity, made a good many reservations which have been ignored by those who frequently quote him. Mill's ideal was by no means that popular government should involve a mere counting of heads, or absolute equality of value among the citizens. While holding that "no arrangement of the suffrage can be permanently satisfactory in which any person or class is peremptorily excluded, or in which the electoral privilege is not open to all persons of full age who desire to obtain it," he insisted on "certain exclusions." Thus he demanded that universal education should precede universal enfranchisement, and laid it down that if education to the required amount had not become universally accessible and thus a hardship arose, this was "a hardship that had to be borne." He would not grant the suffrage to any one who could not read, write and perform a sum in the rule of three. Further, he insisted on the electors being taxpayers, and emphasized the view that, as a condition annexed to representation, such taxation should descend to the poorest class "in a visible shape," by which he explained that he did *not* mean "indirect taxes," a "mode of defraying a share of the public expenses which is hardly felt." He advocated for this purpose "a direct tax, in the simple form of a capitation" on every grown person. But even more than this, he was in favour of a form of plural voting, so that the intellectual classes of the community should have more proportionate weight than the numerically larger working-classes: "though every one ought to have a voice, that every one should have an equal voice is a totally different proposition."

Modern democracy may ignore Mill's emphatic plea for plural voting, as it ignores his equally strong arguments against the ballot —his contention being that secret voting violated the spirit of the suffrage, according to which the voter was a trustee for the public, whose acts should be publicly known—but Mill's discussion of the whole subject proceeds on high grounds which are still worth careful consideration. Where a representative system, as such, is extolled as the ideal polity, the reservations made by Mill, a liberal thinker who cannot be dismissed as a prejudiced reactionary, should be remembered. Mill postulated, in any event, a state of society which was worthy of such a system, no less than the necessary checks and balances which should make it correspond to the real conditions of rational government. "Representative institutions," he pointed out, "are of little value, and may be a mere instrument of tyranny or intrigue, when the generality of electors are not sufficiently interested in their own government to give their vote, or, if they vote at all, do not bestow their suffrages on public grounds, but sell them for money, or vote at the beck of some one who has control over them, or whom for private reasons they desire to propitiate. Popular election, as thus practised, instead of a security against misgovernment, is but an additional wheel in its machinery."

As regards the important question of the selection of candi-

dates (which depends partly on their willingness to stand, and partly on the means available for discovering suitable persons), modern practice is entirely dominated by the organization of political parties and the requirements of party allegiance. Though much has been said as to the desirability or not of paying members for their services (*see* PAYMENT OF MEMBERS), this is certainly overshadowed by the question of the availability of really capable men at all to the number required, for all candidates become "professional" politicians, whether paid or not. The ideal of having a "representative man" in the broader sense as a "representative" in the narrower is only very roughly attained where the conditions of public life make a capacity for electioneering a necessity. To a large extent the political candidate depends purely upon the support of a party organization. His choice rests with party wire-pullers, and the average individual elector is confronted with the task of voting for some one of whom he may personally know very little, except that, if returned, the candidate will in parliament vote for measures embodying certain general principles as indicated in some vague party programme.

Systems of Voting.—The more important point to be considered here is the third. When a representative assembly is to be elected by a direct popular vote, it is obviously necessary (*a*) that either there should be some system by which the whole body as a unit should elect all the members *en bloc*, or, as this usually appears impracticable, that the mass of electors should be divided within defined areas, or "constituencies"; and (*b*) that in the latter case voting shall take place for the purpose of electing one or more representatives of each such area according to some method by which due effect shall be given to the preferences of the electors. In theory there can be no perfectly fair arrangement as between constituency and constituency, where a single representative is to be returned, except on the terms that they are exactly equal in the number of electors; each elector's voice would then count equally with that of any other in the nation (or *mutatis mutandis* in the municipality, etc.). But in practice it is difficult to the point of impossibility to attempt more than an arbitrary distribution of electoral areas, more or less approximating to equality; and recourse is had to the formation of constituencies out of geographical districts taken as units for historical or practical reasons, and necessarily fluctuating from time to time in population or influence. It may become necessary periodically to revise these areas by what in England are called Redistribution Acts, but it has to be admitted that any perfect system of representation is always stultified by the necessary inequalities involved; and what is known as "gerrymandering" is sometimes the result, when a party in power so recasts the electoral districts as to give more opportunity for its own candidates to be returned than for those of its opponents. This flaw is particularly noticeable when the arrangement for the method of voting is that which allots only one member or representative to each district (*scrutin d' arrondissement*).

The essential vice of this single-member system, which prevails in Great Britain and the United States, is the lack of correspondence between the proportions in which the elected members of each party stand to one another and the proportions in which the numbers of the electors who returned them similarly stand; and it may well be that the minority party in the country obtains a majority of representatives in the assembly, or at any rate that a substantial minority obtains an absurdly small representation. "As a result of the district system," writes Prof. J. R. Commons of Wisconsin (*Proportional Representation*, 1907), "the national House of Representatives (in America) is scarcely a representative body. In the Fifty-first Congress, a majority of representatives were elected by a minority of the voters"; the figures being 5,348,379 Republican votes with 164 elected, and 5,502,581 Democratic votes with 161 elected. In the case of the Fifty-second Congress, the Democrats, with 50·6% of the votes, returned 71·1% of the representatives; the Republicans, with 42·9% of the votes, returning 26·5% of the representatives. Lord Avebury (*Proportional Representation*, 1890; new ed. 1906) has given various similar experiences in England; thus, at the general election of 1886, the Liberals, with 1,333,400 votes, only obtained 176 seats, while the Unionists, with 1,423,500, obtained 283 (not counting 99 unopposed returns on the Liberal side, and 111 on the Unionist). So with subsequent elections. In 1906, the Unionist vote, though 44% of the total cast, returned only 28% of the members, and the Liberal majority, which in strict proportion would have been 68, actually was 256.

The definite emergence of a third party system in England, with the rise of the Labour Party, has accentuated such paradoxes. It frequently happens that with three candidates, Conservative, Liberal and Labour, the candidate who heads the poll is returned with a minority of the total number of votes cast. At the general election of 1924, over 16 million votes were recorded, but of the 615 members returned the Liberal party only won 39 seats although nearly three million electors voted in its favour. On a purely numerical basis of votes it was entitled to at least 100 representatives. Together, the two opposition parties, Liberal and Labour, actually polled some 250,000 more votes than the Conservative Party, but only secured 189 seats against 413 seats won by the Conservatives.

The establishment of mere party majority rule, which is characteristic of a representative system, is a necessity, no doubt, in popular government; but the way in which a substantial minority of voters may only obtain a contemptible minority of members, and may in practice be tyrannized over in consequence, somewhat detracts from its blessings, and leads to extreme party measures. The division of the whole electoral body into constituencies is, after all, only a device for getting over the difficulty of the electors voting *en bloc*, and it does not seem to justify the conversion of a real majority in the country into a minority as represented in parliament, nor the complete exclusion of a substantial number of the electorate from parliamentary representation—so far as their views are concerned—at all. Yet under the English system such results are possible as the capture of every seat in Wales (34), in 1906, by the Liberal party, with 217,462 votes, the 100,547 Unionist voters having no representation in parliament.

Proportional Representation.—The attempt to rectify this flaw in the representative method has led to the suggestion of various devices by the adoption of which the elected members may correspond more equally to the divisions of opinion in the electorate. Under the plan of *scrutin de liste* (or "general ticket") larger districts are created, each returning several members, and each voter has as many votes as there are members to elect; but while this system apparently provides the opportunity for the return of candidates with different views, it only requires a solid party vote to capture the whole of the representation for a majority. What is known as the "limited vote" is a form of *scrutin de liste* by which the elector has less votes than there are seats to be filled; with (say) three to be elected, the elector has only two votes. Systems of "limited vote" are in force in Portugal, Spain and Japan. A somewhat better plan is the "cumulative vote," which gives each elector as many votes as there are members to be elected, but allows him to divide them as he pleases (instead of giving only one vote to any one candidate). This enables an organized minority, by concentrating their votes, to elect at all events some representative; but the "cumulative vote" works rather capriciously, and is commonly defeated by careful party organization.

A more elaborate plan, but depending like the "limited" vote and the "cumulative" vote on the formation of constituencies returning three or more members each, is that of the "transferable vote." By this device an elector can indicate on his ballot paper not only his first choice, but also his second or third, etc. To ensure election a candidate need not obtain a majority of the votes polled, but only a certain number, so fixed that it can be obtained by a number of candidates equal to the number of seats to be filled, but by no more; this number of votes is called the "quota." At the first count first choices only are reckoned, and those candidates who have received a "quota" or more are declared duly elected. If all the seats have not then been filled up, the surplus votes of those candidates who have received more than the "quota" are transferred according to the names marked (2) on them. If these transfers still do not bring the requisite number of

candidates up to the "quota," the lowest candidate is eliminated and his votes transferred according to the next preferences, and so on till the seats are filled. This system, which is the one usually associated with the term "proportional representation" was first suggested by Thomas Hare, who published in 1857 a pamphlet on *The Machinery of Representation,* and in 1859 a more complete scheme in his treatise on *The Election of Representatives.* John Stuart Mill, in *Representative Government* (1861) warmly endorsed Hare's proposal. Hare wished to treat the whole country as one constituency, but by later supporters of the "transferable vote" that plan was abandoned as impracticable; and the principle will work so long as the constituencies adopted each return several members. Lord Courtney, in his evidence before the British Royal Commission in 1909, said that his *minimum* constituency would be a three-membered one, but he would create a 15-membered constituency without hesitation. The simple "transferable vote" has been adopted in Tasmania for all elections (1907), after experimental adoption in the constituencies of Hobart and Launceston in 1896–1901, and in the election of the Tasmanian members of the Commonwealth legislature in 1900. It was proposed in the draft of the South African constitution, but abandoned. The principle was also adopted in the "list systems" of Belgium, some Swiss cantons, Sweden, Finland and parts of Denmark, Württemberg and Serbia, where candidates are grouped in lists and all votes given to individual candidates on the list count first as votes for the list itself, the seats being divided among the lists in proportion to the total number of votes obtained by the list.

The principle of proportional representation has been widely adopted in the many new constitutions that have been established in Europe as the result of revolution or secession following on the World War. The most notable is that established in Germany by the Electoral Law of April 27, 1920, for the Reichstag, whereby every party receives a degree of representation corresponding to the number of votes cast in the whole of Germany, one deputy being returned for every 60,000 party votes cast. Minority votes in one constituency are added to the minority votes of the same party complexion cast in another. Article 17 of the *Reich* constitution further imposes the system of proportional representation (*Verhältniswahl*) on the elections to the State legislatures, though the form it has taken differs in the different States. The principle was also adopted by s. 15 of the Government of Ireland Act 1920 and is in consequence in force in Northern Ireland. By Article 26 of the Irish Free State Constitution it has been adopted by the Irish Free State. The extension of the principle in Europe in recent years has been extraordinary. Switzerland adopted it for Federal elections by a referendum to that effect which resulted in its adoption in 1918 in the Constitution. The post-war constitutions of Poland (Art. 11), Czechoslovakia (Art. 13), Austria (Art. 26), make similar provision.

The use of the general term "proportional representation" is, however, somewhat misleading; people often suppose that only one identical system of voting is meant, whereas in fact some 300 possible varieties have been proposed, and each of the States mentioned has a different one from all the others. The only common element is the device of the "transferable vote," *i.e.,* the method of having an "electoral quota," and the filling up of seats, where a quota is not provided by the first choices, by votes transferred from the second choices, and so on. It may be noted here that the "transferable vote" is calculated to multiply candidates to a point at which the minds of the electorate may well be embarrassed as to their preferences (the largest Belgian constituency returns 22 members), and, while undoubtedly providing for "minority representation," to encourage what may be called "minority thinking" and particularist politics. The "transferable vote" is commonly objected to as puzzling to the electors and too complicated for the scrutineers, while it is not much favoured by "machine" party organizations, which generally prefer the simpler plan of rough-and-ready majorities; but it has received a growing amount of theoretical support, as well as success in practical experiment, in recent years.

The Second Ballot.—The "second ballot" is a device for securing absolute majority, instead of relative majority, representation. Where the two-party system prevails, it is usual for only two candidates, one for each party, to stand for each single-member constituency. But there is nothing to prevent a third or even a fourth candidate standing, and this multiplication of candidates becomes the more common in proportion as parliamentary organization is split up into groups. The consequence is that the candidate who heads the poll may well have only a relative, not an absolute, majority of votes, and to meet this objection the "second ballot" has been introduced in several European countries. Under this system, if no candidate receives an absolute majority of all the votes, a second election is held, at which, as a rule, only the two candidates compete who received most; or in cases where more than one seat is to be filled, twice as many candidates compete as there are seats. In principle the second ballot has much in its favour, though it does not necessarily reflect the real opinion of the electorate, but only what is practicable; and while leading to political bargaining it does nothing for minority representation.

In England the importance of the whole subject of the method of elections was recognized at the end of 1908 by the appointment of a Royal Commission to enquire and report. Its conclusions were published in 1910, after much interesting evidence had been taken, but they attracted little attention, being in the main adverse to innovation.

It may be said broadly that all the devices which have been proposed for mitigating or redressing the defects of electoral methods ignore the essential fact that in any case a representative system can only result in a rather arbitrary approximation to correspondence with the opinions of the electorate. It is by no means certain even that "proportional representation" in any of its forms would always result in the return of a representative assembly reflecting with mathematical accuracy the balance of opinion in the electorate; and even if it did, the electors have a way of changing their opinions long before their representatives come up for re-election. It was stated before the British Royal Commission that in Belgium, in spite of "proportional representation," both in 1900 and in 1902 a majority of members was returned by a minority of votes. While under majority rule, as Augustine Birrell once remarked, "minorities must suffer"—even large minorities—it is on the other hand not likely to conduce to the popularity of representative government that minorities should obtain too great a share of political power. Moreover its adoption sometimes, as in Germany, simply results in such a multiplicity of parties, sects and factions as to make a stable Government almost impossible. The fact is that no "representation" can reflect the views of those "represented" as accurately as "presentation" by those entitled personally to speak. This conclusion, while in no necessary degree qualifying the importance of "popular government," undoubtedly detracts from the value of the representative method. The result is seen in the increasing desire in really democratic countries to supplement representative government by some form of Referendum, or direct appeal to the electors for their own personal opinion on a distinct issue—a method which involves fundamentally the addition of a "presentative" element to the representative system.

Alike in the British empire and the United States, in contrast to European countries, popular opinion is against the innovation of proportional representation. Queensland and certain western provinces of Canada as also the western States of the U.S.A. have shown a definite preference for the "referendum." This device, *i.e.,* the reference of bills passed by a representative legislature to a plebiscite of the whole electorate, is, of course, not an extension of the representative principle, as expressed in schemes of "proportional representation," but a direct contradiction to it, as it implies that the "representative" legislators, even when elected on the principle of "proportional representation," are not sufficiently "representative" of the will of the people to make their action in the legislature binding on the latter. Yet the fact that the very countries or some of them, such as Germany and Switzerland, which have adopted "proportional representation," have also adopted or retained the "referendum" seems to indicate doubt as to the perfectibility of proportional representation.

BIBLIOGRAPHY.—The best discussion of the various methods for securing adequate representation is now to be found in the *Report* (1910) of the British Royal Commission on Systems of Election (Parliamentary Paper, Cd. 5,163). It is chiefly valuable for its description of the devices in use in different countries and for its weighty criticism of the proposals for minority representation. Among other authorities may be mentioned the following: J. H. Humphreys, *Proportional Representation* (1911); Ostrogorski, *Democracy and the Party System* (1910); Beard and Schultz, *Documents on the Initiative, Referendum and Recall* (1912); Gierke, *Political Theories of the Middle Age* (Maitland's translation, 1900); J. H. Humphreys, *Practical Aspects of Electoral Reform* (1923); Sir J. Fischer Williams, *The Reform of Political Representation* (1918); C. G. Hoog and G. H. Hollett, *Proportional Representation* (1926). (H. C.; X.)

REPRESENTATIVE GOVERNMENT: *see* REPRESENTATION.

REPRISALS, acts of retaliation by one belligerent to compel the other belligerent to refrain from committing unlawful acts of war, and to comply with the recognized laws and customs of war. Reprisals should only be taken in the last resource. They should not be excessive and in no case be of a barbarous character. They should consist of a repetition of the same or similar acts, and, so far as possible, should be inflicted, not vicariously, but on the actual wrongdoer. The only authoritative rule is to be found in the *Oxford Manual of the Laws and Customs of War on Land* (1880) of the Institute of International Law. For the extent to which neutrals may be involved, *see* NEUTRALITY.

Certain measures of redress, short of war, are also termed reprisals. At the present time they usually take the form of the occupation of a port or some part of the territory of the offending state, or the seizure of its customs duties, or the detention of its vessels lying in the territorial waters of the injured state, or the institution of a pacific blockade (*q.v.*).

See P. Cobbett, *Leading Cases on International Law* (1885); A. D. McNair, *The Legal Meaning of War and the Relation of War to Reprisals,* Grotius Transactions vol. ii. (1926).

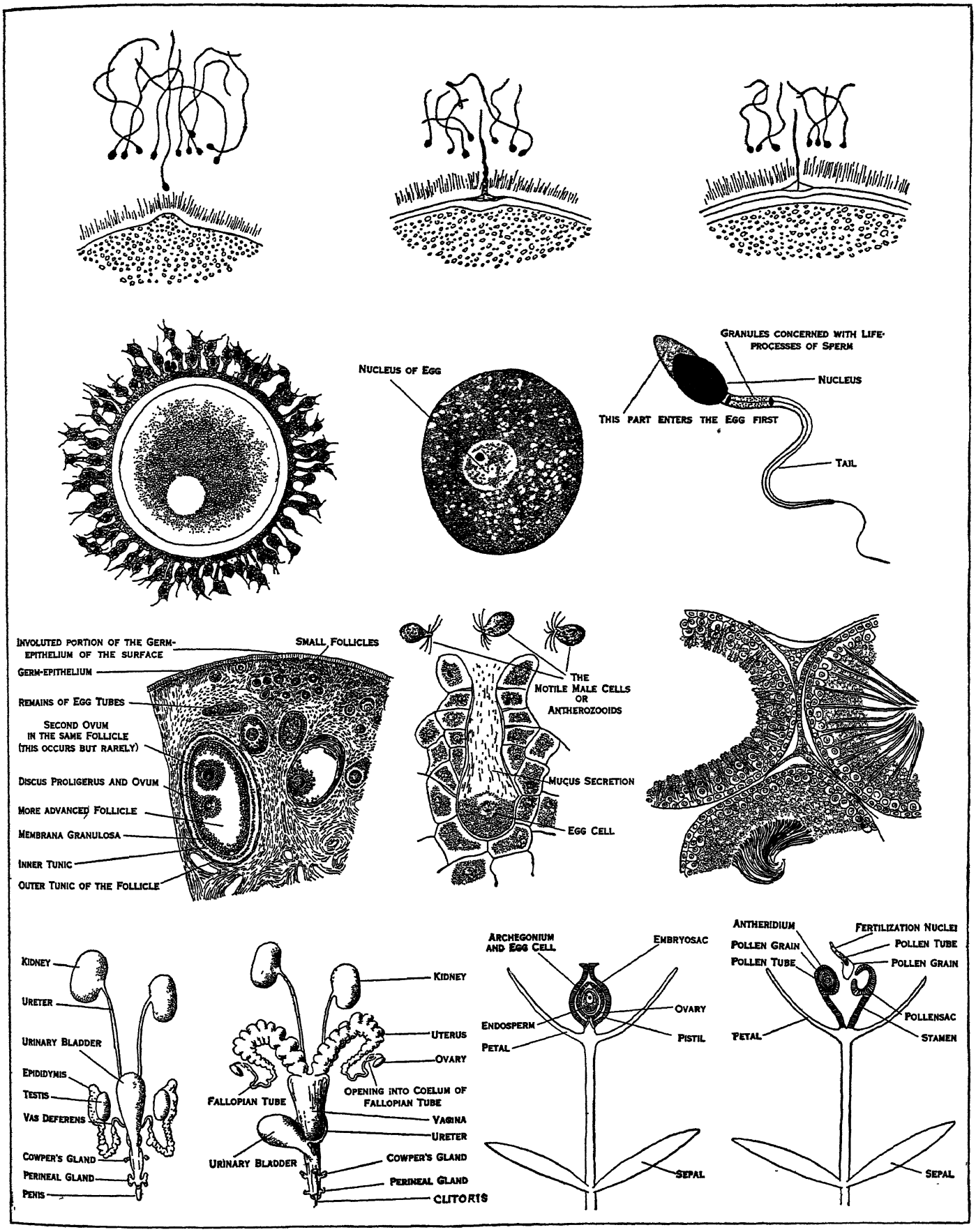
REPRODUCTION. The general term Reproduction includes the whole sequence of processes or events by which new individuals arise and life is continued from generation to generation. It is often and rightly said that the major activities of organisms centre round the contrasted functions of nutrition and reproduction, using both terms widely. Yet it is evident that nutrition and reproduction are not necessarily two sharply circumscribed single functions, but may imply the direction of numerous activities towards two particular ends, the preservation of the individual, on the one hand, and the continuance of the race, on the other. In studying higher animals, it is impossible to consider either reproduction or nutrition apart from the functions of moving and feeling, or apart from circulation and the hormones. Many functions may be ancillary to reproduction, which means much more than the activity of the reproductive organs or gonads. Moreover in the higher reaches of life, reproduction has its psychological as well as its physiological aspect.

The antithesis between nutrition and reproduction, however, is one of the fundamental ideas in biology. Nutrition not only implies fuel for immediate consumption, it implies increase of capital, whether in growth or reserves. It has emphatically a plus sign, whereas reproduction is always minus, since it means parting with some of the living material, and the sacrifice is sometimes enormous. Yet the antithesis must not be pressed too hard. As Haeckel emphasized, reproduction may be regarded as a form of discontinuous growth, specialized for multiplication; and growth is the outcome of nutrition. In asexual modes there is a separation of surplus material accumulated by antecedent nutritive processes. Even in sexual reproduction an elaborate nutritive preparation is often necessary, as in the equipment of a huge number of eggs with yolk.

What Reproduction Implies.—In the simplest case reproduction is complete in one act—the division of a microbe into two. But this is not typical of higher forms. (*a*) Very generally reproduction implies the differentiation of two sexes, the egg-producing female, and the sperm-producing male; and with this many degrees of sex-dimorphism may be associated. Sexual fusion, however, is primarily not reproductive (*see* SEX). (*b*) At a certain age or under certain environmental, *e.g.,* seasonal, stimulation the reproductive organs become active,—a process which may be linked to other physiological changes in the body generally. But biology is still far from an understanding of the physiological processes which lead, for instance, to the activation of a wild bird's gonads in spring. For most of the year they are in abeyance, sometimes hardly visible on dissection, but suddenly they become large and the seat of rapid multiplication of cells. In some animals a special diet is required to activate the gonads; thus in some Diptera a meal of blood is necessary. Especially as regards Algae and small crustaceans, much is known in regard to the environmental conditions that bring on reproductive activity, but generalization is still very difficult. (*c*) While the gonads are influenced by the body, there is also a converse influence. For hormones which are produced by the testis or by the ovary are distributed by the blood throughout the body, and serve to provoke new growths, such as antlers, or to excite previously inactive organs, such as milk-glands. (*d*) In a great variety of animals there is a well-marked phase in which the sexes become aware of one another as desirable, or as opportunities for satisfaction, and seek to secure sexual union, sometimes coercively, but often by evoking mutual interest and excitement. This is a prelude to actual pairing, and it often attains to some artistic subtlety (*see* COURTSHIP OF ANIMALS). (*e*) The outcome is the actual liberation of the sperms on the male's part, which may or may not be simultaneous with the liberation of ova on the female's part, as in the cases of frogs and bees respectively. But all sorts of modes occur. The sexes may not see or touch one another, yet there may be simultaneous liberation of eggs and sperms, as in sea-urchins, where the actual fertilization in the water is very fortuitous. In diverse fishes, though there is no physical contact between the sexes, the proximity of the spawning female is necessary as liberating stimulus to the male's emission of sperm. On the other hand, at many different levels, as from dragon-flies and crabs to birds and mammals, there is some sort of sexual embrace or amplexus in the course of which the sperms pass from male to female. As in other successions of events among organisms, there may be in reproduction an entire suppression of a chapter that is more or less typical of the ordinary trajectory of life. Thus most marine fishes suppress insemination—a term which should be restricted to the transference of sperms from the male to the female, or from one hermaphrodite to another, as in earthworms and snails.

(*f*) But whether there is insemination or not, there is in the great majority of animals the essential process of fertilization, the intimate and orderly union of the sex-cells. (For exceptions, *see* PARTHENOGENESIS.) As the nuclei of the ripe gametes have undergone meiotic division, the process of fertilization restores the number of chromosomes to the normal. It also implies the union of the paternal and maternal hereditary factors, a stimulus to the egg-cell to divide, and a blocking of the egg-cell against other sperms. (*See* FERTILIZATION.) In flowering plants the process of pollination would roughly correspond to insemination in animals, while the union of the microscopic male nucleus from the pollen-tube with the microscopic female nucleus in the egg-cell within the ovule's embryo-sac, is the act of fertilization. In flowerless plants and in the primitive flowering plants known as Cycads and Gingkos, the male cell is a locomotor sperm (antherozoid) as in most animals.

(*g*) Development (*see* EMBRYOLOGY)—the process by which the fertilized ovum builds up an embryo—is a study by itself yet it cannot be rigidly separated off from reproduction, for it is through development that the organization of the parents is reproduced. Moreover, there is the peculiar occurrence of polyembryony in some armadillos, e.g., *Dasypus novemcinctus,* and in some parasitic Hymenoptera, e.g., *Encyrtus,* where the developing egg normally produces several embryos, which is obviously a process of multiplication. It would also be pedantic to try to exclude from the rubric of reproduction the various ways in which the maternal parent contributes to the development of the offspring while it remains within her body. In the gestation of ordinary mammals the placenta establishes what may be called a



TOP ROW: THREE STAGES IN THE FERTILISATION OF OVUM OF STARFISH. SECOND ROW: HUMAN OVUM; EGG (SHOWING NUCLEUS) AND SPERM OF RABBIT. THIRD ROW: SECTION OF OVARY OF A BITCH; FEMALE REPRODUCTIVE ORGAN OF ADDER'S TONGUE FERN; SECTION OF PARTS OF THREE SEMINIFEROUS TUBULES OF A DOG. BOTTOM ROW: MALE AND FEMALE ORGANS OF RABBIT; DIAGRAM OF FEMALE (LEFT) AND MALE (RIGHT) ORGANS OF THE FLOWER OF SEED-PLANT

symbiotic relation between the mother and the offspring; and of this, as Aristotle knew, there are anticipations even at the level of dogfishes. Hints of ante-natal linkage and nutrition are also seen in a few reptiles and even in the primitive Onychophora (*q.v.*). (*h*) The study of reproduction must also join hands with the study of heredity,—the relation of organic continuity between successive generations, which tends to secure the begetting of like by like; and this is particularly the case when there is an intimate linkage between mother and offspring (or between the plant and its seed!) supplying the early "nurture" required if the hereditary "nature" is to express itself aright. (*i*) Nor can we exclude a consideration of the diverse ways in which the new generation is separated from the old, whether by buds and fragments, or by ova, or by ova that have developed before liberation into larvae or into miniature organisms. And this may be complicated by the occurrence of alternation of generations. (*j*) Finally, biology cannot be content with a study of reproduction as a problem in the physiology of the individual, or even of the pair. There is a higher physiology or ecology of reproduction, which concerns itself with such questions as monogamy, polygyny and polyandry (as in the cuckoo) and with the different forms of animal family (*see* SOCIOLOGY, ANIMAL).

Modes of Reproduction in Unicellular Organisms.—Among one-celled organisms, whether protists, Protophyta, or Protozoa, the unit divides into two or more parts (by equal fission, or by giving off small buds, or by spore-formation); and each of these parts grows into the likeness of the whole. In the great majority of cases, the division of the unicellular organism is preceded by the division of the nucleus, and in some types this division takes the form of intricate mitosis (*q.v.*). Yet there are some cases, such as the production of multiple buds around the margin of *Arcella,* or the very rough-and-ready fragmentation described in *Schizogenes,* where reproduction does not seem to be far removed from rupture. In all cases of division there is probably some plasmic instability within the cell, which leads to cytolysis; and it was perhaps one of the early tasks of organic evolution, so to speak, to regularize this disintegration, so that it led not to death, but to more life. The plasmic instability, which modern biochemistry and bio-physics are seeking to define, may be the natural outcome of growth. For it was pointed out by Herbert Spencer and Rudolf Leuckart that a growth-increase in the volume of living matter is not accompanied in regular shapes by a *pro tanto* increase in the surface by which the processes of keeping alive are effected. Thus in spheres, the volume increases as the cube of the radius, while the surface increases only as the square. The consequences of this may be partly evaded, as in Rhizopoda which acquire a large surface by flowing out in numerous pseudopodia; but the general idea is sound. And in addition to the volume-surface ratio, there is the relation (emphasized by R. Hertwig) between nucleoplasm and cytoplasm, which seems to have its optimum and its limits. When the cell divides, there is a reduction of volume, but a relative increase of the surface. Or there may be an adjustment of the ratio between nucleoplasm and cytoplasm; and in this connection the not infrequent occurrence of multiple nuclei should be considered. Of interest are the experiments of Gruber who showed that excised non-nucleated fragments of some Protozoa, which may live for a time and even show growth and repair, eventually fail to survive, the nucleoplasm, in some form or other, being apparently essential. It is suggested, then, that the beginnings of multiplication are to be looked for in cell-rupture following instability.

But reproduction among unicellular organisms must be looked at from another side,—that of fertilization or, to use Weismann's term, amphimixis. It is said that isolated cells sometimes flow together when exhausted, forming a small plasmodium. This has been described in the poured-out coelomic fluid of sea-urchins where moribund cells club together and survive for a time in small groups or plasmodia, not to be confused with clots. A somewhat similar viable coalescence of amoebulae was described by Haeckel in *Protomyxa,* and occurs in some Myxomycetes. From such plasmodium-formation it is but a step to multiple conjugation, as seen in some Heliozoa and other Protozoa, and also in some Algae (*q.v.*). A giant amoeba, in the genus *Pelomyxa,* may be artificially built up by mingling two together with a needle, and then carefully adding a third and a fourth. Of common occurrence is the total conjugation of two indistinguishable units (isogamy) as in the large infusorian *Noctiluca,* or of two unequal units (anisogamy) as in *Vorticella.* In many Protozoa, as in radiolarians, specialized reproductive units (gametes) are produced by the division of the ordinary vegetative units. They are often dimorphic, and unite in pairs to form a zygote, which either grows into the original form, or proceeds to divide into many individuals.

Very suggestive, but on a special line, is the "partial conjugation," familiar in *Paramaecium* and its relatives, where the two conjugants, after a process of nuclear reduction, pointing on to polar-body formation in ova and a similar meiotic division in spermatogenesis, exchange micronuclear elements and then separate, the sequel being nuclear reconstruction in the ex-conjugants. This partial conjugation, obviously a sexual rather than a multiplicative process, possibly increases the vigour and certainly promotes the variability of the stock.

In artificially isolated "pure lines" (all descended from a single *Paramaecium* by generation after generation of fission) no conjugation occurs, and one would not expect any, since they are all the same. In ideal conditions, *e.g.,* as regards aëration, food-supply and the removal of waste-products, there seems to be no limit to asexual reproduction. In L. L. Woodruff's famous experiments the sequence of vigorous asexual generations was continued, without conjugation, for over ten years. But in these optimum artificial conditions, and in natural conditions for certain species (e.g., *Paramaecium caudatum*), there is a periodic, it may be monthly, occurrence of a remarkable process (endomixis) in which the nuclear organization is disintegrated and then re-constructed. The individual slipper animalcules, to give them their popular name, behave as if they were going to conjugate with one another. As in the pre-conjugation phases, there is a scrapping of the dimorphic nuclei, but no conjugation occurs, and reorganization follows. The disintegration and the re-integration here suffice to secure the continuance of vigour. In other Protozoa, however, in which endomixis never occurs, M. Hartmann has been able to obtain a similar indefinite continuation of asexual reproduction. These observations of Woodruff and Erdmann have, like most thorough observations, a significance far beyond the immediate subject-matter. Throughout the whole gamut of organisms there is a contest between life and death, that is to say between the individual conservation and the individual disintegrative loss of energy. To put it in another way, there are processes in the living organism that tend towards senescence (to be distinguished, as far as may be, from the diurnal running down of the clock); and there are counteractive processes that make for repair, recuperation, and rejuvenescence. In short, there are processes of aging and processes of regaining youth.

In senescence it is not the living matter itself that gets worn out; it is rather the less labile framework of the cells; the furnishings of the laboratory, rather than the workers. This universal senescence-versus-rejuvenescence contest, is to be distinguished as far as may be, not as if they were *au fond* different, from the normal and continual recuperation of katabolism by anabolism. An organism may be balancing expenditure and income every day, and yet there may be a serious depreciation of property. This is senescence, and there are various ways in which rejuvenescence-processes stave off the evil day of insolvency. In *Paramaecium* one of these rejuvenescent processes is endomixis, and it may be that in the subtler and more intimate modes of reproduction at higher levels, some rejuvenescence is effectively secured by rearrangements. In Polyzoa, for instance, there is a collapse of the fatigued individual into a "brown body," from a bud of which, after rest and re-integration, a vigorous new individual arises.

Modes of Reproduction in Multicellular Organisms.—(A) Many forms of asexual increase occur in multicellular plants and animals, with this in common that a considerable portion of the parent is separated off, though not necessarily liberated, to form a new individual. Thus the freshwater *Hydra* gives off buds; a sea-anemone may split longitudinally into two; a nemer-

tine worm may break into several viable pieces; there are two or three starfishes that actually multiply by separating off their arms; a liverwort may produce minute multicellular gemmae which float away in runlets of rain; a tiger-lily drops its bulbils; and a strawberry plant sends out runners, which root and form independent individuals at well-spaced intervals. In many cases the asexual multiplication leads to the formation of physically continuous colonies, as in zoophytes and corals, Polyzoa and compound tunicates; while many hydroids, such as *Obelia,* illustrate the formation of polypoid buds which remain members of the colony, and medusoid buds which are set adrift as sexual swimming-bells. It is certain that a knowledge of metabolic gradients (*see* AXIAL GRADIENTS) will explain, as is already being indicated, why there should be at particular places in the organism lines of weakness, or reductions in the intensity of metabolism, or processes of cytolysis, which bring about the separation of a bud or a bulbil, or the breaking of a worm into viable pieces.

But the large fact is that all the Metazoa and the great majority of the Metaphyta, exhibit sexual reproduction, though the asexual mode may be retained. The chief mode of multiplication in *Hydra* is by separating off asexually produced buds, but there is also sexual reproduction by ova and spermatozoa. But in this case the relative unimportance of the sexual method, as far as multiplication of these polyps is concerned, is emphasized by the fact that the ovary contains only one mature egg, and that there is usually only one ovary. The highest animals to show asexual multiplication regularly and in the adult stage are the Tunicata. Thus in the salps, a solitary "nurse" buds off a chain of sexual individuals, which eventually separate. This case is interesting since the tunicates have reached a high degree of structural complexity. Twinning by division of a single egg or embryo is a form of asexual reproduction confined to the developmental period.

(B) The term "sexual reproduction" covers several distinct facts: (1) the formation and segregation of special reproductive cells, as contrasted with those of the body or "soma" generally; (2) the differentiation of special reproductive cells, usually the dimorphic egg-cells and sperm-cells, the latter non-viable except in fertilizing the former; (3) the typical production of these specialized reproductive cells by different (male and female) organs or individuals. But to these three statements it is necessary to add several saving-clauses. (1) In many plants, most clearly in vascular cryptogams like ferns, one phase in the life-history has to do with the production of spores. These are special reproductive cells which develop without fertilization. Thus those that fall from the sporangia on the back of a fern-frond develop into small sexual prothalli (gametophytes). The egg-cell of a prothallus fertilized by a sperm-cell (or antherozoid), develops into an ordinary fern-plant (the sporophyte); and the life-history thus illustrates alternation of generations. This may be defined as the alternate occurrence in one life-history of two or more different forms differently produced. Spore-cells may also occur among multicellular animals, as is seen in the life-history of the liver-fluke, where two larval stages (sporocysts and rediae) multiply by spore-cells, which are hardly differentiated enough to be called parthenogenetic ova, while the adult fluke reproduces by ova and spermatozoa as usual, except that self-fertilization or autogamy occurs. (2) In some animals, such as certain rotifers, the males are unknown; in other types, *e.g.,* summer green-flies, they may be absent for long periods; in other cases, such as certain gall-flies, the males are unnecessary even when present. In other words, parthenogenesis (*q.v.*), is common. Yet this launching of an unfertilized ovum on the voyage of development should be retained under the rubric of sexual reproduction, for although there is no fertilization, there is multiplication by means of egg-cells. (3) Many common animals, such as snails, earthworms and leeches, are hermaphrodite, each individual having both ovary and testis, which often ripen at different times (protandrous and protogynous dichogamy). In the cases mentioned there is cross-fertilization in spite of the hermaphroditism; in rare cases, such as the liver-fluke and some tapeworms, there is self-fertilization or autogamy. To be distinguished from thoroughgoing hermaphroditism is the normal reversal of sex in the course of the animal's life. Thus among cymothoid and epicarid crustaceans, the females pass through a male phase, though they may not function as such. According to Cunningham and Nansen all the smaller hags (*Myxine*) have a testis, which is subsequently replaced by an ovary. (*See* SEX.)

Advantages of Sexual Reproduction.—Since most multicellular plants and animals exhibit sexual reproduction, either exclusively or along with a retained asexual multiplication, the question rises as to the advantages of the sexual process. (*a*) That sexual reproduction is fatal to the individual in many cases, *e.g.,* butterflies and eels, does not contradict the general proposition that sexual multiplication is physiologically more economical than the asexual modes when there is a large number of progeny.

(*b*) Although asexual multiplication may occur in complicated animals, such as tunicates, it would be attended with obvious difficulties in many of the highly differentiated and integrated types, such as arthropods and vertebrates.

(*c*) The outstanding fact implied in having specialized reproductive units is that these have not shared in the building up of the parental "body," but have retained an organization (or equipment of hereditary factors) continuous in quality with that of the original fertilized egg-cell from which the parent arose. They are thus not very liable to be tainted by any of the mishaps which are likely enough to befall the "body" or "soma" which bears them. This gives them an advantage over buds or fragments, for these are liable to start with such disabilities as the parental body may have acquired. Plants, such as potatoes, that are artificially propagated by means of cut-off pieces, are apt to lose their good qualities in the course of a number of asexually-produced generations.

(*d*) In the course of the life-history of the germ-cells, in the processes of final maturation, and in the mingling of hereditary factors that is effected in fertilization, there are opportunities for new permutations and combinations. Here is the crowning advantage of sexual reproduction, that it favours, more than the asexual process, the emergence of new variations.

(*e*) Without falling into a teleological fallacy, we may look further ahead and recognize that sexual reproduction among animals leads to dimorphic and separate sexes, whence follow courtship and the dawn of the love of mates. Sexual reproduction has been a factor in evolution, as regards, for instance, the emotions, family life and speech. The first use of the voice was doubtless as a reproductive call. One does not, of course, account for origins by indicating the advantages accruing from the steps taken, but it is legitimate to point to consequences as well as origins.

Nutrition and Reproduction.—Growth tends to occur when nutrition is in excess of what is required for everyday recuperation. In unicellular organisms the limit of growth is in most cases quickly reached, explicable exceptions occurring in special cases, such as giant Foraminifera, where there is a large pseudopodial surface. The frequent multiplication of unicellular organisms has its counterpart in the frequent cell-divisions that occur in the developing Metazoa and Metaphyte (multicellular organisms). But in most Metazoa there is a more or less definite limit of growth—the physiological optimum of size. Further growth is apt to be attended by the setting in of some detrimental instability, and it is after the limit of growth has been reached that reproduction usually occurs. Special explanations are needed for peculiar phenomena like precocious reproduction or paedogenesis, as in the liver-fluke, the gall-midge *Miastor* (in which there are larvae within larvae), and some Urodela, e.g., *Amblystoma* and occasional newts. It should also be noted that some fishes and reptiles seem to have no limit of growth, and have a very prolonged succession of breeding periods. When the nature of the organism allows of a very large surface in proportion to size, as in trees, there seems to be no definite limit of growth. On the whole, however, the proposition stands that reproduction does not usually occur until the limit of growth has been reached.

Abundant nutrition favours asexual multiplication, but a check to the nutrition may bring about the separation of the buds. A simple illustration may be found in *Hydra,* where a bud often produces buds of its own. Eventually a check to nutrition occurs

and the buds drop off; and this may be followed by a phase of sexual reproduction. Similarly a planarian worm in good nutritive conditions may form asexually a chain of four; if a check to nutrition occurs, the links separate; and sexual reproduction may set in. Vigorously growing fruit-trees are often root-pruned because the check to nutrition favours the reproductive activity of flowering and fruiting. But if foliage and vegetative activity are desired, it may be useful to nip off the flower-buds. Other things equal, abundant nutrition favours asexual multiplication, but the formation rather than the separation of buds. On the other hand, a check to nutrition may act as a stimulus to sexual reproduction.

Individuation and Genesis.—The rate of reproduction depends (*a*) on the constitution of the individual organism, and (*b*) on its immediate environment and nutrition. It is high in green flies and rabbits, low in golden eagles and elephants. The actual rate of increase, which is much more difficult to estimate, when a periodic census is not readily practicable, depends on the wide and complex conditions of life which are summed up in the phrase "the struggle for existence." Organisms sometimes show an extraordinary increase in numbers in favourable areas and seasons, witness plagues of voles or locusts; and in exceptional cases, where food continues abundant and checks continue to be slight, the increase may go on for many years, as with the rabbits in Australia or the potato beetles in North America. But in most of the cases known to-day the sudden floods of life soon cease. The increase meets checks of famine and weather and enemies, and a balance is automatically restored.

Similarly, when the rate of increase fails to meet the elimination, there may be sudden rarity, as with the tile-fish, and even sudden extinction, as with the passenger pigeon. But in most cases there is an automatic adjustment of the balance; thus the sudden decrease may relieve the intra-specific competition, so that the mortality among the young stages is greatly reduced. Slight fluctuations in numbers are much commoner than sudden increases or decreases.

Reference must be made here to Herbert Spencer's thesis that reproductivity tends to decrease in the more highly evolved organisms. Including under the term "individuation" all the race-preserving processes by which the individual life is completed and maintained, and under the term "genesis" all the reproductive processes that lead to the formation of new individuals, Spencer maintained that individuation and genesis vary inversely. Genesis decreases as individuation increases, but not quite so fast; in other words, progressive evolution in the direction of individuation is correlated with a diminished rate of reproduction.

In support of this conclusion Spencer adduced some general physiological reasons why individuation and genesis should vary inversely, and he brought forward inductively a number of instances of poorly individuated types, like tapeworms, that are very prolific, and of highly individuated types, like golden eagles, that show greatly economized reproductivity. But he did not prove that high individuation directly lessens fertility. What is much more probable is that highly individuated types have resources which have enabled them to reduce the ratio of elimination, and have thus allowed them to vary in the direction of economized reproductivity without decreasing their chances of survival. In mankind the psychological and social factors in individuation may operate directly in lessening pre-occupation with sex-indulgence and in lessening in monogamous married life, the physical incentives thereto, thus resulting in smaller families, but there is no proof that education or the like physiologically lessens fertility.

Reproduction and Death.—While reproduction is concerned with the beginning of new lives, it is not infrequently associated with the death of the parent. In many organisms reproduction is the beginning of death, and the connection may be either direct or indirect. (*a*) In some Annelida, for instance, the multiplication of germ-cells distends the body and leads to fatal rupture, which is checkmated in the Palolo worms by the sacrifice of the bulk of the body, while the head end remains in a crevice of the coral reef and regrows a new body for the next season. Apart from the bursting of the body—a somewhat crude nemesis—a fatal strain on the constitution of the animal may result from the amount of nutritive material required for the equipment of the eggs, and from the fatigue involved in liberating either the eggs or the embryos. In the male the tumescence in the reproductive organs and, in vertebrates, the erotization of the body by reproductive hormones may lead to an orgasm so violent that it is sometimes fatal. Both sexes of the fragile butterfly and of the stoutly built marine lamprey pay for their reproduction with their life. Among higher vertebrates there is a marked reduction of the physiological expensiveness of the reproductive process. The too familiar tragedy of the human mother's death in childbirth is an exception, due partly to the increase of brain size in man with consequent enlargement of the infant's head, partly to the unhealthiness of civilized life.

(*b*) But there is an indirect way in which death has come to be associated with reproduction. There is abundant evidence that the length of life, within certain limits of constitution, is adaptive. In the course of ages of natural selection the duration of life has been automatically adjusted to the survival-welfare of the species, and it is vitally important that reproduction should occur when the organism is in full vigour. It is against the welfare of the species that organisms should reproduce after they are long past their best, and this is one reason why animals die after they reproduce. As Goethe said, death is nature's device for securing abundance of life.

BIBLIOGRAPHY.—Herbert Spencer, *Principles of Biology* (1864–66); P. Geddes and J. Arthur Thomson, *The Evolution of Sex* (1889); *Sex* (Home University Library, 1914); E. Korschelt, *Lebensdauer, Altern und Tod* (Jena, 1922); F. H. A. Marshall, *The Physiology of Reproduction* (rev. ed., 1922); J. Meisenheimer, *Geschlecht und Geschlechter im Tierreich* (Jena, 1922); E. Godlewski, *Physiologie der Zeugung Handbuch der vergleichenden Physiologie* (ed. H. Winterstein, Jena, 1924, etc.); A. Lipschütz, *The Internal Secretions of the Sex Glands* (1924); F. A. E. Crew, *Animal Genetics* (Edinburgh, 1925); John Hammond, *Reproduction in the Rabbit* (Edinburgh, 1925); M. Hartmann, *Allgemeine Biologie* (Jena, 1927). (J. A. TH.)

REPRODUCTION, PHYSIOLOGY OF. It is common knowledge that the majority of animals and plants have more or less definite times at which they breed, though the ova (estimated at 100,000 in man) are probably preformed at birth. These depend often upon seasonal or environmental conditions and it is well known that spring and summer are the times for reproductive activity among birds, insects and a host of other animals. Unusual warmth or cold may hasten or check the periodic development of sexual activity and the accompanying internal and external changes which take place in the body. The connection between breeding and food supply is also generally realized. Moreover, where climatic and nutritive conditions are approximately uniform throughout the year, periodicity in the breeding habits of animals is often obliterated. Thus, Semper states that sexual periodicity is absent among molluscs, insects, and other land animals in the Philippine Islands. On the other hand, the regularity of the migratory movements, which directly relates to changes in the reproductive organs and the instincts for breeding, occurs to a great extent independently of temporary climatic conditions, though not wholly so. (*See* MIGRATION OF BIRDS.) It is clear, however, that, broadly speaking, the factors which control the periodic changes in the generative system in association with breeding are of two kinds, the external ones referred to above, and internal factors inherent in the animals themselves, and particularly in the essential reproductive organs. Before attempting to describe these changes and the manner in which they occur it will be well, briefly, to describe the reproductive organs, referring more particularly to the higher animals.

The Generative System.—Amongst vertebrates the sexes are nearly always separate, although a few species are hermaphrodite. The usual arrangement, however, is for each individual to have its own characteristic sexual organs, those of the other sex, if represented at all, failing to develop or undergoing early degeneration. In the male of all lower vertebrates (including birds) the *testes* lie dorsally inside the body cavity and discharge their products, the spermatozoa, along with fluid secretions, into ducts communicating with the exterior by a passage (the *cloaca*) common to the urogenital and alimentary systems. In most mammals,

on the other hand, the testes lie outside the main body cavity in a double sac (the *scrotum*) between the anus (or opening of the gut) and the penis. The testes are largely composed of tubules whose walls give rise to the spermatozoa and these latter are budded off into the interior as in other animals. Between the seminiferous tubules are *interstitial cells*. These give rise to chemical substances (hormones, *q.v.*) which pass internally into the blood. (*See* ENDOCRINOLOGY.) There is strong evidence that these internal secretions by their power of stimulation are responsible for the growth and development of the distinctively male characters and instincts. Thus, the presence of the testes is commonly regarded as the test for maleness.

In all mammals the spermatozoa pass out from the testis by a number of short ducts (the *vasa efferentia*) into a coiled tube lying alongside it (the *epididymis*). This acts as a storehouse for the spermatozoa until they are ejaculated. Spermatozoa may remain alive within the epididymis and still be capable of fertilizing ova for 30 days (rabbit). The epididymis is a long coiled tube with muscular walls and the coils lie in juxtaposition so that the whole forms one discrete body closely applied to the testis. From each epididymis a duct (the *vas deferens*) passes back through the *inguinal canal* (a passage connecting the scrotum with the body cavity). The two vasa deferentia open close together in the common channel with which the urinary bladder also communicates. This passage (the *urethra*) is continued within the erectile copulatory organ or *penis*, at the end of which it opens to the exterior. In addition to these organs there are several accessory glands communicating with the common urogenital passage. These are the *seminal vesicles*, the *prostate gland* and *Cowper's glands*, all of which contribute fluid substances to the semen in which the spermatozoa swim; the secretions are believed also to cleanse the urethra of urine prior to the ejaculation of semen. The above description applies more especially to man, but in the majority of the lower mammals the organs are similarly arranged.

The ovaries, the essential reproductive organs of the female, likewise serve a double function. They produce the ova and also elaborate internal secretions comparable to those of the testes; these secretions are responsible for initiating the development of the female characters, as well as being a necessary factor in the sexual and reproductive processes. In the lower vertebrates the ova are large owing to the amount of food substances (yolk) contained in them (as with the egg of the fowl), but in mammals they are microscopic, each being about $\frac{1}{180}$ in. in diameter (this, however, is considerably bigger than a spermatozoon, which is about $\frac{1}{500}$ in. in length). The ova are contained within little sacs (Graafian follicles). These begin by being very small, but as they approach maturity their cavities enlarge until they protrude from the surface of the ovary; eventually (unless, as often happens with some of them, they have degenerated) they discharge their ova to the exterior in *ovulation*.

The ovaries are attached, one on either side, to the dorsal wall of the abdominal cavity by the *broad ligament*. The tubes which convey the ova to the exterior are also suspended by this ligament, a double fold of tissue arising from the wall of the body cavity. In the lower vertebrates the oviducts are provided with glands secreting albumen or egg-white which coats the ovum as it passes down the tube. The egg-shell in those animals in which it is formed is also secreted by a gland; in birds this is at the posterior end of the oviduct just in front of where it opens into the common urogenital passage. At the anterior end each oviduct has a fimbriated trumpet-shaped aperture which expands at ovulation and receives the eggs as they pass into the body cavity. The interior of the expanded end is provided with cilia which direct the passage of the ova into and down the tubes. The oviducts are usually paired to correspond with the ovaries, but in birds only the left ovary and oviduct are present. In mammals and birds the ova are usually fertilized by the spermatozoa in the passage of the oviduct, but in the lower vertebrates (*e.g.*, most fish) this often occurs outside the body. In mammals, the oviducts (small somewhat coiled tubes) swell out posteriorly to form the *cornua uteri*, or womb. These may continue double throughout their entire length and open separately into the vagina (rabbit) or after continuing separate for a considerable distance may unite together to form the *corpus uteri* or body of the uterus (cow, sheep, mare, bitch, etc.) or they may extend for only a short distance before opening into the corpus uteri, which is a sac or bag (man). At the hind end the corpus uteri narrows down to form a neck (*cervix*) and this opens into the vagina by the *os uteri*. The uterus is the organ which contains the developing young during pregnancy. It has thick muscular walls on the outside and a mucous membrane with numerous glands lining the cavity inside. These secrete a fluid which helps to nourish the developing embryo during pregnancy and supplies a medium in which the spermatozoa swim after copulation. The *vagina* is the broad urogenital passage which extends backwards through the pelvis and opens to the exterior at the *vulva*. The latter is constituted by all the female generative organs visible externally. The lateral boundaries are the *labia* or lips. The *clitoris* is a small rod-like erectile structure and corresponds to the penis of the male but is solid.

The mammary glands, although not directly concerned with the reproductive processes, are dependent upon the ovaries for growth. They consist of milk-secreting tissue and are provided with ducts which convey the milk to the nipple, whence it can be drawn off.

The Reproductive Cycle.—At the approach of the breeding season in most animals the gonads (testes and ovaries) undergo marked growth. This is very pronounced in fishes and is hardly less marked in birds. Thus in the sparrow in winter the testis is no larger than a grain of mustard seed but at the breeding season it reaches the size of a small cherry.

The male breeding season, when it occurs, is called the season of *rut*. The increase in the size of the testes which occurs prior to rut is accompanied by activity not only of the cells which give rise to the spermatozoa (the spermatogenetic tissue of the seminiferous tubules) but also of the interstitial cells. In some mammals the testes are not permanently retained in the scrotum but descend thither at the beginning of rut and are withdrawn into the abdomen again after the rutting season is over (*e.g.*, many rodents). In insectivores (*e.g.*, mole and hedgehog) the testes descend periodically into temporary receptacles. In the mole it is estimated that the testes increase in size 64 times, and the seminal vesicles, prostate and other accessory glands likewise show enormous growth. The time for sexual intercourse is continuous throughout rut, there being no short periods of quiescence within the breeding season as in the females of many species. Amongst domestic animals generally there is no special season of rut, the male being capable of service throughout the year, the semen evacuated normally containing an abundance of spermatozoa. In this respect these species differ from their wild ancestors, for in the undomesticated state the male usually experiences a rutting season at the same time as the breeding season in the female.

In the female mammal the times for sexual intercourse, instead of extending continuously over a season of considerable duration, as with the male, are restricted to periods of "heat" or oestrus. These may recur at rhythmical intervals within one breeding season (mare, cow, ewe, sow) or there may be only one oestrus to the season (bitch). The former condition has been described by Heape as polyoestrous, the latter as monoestrous. The whole cycle of changes is known as the oestrous cycle. In the case of a typical monoestrous mammal, such as the dog, the oestrous cycle is divided as follows: anoestrum (period of rest); prooestrum (period of growth and preparation); oestrus (period of desire); pregnancy or (alternatively) pseudo-pregnancy.

During the anoestrum the reproductive system is, relatively speaking, quiescent. The Graafian follicles which contain the ova probably undergo slow growth and ripening, but they do not become conspicuous upon the ovarian surface until near the end of the anoestrum. The uterus is relatively anaemic and the glands inactive. The mammary glands are also inactive unless lactation is in progress after recent pregnancy. The entire anoestrum in the bitch lasts about three months.

The prooestrum is marked by increased activity of the genera-

tive system generally. It is the time of "coming on heat." The follicles come to protrude visibly from the surface of the ovaries. The uterus also undergoes growth, the blood vessels increase in size and number, and the glands in the mucous membrane elaborate more secretion. At a slightly later stage a definite haemorrhage occurs in the uterus and blood is passed out to the exterior at the vulva. The mammary glands may also become slightly congested. The entire prooestrum lasts from one to two weeks and external bleeding may go on for ten days, but it is usually slight, consisting of no more than a sanguineo-mucous flow.

Oestrus or "heat" is the period at which (and, ordinarily, only at which) sexual intercourse takes place. It is marked internally by ovulation, that is, the rupture of the Graafian follicles and the discharge of the ova, which then become mature and ready for fertilization by spermatozoa. The wall of the uterus undergoes repair at this time but the glandular secretion is abundant and more liquid in character, to provide a suitable medium for the spermatozoa. In the bitch oestrus lasts about a week.

Oestrus is succeeded by either pregnancy or pseudo-pregnancy. Each of these periods in the bitch lasts about two months. At their termination the uterus and the generative organs pass back to a condition of rest, and so the oestrous cycle is repeated. The complete cycle takes about six months in the bitch, there being typically two cycles and two oestrous periods in the year but there is a good deal of individual and racial variation.

If pregnancy takes place as a result of fertilization of the ova, discharged during oestrus, these segment and become attached to the inside wall (mucous membrane) of the uterus, which grows around each of them. The structure formed in this way is highly vascular and serves as the organ of nourishment for the developing embryos to which the ova give rise. (*See* VERTEBRATE EMBRYOLOGY.) This organ is the *placenta* and is characteristic of nearly all mammals. The embryos are attached to the placenta of the mother by the outer of a number of membranes, and vascular processes (*villi*) grow out from this membrane (the *chorion*) into the hypertrophied uterine mucous membrane now forming the maternal placenta. Thus a close connection is formed between the embryo and the mother and the placenta acts as an organ of respiration, supplying the developing young with oxygen brought thither in the maternal blood, and an organ of excretion, getting rid of carbon dioxide and the waste nitrogenous products, besides supplying the necessary nutriment. During pregnancy also the uterine muscles undergo a great hypertrophy, and are responsible for a great part of the increased weight which occurs in that organ. Thus, in the human subject, the virgin uterus weighs about 30 grams, whereas the same organ at the close of pregnancy, apart from the contained young, weighs 1,000 grams. It is through the rhythmical contraction of the uterine muscles that the young are expelled in parturition (the act of giving birth). The mammary glands undergo great development during pregnancy in preparation for the secretion of milk at its close.

If the ova discharged at ovulation are not fertilized during oestrus (as when coition does not occur) they die in the uterus and disintegrate. Nevertheless, in the bitch and many other mammals the uterus and mammary glands pass through growth-changes which, though not so pronounced, are similar in character to those during pregnancy. Thus, the mucous membrane becomes highly vascular and the glands greatly enlarge. The mammary glands also undergo marked development and towards the end of the period secrete milk. Even virgin bitches secrete milk freely about two months after the cessation of oestrus. At the end of this pseudo-pregnancy the generative system as a whole subsides into a condition of rest.

The ovarian changes (at any rate in the bitch) are also similar in both pregnancy and pseudo-pregnancy. The Graafian follicle, after parting with its ovum, becomes converted into the *corpus luteum* or "yellow body," so called on account of a pigmented fat (lutein) formed inside it. The yellow body is formed by the rapid hypertrophy of the cells surrounding the wall of the follicle; this is so great that the individual cells increase in size 16 or 20 times. This structure, which plays an important part during pregnancy, lasts throughout that period (and correspondingly during pseudo-pregnancy) and then undergoes degeneration.

In polyoestrous animals there is a succession of oestrous periods within a single breeding season, that is to say, that if coition does not take place at the first oestrus, or if for some other reason the ova discharged at ovulation are not fertilized, the animal, instead of experiencing a prolonged pseudo-pregnancy followed by an anoestrum (as with the bitch), undergoes a short period of apparent quiescence, called by Heape the dioestrum, and then "comes on heat" again. Thus with the sheep, the ewe, if she fails to become pregnant at her first oestrus, "comes back to the ram" (as the shepherds say) after about 15 days, and if she again fails, may experience a third oestrus after another 15 days, and so on for a succession of cycles until the breeding season is over or the ewe succeeds in becoming in-lamb. This short (or dioestrous) cycle in the sheep is therefore 15 days. The number of dioestrous cycles which the animal is capable of experiencing depends partly on the breed and partly on the environment, whether favourable or otherwise. Among sheep of all breeds there is a complete gradation between the monoestrous condition of certain wild varieties and the extreme of polyoestrum exhibited by certain merinos, in which there may be no anoestrum (even in the non-occurrence of pregnancy) but (in the absence of the ram) an unbroken succession of dioestrous cycles which last the whole year. Many wild animals (*e.g.*, rodents) are polyoestrous and the dioestrous cycle may last for only a few days.

In polyoestrous animals ovulation typically occurs during oestrus and is followed by the formation of the corpus luteum. The time of persistence of this structure varies according to whether or not pregnancy occurs. In the absence of pregnancy the corpus luteum persists for the duration of the dioestrum and then begins to degenerate as if to make way for the ripening of a fresh batch of follicles in the ovary and a new oestrous period. If, however, pregnancy takes place the corpus luteum continues in the ovary until parturition as in monoestrous animals. In reality, the dioestrum, instead of being a period of complete rest, is of the nature of a very abbreviated pseudo-pregnancy, and the uterus undergoes some growth changes in association with the presence of the corpus luteum in the ovary.

In man there is typically no anoestrum (except among the Esquimaux in winter) and the menstrual cycles, each lasting about a month, correspond to the dioestrous cycles of the polyoestrous lower mammal The actual menstrual phenomena probably represent the degenerative changes at the end of an abbreviated pseudo-pregnancy (or dioestrum) telescoped into the prooestrum of a new cycle. Ovulation takes place most commonly about the 18th day after the beginning of the menstrual flow but it may occur at other times, though rarely, in the week or ten days before the beginning of menstruation.

In some animals (rabbit, ferret) ovulation only takes place after coition. The actual process can be demonstrated in an anaesthetized rabbit whose ovaries have been exposed to view (Hammond). It is probable that in man also ovulation may sometimes require the additional stimulus set up by coition. In most domestic animals (bitch, sow, ewe, cow, mare) ovulation takes place spontaneously at or about the time of oestrus.

The Testis and Ovary as Organs of Internal Secretion.—It has been mentioned that the testis, besides producing the spermatozoa, is also an organ elaborating an internal secretion which is discharged into the blood. A similar statement may be made about the ovary. The evidence for these conclusions falls under three heads, (1) the effects of removing these organs (castration), (2) the effects of transplanting the testis or ovary into animals whose own gonads have previously been removed, and (3) the result of injecting tissue extracts prepared from testes or ovaries.

The general effect of castration in all vertebrate animals is to prevent the development of the secondary characters of sex, that is, of those characters which, while correlated with the sex in question, are not directly concerned with reproduction. This statement applies to ovariotomy or the extirpation of the ovaries

in the female as well as to castration in the male. It is essential, however, that this operation should be performed early in life to have its full effect. It not only ensures permanent sterility (whenever it is done) but if performed on the young stops the development of superficial sexual characters as well as the accessory reproductive organs (prostate gland, etc.). Thus, in man, castration prevents the growth of hair on the face and various parts of the body and arrests the enlargement of the larynx and the consequent deepening of the voice normally characteristic of puberty in the male. In stags castration inhibits the growth of the antlers and in those breeds of sheep which are horned in the male and hornless in the female it prevents development of the horns; moreover, the horn growth is arrested at any stage of development at which castration is performed. With fowls, castration is followed by an arrest of the development of the erectile structures about the head (comb, wattles, etc.). Castration has been practised on the domestic animals from the earliest times, for it improves the quality of the flesh and favours fattening in meat-producing animals and is conducive to a greater tractability in working animals since the disturbing effects of sexual desire no longer occur.

If the testes are removed from the normal position and grafted to an abnormal one (or if the testes of another male are transplanted immediately after castration), the organs exert their usual influence on the secondary sexual characters and accessory sexual glands, although their normal nerve connections have been severed. Since, then, the influence of transplanted organs cannot be through intermediation of the nervous system it would seem that it must operate through chemical substances passed into the blood and so into the general circulation. Thus, in experiments upon fowls the testes have been removed and broken up into pieces, which have attached themselves to different parts of the alimentary canal or the wall of the body cavity, and the birds have developed into typical cocks with comb, wattle, etc., male voice, and sexual and combative instincts. Furthermore, the experiments of Steinach and others have shown that the grafting of testes into females whose ovaries had been removed may cause the development of secondary male characters and bring about a partial or complete reversal of sex. There is some evidence that the grafting of additional testicular tissue into the aged may bring about a general rejuvenation, and that if a similar operation is done upon an immature or young animal it may promote an increase in growth and hastening of maturity (Steinach, Voronoff).

Ovariotomy leads to the suppression of the distinctly female characters. If done before puberty the uterus and mammary glands do not develop and the general bodily form tends towards a neutral condition not dissimilar to that of the castrated male. If performed after puberty ovariotomy is followed by cessation of the oestrous or menstrual cycles and the uterus undergoes atrophy in much the same way as occurs normally at the menopause (climacteric) or time of permanent cessation of reproductive activity (in women at from 45 to 50). If, however, the ovaries (or one of them) instead of being removed are grafted to an abnormal position such as the ventral wall of the body cavity or into a kidney the oestrous cycle is continued and the uterus remains normal. Since the ovary in such a position is without its normal nerve supply it is presumed that its influence on the organism is due to internal secretions passed into the circulation. The corpus luteum is also believed to be an organ of internal secretion serving the special function of secreting into the blood substances essential for maintaining the raised nutrition of the uterus during pregnancy and for the development of the mammary glands, for if this structure be removed surgically pregnancy cannot continue, the uterus lapses, and the mammary glands fail to develop. The corpus luteum also plays some part in controlling the short or dioestrous cycle, for so long as it is present in its integrity heat cannot occur, but if it is extirpated some days before a new oestrous period is normally due, the period occurs shortly after the operation of removal. Thus Hammond, by squeezing out the corpus luteum of a cow, has induced oestrus after nine days instead of the usual 19 to 21.

Fertility and Sterility.—The number of spermatozoa discharged in a normal ejaculation of human semen is estimated at 226,000,000, whereas the number of ova ejected at one ovulation is usually only one. For mammals generally the number of ova discharged is on an average only slightly more than the average number of young in a litter. It follows that the female rather than the male controls the size of the litter. (On the other hand, Sanders has shown for horses that a reduction in the number of spermatozoa may reduce the chances of the ovum being fertilized.) The sheep discharges one or two (sometimes three and rarely more) ova at oestrus, but by "flushing" the ewes, that is supplying them with extra or stimulating food before and during breeding, the number may be increased and consequently a higher proportion of lambs obtained. This is an example of the influence of favourable nutrition upon fertility. Too high feeding (resulting in adiposity), however, promotes atrophy of the ova in the ovary and so is conducive to sterility. There is evidence also that sterility may be due to the absence of certain essential accessory food substances or vitamins (*q.v.*) and that such a vitamin is present in green food (Evans). Degeneration of ova in the ovary may therefore be due to faulty nutrition of various kinds, but some degeneration is normal.

Sterility may result from coition at an inappropriate time, that is, at too long an interval before or after ovulation, for Hammond has shown in the rabbit that the ova are not capable of being fertilized for longer than four hours after their release from the ovary, and that the spermatozoa in the female passages do not retain their power of fertilization for more than two days. (In the male passage, where they are quiescent, they retain this power for 30 days.) It is probable that in many other mammals the duration of viability of the spermatozoa and ova is not widely different. In animals such as the mare, which has a prolonged oestrus (a week or more), sterile unions may well be due to this cause (Hammond).

Artificial insemination is sometimes successfully resorted to in cases where sterility has been due to an abnormal constriction of the os uteri or to the presence of an acid secretion in the vagina. The practice is to inject the semen directly into the os uteri, thus avoiding the constriction or escaping the action of the abnormal secretion. Walton has found that the semen of rabbits may be kept in a fertile condition in tubes outside the body at a medium temperature for more than five days and that after a journey by post from Cambridge to Edinburgh the spermatozoa contained therein could still successfully fertilize ova with normal pregnancy as a result.

Fertility, like other characters, is capable of being transmitted from one generation to another. Thus rams which were twin lambs may hand on the tendency to produce twins to the next generation of ewes, and by breeding from rams which were twins the fertility of a flock may be increased.

BIBLIOGRAPHY.—F. H. A. Marshall, *An Introduction to Sexual Physiology* (1925); *The Physiology of Reproduction* (1922); J. Hammond, *Reproduction in the Rabbit* (1925); *The Physiology of Reproduction in the Cow* (1926); A. Lipschütz, *The Internal Secretions of the Sex Glands* (1924); J. S. Fairbairn, *Obstetrics* (1927).

(F. H. A. M.)

REPRODUCTIVE SYSTEM, ANATOMY OF. The reproductive system in some parts of its course shares structures with the urinary system (*q.v.*). In this article the following structures will be dealt with: In the male the testes, epididymis, vasa deferentia, vesiculae seminales, prostate, penis and urethra. In the female the ovaries, Fallopian tubes, uterus, vagina and vulva.

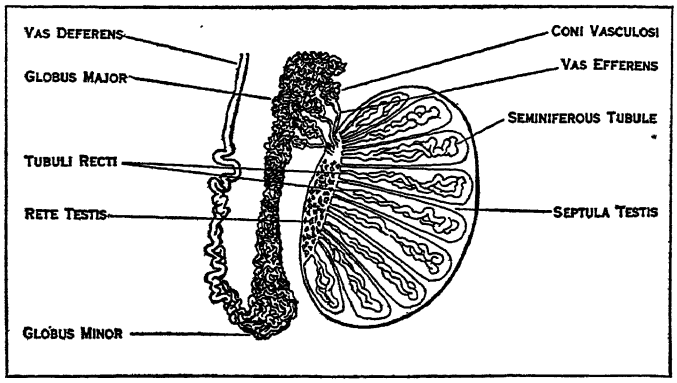
MALE REPRODUCTIVE ORGANS

The *testes* or *testicles* are the glands in which the male reproductive cells are formed. They lie, one on each side, in the scrotum surrounded by the tunica vaginalis (*see* COELOM AND SEROUS MEMBRANES). Each is oval, about one and a half inches long and has a strong fibrous coat (*tunica albuginea*), from which septa penetrate into the substance, dividing it into lobules in which the seminiferous tubes are coiled. It is estimated that the total length of these seminiferous tubes in the two glands is little short of a mile. (*See* fig. 1.)

Posteriorly, the fibrous sheath is thickened, and contains a

plexus of tubules (*rete testis*) (*see* fig. 1), into which the seminiferous tubes open. In this way the secretion of the gland is carried to its upper and back part, whence from fifteen to twenty small tubes (*vasa efferentia*) pass to the epididymis. Each of these is convoluted before opening (*conus vasculosus*).

Microscopically, the seminiferous tubules consist of a basement membrane surrounding several layers of epithelial cells,



FROM CUNNINGHAM, "TEXT-BOOK OF ANATOMY" (OXFORD MEDICAL PUBLICATIONS)

FIG. 1.—DIAGRAM SHOWING THE STRUCTURE OF THE TESTIS, AND EPIDIDYMIS

some of which are constantly being transformed into spermatozoa or male sexual cells.

The *epididymis* (*see* fig. 1) is a soft body lying behind the testis; it is enlarged above to form the *globus major* or head, while below is a lesser swelling, the *globus minor* or tail. The whole epididymis is made up of a convoluted tube about 20ft. long. Between the globus major and the testis two small vesicles (*hydatids of Morgagni*) are often found.

The *vas deferens* is the continuation of the tube of the epididymis and starts at the globus minor; it runs up on the inner (mesial) side of the epididymis to the external abdominal ring. On its way up it is joined by testicular arteries, veins, lymphatics and nerves to form the *spermatic cord.* After entering the external abdominal ring, these structures pass obliquely through the abdominal wall, lying in the inguinal canal for an inch and a half, until the internal abdominal ring is reached. Here they separate and the vas passes down the side of the pelvis and turns inward to meet its fellow at the back of the bladder, just above the prostate. The whole length of the vas is 12 to 18in. and it is remarkable for the thickness of its muscular walls, which gives it the feeling of a piece of whipcord when rolled between the finger and thumb.

A little above the globus major a few scattered tubules are found in children in front of the cord; these form the rudimentary structure known as the *organ of Giraldès* or *paradidymis.*

The *vesiculae seminales* are muscular sac-like diverticula, one on each side, from the vasa deferentia. They are about 2in. long and run outward behind the bladder and parallel to the upper margin of the prostate for some little distance, but usually turn upward near their blind extremity. When unravelled each is about 5in. long, sharply bent upon itself two or three times. Where the vesiculae join the ampullae of the vasa deferentia the *ejaculatory ducts* are formed; these are narrow and thin-walled, and run, side by side, through the prostate to open into the floor of the prostatic urethra.

The *prostate* is situated just below the bladder and traversed by the urethra; it is somewhat conical with the base upward in contact with the bladder. Vertically and transversely it measures about an inch and a quarter, antero-posteriorly it is only about three-quarters of an inch, though its size is liable to great variation. It is enclosed in a fibrous capsule from which it is separated by the *prostatic plexus of veins* anteriorly.

Microscopically, it consists of masses of long, slender, slightly branching glands, embedded in unstriped muscle and fibrous tissue; these glands open by delicate ducts (about twenty in number) into the prostatic urethra.

The *male urethra* begins at the bladder and runs through the prostate and perineum to the penis, which it traverses as far as the tip. It is divided into a prostatic, membranous and spongy part, and is altogether about 8 inches in length. The *prostatic urethra* is about an inch and a quarter long, and a longitudinal ridge is seen in its posterior wall (*verumontanum*), on each side of which the numerous ducts of the prostate open. Near the lower part of the verumontanum is a little pouch, the *utriculus masculinus,* about one-eighth of an inch deep, the opening of which is guarded by a delicate membranous circular fold, the *male hymen.* Close to the opening of the utriculus the ejaculatory ducts open into the urethra by very small apertures. The part of the urethra above the openings of these ducts really belongs to the urinary system only, though it is convenient to describe it here. After leaving the prostate the urethra runs more forward for about three-quarters of an inch, lying between the two layers of the triangular ligament, both of which it pierces. This is known as the *membranous urethra,* and is very narrow, being gripped by the compressor urethrae muscle.

The *spongy urethra* is that part which is enclosed in the penis after piercing the anterior layer of the triangular ligament. At first it lies in the substance of the bulb and, later, of the corpus spongiosum, while finally it passes through the glans. In the greater part of its course it is a transverse slit, but in traversing the glans it enlarges considerably to form the *fossa navicularis,* and here, in transverse section, it looks like an inverted T (⊥), then an inverted Y (⅄), and finally at its opening (external meatus) a vertical slit. Into the whole length of the urethra mucous glands (*glands of Littré*) open. As a rule the meatus is the narrowest part of the whole canal.

Opening into the spongy urethra where it passes through the bulb are the ducts of two small glands known as Cowper's glands, which lie on each side of the membranous urethra.

The *penis* is the intromittent organ of generation, and is made up of three cylinders of erectile tissue, covered by skin and subcutaneous tissue without fat. In a transverse section two of these cylinders (the *corpora cavernosa*) are above, side by side, while one, the *corpus spongiosum,* is below. At the root of the penis, the two corpora cavernosa diverge, become more and more fibrous in structure, and are attached on each side to the rami of the ischium, while the corpus spongiosum becomes more vascular and enlarges to form the bulb. The whole length of the corpus spongiosum is traversed by the urethra. The anterior part of the penis is formed by the *glans,* a bell-shaped structure, apparently continuous with the corpus spongiosum, and having the conical ends of the corpora cavernosa fitted into depressions on its posterior surface. On the dorsum of the penis the rim of the bell-shaped glans projects beyond the level of the corpora cavernosa (*corona glandis*). The skin of the penis forms a fold which covers the glans (*prepuce* or *foreskin*); when this is drawn back a median fold, the *frenulum praeputii,* is seen running to just below the meatus. After forming the prepuce the skin is reflected over the glans and here looks like mucous membrane. The structure of the corpora cavernosa consists of a strong fibrous coat, the *tunica albuginea,* from the deep surface of which trabeculae penetrate the interior and divide it into a number of spaces which are lined with endothelium and communicate with the veins. Between the two corpora cavernosa the sheath is not complete and, having a comb-like appearance, is known as the *septum pectinatum.* The structure of the corpus spongiosum and glans resembles that of the corpora cavernosa, but the trabeculae are finer and the network closer.

FEMALE REPRODUCTIVE ORGANS

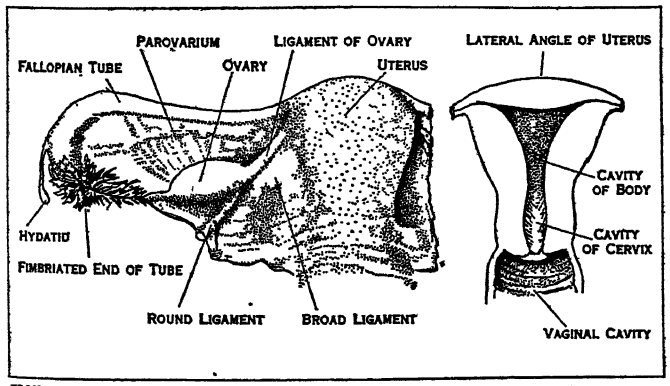
The *ovary* is an organ which in shape and size somewhat resembles a large almond, though its appearance varies in different individuals, and at different times of life. It lies in the side wall of the pelvis and is attached to the uterus by the ligament of the ovary, while its anterior border has a short reflection of peritoneum (*mesovarium*), running forward to the broad ligament of the uterus. It is through this anterior border that the vessels and nerves enter and leave the gland.

Under the microscope the ovary is seen to be covered by a layer of cubical cells, continuous near the anterior border with

the cells of the peritoneum. Deep to these is the ovarian stroma and embedded in it are numerous nests of epithelial cells, the *Graafian follicles,* in various stages of development. During the childbearing period some of these will be nearing the ripe condition and then contain one large cell, the *ovum,* surrounded by a mass of small cells forming the *discus proligerus.* At one point this is continuous with a layer of cells (*stratum granulosum*) which lines the outer wall of the follicle, but elsewhere the two layers are separated by fluid, the *liquor folliculi.* When the follicle bursts, as it does in time, the ovum escapes on to the surface of the ovary. The substance of the ovary also contains cells which are believed to form the ovarian internal secretion.

The *Fallopian tubes* receive the ova and carry them to the uterus. That end of each which lies in front of the ovary has a number of fringes (*fimbriae*) hanging from it; one of the largest of these is the ovarian fimbria and is attached to the upper or tubal pole of the ovary. The small opening among the fimbriae by which the tube communicates with the peritoneal cavity is the *ostium abdominale,* and from this the lumen of the tube runs from four to four and a half inches, until it opens into the cavity of the uterus by an extremely small opening. In fig. 2 the Fallopian tube and ovary are pulled out from the uterus; this is not the position of the ovary in the living body, nor is it of the tube, the outer half of which lies folded on the front and inner surface of the ovary. The Fallopian tubes are made chiefly of unstriped muscle, the outer layer of which is longitudinal and the inner circular; deep to this are the submucous and mucous coats, the latter being lined with ciliated epithelium (*q.v.*) and thrown into longitudinal pleats. Superficially the tube is covered by peritoneum.

The *uterus* or *womb* is a pear-shaped, very thick-walled muscular bag, lying in the pelvis between the bladder and rectum. In the non-pregnant condition it is about three inches long and two in its broadest part, which is above. The upper half or body is somewhat triangular with its base upward, and has an anterior surface which is moderately flat, and a posterior convex. The lower half is the neck or cervix and is cylindrical; it projects into the anterior wall of the vagina, into the cavity of which it opens by the *os uteri externum.* This opening in a uterus which has never been pregnant is a narrow transverse slit, rarely a circular aperture, but in those uteri in which pregnancy has occurred the slit is much wider and its lips are thickened and gaping and often scarred. The interior of the body of the uterus shows



FROM CUNNINGHAM, "TEXT-BOOK OF ANATOMY" (OXFORD MEDICAL PUBLICATIONS)

FIG. 2.—(LEFT) THE UTERUS AND BROAD LIGAMENT SEEN FROM BEHIND; (RIGHT) DIAGRAMMATIC REPRESENTATION OF THE UTERINE CAVITY, OPENED UP FROM IN FRONT

a comparatively small triangular cavity (*see* figure 2), the anterior and posterior walls of which are in contact. The base of the triangle is upward, and at each lateral angle one of the Fallopian tubes opens. The apex leads into the canal of the cervix, but between the two there is a slight constriction known as the *os uteri internum.* The canal of the cervix is about an inch long, and is spindle-shaped when looked at from in front; its anterior and posterior walls are in contact, and its lining mucous membrane is raised into a pattern which, from its likeness to a cypress twig, is called the *arbor vitae.* This arrangement is obliterated after the first pregnancy. On making a mesial vertical section of the uterus the cavity is seen as a mere slit which is bent about its middle to form an angle the opening of which is forward. A normal uterus is therefore bent forward on itself, or anteflexed. In addition to this, its long axis forms a marked angle with that of the vagina, so that the whole uterus is bent forward or anteverted. As a rule, in adults the uterus is more or less on one side of the mesial plane of the body. From each side of the uterus the peritoneum is reflected outward, as a two-layered sheet, to the side wall of the pelvis; this is the *broad ligament,* and between its layers lie several structures of importance. Above, there is the Fallopian tube, already described; below and in front is the round ligament; behind, the ovary projects backward, and just above this, when the broad ligament is stretched out as in fig. 2, are the epoöphoron and paroöphoron with the duct of Gärtner.

The *round ligament* is a cord of unstriped muscle which runs from the lateral angle of its own side of the uterus forward to the internal abdominal ring, and so through the inguinal canal to the upper part of the labium majus.

The *epoöphoron* or *parovarium* is a collection of short tubes which radiate from the upper border of the ovary when the broad ligament is pulled out as in fig. 2. It is best seen in very young children and represents the vasa efferentia in the male. Near the ovary the tubes are closed, but nearer the Fallopian tube they open into another tube which is nearly at right angles to them, and runs toward the uterus, though in the human subject it is generally lost before reaching that organ. It is known as the duct of Gärtner, and is the homologue of the male epididymis and vas deferens. Some of the outermost tubules of the epoöphoron are sometimes distended to form hydatids. Nearer the uterus than the epoöphoron a few scattered tubules (*paroöphoron*) are occasionally found which are looked upon as the homologue of the organ of Giraldès in the male.

The *vagina* is a dilatable muscular passage, lined with mucous membrane, which leads from the uterus to the external generative organs; its direction is, from the uterus, downward and forward, and its anterior and posterior walls are in contact, so that in a horizontal section it appears as a transverse slit. As the orifice is neared the slit becomes H-shaped. Owing to the fact that the neck of the uterus enters the vagina from in front, the anterior wall of that tube is only about 2½in., while the posterior is 3½. The mucous membrane is raised into a series of transverse folds or rugae, and between it and the muscular wall are plexuses of veins forming erectile tissue. The relation of the vagina to the peritoneum is noticed under COELOM AND SEROUS MEMBRANES.

The *vulva* or *pudendum* comprises all the female external generative organs, and consists of the mons Veneris, labia majora and minora, clitoris, urethral orifice, hymen, bulbs of the vestibule, and glands of Bartholin. The *mons Veneris* is the elevation in front of the pubic bones covered by hair in the adult. The *labia majora* are two folds of skin, containing fibro-fatty tissue and covered on their outer surfaces by hair, running down from the mons Veneris to within an inch of the anus and touching one another by their internal surfaces. They are the homologues of the scrotum in the male. The *labia minora* are two folds of skin containing no fat, which are usually hidden by the labia majora and above enclose the clitoris, they are of a pinkish colour and look like mucous membrane.

The *clitoris* is the representative of the penis, and consists of two corpora cavernosa which posteriorly diverge to form the crura clitoridis, and are attached to the ischium; the organ is about an inch and a half long, and ends anteriorly in a rudimentary glans which is covered by the junction of the labia minora; this junction forms the prepuce of the clitoris.

The *orifice of the urethra* is about an inch below the glans clitoridis and is slightly puckered.

The *hymen* is a fold of mucous membrane which surrounds the orifice of the vagina and is usually only seen in the virgin. As has been pointed out above, it is represented in the male by the fold at the opening of the uterus masculinus.

The *bulbs of the vestibule* are two masses of erectile tissue

situated one on each side of the vaginal orifice: above they are continued up to the clitoris; they represent the bulb and the corpus spongiosum of the male, split into two, and the fact that they are so divided accounts for the urethra failing to be enclosed in the clitoris as it is in the penis.

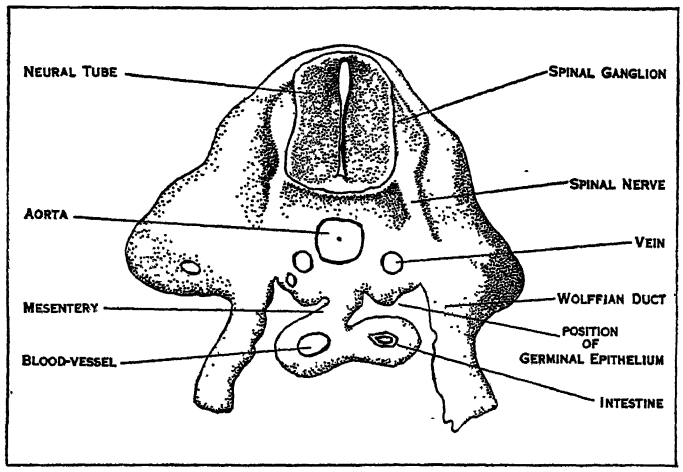
The *glands of Bartholin* are two oval bodies about half an inch long, lying on each side of the vagina close to its opening; they represent Cowper's glands in the male, and their ducts open by minute orifices between the hymen and the labia minora.

From the foregoing it will be seen that all the parts of the male external genital organs are represented in the female, though usually in a less developed condition, and that, owing to the orifice of the vagina, they retain their original bi-lateral form.

EMBRYOLOGY

The development of the reproductive organs is so closely interwoven with that of the urinary that some reference from this article to that on the URINARY SYSTEM is necessary. It will here be convenient to take up the development at the stage depicted in the accompanying figure (fig. 3), in which the genital ridge is seen on each side of the attachment of the mesentery; external to this, and forming another slight ridge of its own, is the Wolffian duct, while a little later the Müllerian duct is formed and lies ventral to the Wolffian. The early history of these ducts is indicated in the article on the URINARY SYSTEM. Until the fifth or sixth week the development of the genital ridge is very much the same in the two sexes, and consists of cords of cells growing from the epithelium-covered surface into the mesenchyme, which forms the interior of the ridge. In these cords are some large germ cells which are distinguishable at a very early stage of development. It must, of course, be understood that the germinal epithelium covering the ridge, and the mesenchyme inside it, are both derived from the mesoderm or middle layer of the embryo. About the fifth week of human embryonic life the tunica albuginea appears in the male, from which septa grow to divide the testis into lobules, while the epithelial cords form the seminiferous tubes, though these do not gain a lumen until just before puberty. From the adjacent mesonephros, or perhaps, coelomic epithelium, cords of cells grow into the attached part of the genital ridge, or testis, as it now is, and from these the rete testis is developed.

In the female the same growth of epithelial cords into the mesenchyme of the genital ridge takes place, but each one is



FROM CUNNINGHAM, "TEXT-BOOK OF ANATOMY" (OXFORD MEDICAL PUBLICATIONS)

FIG. 3.—TRANSVERSE SECTION THROUGH A RAT EMBRYO SHOWING POSITION OF GERMINAL EPITHELIUM

distinguished by a bulging toward its middle, in which alone the large germ cells are found. Eventually this bulging part is broken up into a series of small portions, each of which contains one germ cell or ovum and gives rise to a Graafian follicle. Mesonephric cords appear as in the male; they do not enter the ovary, however, but form a transitory network (*rete ovarii*) in the mesovarium. As each genital gland enlarges it remains attached to the rest of the intermediate cell mass by a constricted fold of the coelomic membrane, known as the *mesorchium* in the male, and the *mesovarium* in the female. Lying dorsal to the genital ridge in the intermediate cell mass is the *mesonephros*, consisting of numerous tubules which open into the Wolffian duct. This at first is an important excretory organ, but during development becomes used for other purposes. In the male, as has been shown, it may form the rete testis, and certainly forms the vasa efferentia and globus major of the epididymis: in addition to these, some

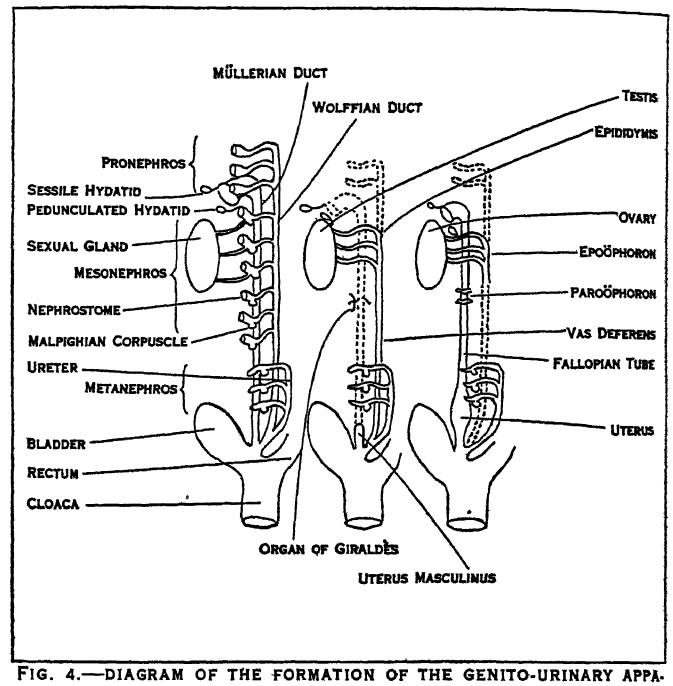


FIG. 4.—DIAGRAM OF THE FORMATION OF THE GENITO-URINARY APPARATUS (SUPPRESSED PARTS ARE DOTTED)

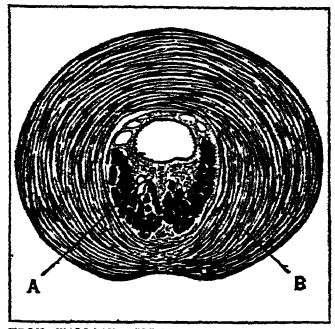
of its separate tubes probably account for the vas aberrans and the organ of Giraldès (*see* fig. 4). In the female the tubules of the epoöphoron represent the main part, while the paroöphoron, like the organ of Giraldès in the male, is probably formed from some separate tubes (*see* fig. 4).

The Wolffian duct, which, in the early embryo, carries the excretion of the mesonephros to the cloaca, forms eventually the body and tail of the epididymis, the vas deferens, and ejaculatory duct in the male, the vesicula seminalis being developed as a pouch in its course. In the female this duct is largely done away with, but remains as the collecting tube of the epoöphoron, and in some mammals as the duct of Gärtner, which runs down the side of the vagina to open into the vestibule.

The Müllerian duct, as it approaches the cloaca, joins its fellow of the opposite side, so that there is only one opening into the ventral cloacal wall. In the male the lower part only of it remains as the uterus masculinus (fig. 4), but in the female the Fallopian tubes, uterus, and probably the vagina, are all formed from it (fig. 4). In both sexes a small hydatid or vesicle is liable to be formed at the beginning of both the Wolffian and Müllerian duct (fig. 4); in the male these are close together in front of the globus major of the epididymis, and are known as the sessile and pedunculated hydatids of Morgagni. In the female there is a hydatid among the fimbriae of the Fallopian tube which of course is Müllerian and corresponds to the sessile hydatid in the male, while another is often found at the beginning of the collecting tube of the epoöphoron and is probably formed by a blocked mesonephric tubule. This is the pedunculated hydatid of the male. The development of the vagina, as Berry Hart (*Journ. Anat. and Phys.* XXXV. 330) has pointed out, is peculiar. Instead of the two Müllerian ducts joining to form the lumen of its lower third, as they do in the case of the uterus and its upper two-thirds, they become obliterated, and their place is taken by two solid cords of cells, which later become canalized and the septum between them is obliterated.

The common chamber, or cloaca, into which the alimentary, urinary and reproductive tubes open in the foetus, has the urinary bladder (the remains of the allantois) opening from its ventral wall (*see* PLACENTA and URINARY SYSTEM).

During development the alimentary or anal part of the cloaca is separated from the urogenital. According to F. Wood Jones, the anal part is completely shut off from the urogenital and ends in a blind pouch which grows toward the surface and meets a new ectodermal depression, the permanent anus, not being part of the original cloacal aperture, but a new perforation. This description is in harmony with the malformations occurring in this region.



FROM WALLACE, "PROSTATIC ENLARGEMENTS" (OXFORD MEDICAL PUBLICATIONS)

FIG. 5.—TRANSVERSE SECTION OF SHEEP'S PROSTATE: (A) PROSTATE GLAND, (B) STRIATED MUSCLE

The external generative organs have at first the same appearance in the two sexes and consist of a swelling, the genital eminence, in the ventral wall of the cloaca. This in the male becomes the penis and in the female the clitoris. Throughout the generative system the male organs depart most from the undifferentiated type and in the case of the genital eminence two folds grow together and enclose the urogenital passage, thus making the urethra perforate the penis, while in the female these two folds remain separate as the labia minora. Sometimes in the male the folds fail to unite completely and then there is an opening into the urethra on the under surface of the penis—a condition known as hypospadias.

In the undifferentiated condition the integument surrounding the genital opening is raised into a horseshoelike swelling with its convexity over the pubic symphysis and its concavity toward the anus; the lateral parts of this remain separate in the female and form the labia majora, but in the male they unite to form the scrotum. The median part forms the mons Veneris or mons Jovis.

It has been shown that the testis is formed in the loin region of the embryo close to the kidney, and it is only in the later months of foetal life that it changes this position for that of the scrotum. In the lower part of the genital ridge a fibro-muscular cord is formed which stretches from the lower part of the testis to the bottom of the scrotum; it is known as the gubernaculum testis, and by its means the testis is directed into the scrotum. Before the testis descends, a pouch of peritoneum called the processus vaginalis passes down in front of the gubernaculum through the opening in the abdominal wall, which afterwards becomes the inguinal canal, into the scrotum, and behind this the testis descends, carrying with it the mesonephros and mesonephric duct. These, as has already been pointed out, form the epididymis and vas deferens. At the sixth month the testis lies opposite the abdominal ring, and at the eighth reaches the bottom of the scrotum and invaginates the processus vaginalis from behind. Soon after birth the communication between that part of the processus vaginalis which now surrounds the testis and the general cavity of the peritoneum disappears, and the part which remains forms the tunica vaginalis. Sometimes the testis fails to pass beyond the inguinal canal, and the term "cryptorchism" is used for such cases.

In the female the ovary undergoes a descent like that of the testis, but it is less marked since the gubernaculum becomes attached to the Müllerian duct where that duct joins its fellow to form the uterus; hence the ovary does not descend lower than the level of the top of the uterus, and the part of the gubernaculum running between it and the uterus remains as the ligament of the ovary, while the part running from the uterus to the labium is the round ligament. In rare cases the ovary may be drawn into the labium just as the testis is drawn into the scrotum.

COMPARATIVE ANATOMY

In the Urochorda, the class to which Salpa, Pyrosoma and the sea squirts (Ascidians) belong, male and female generative glands (*gonads*) are present in the same individual; they are therefore hermaphrodite.

In the Acrania (Amphioxus) there are some twenty-six pairs of gonads arranged segmentally along the side of the pharynx and intestine and bulging into the atrium. Between them and the atrial wall, however, is a rudimentary remnant of the coelom, through which the spermatozoa or ova (for the sexes are distinct) burst into the atrial cavity. There are no genital ducts.

In the Cyclostomata (lampreys and hags) only one median gonad is found, and its contents (spermatozoa or ova) burst into the coelom and then pass through the genital pores into the urogenital sinus and so to the exterior. It is probable that the single gonad is accounted for by the fact that its fellow has been suppressed.

In the Elasmobranchs or cartilaginous fishes there are usually two testes or two ovaries, though in the dogfish one of the latter is suppressed. From each testis, which in fish is popularly known, as the soft roe, vasa efferentia lead into the mesonephros, and the semen is conducted down the vas deferens or mesonephric duct into the urogenital sinus, into which also the ureters open. Sometimes one or more thin-walled diverticula—the sperm sacs—open close to the aperture of the vas deferens. In the female the ova are large, on account of the quantity of yolk, and they burst into the coelom, from which they pass into the large Müllerian ducts or oviducts. In the oviparous forms, such as the common dogfish (Scyllium), there is an oviducal gland which secretes a horny case for the egg after it is fertilized, and these cases have various shapes in different species. Some of the Elasmobranchs, *e.g.*, the spiny dogfish (Acanthias), are viviparous, and in these the lower part of the oviduct is enlarged and acts as a uterus. In male elasmobranchs the anterior part of the Müllerian duct persists. Paired intromittent organs (claspers) are developed on the pelvic fins of the males; these conduct the semen into the cloaca of the female.

In the teleostean and ganoid fishes (Teleostomi) the nephridial ducts are not always used as genital ducts, but special coelomic ducts are formed (*see* COELOM AND SEROUS MEMBRANES).

In the Dipnoi or mudfish long coiled Müllerian ducts are present, but the testes either pour their secretion directly into the coelom or, as in Protopterus, have ducts which are probably coelomic in origin.

In both the Teleostomi and Dipnoi the testes and ovaries are paired.

True hermaphroditism is known among fishes, the hag (Myxine) and the sea perch (Serranus) being examples. In many others it occurs as an abnormality.

In the Amphibia both ovaries and testes are symmetrical. In the snakelike forms which are found in the order Gymnophiona the testes are a series of separate lobules extending for a long distance, one behind the other, and joined by a connecting duct from which vasa efferentia pass into the Malpighian capsules of the kidneys, and so the sperm is conducted to the mesonephric duct, which acts both as vas deferens and ureter. The Müllerian ducts or oviducts are long and often coiled in Amphibia, and usually open separately into the cloaca. There is no penis, but in certain forms, especially the Gymnophiona, the cloaca is protrusible in the male and acts as an intromittent organ. Corpora adiposa or fat bodies are present in all Amphibians, and probably nourish the sexual cells during the hibernating period.

In Reptilia two testes and ovaries are developed, though they are often asymmetrical in position. In Lizards the vas deferens and ureter open into the cloaca by a common orifice; as they do in the human embryo. In these animals there are two penes, which can be protruded and retracted through the vent; but in the higher reptiles (Chelonia and Crocodilia) there is a single median penis rising from the ventral wall of the cloaca, composed of erectile tissue and deeply grooved on its dorsal surface for the passage of the sperm.

In birds the right ovary and oviduct degenerates, and the left alone is functional. In the male the ureter and vas deferens open separately into the cloaca, and in the Ratitae (ostriches) and

Anseres (ducks and geese) a well-developed penis is present in the male. In the ostrich this is fibrous, and bifurcated at its base, suggesting the crura penis of higher forms.

Among the Mammalia the Monotremata (Ornithorhynchus and Echidna) have bird-like affinities. The left ovary is larger than the right, and the oviducts open separately into the cloaca and do not fuse to form a uterus. The testes retain their abdominal position; and the vasa deferentia open into the base of the penis, which lies in a separate sheath in the ventral wall of the cloaca, and shows an advance on that of the reptiles and birds in that the groove is now converted into a complete tunnel. In the female there is a well-developed clitoris, having the same relations as the penis.

In the marsupials the cloaca is very short, and the vagina and rectum open separately into it. The two uteri open separately and three vaginae are formed, two lateral and one median. The two lateral join together below to form a single median lower vagina, and it is by means of these that the spermatozoa pass up into the oviducts. The upper median vagina at first does not open into the lower one, but during parturition a communication is established which in some animals remains permanent (*see* J. P. Hill, *Proc. Linn. Soc. N.S. Wales,* 1899 and 1900). From the marsupials upward the ovarian end of the Fallopian tube has the characteristic fimbriated appearance as in human anatomy.

In some mammals, such as the sow and the cow, the Wolffian duct is persistent in the female and runs along the side of the vagina as the duct of Gärtner. It is possible that the lateral vaginae of the marsupials are of Wolffian origin.

In marsupials the testes descend into the scrotum, which lies in these animals in front of instead of behind the penis. In some mammals, such as the elephant, they never reach the scrotum at all; while in others, *e.g.,* many rodents, they can be drawn up into the abdomen or lowered into the scrotum. The subject of the descent of the testicles is treated by H. Klaatsche, "Ueber den Descensus testiculorum," *Morph. Jahrb.,* Bd. xvi.

The prostate is met with in its most simple form in marsupials, in which it is a mere thickening of the mucous membrane of the urethra; in the sheep it forms a bilateral elongated mass of gland tissue lying behind the urethra and surrounded by a well-developed layer of striped muscle. In the sloth it is said to be altogether absent, while in many of the insectivores and rodents it consists of many lobes which usually show a bilateral arrangement. The vesiculae seminales are usually present in higher mammals, and sometimes, as in the hedgehog, are very large, though they are absent in the Carnivora. Cowper's glands are usually present and functional throughout life. The uterus masculinus is also usually present, but there is grave doubt whether the large organ called by this name in the rabbit should not rather be regarded as homologous with part of the vesiculae seminales. The penis shows many diversities of arrangement; above the marsupials its two crura obtain an attachment to the ischium. In many mammals it is quite hidden by the skin in the flaccid condition, and its external orifice may range from the perineum in the marsupials to the middle of the ventral wall of the abdomen in the ruminants. In the Marsupialia, Rodentia, Chiroptera, Carnivora and some Primates an os penis is developed in connection with the corpora cavernosa.

The clitoris is present in all mammals; sometimes, as in the female hyena, it is very large, and at others, as in the lemur, it is perforated by the urethra.

See Quain's *Anatomy;* Gray's *Anatomy;* Cunningham's *Text-Book of Anatomy;* Macalister's *Anatomy;* Oppel's *Lehrbuch der vergleich. mikroskop. Anatomie der Wirbelthiere,* Bd. iv. (Jena, 1904); Gegenbaur's *Vergleich. Anat. der Wirbelthiere;* Wiedersheim's *Comparative Anatomy of Vertebrates,* translated by W. N. Parker (London, 1907); E. R. Bundy, *Textbook of Anatomy and Physiology* (5th ed., 1923); F. H. A. Marshall, *Introduction to Sexual Physiology* (1928) and *The Physiology of Reproduction* (2nd ed., 1922); J. Hammond, *Reproduction in the Rabbit* (1925); Buchanan's *Manual of Anatomy* (5th ed., 1925); W. H. Howell, *Textbook of Physiology* (1927). (F. G. P.)

REPTILES (*Reptilia*) is the name given to a class of vertebrates which hold a position in the animal kingdom intermediate between the amphibians and the birds, and the mammals. The group arose, perhaps in Lower Carboniferous times, from the Labyrinthodont Amphibia, and was already varied at the end of the Carboniferous. During Permian times the class branched out into many orders, one of which included the ancestors of the Mammalia, whilst from another the birds, crocodiles, Sphenodon, and perhaps the lizards and snakes arose. The tortoises are the descendants of another early group. In a recent survey by Nopcsa, it is pointed out that, of the 125 families into which he divides the reptiles, only 18 are represented by living forms, whilst of the 19 orders only four are extant. The modern forms fall into the orders Crocodilia, including the crocodiles and alligators; the Squamata, the lizards and snakes; the Rhynchocephalia, represented only by the Tuatera lizard of New Zealand, and the Chelonia, the tortoises and turtles. These living forms are characterized as follows:

(1.) The animal breathes air by lungs.

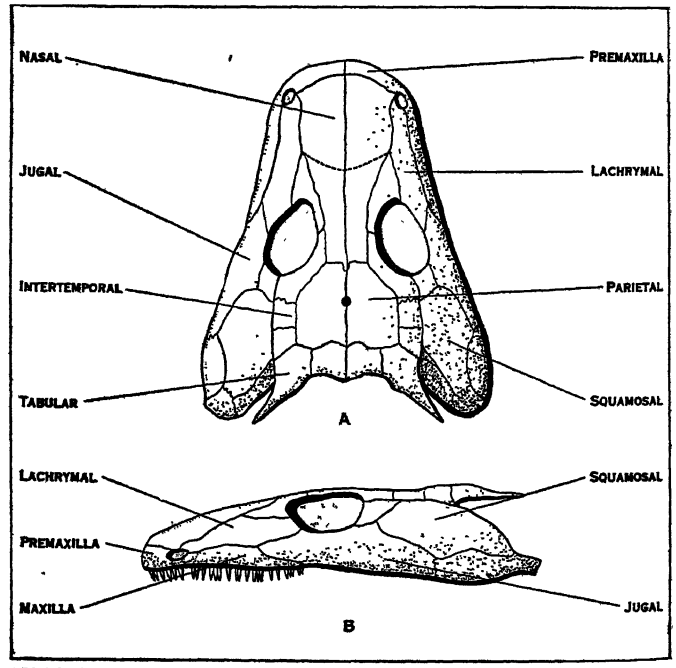
(2.) The body temperature is variable.

(3.) The skin is covered with horny scales formed by the epidermis.

(4.) Fertilization is internal, and an egg, consisting of a yolk surrounded by albumen and contained in a shell, is usually laid and hatched by the heat of the sun or of decaying vegetation. In some cases reptiles are viviparous.

(5.) In the brain the cerebral hemispheres are comparatively small. Their roof tends to become thinned and may be almost membranous. There is a well-developed hypopallium which becomes assimilated to the corpus striatum, losing the original stratification of the neurones. The mid-brain is relatively large and its roof forms a pair of large optic lobes.

(6.) The olfactory organ has its surface increased by a simple turbinal or concha, and there is a well-developed Jacobson's organ.



FROM PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY

FIG. 1.—SKULL OF THE EMBOLOMEROUS AMPHIBIAN PALAEOGYRINUS, (A) FROM ABOVE. (B) FROM THE LEFT SIDE

The posterior nares may be immediately below the external nostrils or may be carried back to the hinder end of the head.

The eyes are usually present, but may be hidden in burrowing forms. The retina normally contains both rods and cones, but may consist exclusively of either type. There is a pecten in the form of a folded sheet projecting into the vitreous humour.

The internal ear shows a more marked separation of *sacculus* and *utriculus* than obtains in Amphibia, a lagena always occurs and is associated with a perilymphatic duct, in some cases so as to form a rudimentary cochlea. The tympanic cavity lies high up and the tympanic membrane is either superficial or lies at the end of a short external auditory meatus. The membrane is con-

nected to that closing the *fenestra ovalis* by a straight rod, whose inner end, the columella, is bony, whilst the outer half, the extra-columella, is often four-rayed, a short dorsal process being connected to the end of the paroccipital process and a ventral process often continued into the hyoid.

(7.) There is a well-developed tongue capable of free movement. The mid-gut has the usual structure; there is a cloaca and an urinary bladder of allantoic origin. The lungs are more elaborate than those of Amphibia and less than those of mammals.

(8.) The heart is three- or four-chambered, there being two auricles and a ventricle more or less completely divided into two. There is no bulbus; three arteries arise from the ventricle; of these one is the right systemic, another the pulmonary, whilst the third is the left systemic and both carotids. The posterior cardinals have both almost disappeared as such, the post-caval vein returning most of the blood from the posterior part of the animal to the heart. There is a coronary circulation.

(9.) The functional kidney in the adult is a metanephros discharging by a ureter into the cloaca. The ovary is often single and the egg always large. The oviduct is provided with glands which secrete albumen and a shell. A copulatory organ is usually present in the male, but is variable in structure.

(10.) The pre-sacral part of the vertebral column is usually less clearly divided into regions than in mammals and birds. There are two sacral vertebrae and a longer or shorter series of caudals. The atlas consists of a pair of neural arches, a single inter centrum and a centrum which forms an odontoid, though it may not be fused to the axis. There is sometimes a pro-atlas. The vertebra of the rest of the column always consists of a neural arch and a centrum with inter-centra forming chevron bones in the tail. Small inter-centra may be present throughout the column. Ribs are usually present on all vertebrae except the posterior caudals; they may be single or double headed. A true sternum is usually present, connected to some of the dorsal ribs by sternal ribs.

The neural cranium is generally incompletely ossified, a good deal of the lateral walls anteriorly being membranous. It is often movably connected to the dermal bones of the skull roof and palate. There is a single occipital condyle, mainly basi-occipital but with contributions from the ex-occipital. A supra-occipital is present and articulates with the parietals. The inner ear lies within the opisthotic, usually fused with the ex-occipital, the pro-otic and the supra-occipital. An ossification in front of the pro-otic, in the side wall of the cranium, is absent in only two orders. There is an ossified basi-sphenoid, but the unossified pre-sphenoid is usually underlain by a para-sphenoid.

The dermal bones of the skull form a roof, which may be very incomplete or, indeed, absent, over the masticatory muscles, whilst the orbit is surrounded by a ring of bones which are continuous with the maxillae and nasals which enclose the anterior end of the head. In the palate the pterygoids are always large bones articulating with the basi-sphenoid and extending back to the quadrate. Pre-vomers and palatines are always present and ectopterygoids usually so. In many forms an epipterygoid is ossified. The lower jaw is complex, it articulates with the quadrate by an articular bone of endochondral origin, and at least five membrane bones contribute to its structure.

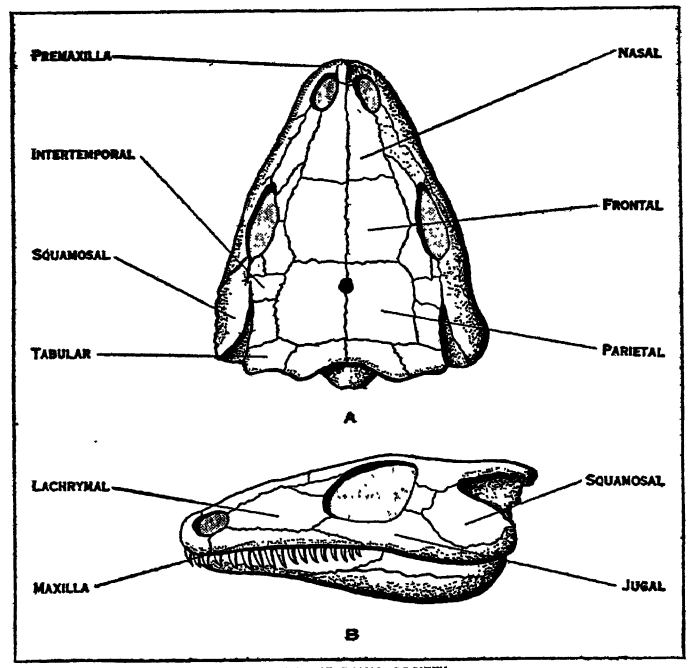
Fore and hind limbs are usually present, but either or both may be absent. The shoulder girdle consists of a pair of scapulae and "coracoids," both contributing to the glenoid cavity. There are generally clavicles and an inter-clavicle. The hand and foot are primitively pentadactyl, the fourth digit being the longest.

(11.) Segmentation of the egg is incomplete (meroblastic). No primitive streak is formed and a rudimentary archenteron with both roof and floor may be established. There is an amnion and an allantois, membranes developed for the protection, nutrition and respiration of the embryo.

Amphibian Ancestry.—The Amphibia, which were the ancestors of the reptiles, spent the greater part of their life in water, probably crawling on to land only to pass from one pool to another. They laid small eggs, which were fertilized after they had passed out from the body of the mother. These eggs developed into an aquatic larva which breathed by means of gills; subsequently, when this larva had reached a relatively large size, the gills were absorbed and the animal became dependent on the air for the main bulk of its oxygen. An aquatic animal may have, and in the case of the Amphibia did have, a soft skin which can only remain healthy if it be kept moist. Living Amphibia secure this condition by pouring out mucus and water from glands in their skin, which is therefore slimy. An animal which adopts this method has great difficulty in roaming far from water, the possibility of dying from desiccation being always present. Thus one of the first changes necessary to make an effectively terrestrial animal from an amphibian is to alter the character of its skin in such a way that it becomes water-tight, and has a dry outer surface. Such a change in a vertebrate is most readily achieved by thickening the epidermis and laying down keratin in its outer layers; continuation of this process leads to the formation of the horny scales of reptiles, which are made by localized patches of skin exceptionally active in the production of keratin. As such a skin does not require to be kept moist, glands are very poorly developed in the skin of reptiles.

During the transition from water to air the sense organs necessarily undergo great modifications. The olfactory organ, which had become adapted to the relatively large amounts of odorous substances which could come to it in solution in water, had to be made capable of recognizing the much smaller amounts brought to it as vapour through the air. In the intervening stage of the Amphibia the nose becomes double, one part of it, Jacobson's organ, functioning in water, the rest in air. When the reptiles became completely terrestrial, Jacobson's organ took on the new function of smelling the material lying in the mouth, and the rest of the organ became the normal organ of smell.

The eye, adapted for focussing objects under water, has to be so



FROM PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY

FIG. 2.—SKULL OF THE COTYLOSAUR SEYMOURIA; (A) FROM ABOVE, (B) LEFT SIDE

changed in its proportions as to see its surroundings through air.

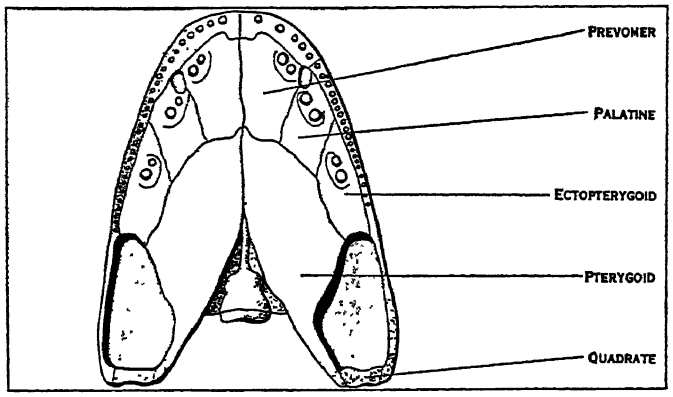
That part of the ear whose function is to determine the position of the animal with respect to gravity and to recognize changes in position, can remain unaltered, but the lagena, which, with its associated structures, the columella, middle ear and tympanic membrane, is concerned with hearing in the ordinary sense, necessarily undergoes changes on account of the very different specific gravity of the mediums, water or air, through which sound waves come to it.

Aquatic Amphibia have, in common with fish, a special sense,

whose organ is the lateral line, which is concerned with the recognition of movements in water; with the transition to land this sense is entirely lost.

Any animal living in water is so nearly floating that the proportion of its weight which has to be supported by the limbs is extremely small. As soon as it comes out of water practically the whole of its weight falls on the legs. Thus the skeleton and musculature necessarily become more powerful.

The most serious changes, however, are those in the mode of reproduction. An amphibian which lays its eggs in the water can fertilize them there, but a terrestrial animal can only lay an egg



FROM PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY

FIG. 3.—PALATE OF THE EMBOLOMEROUS AMPHIBIAN, BAPHETES

if it be included in a shell which will protect it from mechanical injury and, a matter of more importance, from drying up. Such a shell cannot be perforated by a spermatozoan, so that fertilization must take place within the body of the mother before the shell is formed. The uro-genital organs of both sexes have to be so modified as to allow this to take place, and the oviduct of the female must be provided with the glands that are necessary for the formation of the shell.

The amphibian egg may be comparatively small; it only needs to contain a food supply sufficient to maintain the developing embryo to a stage when it hatches as a small larva capable of feeding on the abundant food present in the water in which the egg was laid. The animal, which hatches from an egg laid on land, must make its appearance at a stage in development when it can maintain itself under conditions similar to those in which its parents live. The time taken in reaching such a stage of development is considerable, and the egg included in its shell has no opportunity of obtaining food or water from outside. Thus, when laid, the egg must contain everything necessary for the development of the embryo up to the time of hatching.

The reptile ovum, the yolk of the egg, contains the great bulk of the food materials, whilst the albumen, the white which surrounds it, is mainly a water store. The egg-shell is porous and transmits gases. The character of the development of the large egg is necessarily modified by its bulk, much of the yolk remaining undivided into cells until it is absorbed and converted into part of the animal's own tissues. Special embryonic membranes, the amnion and allantois, are produced during the development for the protection of the embryo and for its nutrition and respiration, the allantois serving also as a reservoir for the nitrogenous waste products produced by its metabolism.

The great majority of these changes, including all those which are of the greatest importance, cannot be determined from fossil material, and we are driven back for the discrimination between fossil reptiles and fossil amphibians to the use of technical points mainly of little functional importance to the animal. The break between the Amphibia and Reptilia was regarded by Huxley and other early workers as the most important in the vertebrate phylum; such contrasted terms as Ichthyopsida and Sauropsida, Anamniota and Amniota emphasize its importance. None the less we now know an animal, Seymouria, from the lowest Permian of Texas, which is regarded by one group of students as an amphibian and by another as a reptile. As the osteology of this animal is very completely known, the doubt which exists as to its systematic position illustrates vividly the completeness with which the gap between these two divisions has been bridged.

Seymouria is a small animal about 2 ft. in length, with a comparatively small head, no visible neck, a somewhat stumpy body, and a short tail. The limbs were very muscular, but short. The hands and feet were placed far away from the middle line, and the stride was exceedingly small Each limb has five digits.

The skull of Seymouria consists of two parts, which could have easily been separated from one another. These are the brain-case, made of bones which have replaced the cartilage which existed in the embryonic skull, and a superficial coating covering the whole outer surface of the head (except for the nostrils, orbits and pineal foramen), and the roof of the mouth, made of bones which have developed in the lower layers of the skin. The pattern formed by these dermal bones is identical with that which is found in the more primitive Labyrinthodont Amphibia, and is important, because from it the structure of the corresponding parts of the skulls of all other reptiles can be derived, by a process of reduction. The palate of Seymouria is, in essence, identical with that of an Embolomerous Labyrinthodont. The brain case, however, differs somewhat from those of the Amphibia. For example, the single occipital condyle is convex instead of being concave, and there is a large fenestra ovalis leading into the ear which does not exist in the Embolomeri. There are also variations in other details of the structure of the otic region. In the lower jaw, Seymouria is identical with an amphibian, but the vertebral column is very different.

In the amphibian the first vertebra articulates with the condyle by a disc-shaped inter-centrum followed by a disc-shaped centrum, of the same character as those which succeed it. In Seymouria the rounded condyle articulates below with a concavity on an inter-centrum which represents only the lower half of that of the amphibian, and with facets carried on the lower ends of the two halves of the neural arch. The centrum of the atlas is a curious trefoil-shaped bone which fits in between the three elements which articulate with the condyle; this arrangement is completely reptilian. The structure of a vertebra from the middle of the back of Seymouria is quite peculiar. There is a small cylindrical centrum separated from the next by an intercentrum having the shape of half a disc. The neural arch is enormously heavy, it articulates with the centrum alone and the pre- and post-zygopotheses are produced laterally as masses of bone which overhang the much smaller centrum. The articulating faces are quite flat and placed horizontally, so that the back, although free to move from side to side, must have been extremely stiff dorso-ventrally.

Vertebrae of this type are known in no amphibian, but in a less exaggerated form occur in many of the more primitive reptiles. It is reasonable to believe that they were evolved as a clumsy method of giving that stiffness to the back which is necessary to an animal which, living in air, has to support the whole of its weight. The ribs of Seymouria do not differ essentially from those of some Labyrinthodonts. The limb girdles and limbs are of the amphibian pattern except in one or two details, *e.g.*, the occurrence of an ent-epi-condylar foramen piercing the humerus, and the number of the phalanges, which is two, three, four, five, three, the characteristic reptilian number.

Thus it is possible to be in doubt whether an extinct animal whose skeleton is completely known is an amphibian or a reptile, the break between the two being completely bridged so far as the skeleton is concerned. From a skeleton similar to that of Seymouria it is possible to derive those of all later reptiles, and in this way, by sorting out separate evolutionary lines to establish a classification which may express not only differences of structure existing between the animals contained in it, but something of their phylogenetic relationships.

Evolutionary Development.—The reptiles, as a whole, with a few doubtful exceptions, divide into two great branches, the mammal-like reptiles and the rest. The differences between the members of these two groups are to be found mainly in the structure of the brain case and the back of the skull. In all the

mammal-like reptiles the inner ear lies in the lower part of the side wall of the brain-case, the brain extending far above it, whilst in all other reptiles the ear extends throughout the whole of the side wall of the cranium and is not exceeded in height by the brain. In Seymouria the tympanic membrane is stretched across a notch on the outer surface at the back of the skull; in the mammal-like reptiles this notch is destroyed, so that the occipital surface of the skull is flat and the tympanic membrane, if it exists at all, lies ventrally in the neighbourhood of the hinder end of the lower jaw, to one of whose elements it is attached. In the remaining reptiles the tympanic or otic notch is preserved, bounded above by a special process of the squamosal or tabular bone, and by the free distal extremity of the paroccipital. The tympanic membrane, when present, lies high up on the side of the head, far removed from the lower jaw. In the mammal-like reptiles the stapes is attached directly to the quadrate bone, whilst in the others it is continued by an extra columella which is inserted into the tympanic membrane.

It is customary to recognize a primitive group of reptiles, the Cotylosauria, which includes the most primitive members of each division of the reptiles. The animals included in it agree with Seymouria in that the dermal bones of the outer surface of the skull form a continuous sheet, perforated only by the nostrils, orbits and pineal foramen. This group is restricted to Permian and Triassic time, and its members thus possess very primitive limbs and limb-girdles. They are usually devoid of a neck, the shoulder-girdle lying immediately behind the head. The back is short and the vertebrae of which it is composed have very massive neural arches which articulate with one another by horizontal surfaces. The centra are perforated and transmit a continuous notochord. There is usually a series of intercentra throughout the column. The shoulder girdle has three bony elements, the scapula, procoracoid and coracoid in each side of the cartilage girdle; all of them contribute to the glenoid cavity. Cleithra are often present, and clavicles and large inter-clavicles are universal. The fore leg is short and massive, the humerus projecting out at right angles to the animal's body and lying in a plane parallel to the ground. It can only be moved backwards and forwards, and is incapable of rotation. The elbow joint is flexible, so that the fore arm has much freedom of movement. The hand has five fingers, the number of the phalanges being 2, 3, 4, 5, 3, in the digits from 1 to 5. The pelvis consists of an ilium, pubis and ischium on each side, these bones meeting one another in continuous sutures, so that the whole structure is "plate-like." The hind limb projects out laterally and the knee was relatively inflexible; it could be stretched out straight, but, in many cases, could not be closed even to a right angle. The foot has five toes with a digital formula 2, 3, 4, 5, 4.

This super-order can be divided into three sub-groups, as follows:—(A.) Seymouria morpha, primitive forms represented by three genera, Solenodonsaurus, from the Upper Carboniferous of Czechoslovakia; Seymouria, from the basal Permian of Texas, and Kotlassia, from the Upper Permian of Russia, which may not properly belong to the group.

These animals possess skulls which very greatly resemble those of the Embolomerous Amphibia. (*See* AMPHIBIA.) These skulls have a narrow otic notch differing from that of all other reptiles; the neural cranium is peculiar in that the powerful paroccipital processes which arise from the sides of the brain case extend outwards and upwards to support the tabular bones. The basioccipital, together with the exoccipitals, form a rounded condyle. There are well marked basisphenoidal tubera and the basipterygoid processes of the basisphenoid are short, and in Seymouria support the pterygoid, not directly, but through the intervention of the epipterygoid. The parasphenoid is short and narrow. The palate is almost completely roofed with bone, there being small palatal nostrils and sub-temporal fossae in addition to a very conspicuous inter-pterygoid vacuity. The palatine bears a large tusk, the marginal teeth in the upper jaw form a uniform unbroken series and exhibit an indefinite replacement. The lower jaw is built up from nine bones, dentary, splenial, post splenial, angular, sur-angular on the outer surface, the series of three coronoids between the prearticular and dentary, and an articular bone which, unlike that of all contemporary Amphibia, is not a mere part of the sur-angular. With this exception, the jaw is identical with that of a Labyrinthodont.

The vertebral column is massive, there is no distinction of neck, trunk, and lumbar region, all the vertebrae from the atlas back to the sacrum bearing two-headed ribs; there is one sacral vertebra. In the shoulder girdle a coracoid is absent, the lower part of the primary structure being ossified entirely as a pre-coracoid. The glenoid cavity has the characteristic screw-shaped form of the early Tetrapod. The humerus is an extraordinary bone, nearly as wide as it is long, whilst the fore arm is short. The hand is short and broad, the five fingers ending in small claws.

The pelvis is plate-like, the pubes and ischia being exceptionally large elements; the femur, short, broad and unusually massive, exactly resembles that of contemporary Amphibia. The fibula is widened distally, and the tarsus is remarkable amongst reptiles in possessing three bones in its proximal row, the intermedium being still separate from the tibiale. The foot is five toed, with the normal formula.

The mammal-like members of the Cotylosauria belong to the group (B.) Captorhinomorpha. This group includes a considerable number of reptiles, all of Lower Permian age, which vary a good deal in their general structure. The most typical are Captorhinus and its descendant, Labidosaurus. These animals are comparatively small, with no neck, rather long bodies and not excessively long tails. They had a straddling gait, the ventral surface touching the ground and the feet being placed well away from the side of the body. The head is pointed, the face in front of the eyes narrow, whilst the temporal region was wide. The skull is completely roofed and there is no trace of an otic notch, the head having a square cut appearance posteriorly. The brain case seems to be high, and is loosely connected with the rest of the skull by the summit of the supraoccipital and the ends of the paroccipital process. The stapes is very massive and extends from the fenestra ovalis, which is placed below the level of the brain, to the quadrate to which it is attached.

The lower jaw differs from that of Seymouria by a lateral compression of its hinder half, and by the reduction of the coronoids to one.

The vertebral column is characterized by the massiveness of the neural arches and the obsolescence of the neural spines. The

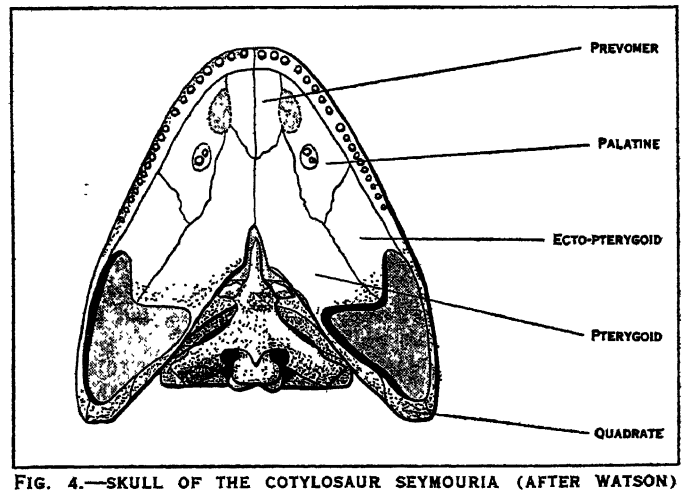


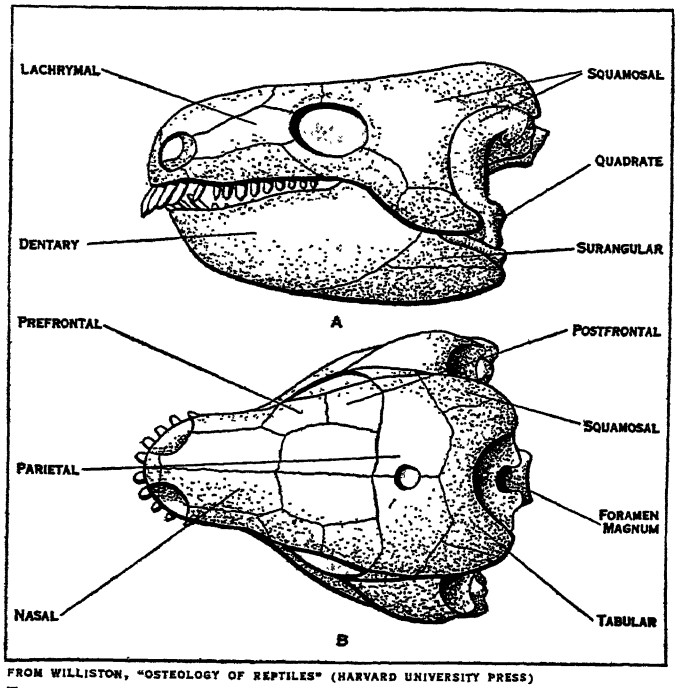
FIG. 4.—SKULL OF THE COTYLOSAUR SEYMOURIA (AFTER WATSON)

centra are small and perforated, the intercentra much reduced. All the ribs are single-headed. The remainder of the skeleton does not differ materially from that of Seymouria, which has been described above.

The earliest and most primitive members of the group of mammal-like reptiles belong to the order Pelycosauria. The most primitive members of this group, such as Varanosaurus and Mycterosaurus are small, rather slender animals, with elongated pointed heads. They had no visible neck, the shoulder girdle being placed behind the skull. The body was long and the

tail even longer. Their skulls differ from those of the Captorhinomorpha most obviously in that the dermal roof is no longer complete, but is perforated by a large lateral vacuity which is bounded by the jugal. postorbital and squamosal bones. This opening serves to give room for the thickening of the masticatory muscles, which necessarily occurs when they are shortened so as to close the mouth.

Another important difference is that the supraoccipital bone becomes so widened that, with the overlying interparietal and tabular, it forms a plate on the hinder surface of the skull, which reduces the post-temporal fossae to very small proportions.



FROM WILLISTON, "OSTEOLOGY OF REPTILES" (HARVARD UNIVERSITY PRESS)

FIG. 5.—SKULL OF THE CALYLOSAUR, DIADECTES; (A) LEFT SIDE WITH LOWER JAW, (B) FROM ABOVE

The only important changes in the post cranial skeleton are that the neural arches become light and narrow, the neural spines high, and the articulation faces of the zygapophyses are obliquely placed.

From such animals a series of short evolutionary lines arose, which led to the development of some extraordinary forms in which the neural spines from the head to the root of the tail become immensely elongated, and, in some cases, provided with lateral processes like the yard-arm of a ship. These animals, Dimetrodon and Naosaurus, must have been of grotesque appearance, one with a huge head with great piercing teeth, the other with a very small head with crushing dentition, each with a crest, as high as its own length from head to the root of the tail. Animals so specialized naturally had only a short range in time, they only occur in Lower Permian rocks, but the latter ranged from Czechoslovakia to Texas.

More conservative members of the group gave rise to a number of reptilian orders whose remains have been found in the Middle and Upper Permian rocks of Europe and South Africa, and in the Trias of South Africa, Asia and North America. The most important of these orders, the Theriodontia, included the ancestors of the mammals, and its members exhibit a series of stages which seem to bridge the structural gap between a Pelycosaur and a mammal very completely.

Some of these changes are illustrated by a comparison of the skulls of Scymnognathus and Cynognathus.

The skull of Scymnognathus, a Gorgonopsid, differs from that of a primitive Pelycosaur in that in it the whole head is flattened, the temporal vacuity, instead of facing laterally, is directed upward and is greatly increased in size; this change implies that the muscles which close the mouth had changed, an originally rather simple mass splitting up into pterygoidal, temporal and masseter muscles. In order to give room for this powerful development the side of the roof of the skull, formed by the jugal postorbital and squamosal, is bowed out, with the result that the quadrate and quadrato-jugal, being fixed in position by their articulation with the lower jaw, become detached from the side of the head and remain inserted in a depression on the front face of the squamosal, within the temporal vacuity. At the same time they are somewhat reduced in size.

The enlarged masticatory muscles require a more extensive area of attachment on the lower jaw, to provide which the upper and hinder end of the dentary becomes free and grows upward. At the same time, the hinder half of the jaw, composed of the surangular, angular, articular and prearticular bones, become converted into a thin sheet by a lateral compression, and the lower border of the angular is notched, a special lamina of the bone being reflected over the outer surface of its posterior part. To this reflected lamina the lower edge of the tympanic membrane seems to have been attached.

The palate, though it still has the posterior nares placed far forward, is advanced because it is very much vaulted, owing to the downgrowth of the maxillae on each side of it. Posteriorly, the pterygoids, with a parasphenoid held between them, form a narrow girder which connects the basisphenoid with the anterior part of the palate.

The stapes still articulates with the quadrate. The brain case is incompletely ossified in front of the point of exit of the fifth cranial nerve. The branches of that nerve pass on each side of the rod-like epipterygoid, and the cerebral hemispheres are enclosed in a single ossification homologous with the sphenethenoid of a frog.

Cynognathus has advanced beyond Scymnognathus in that the face has become deeper and more rounded, and the nostrils larger. The temporal vacuity has enlarged so that it is bounded above by the parietal, and this bone is drawn up into a deep sagittal crest which allows of longer temporal muscles. The quadrate and quadrato-jugal have become greatly reduced in size, but retain their position and function.

The coronoid process of the dentary has increased enormously, and now overlaps the rest of the lower jaw so greatly that it has nearly, but not quite, acquired an independent articulation on the squamosal.

The hinder part of the lower jaw, though still retaining all its constituent bones, has become so small that it seems inadequate to resist the very great stresses to which it might be subjected during feeding. The reflected lamina of the angular is still present in the form of a slender downturned process.

The palate has changed greatly, the original roof of the median area is still present in part, but it is concealed from view by a secondary palate exactly like that of a mammal, which is formed by ingrowths from the maxillae and palatines. By this change the posterior nares are driven so far backward that they open behind the cheek teeth, and the animal became capable of breathing whilst the mouth was full of food undergoing mastication. The ectopterygoid is greatly reduced, and the posterior part of the pterygoid, the quadrate ramus, has vanished altogether, its place being taken by a process which grows backward from the root of the epipterygoid.

The side walls of the brain case have become bony by a widening of the upper end of the epipterygoid, now recognizable as the homologue of the mammalian alisphenoid. This arrangement involves the inclusion in the cranial cavity of a space, the cavum epiptericum, which in most other reptiles lies outside the cranium. By a continuation of changes in the same direction as those which converted a Gorgonopsid such as Scymnognathus into the Cynodent Cynognathus, a primitive mammalian structure is easily reached.

The face changes little, a disappearance of the internarial processes throws the bony nostrils into one, the prefrontal and postorbital disappear, and the orbit becomes confluent with the temporal fossa.

Further growth of the dentary leads to the development of a new temporo-mandibular joint between that bone and the squa-

mosal, and the quadrate and hinder part of the jaw, freed from any function in connection with the jaw, become available as auditory ossicles. The stapes persists, little changed, the quadrate, further reduced in size, becomes the incus. The articular is the malleus, and the prearticular its processus folianus. The angular, to which the tympanic membrane has been attached for a very long period, becomes the tympanic, and the surangular disappears.

This account of the origin of the mammalian auditory ossicles is confirmed by the mode in which those bones develop in every mammal; indeed, all marsupials are still born in a stage in which the lower jaw still moves on the old reptilian joint between the incus and malleus, and the musculus tensor tympani still functions as a jaw muscle.

The palate of Cynognathus requires very few modifications to become typically mammalian. The already minute ectopterygoid vanishes, the great flanges of the pterygoids, which exist to ensure the accurate closure of the mouth, become unnecessary when the new temporo-mandibular joint is established, and vanish, and the posterior ramus of the alisphenoid becomes the tympanic process.

The skull of Scymnognathus is connected to the complex atlas by a single condyle composed of the basi and exoccipitals, that of Cynognathus has a mammal-like pair of exoccipital condyles.

More serious modifications have to be made in the ear region and brain case. The opisthotic and pro-otic of Cynognathus house only part of the inner ear, the summit of that organ lying in the supraoccipital. In mammals, the whole lies in a single bone, the periotic. The mammalian periotic is a much smaller bone than the pro- and opisthotics of a cynodont, and, unlike them, it is comparatively unimportant as a buttress for the squamosal. None the less, it is not impossible to homologize the different regions of the two sets of structures.

The post-cranial skeleton of Cynodonts shows a similar resemblance to that of mammals, some of the more important features of the evolution being discussed in the section *Locomotion* of this article. Thus we know in considerable detail the evolutionary stages which lie between the structure of an embolomerous amphibian and that of a mammal. Unfortunately, we can trace no such ancestry for the birds. We are certain that they sprang from a group of reptiles very remote from the mammal stock, but we are still faced by a considerable gap.

Classification.—The classification of reptiles is necessarily based on skeletal characters, and is still in a state of flux. The existing divergences of view are not very important; they relate to the phylogenetic position of a few orders, and do not seriously affect the main outline.

Class Reptilia.—Tetrapodous vertebrates, which breathe air throughout their life. The body temperature is variable. The heart possesses a sinus venosus, two auricles and a ventricle incompletely or completely divided into two; there is no conus arteriosus. Both systemic arches persist. The red blood corpuscles are nucleated, oval and biconvex. The kidney is a metanephros, and there is an allantoic bladder, in most forms. There is a cloaca, which in living reptiles is divided into a series of regions. The skin is either naked or covered with scales, never with feathers or hair. It includes very few glands, always placed in special situations, and not generally distributed. The skeleton is ossified. The skull comprises a cranium, of cartilage bones, and an extensive series of bones, which, dermal in origin, sink in and become membrane bones in the later forms. The occipital condyle is single or double. The lower jaw articulates with a quadrate bone and is built up of a number of bones. There is a rod-like columella auris. The vertebrae consist mainly of centra and neural arches, intercentra, when present, being small. Ribs occur on all precaudal vertebrae, those in the thoracic region joining to form a sternum in the mid-ventral line.

The pectoral girdle, when fully developed, includes at least a scapula and precoracoid, clavicles and an interclavicle. The pelvic girdle, except in one or two cases, articulates with two or more sacral ribs. The limbs are primitively pentadactyle and the phalangeal formula 2, 3, 4, 5, 3 or 4.

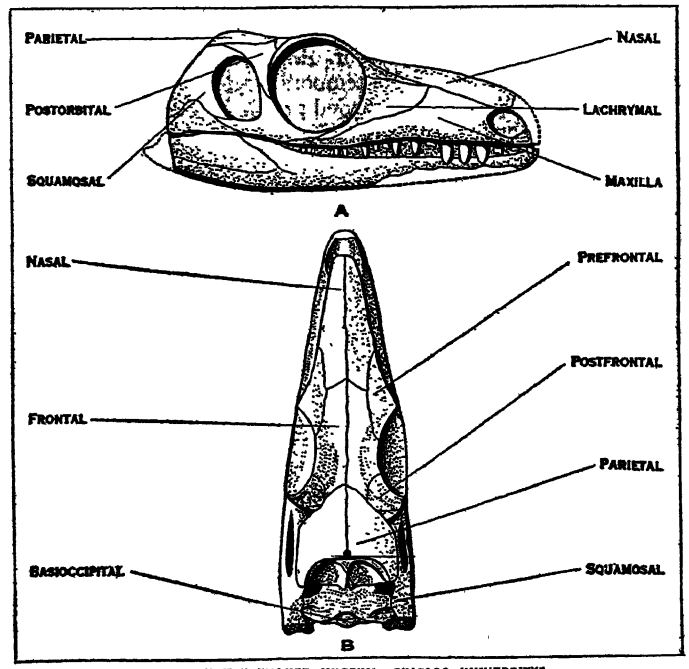
Fertilization is internal, the eggs are large and yolk laden, usually laid, when they are surrounded by a coat of albumen and a shell which is often calcified. Cleavage is meroblastic, a primitive streak is not formed, the embryo is surrounded by an amnion and an allantois is developed.

Super-order. Cotylosauria. Archaic reptiles in which the temporal region of the skull is completely covered by a continuous roof of dermal bones. Stapes either articulating with the quadrate or ending in a tympanic notch. Lower jaw usually with more than one coronoid. Presacral vertebrae (except in Pantylus) with very heavy neural arches with horizontal zygapophysial articular faces. Ribs one or two headed. No ossified sternum. Abdominal ribs sometimes present as fine bony rods. Shoulder girdle with scapula and precoracoid at least, a coracoid usually present in addition. Cleithra usually, clavicles and an interclavicle always present. Humerus with (usually) a screw-shaped head, short and with widely expanded extremities. Pelvis, plate-like, the suture between the pubis and ischium extending from the acetabulum to the middle line.

Order 1. Seymouriamorpha. Cotylosaurs in which the skull greatly resembles in all external features that of the Embolomerous Labyrinthodonts, the dermal bones are sculptured and the otic notch extends far forward below the tabular and supratemporal, so that the quadrate slopes backward. Stapes ending in the otic notch. Fenestra ovalis low down on the cranium, below the level of the base of the brain. Intercentra present and very large, ribs one or two headed. Only one sacral vertebra. Shoulder girdle without coracoid or cleithrum, limbs primitive.

Upper Carboniferous to Upper Permian. Families, *Seymouriidae, Kotlassiidae.*

Order 2. Captorhinomorpha. Cotylosaurs in which the otic notch has been obliterated by a movement backward of the upper end of the quadrate. Dermosupraoccipitals and tabulars, when present, restricted to the occipital surface. Stapes articulating



FROM "CONTRIBUTIONS FROM THE WALKER MUSEUM, CHICAGO UNIVERSITY"

FIG. 6.—SKULL OF PELYIOSAUR MYCTEROSAURUS: (A) RIGHT SIDE WITH LOWER JAW, (B) SKULL FROM ABOVE

distally with the quadrate. Brain case behind the incisura prooticum short and high, fenestra ovalis ventrally situated. Intercentra usually present. One or two sacral vertebrae. Shoulder girdle with both precoracoid and coracoid. Cleithrum present or absent. Limbs primitive, though sometimes slender.

Lower Permian. Families *Captorhinidae, Pantylidae, Limnoscelidae.*

Order 3. Diadectomorpha. Cotylosaurs in which the otic notch is enlarged by a movement forward of the lower end of the quadrate, dermosupra occipitals and tabulars when present on the

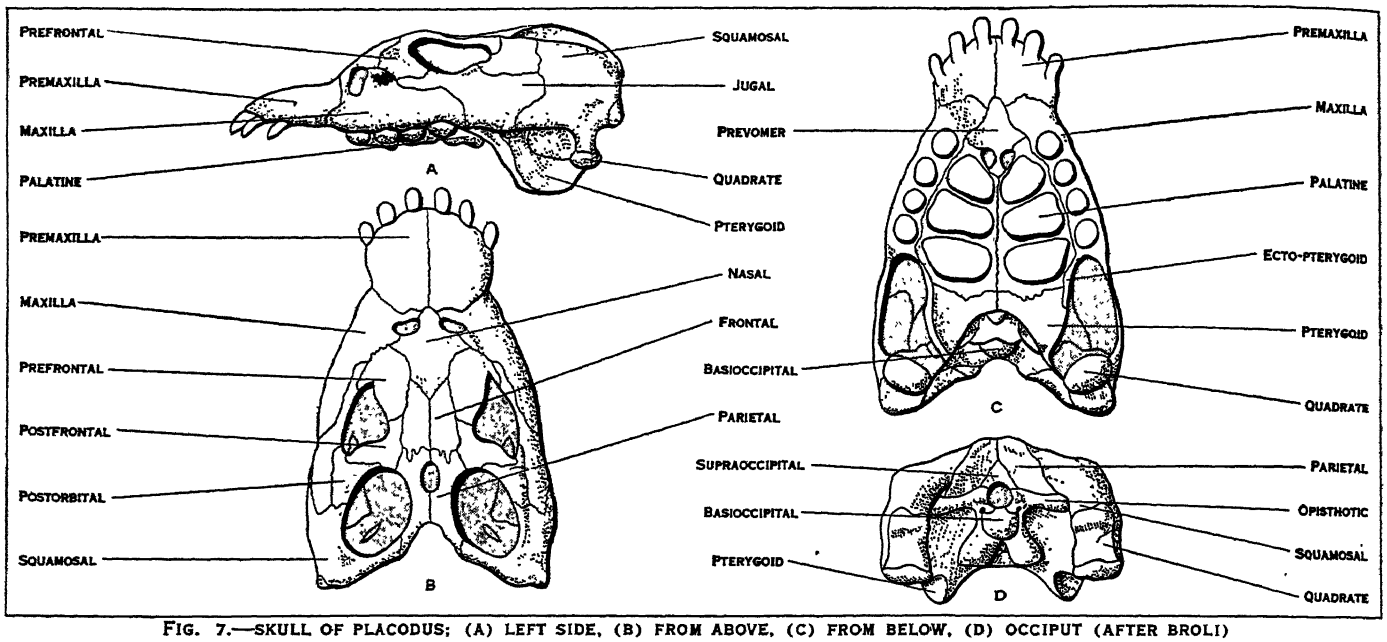


FIG. 7.—SKULL OF PLACODUS; (A) LEFT SIDE, (B) FROM ABOVE, (C) FROM BELOW, (D) OCCIPUT (AFTER BROLI)

upper surface of the skull, the latter overhanging the otic notch. Stapes terminating freely in the otic notch. Brain case long, fenestra ovalis placed at about the middle of its height. Intercentra usually present. Two to four sacral vertebrae. Shoulder girdle with a scapula alone or with three cartilage bones. Cleithrum usually present. Humerus always with expanded ends but often of advanced structure. Ilium sometimes backwardly directed.

Lower Permian to Middle Trias. Families: *Diadectidae, Pariasauridae, Procolophonidae.*

Super-order Theromorpha (or *Anomodontia*). Mammal-like reptiles. Reptiles in which the temporal region of the skull is perforated by a single vacuity, bounded primitively by the postorbital and squamosal, but enlarging so that the parietal and jugal also enter its borders. Cranium short and high behind the incisura prooticum, fenestra ovalis below the level of the base of the brain. Stapes articulating with the quadrate. The lower jaw, and especially its hinder end, laterally compressed, the angular in all except, perhaps, the most primitive forms, with a notch in its lower border.

A pro-atlas present, the neural arch of the atlas usually a pair of bones, which, with the intercentrum, rest on the anterior end of a trefoil-shaped odontoid. Vertebrae with slender neural arches with oblique articular faces, centra notochordal or deeply amphicoelous. Intercentra usually present, at any rate in the cervical region, ribs always two-headed anteriorly, usually single-headed posteriorly. An ossified sternum sometimes present, abdominal ribs present as slender rods in primitive forms. Pectoral girdle with scapula, precoracoid and coracoid in all forms (except one, Varanops), clavicle with expanded lower end, and interclavicle a wide flat sheet. Cleithra usually present, but small. Pelvis very variable, plate-like in primitive forms, with an obturator foramen in later types. Ilium, directed forwards, vertically, or backward. Two to seven sacral vertebrae. Limbs exhibiting all stages of advance from primitive cotylosaur-like organs to a pro-mammalian condition. Digital formula primitively 2, 3, 4, 5, 3 or 4 reduced to 2, 3, 3, 3, 3 in later forms.

Order 1. Pelycosauria. Primitive Theromorpha in which the pterygoids articulate with the basipterygoid processes of the basisphenoid by a movable joint. The quadrate is relatively large and the quadrato-jugal forms part of the lateral surface of the skull. The shoulder girdle has a screw-shaped glenoid cavity shared by the scapula, coracoid and precoracoid, and the limbs are primitive. The pelvis is plate-like.

Upper Carboniferous and Lower Permian. Families: *Poliosauridae, Ophiacodontidae, Sphenacodontidae, Edaphosauridae, Caseidae, Bolosauridae, Palaeohatteriidae.*

Order 2. Deinocephalia. Theromorpha in which the pterygoids are attached to the basisphenoid by an immovable joint. The basioccipital and basisphenoid are produced downward below the occipital condyle as a thick sheet of bone. The quadrate is unreduced and the quadrato-jugal is on the lateral surface. The shoulder girdle in early forms has the glenoid cavity borne only to a very slight extent on the precoracoid, but it is screw-shaped; in later forms this structure disappears and the glenoid cavity is restricted to the scapula and coracoid. The limbs are of modernized type. The pelvis is plate-like, the ilium being attached to four sacral ribs.

Middle Permian. Families: *Tapinocephalidae, Titanosuchidae.*

Order 3. Dromosauria. Small Theromorpha in which the facial region of the skull is very short, the temporal fossa is bounded above by the postorbital and squamosal and the zygomatic arch is reduced to a narrow rod so that the quadrate and quadrato-jugal project below it. Shoulder girdle with the glenoid cavity on the scapula and coracoid, precoracoid large. No cleithra. Pelvis plate-like. Limbs very long and slender, digital formula 2, 3, 3, 3, 3.

Upper Permian. One family only.

Order 4. Dicynodontia (or *Anomodontia*). Theromorpha in which the preorbital part of the skull is very short, whilst the temporal vacuity is greatly enlarged. The latter is bounded above by the postorbital and squamosal. The quadrate and quadrato-jugal are reduced, and rest in a recess in the front face of the lower end of the T-shaped squamosal, which is widely expanded laterally so as to form a sheet in the plane of the occipital surface. The pterygoids are rigidly fixed to the basisphenoid, and are not produced into transverse flanges. The premaxillae are fused and toothless, the maxillae may have a large canine or a series of small cheek teeth, or both, or be toothless. A horny beak like that of a tortoise was always present. The articular of the lower jaw always has the unique feature of a convex articular surface. Intercentra are absent except in the atlas and axis. The tail is short. The glenoid cavity is entirely, or almost entirely, restricted to the scapula and to the coracoid. There is an acromium on the scapula which also shows the beginnings of a mammal-like scapular spine.

There is an obturator foramen in the pelvis. The limbs are short and powerful, the track wide, and the digital formula 2, 3, 3, 3, 3.

Upper Permian to Middle Trias. Division into families not yet carried out.

Order 5. Theriodontia. Theromorpha in which there is a differentiation of the dentition into incisors, canine and cheek teeth. The face is usually long, the temporal fossa, short in primitive forms,

elongated in the more advanced types, the parietal entering into its border.

Quadrate and quadrato-jugal, fused, much reduced and carried in a recess on the front face of the squamosal.

Pterygoids forming great transverse flanges, behind which they suddenly contract to form a narrow girder extending back to the basisphenoid. Palate at first with the large posterior nares placed anteriorly, becoming vaulted, the air passage being finally cut off from that for the food by a secondary palate. The dentary, always extending above the surangular, in a free coronoid process. Limbs and their girdles variable.

Sub-order 1. Gorgonopsia. Primitive Theriodonts, with the postorbital and squamosal meeting above the temporal fossa. Single occipital condyle: No sub-orbital vacuities. No secondary palate. Scapula without acromion, plate-like pelvis, digital formula (of hand) 2, 3, 4, 5, 3.

Upper Permian.

Sub-order 2. Cynodontia. Advanced Theriodonts, with the parietal entering the temporal fossa. No sub-orbital vacuities. A secondary palate. Pair of exoccipital condyles. Scapula with acromion. Pelvis with an obturator foramen. Limbs modernized, digital formula 2, 3, 3, 3, 3.

Top of the Permian and Lower Trias.

Sub-order 3. Therocephalia. Primitive Theriodonts with large temporal vacuities into whose border the parietal always enters. Large sub-orbital vacuities. No secondary palate or vaulting of the mid line of the anterior part of the palate. Single occipital condyle.

Upper Permian.

Sub-order 4. Bauriamorpha. Advanced Theriodonts, with the parietal forming part of the temporal fossa. Large sub-orbital vacuities, a secondary palate. Single occipital condyle.

Lower to Upper Trias.

Order 6. Thalattosauria. A group of marine reptiles, still incompletely known, but perhaps allied to the Pelycosauria. If so interpreted they may be defined by the following characters:—Skull with a very elongated face formed by the maxillae and premaxillae, nostrils dorsal and immediately in front of the large orbit, nasals small. The large temporal fossa is entirely lateral and is bounded above by the postorbital and squamosal. Quadrate large. A supratemporal present. Parietals short and wide. Vertebrae with biconcave centra which are short cylinders, ribs single-headed. Scapula and coracoid incompletely ossified. Humerus with expanded ends and a twisted shaft. Radius and ulna short flattened bones.

Upper Trias.

Super-order Archosauria (*Diaptosauria*). Reptiles in which the temporal region of the skull is perforated by two vacuities, the upper of these, the supratemporal fossa is bounded by the parietal, supratemporal, squamosal and postorbital the lower, the infratemporal fossa lies between the postorbital squamosal, quadrato-jugal and jugal bones.

The brain, at any rate in the later forms, is completely enclosed by bone, a pair of latero-sphenoids surrounding the cerebral hemispheres and stretching back to have a suture with the pro-otic. The epipterygoid forms no part of the wall of the cranial cavity. The fenestra ovalis lies half way up the wall of the brain case. There is always a distinct neck, often of eight vertebrae.

The pectoral girdle contains a scapula and precoracoid on each side, the true coracoid never appearing. Cleithra are never present. The sternum usually ossifies from a pair of centres. The limbs are never of the primitive Cotylosaurin character, and are often very highly modified. The digital formula is 2, 3, 4, 5, 4 or 3.

Order 1. Thecodontia. Primitive Archosauria in which a supratemporal, tabular and interparietal may be present in the skull. A preorbital vacuity may be present or absent. The ribs may have one or two heads and a sternum if ossified is paired.

Clavicles and an interclavicle are always present, the pelvis is plate-like, and there are only two sacral vertebrae.

Upper Permian to Upper Trias. Families: *Eosuchidae, Phytosauridae, Pseudosuchidae, Erythrosuchidae, Erpetosuchidae* and others not yet defined.

This order is, in a sense, artificial, it includes the ancestors, for the greater part unknown, of the remainder of the orders of Archosauria, and in addition contains a number of animals which belong to short-lived unsuccessful side branches.

Order 2. Crocodilia. Archosaurs usually of medium or large size, and adapted more or less completely to an aquatic habit. The skull is characterized most clearly by the fact that the quadrate is very large, and lies at a very low angle with the horizontal. The wedge-shaped otic cavity so formed is closed behind by a downgrowth of the squamosal, which, with the overlapping "exoccipital" reaches the quadrate. The tympanic membrane lies some distance below the outer surface, and the external auditory meatus can be closed by a muscular flap. The elongated face is chiefly formed by the maxillae, the external nostrils, usually confluent in the bony skull lying quite anteriorly. There is always a secondary palate, the choanae lying posteriorly between the palatics or pterygoids. The vertebrae are amphiplatean or procoelous, the ribs double-headed throughout the presacral part of the column, the dorsal ribs articulating entirely with the neural arch. The coracoid is elongated, clavicles are absent; and the sternum is unossified. The ilium is a small bone supported by two sacral ribs, and the pubis is excluded from the acetabulum.

The hand is five-fingered, the foot has the fifth toe reduced to a stump of its metatarsal.

Lower Jurassic (Upper Trias) to Recent. Families: *Teleosauridae, Metriorhynchidae, Dyrosauridae, Goniopholidae, Libycosuchidae, Pholidosauridae, Stomatosuchidae, Gavialidae, Crocodilidae.*

It is not improbable that the Crocodilia sprang from the family *Erpetosuchidae* of the order Thecodontia.

Order 3. Saurischia (Deinosauria parts) Archosauria, with a well-developed preorbital vacuity. The neck is sharply marked off from the trunk. The presacral ribs are two-headed, and the dorsal ribs articulate only with the neural arch. Clavicle and interclavicle are lacking, the coracoid is short. There are three or more sacral vertebrae. The pubis and ischia form diverging rods, primitively the pelvis is plate-like, but the bones separate from one another in later forms. The acetabulum is perforate. The fore limb is shorter than the hind, and the femur moves in a plane parallel to the animal's length. The body is thus held well above the ground, and the animal is often bipedal.

Sub-order Theropoda. Carnivorous Saurischia, in which the dentition consists of a single series of the codont, laterally compressed teeth in the premaxillae and maxillae. The cervical vertebrae may be opisthocoelus. The fore limb is often very much smaller than the hind, and the animals are usually bipedal. The hand tends to be reduced to the first three fingers, which are provided with powerful claws, and the foot becomes functionally tridactyl and symmetrical about the third toe.

Middle Trias to Upper Cretaceous.

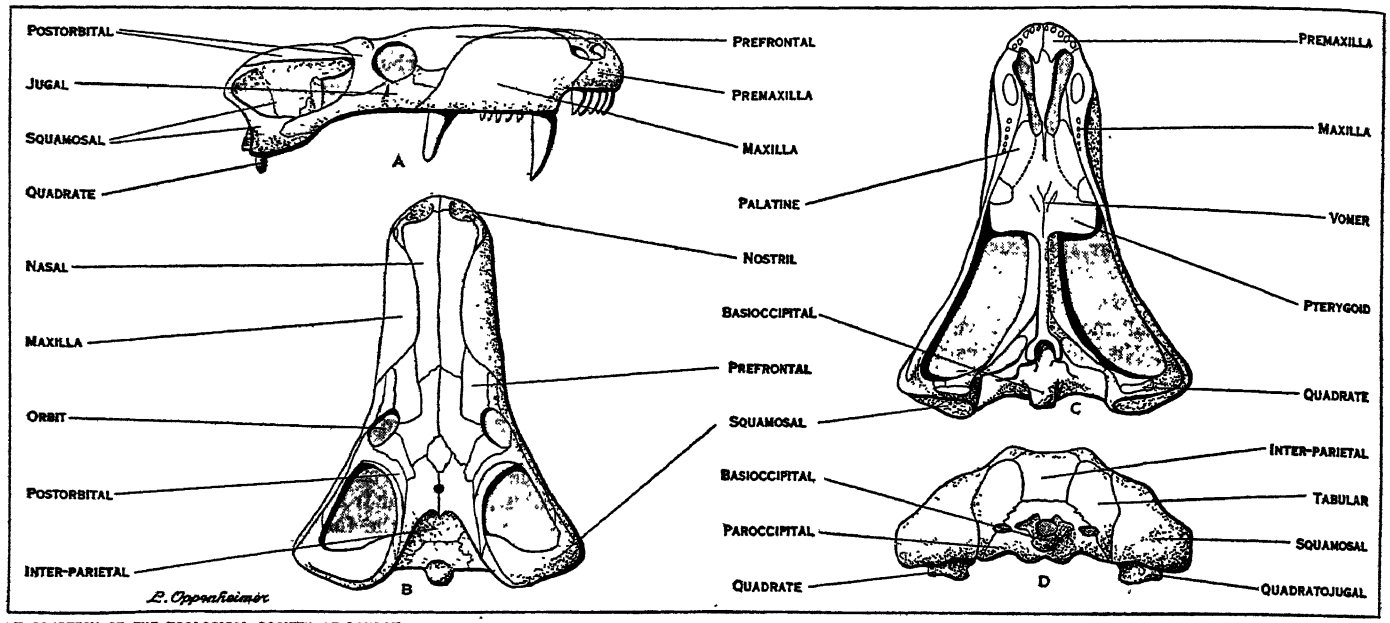
Families: *Hallopidae, Podokosauridae, Coeluridae, Compsognathidae, Ornithomimidae, Plateosauridae, Zanclodontidae, Anchisauridae, Megalosauridae, Spinosauridae.*

Sub-order Sauropoda. Herbivorous Saurischia, usually of gigantic size. The skull is extremely small, and the dentition feeble. The cervical and many or all the dorsal vertebrae opisthocoelic, Accessory articulating faces are developed in the neural arch of the dorsal vertebrae. The dorsal centra are excavated laterally, so that they may be reduced to mere shells of bones.

The animals are quadripedal, and walk on the ends of the metapodials, both feet are five toed, but some of the digits have a reduced number of phalanges and most lack claws.

Middle Jurassic to Upper Cretaceous. Families: *Cetrosauridae, Allantosauridae, Camarosauridae, Diplodocidae, Titanosuchidae.*

Order 4. Ornithischia (Deinosauria pars). Archosauria of herbivorous diet. The preorbital fossa is usually small or absent, the nostrils very large. The quadrate, unless secondarily fixed, is movable, a spherical head on its upper extremity resting in a cup in the squamosal. Premaxillae usually toothless, and covered with a horny beak, which opposes a similar structure carried by a special predentary bone in the lower jaw. Posterior end of the dentary raised into an upstanding coronoid process. The pubis bifid, a prepubic process stretching forward along the belly, and a posterior part passing downward and backward parallel to the



BY COURTESY OF THE ZOOLOGICAL SOCIETY OF LONDON

FIG. 8.—SKULL OF THE GORGONOPSID REPTILE, SCYMMOGNATHUS
A. Right side, B. from above, C. from below, D. occiput

ischium. Ilium elongated anteroposteriorly. Acetabulam perforate. Fore leg shorter than the hind, the animal being often bipedal. Hand usually pentadactyl, foot often tridactyl.

Rhaetic to Upper Cretaceous.

Super-family Ornithopodidae. Families: *Hypsilophodontidae, Camptosauridae, Ignanodontidae, Trachodontidae. Super-family Stegosauridae.* Families: *Scelidosauridae, Stegosauridae, Acanthopholidae, Polocanthidae. Super-family Ceratopsidae,* with one family.

Order 5, Pterosauria. Archosauria fully adapted for flight. The vertebrae and many long bones are hollow and, where occupied by air sacs, arising no doubt, like those of birds, by extension of the bronchi. Skull elongated, triangular in plan, and peculiar in that the quadrato-jugal excludes the jugal from the border of the infra temporal fossa. Teeth may extend throughout the jaws, be restricted to their anterior ends, or be absent altogether.

Cervical vertebrae large, procoelous, and very freely movable, head carried nearly at right angles to the neck. Dorsal vertebrae small, sometimes largely fused, sacrum of four to 10 vertebrae, tail either very short or greatly elongated and quite stiff.

Scapula and coracoids elongated slender rods, the latter articulating with a large shield-shaped sternum. Clavicular arch absent. Ilium long, pubis and ischium fused with it and with each other, not meeting in a median symphysis. Prepubic bones present. Fore limb supporting a wing, which is formed by a fold of skin arising from the side of the body and stretched between the upper arm, fore arm and greatly extended fourth finger, and the hind leg. Fingers one to three, present and clawed.

Sub-order Rhamphorhynchoidae. Pterosaurs, with a long tail, wing metacarpal short, fifth toe well developed.

Upper Trias? Lower Lias to Upper Jurassic.

Sub-order Pterodactyloidae. Pterosaurs, with a short tail, wing metacarpal long, and fifth toe reduced or absent.

Upper Jurassic to Upper Cretaceous. Families: *Pterodactylidae, Ornithocheiridae.*

The birds, class Aves, are certainly descendants of Archosaurian reptiles; had the group become extinct in Cretaceous time it would be regarded as an order equivalent to those listed above.

The remaining reptilian orders cannot usefully be grouped into super-orders.

Order Rhynchocephalia. Reptiles in which the temporal region is perforated by two fossae; the supratemporal fossa seems to differ from that of Archosauria in that the post frontal enters into its margin, whilst the infratemporal fossa differs by the exclusion of the quadratojugal.

The preorbital part of the skull is short, and there is no preorbital opening. The fenestra ovalis is placed high in the skull. The dentary bears a single series of acrodont teeth which bite into a groove between the similar teeth on the maxilla and palatine, so that with use they acquire a wedge-shaped section. The vertebrae have amphicoelous centra, and all the ribs are single-headed. An unossified sternum is present. The shoulder girdle includes scapulae, precoracoids, clavicles and an interclavicle.

The pelvis has an ilium attached to two sacral vertebrae and directed downward in front. The pubis and ischia are plate-like in primitive forms, but diverge widely in later times. The limbs are pentadactyl, and the fifth metatarsal has a hook-shaped upper extremity.

One group of Rhynchocephalia, the *Champsosauridae,* became highly adapted to an aquatic life in estuaries.

Middle Trias to Recent. Families: *Rhynchosauridae, Sauranodontidae, Sphenodontidae, Champsosauridae.*

Order Squamata. (The following account does not include the characters of the reptile Pleurosaurus, which is, perhaps, a member of the order.)

Reptiles in which the dermal roof of the temporal region is so far reduced that only a single temporal arcade, or none at all, remains. The quadrate is thereby freed so that it can move, its rounded head articulating with one or two bones which are connected with the parietal. If two bones be present the inner is firmly applied to the front face of the posterior wing of the parietal, and rests against and may even be firmly fixed by suture to the front face of the end of the paroccipital process. This bone is either the supratemporal or squamosal, or, very improbably, tabular. The outer bone is fixed to the lateral surface of the inner, often overlapping it on to the parietal; it stretches forward as the hinder part of the temporal arcade, and meets the postorbital and sometimes the jugal. This bone is either the squamosal or quadrato-jugal. In the palate the pterygoid no longer reaches the prevomers, and the whole is often very lightly constructed.

The vertebrae are usually procoelous, but may be amphicoelous; there are two sacrals or none. Ribs are single-headed throughout. The shoulder girdle, if present and fully developed, consists of scapulae and precoracoids, often enlarged and notched or fenestrated, clavicles, an interclavicle and a sternum. The pelvis has a forwardly and downwardly directed ilium, the pubes and ischia are divergent rods. The limbs are pentadactyl primitively, but may be reduced or absent.

Sub-order Lacertilia (Lizards). Squamata in which a temporal arcade is usually present, and in which the two rami of the lower

jaw are connected suturally at the symphysis. An epipterygoid is present in the normal position and the anterior part of the brain case is very little ossified. The pterygoid articulates with the basipterygoid process of the basisphenoid.

Upper Jurassic to Recent.

Division Ascalabota.

Section Gekkota.

Families: *Ardeosauridae, Gekkonidae, Uroplatidae.*

Section Iguania. Families: *Iguanidae,* and *Agamidae.*

Section Rhiptoglossa. Family *Chamaeleonidae.*

Division Antarchoglossa. Section Scincomorpha. Families: *Xantusiidae, Scincidae, Anclytropiidae, Flyliniidae, Dibamidae, Gerrhosauridae, Lacertidae, Tejidae, Amphisbaenidae.* Section Anguimorpha. Families: *Euposauridae, Varaniidae, Dolichosauridae, Aigialosauridae, Mosasauridae, Pygopodidae, Glyptosauridae, Helodermatidae, Anguidae, Xenosauridae, Anniellidae, Zonuridae.*

Sub-order Ophidia (Snakes). Squamata in which the temporal arcade has completely vanished, and the quadrate is very freely movable. The pterygoids have lost all connection with the basisphenoid, and the palate has become mobile, connected to the cranium only by ligaments and by its connection with the maxillae and quadrate. Much of the palate and the maxillae may vanish in burrowing forms. The brain case is completely ossified, the epipterygoid being absorbed into it. The two halves of the lower jaw are loosely connected by an extensible ligament.

The vertebral column is extraordinarily long, in one case containing 565 vertebrae. Each vertebra has a procoelous centrum and a heavy neural arch, on which additional articulating faces, the zygosphenes, and zygantra, are developed. The single-headed ribs are long and are very freely movable antero-posteriorly; by such movements they cause the transversely widened ventral scales to catch the ground, and force the animal along. There is never any trace of a fore limb or its girdle. All three elements of the pelvic girdle may be present in one family, the Glauconidae, but in most this limb is entirely absent. Upper Cretaceous to Recent.

Families: *Typhlopidae, Glauconiidae, Ilysiidae, Uropeltidae, Boidae* (boa constrictors), *Xenopeltidae, Colubridae.* As the last family contains nine-tenths of all known snakes it is subdivided into the series Aglypha (harmless snakes), Opisthoglypha (poisonous but little dangerous to man) and Proteroglypha (typical poisonous snakes).

Sub-order Pleurosauria. A small group of extinct reptiles including only one or two genera, which may be related to the Squamata; if so, these are not, as usually held, derived from the Archosauria. Aquatic reptiles with a very long body and lizard-like limbs partially adapted for swimming. Limb girdles of Lacertilian type. Skull elongated and depressed, quadrate short and immovable. There is a single temporal fossa, bounded below by a broad arcade composed of the squamosal, postorbital and jugal. There is no supratemporal, and the outer surface of the quadrate is covered by a quadrato-jugal. Upper Jurassic. One family.

Order Sauropterygia (*Plesiosauria*). Reptiles which show a progressive adaptation to a marine life.

Skull with a single temporal vacuity surrounded by the parietal, squamosal, postorbital and post-frontal, and therefore apparently homologous with the upper temporal vacuity of Rhynchocephalia, and not with the single fossa of Theromorpha and Squamata. The single temporal arcade is formed almost entirely by the squamosal and postorbital, the jugal being a small bone wedged in between the postorbital and the hinder end of the maxilla. A quadrato-jugal is absent. The fenestra ovalis lies high in the side wall of the brain case. The palate is primitive, the posterior nares being anterior, and the pterygoids reaching the prevomers.

Except in Placodonts, the neck is long, often exceedingly so (76 vertebrae in Elasmosaurus), the back is long and the tail short; there are usually three sacral vertebrae, but may be more. The cervical ribs, though double-headed in early forms, articulate only with the centra, the single-headed dorsal ribs being supported entirely by the long transverse process of the neural arch.

The pentadactyl limbs are large, and are more or less completely converted into paddles by a flattening and shortening of the radius and ulna and tibia and fibula, and an increase in the number of phalanges. The shoulder girdle consists of scapulae and coracoids, which meet one another in median suture. Clavicles are probably always present, an interclavicle usually so. The ilium is small, the pubis and ischium, though separated by an obturator foramen, are expanded into flat sheets of bone. A strong plastron of abdominal ribs is always present.

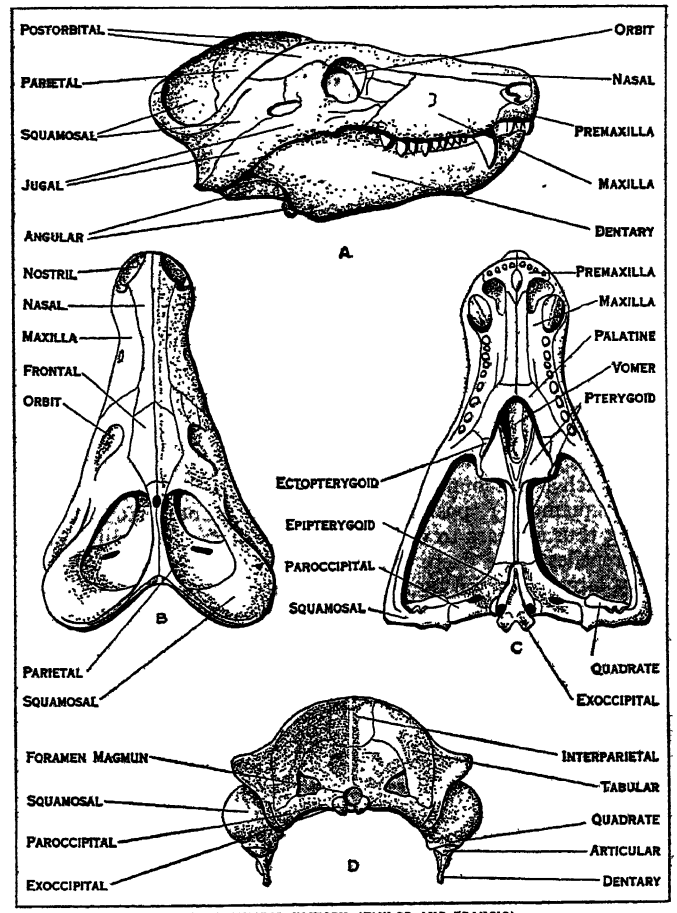
Sub-order 1. Trachelosauria. A single, small reptile, with a long neck consisting of 20 vertebrae whose centra support two-headed ribs. Dorsal ribs single-headed and articulating with the long transverse processes of the dorsal neural arches.

Ilium and femur like those of a land reptile.

Lower Trias.

Sub-Order 2. Nothosauria. Sauropterygia in which the limbs are still incompletely converted into paddles, the elbow and knee joints still being flexible. Phalangean formula 2, 3, 4, 5, 3 or 4.

In the skull the opisthotic is enlarged distally, and articulates with the squamosal quadrate and pterygoid, so as to close the middle ear cavity behind. Clavicular arch powerful; coracoids



FROM ANNALS & MAGAZINE OF NATURAL HISTORY (TAYLOR AND FRANCIS)

FIG. 9.—SKULL OF THE CYNODONT, CYNOGNATHUS

A. From the right side, with lower jaw, B. from above, C. from below, D. occiput

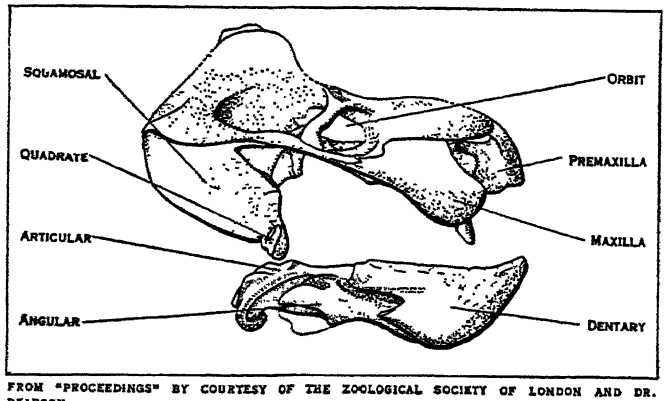
meeting in a short symphysis, which lies behind a line joining the glenoid cavities. Ilium articulating with both pubis and ischium.

Middle Trias, perhaps just appearing in the Lower Trias. Families not discriminated.

Sub-Order 3. Plesiosauria. Sauropterygia in which the limbs are completely converted into paddles, with no freedom of movement at any joint; the number of phalanges in the five fingers and toes is increased, reaching 6, 13, 15, 13, 9 or more. The distal end of the opisthotic is slender, resting on the hinder surface of

the squamosal. Clavicular arch, when present, reduced to flat sheets of bone, supported by the greatly enlarged acromia of the scapulae. Coracoids with a symphysis which extends forward between the glenoid cavities. Ilium articulating only with the ischium. Rhaetic to Upper Cretaceous. Families not yet discriminated.

Sub-order 4. Placodontia. Sauropterygia in which the skull has become modified to support great crushing teeth in the maxillae and palatines. Neck with eight vertebrae, the cervical ribs articulating with both centrum and neural arch; dorsal vertebrae with concave articulations, ribs attached solely to the neural arch. Limb girdles essentially like those of Nothosauria, fore limb somewhat paddle-like, but with the primitive number of phalanges, Femur like that of a land animal. A well-developed armour of dermal ossifications both dorsally and ventrally. Middle Trias to Rhaetic.



FROM "PROCEEDINGS" BY COURTESY OF THE ZOOLOGICAL SOCIETY OF LONDON AND DR. PEARSON

FIG. 10.—SKULL AND LOWER JAW OF THE DICYNODONT REPTILE KANNEMEYERIA, RIGHT SIDE

Order Ichthyosauria. Reptiles which are fully adapted for a marine life. The head is elongated, the neck short and the tail very long and powerful, provided with a terminal fin, which is the most important swimming organ.

The limbs are paddles, they are never large, and the hind limbs may become very small. The skull has a single temporal fossa which is surrounded by the parietal, supratemporal (often called squamosal) postfrontal, and sometimes frontal. This opening thus appears to differ in its boundaries from all found in other reptiles. The deep, but usually very short temporal arcade is very largely formed by a bone, often called the supratemporal, which is, perhaps, the true squamosal; it contains also processes of the postfrontal and supratemporal, and a quadrato-jugal. The postorbital and jugal are narrow bones round the enormous orbit.

The nostril lies immediately in front of the orbit, and the long rostrum is built up from the premaxillae and nasals. The biconcave vertebral centra are extremely short, and the neural arches feeble. The ribs are two-headed at least anteriorly, and articulate solely with the centra. There is no sacrum. The hinder part of the tail is downturned very slightly in Triassic forms, nearly at right angles in those from the Upper Jurassic, in order that it may support the lower lobe of a vertical caudal fin whose upper lobe has an unossified skeleton.

The shoulder girdle consists of scapulae and coracoids which meet in a powerful median symphysis between the glenoid cavities, and a rigid clavicular arch. The pelvis has a narrow ilium and pubis and ischia, separated by an obturator foramen, but expanded into great sheets in Triassic forms. In both fore and hind limbs the proximal bone is very short and widened distally, the remainder of the limb, in the later forms, being reduced to an interlocking mass of polygonal bones. The number of fingers is often increased to seven or more, and the phalanges increase to a very great number.

Middle Trias to Upper Cretaceous. Families: *Mixosauridae, Ichthyosauridae.*

Order Chelonia. Reptiles in which the trunk is enclosed in a shell built up from a series of dermal bones, with which the neural arches and ribs become continuous. The limb girdles are unique, in that they lie entirely within the ribs. Skull without any temporal vacuity, but the continuous sheet of bone which, in the primitive forms, overlies the temporal muscles may be emarginated either from the back or from below, or from both, so that in extreme cases the squamosal may be left without connection with any other bones of the skull roof. The powerful vertically-placed quadrate is then only supported by its abutment in the pro-otic opisthotic and pterygoid.

Postfrontals and lachrimals are always, nasals usually absent, and the external nares are confluent. Except in Triassochelys, the jaws are toothless, and they always support a horny beak. There is often a small secondary palate, not homologous with that of mammals or crocodiles, formed by extensions of the palatines and prevomers. The eight cervical vertebrae are so formed that the neck is flexible, bending into a vertical loop in Cryptodeira, and into a horizontal S in Pleurodeira.

The dorsal vertebrae are ten in number, the first being free, or nearly so, from the shell, whilst the rest are fixed immovably by their attachment to the neural plates of the carapace; the two sacral vertebrae are similarly attached. The posterior dorsal vertebrae are peculiar, in that each of their neural arches rests on two centra.

The shoulder girdle consists of a scapula, whose acromian process is produced into a long rod lying horizontally, and approaching its fellow in all forms except Triassochelys, and a coracoid which form a curious pedunculate glenoid cavity. Cleithra are present only in Triassochelys. Clavicles and an interclavicle are entirely detached from the shoulder girdle and form part of the plastron.

The ilium usually articulates, not with the sacral ribs, but with the carapace; the pubis and ischium are lacertilian-like. The limbs are much modified, in order to reach the girdles which lie within the shell, and to allow of their withdrawal in the more primitive forms. The fifth metatarsal is hook shaped. Both feet are pentadactyl, the phalangeal formula never exceeding 2, 3, 3, 3, 3, and being sometimes reduced to 2, 2, 2, 2, 0.

The shell, in its fullest development, consists of a dorsal carapace, built up from a median row of nuchal, preneural, eight neural and two suprapygal bones, and lateral rows, each of eight costals, articulating with the neurals, a variable development of supra marginals may occur secondarily; in their absence the costals articulate with a continuous chain of marginals which connect carapace and plastron.

The plastron consists of three plates anteriorly, the epiplastra which are clavicles, and an entoplastron, the interclavicle; a pair of hyoplastra, two pairs of mesoplastra, one pair of hypoplastra and one of xiphiplastra. The neural bones are co-ossified with the neural spines of the dorsal vertebrae, the costals with the ribs of the second to ninth dorsals.

Sub-order Amphichelydia. Chelonia with no power of completely withdrawing the head within the shell, mesoplastra present, pelvic girdle not fused with the plastron. Families not yet discriminated. Middle Trias to Eocene.

Sub-order Pleurodeira. Chelonia which withdraw the head sideways. Mesoplastra usually present, pelvic girdle fused with the carapace, and usually with the plastron. Families: *Pelomedusidae, Chelyidae, Miolanidae, Plesiochelyidae.* Jurassic to Recent.

Sub-order Cryptodeira. Chelonia which withdraw the head vertically. Mesoplastra absent, pelvic girdle never fused with the plastron. Families: *Thalassemydidae, Chelydridae, Testudinidae, Cinosteriidae, Platysternidae, Cheloniidae, Protostegidae, Dermochelyidae, Dermatemydidae, Trionychiidae.* Jurassic to Recent.

There is a considerable number of small Palaeozoic reptiles which do not fall into any of the 19 orders defined above. Of these the more important are: Eosaurus from the Coal Measures of the United States, which may be Cotylosaurian; Eunotosaurus from the Upper Permian of South Africa, which may be an ancestor of the Chelonia; Broomia from the Upper Permian of South Africa, which may be an ancestral lizard; and Araeos-

celis, from the Lower Permian of Texas, which has also been regarded as a lizard ancestor.

Limbs and Locomotion.—The Lower Permian reptiles of all groups possess limbs which either belong to a definite characteristic type or are clearly simple derivatives of it.

In all of them a distinct neck is absent, the body is of circular section, although variable in length, and the tail is usually of considerable size.

The fore limbs were attached to the body immediately behind the head, the upper arm lies parallel to the ground, and was capable of being moved backward and forward only. The elbows were thus pointed directly outward. The forearm lay nearly parallel to the principal plane of the animal, and made a very small angle with the ground. The wrist was large in comparison with the forearm, and the hand possessed five somewhat spreading digits. The hind leg was attached to the body at a considerably higher level than the fore leg. The thigh projected freely from the body, almost at right angles, and the lower leg made a wide angle with it, indeed the stiff knee could not, in many cases, be bent to a right angle. The ankle joint was flexible, and the five toes greatly resemble the fingers of the same animal.

As the large head makes the load carried by the fore legs rather larger than that on the hind, the hand is generally larger than the foot.

These animals, like the lizards and salamanders of to-day, threw their backbones into lateral waves as they walked. Their procedure was as follows:—When the animal is standing with its right fore leg advanced to the greatest possible extent, and the right hand on the ground, the head is turned to the left, and the left hand lies near to it but is ready to be lifted. The trunk is thrown over to the right side and the base of the tail to the left. This body flexure implies that the right hind leg is turned somewhat backward and the left hind leg is directed forward. The left hand is then lifted from the ground by movement at the elbow, and carried forward not only by a movement of the upper arm on the shoulder girdle and a straightening of the elbow, but also by a bending of the backbone so that the head becomes directed to the right. This movement of the back involves a corresponding twist of the pelvis, which brings the left hind leg to its backward position, and makes it necessary to lift the right foot from the ground. The right hind leg is then swung forward by motion, mainly at the hip joint, and the foot placed down as far ahead as possible. During these movements the animal, as a whole, has travelled forward and the right hand is ready to be raised. Its movements agree exactly with those of the left, and it is followed in turn by the left hind foot.

Thus the animal progresses with a waddling gait, the head and body being constantly thrown from side to side of the line along which the animal is moving. The feet are moved one at a time, so that the animal is never standing on less than three of them, and are placed wide apart. This mode of walking must have been extremely slow and clumsy; measurements suggest that a reptile about a yard in length, without the tail, must have made a track 15 in. in width, with a stride of some 6 or 8 inches.

Fossil materials enable us to trace the steps whereby the later reptiles gradually improved their modes of walking, until on one line, they became like the more primitive mammals, walking with their bodies raised high above the ground, the feet brought in towards the middle line and the stride long, whilst along a second course they became bipedal, striding along on their hind legs, with their heads raised high in the air.

The nature of the skeleton and musculature which is associated with the primitive type of locomotion is as follows:—The shoulder girdle consists of the pair of primary elements, each of which is in the most primitive forms, Seymouria and Varanops, ossified as two bones, the dorsal scapula and ventral precoracoid. The glenoid cavity has a characteristic shape in that its articular surface is a rather narrow screw-shaped strip of a cylinder whose axis is nearly vertical. The glenoid cavity is shared nearly equally by the two bones. The two halves of the primary shoulder girdle do not touch one another in the mid line ventrally; but are held in position with respect to one another by the powerful clavicular arch. This consists of pairs of cleithras and clavicles and an interclavicle. Each cleithrum is firmly attached to the front edge, and sometimes to the upper end of the scapula. The clavicle is firmly attached to the front face of the lower end of the cleithrum and has no contact with the scapula; its lower end is turned inward so as to underlie the thorax, and is usually widened. its lower end underlying the lateral margin of the interclavicle. The interclavicle is usually a thin flat bone, with a widely expanded anterior end, and a narrower shaft projecting posteriorly under the sternum, which is unossified.

The whole girdle was held in position by muscles, the serrati passing from the ribs to the inner surface of the scapula and by others, sternomastoids and cleidomastoids passing from the head to the clavicular arch. Posteriorly, the coracoid is attached to the ventral surface of the abdomen.

The humerus of these reptiles has its extremities very much widened and placed nearly at right angles to one another. The articular surface of the head is screw-shaped, and fits the glenoid cavity so accurately that the bone cannot be rotated, and is restricted to a to-and-fro motion along a definite track. The widened proximal end allows the muscles which pass from the humerus to the ventral part of the animal, the pectoral and coraco-brachials, to have a mechanically favourable insertion. The widened lower end of the humerus similarly secures a

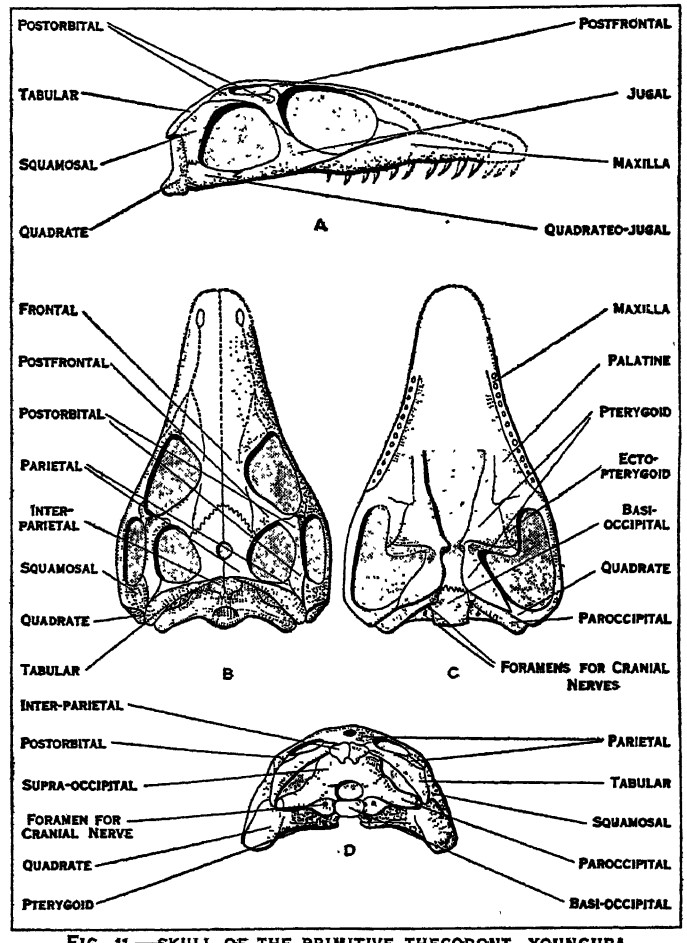


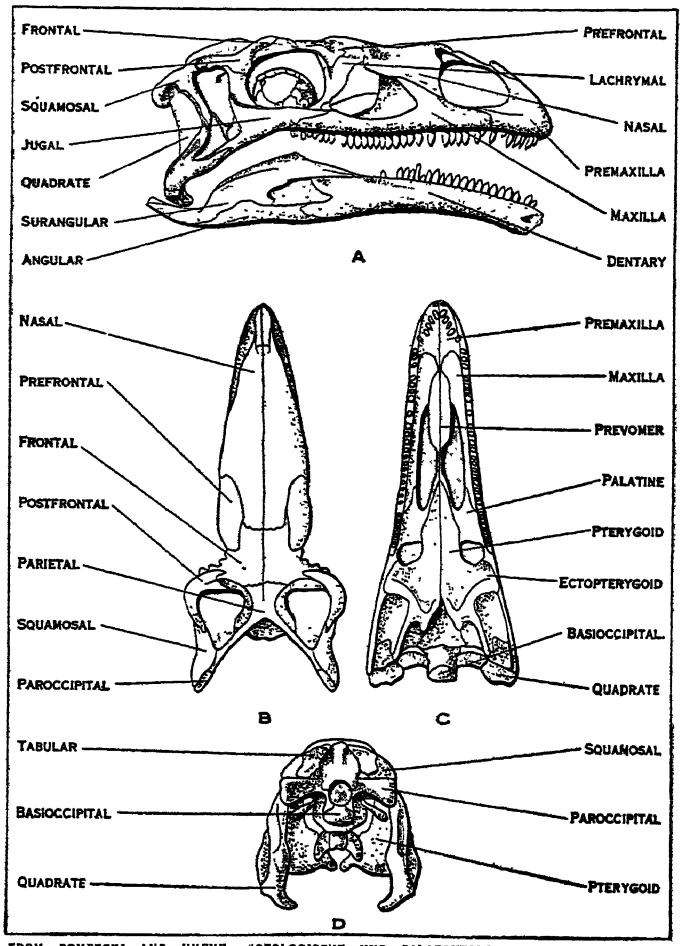
FIG. 11.—SKULL OF THE PRIMITIVE THECODONT, YOUNGURA
A. Right side, B. from above, C. from below, D. occiput

favourable insertion for the flexor muscles which pass from it to the palmar surface of the hand and forearm, and take the whole weight of the anterior part of the body.

The lower end of the humerus bears a hemispherical boss on its front face, with which the head of the radius articulates, and a cylindroid articulation on its end which fits into the sigmoid notch of the ulna. The distal ends of the radius and ulna are widely separated; they articulate with the four bones: radiale, intermedium, ulnare and pisiform, of the proximal row of the carpus. The middle row of the wrist usually consists of only two

bones, the centralia, one of which forms part of the inner border, whilst the other separates the intermedium from the distal row. This consists of five bones, of which the fourth, which articulates with the ulnare, is the largest. The metacarpals articulate directly with the corresponding carpals and the number of phalanges is 2, 3, 4, 5, 3 respectively. This ensures that the ends of the fingers lie in a straight line at right angles to the animal, when the hand is placed on the ground.

The pelvis is attached to the vertebral column by the sacral ribs, which vary in number in Lower Permian reptiles from one



FROM POMPECKJ AND HUENE, "GEOLOGISCHE UND PALAEONTOLOGISCHE ABHANDLUNGEN" (GUSTAV FISCHER)

FIG. 12.—SKULL OF THE DINOSAUR, PLATIOSAURUS
A. Right side with lower jaw, B. from above, C. from below, D. occiput

to four. It consists of three pairs of bones, the ilia, pubes and ischia. These meet in a triradiate suture, so that each supports about one-third of the acetabulum, with which the head of the femur articulates. The pubis and ischium of the same side are firmly united by a continuous suture and the two halves of the pelvis articulate continuously, so that the whole structure is usually described as plate-like. The femur is a straight bone, with the articular face of its head placed on the end of the shaft. The condyles at the distal end are only slightly curved, well separated and placed at such an angle as to suggest that the knee could neither be extended into a straight line nor flexed beyond a right angle.

The tibia is a bone with an expanded upper end, and is always shorter than the fibula, which is unusually massed. At their lower ends the two bones are widely separated. The tarsus, in one case (Seymouria) has a proximal row of three bones, the tibiale intermedium and fibulae, corresponding with those of the carpus, but in nearly all other reptiles and their descendants, the mammals and birds, the intermedium is no longer found as an independent bone, even during development, and has fused with the tibiale to form an astragalus. As a result of this fusion the tibia articulates only with the astragalus, whilst the fibula impinges on both astragalus and fibulare or calcaneum. The calcaneum is always in direct contact with the fourth and fifth (if present) distal tarsal, whilst the astragalus is separated from the first three distal tarsals by a row of two or more, usually one, centrale, the mammalian navicular. There are primitively five digits, the fourth being the longest. The phalangeal formula is 2, 3, 4, 5, 4.

The great majority of the changes which take place in the structures of these limbs during the evolution of the reptiles can be explained by a consideration of the mechanics of the structures under modified conditions of locomotion.

In the line of the mammal-like reptiles, and also in some of the other forms, the first change which takes place in the shoulder girdle is the addition of a bone, the coracoid, to the two existing in the primary shoulder girdle. These animals then acquire a pectoral girdle which resembles the pelvis in that the facet for articulating the proximal bone of the limb is carried almost equally on three bones. The glenoid cavity at first retains its screw shape, the humerus being restricted in its motion to an excursion along an arc lying nearly parallel to the ground. Gradually, as an integral part of the whole process whereby these animals acquired a more rapid and less clumsy gait, the plane of this glenoid cavity becomes twisted round, so that the humerus moves freely in a dorso-ventral direction and the elbow is no longer directed outward, but is drawn in toward the side of the body, nearly to the stage in which it exists in the more primitive mammals. This change results in the restriction of the glenoid cavity to the scapula and coracoid alone, the precoracoid no longer contributing to it.

Concurrently with this change, the humerus took up a more vertical position, so that the muscles connecting it with the coracoid could become smaller, in part because the forces they had to exert were actually reduced and, in part, because their insertion became more favourable. Thus the coracoid and precoracoid suffer steady reduction compared with the scapula. Finally, in order to secure a larger surface for its attachment, one muscle, which serves to support the animal's weight and to drive the humerus downwards, migrates on to the inner surface of the scapula, the tendon by which it is attached to the humerus passing over a notch in the front border of the scapula below the point at which the clavicle is attached to that bone. In this way a definite acromium becomes established, and the upper part of the anterior border of the scapula becomes recognizable as the homologue of the spine of a mammalian scapula.

The most important change in the clavicular arch is the gradual reduction and final complete disappearance of the cleithrum. The other bones sink in from their original position in the skin, so that they become surrounded by muscles on all sides, but otherwise they suffer comparatively little change during the evolution of the mammals.

The great changes in the position of the fore limb during the development of the mammal-like reptiles necessitate corresponding modifications of the structure of the humerus and other limb bones. Of these, the most striking is the gradual narrowing of the two ends of the humerus and their rotation until they become nearly parallel.

In the hand, the number of phalanges in the third and fourth fingers is reduced to three, so that the formula becomes that characteristic of mammals, 2, 3, 3, 3, 3. It is evident that this change is associated with a new pose in which the third finger, which becomes the longest, lies parallel to the mid line of the animal and the others are symmetrically placed on each side of it.

In the pelvis, the most important changes are a widening of the upper part of the ilium associated with an increase in the number of vertebrae in the sacrum, and the development of an obturator foramen, a gap lying in the suture between the pubis and ischium.

The femur so changes its shape that it can lie with the knee directed as much forward as outward, and the lower leg become capable of much freer movement. At the same time the astragalus and calcaneum shorten so that the tibia and fibula rest partly on their upper surface, thus forming an ankle joint which is on

the way to a mammalian structure and the phalangeal formula of the foot becomes reduced to 2, 3, 3, 3, 3.

The non-mammal-like reptiles exhibit so many different types of adaptation that a full analysis of the structures of their limbs is impossible; indeed, it has not yet been systematically attempted. Some of the main types of life are here discussed with reference to a particular case.

Nondescript.—The majority of lizards and Rhynchocephalia exhibit a simple modification of the mode of locomotion found in the most primitive reptiles. In them the body and tail are thrown into lateral waves, which pass steadily backward so that each point along the back swings from side to side across the animal's track as the creature moves forward. The hands and feet are widely separated, the body only just raised off the ground, and only one foot is moved at a time. In detail there is much variety; both fore and hind feet may be much everted, so that the first digits point forward and the toes increase in length from one to four, so that when in the natural position their claws end on a straight line at right angles to the body. In some cases, however, the fingers are directed forward and the hand is nearly symmetrical about the third finger, and even the foot is less asymmetrical than in the more primitive forms. Nevertheless, these animals always retain the original phalangeal formula.

These animals have a primary shoulder girdle consisting of a scapula and precoracoid, the glenoid cavity has lost all trace of the screw shape of primitive reptiles and permits considerable freedom of motion. In the larger and more advanced lizards the anterior part of the scapula and coracoid is much enlarged, and these bones are perforated by fenestrae.

The clavicles have an expanded, and sometimes fenestrated, lower end, and the interclavicle is usually cross-shaped. There is a large sternum, which is usually calcified although not ossified, with whose antero-lateral borders the precoracoids articulate.

The pelvis of these reptiles is of very characteristic pattern, the ilia are narrow rods with an expanded lower end which contributes to the acetabulum. It slopes downward and forward and is firmly held by its articulation with the two sacral ribs. The pubis and ischium are separated by a large obturator foramen which, in many cases in the bony skeleton, is confluent with that of the opposite side. The hind limb presents few features of interest, but it may be noted that a patella is sometimes present, and that most of the motion at the ankle-joint takes place between the two rows of tarsals and not, as in mammal-like reptiles, between the tarsus and lower leg.

One universal and unexplained feature of the hind foot of these reptiles is that the fifth distal tarsal is absent, and that the upper end of the fifth metatarsal has moved up into contact with the calcaneum, and has become much widened so that the whole bone is hook-shaped. As a result, the fifth toe tends to be widely separated from the other four.

This feature occurs in Rhynchocephalia, Thecodontia, Crocodilia, Dinosauria, Squamata, and Chelonia, and has been held to imply a close relationship between these orders.

Cursorial Progression.—The only group of non-mammal-like reptiles which became highly adapted for rapid progress on hard land was the Dinosauria. They arose from Thecodonts whose general body proportions and gait generally resembled those of certain lizards. These animals possessed slender scapulae and small precoracoids, clavicles and interclavicle were present, and there was, in some cases, a sternum with a single pair of ossifications. The fore limb was slender, the hand small and with five fingers. The pelvis had an ilium which was antero-posteriorly extended, but so low that the acetabulum lay on the level of the vertebrae. The pubis and ischium were plate-like, but much elongated and directed largely downward. The hind legs were much longer and more massive than the fore, a condition made possible to a quadripedal animal by the presence of a long tail, which acted as a counterpoise to the body. Although it is certain that these animals had a straddling gait, it is probable that the feet were placed unusually near to the middle line and the feet were not so asymmetrical as those of most lizards.

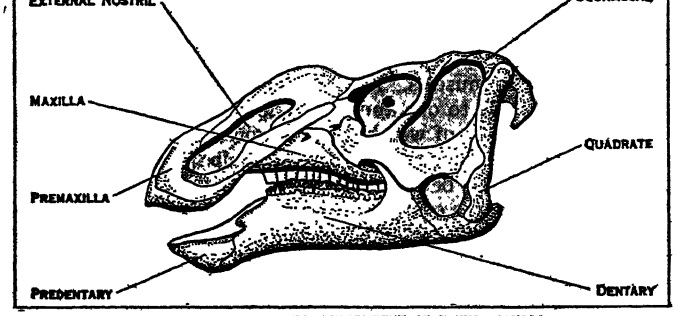
From such reptiles the Saurischia, the carnivorous dinosaurs arose by an increase in the length of the hind legs, and concurrent reduction of the arms. They became predominantly bipedal, a habit which necessitates the raising of the body so far above the ground that the whole animal balances about the pelvis. This pose can only be attained if the thighs are turned in until they lie parallel to the body of the animal, and the feet are placed on the line which marks the middle of the track. Such an arrangement ensures that the body need no longer be thrown from side to side, as it is in all more primitive reptiles.

A further result is that, as the powerful muscles which are used for propelling the animal forward no longer press the heads of the femora into the acetabula, this depression no longer needs a floor and becomes perforated. At the same time, in order to lengthen the muscles attached to them and thus enable the leg to swing through a larger arc, the pubis and ischium, both elongated, stretch downwards and away from one another, meeting only at the acetabulum. The reduction in size of the forelimb, which occurs because it is no longer required to carry the weight of the body, results in a reduction and final loss of the clavicular arch, and in a reduction in size of the precoracoid. Subsequently, certain carnivorous dinosaurs increased greatly in size and became quadripedal again, retaining in many parts of their skeleton features which arose during the bipedal stage in their ancestry.

The long limbs which are necessary for a bipedal cursorial life, involve elongated feet. These are secured by lifting the heel entirely off the ground, so that the animal walks on the ends of the metatarsals, the toes stretching out along the ground as they do in birds. As the foot is placed directly under the body it tends to become symmetrical about the middle third toe, and rapidly becomes either functionally or actually tridactyl. The hand, which serves as a grappling hook for catching the prey, is reduced to three fingers, all provided with claws, that on the thumb becoming very large indeed in the latest forms.

The other group of dinosaurs, the Ornithischia, pursue a somewhat similar course of modifications; they also become bipedal, some of them secondarily returning to a quadripedal life. But in them the extension of the pubis and ischium into long downwardly directed rods, which is necessary to afford suitable muscle attachments, takes place in such a way that the pubis acquires two branches, one directed downward and forward, the other directed backward so that it lies parallel to the ischium. The early stages of this arrangement are not known, but it persists throughout the whole group.

Flight.—One group of lizards, the genus Draco, has the habit of living in trees and of passing from tree to tree by making great



BY COURTESY OF THE GEOLOGICAL SURVEY, DEPARTMENT OF MINES, CANADA

FIG. 13.—SKULL AND LOWER JAW OF THE ORNITHOPODOUS DINOSAUR KRITOSAURUS

leaps, whose length is extended by the presence of a parachute, made by flaps of skin which project from the sides of the body and are supported by the much elongated ribs. Such gliding is scarcely flight in any true sense, it cannot be maintained by any action of the animal whilst in the air, and its extent is limited by the speed acquired at the original jump and by the height of the point of departure. A similar gliding habit, carried out without any elaborate mechanism by a mere concavity of the ventral surface, is exhibited by certain arboreal snakes from Borneo. The only reptiles which have acquired true flight were

the extinct Pterodactyls.

There are two series of the animals, in one of which the tail is extremely short and probably functionless, whilst in the other the tail is a very long stiff rod bearing a horizontal fin at its hinder end. The presence of this fin renders the maintenance of the body on an even keel much easier than it can have been in the tailless forms. The wing of every pterodactyl consists of a fold

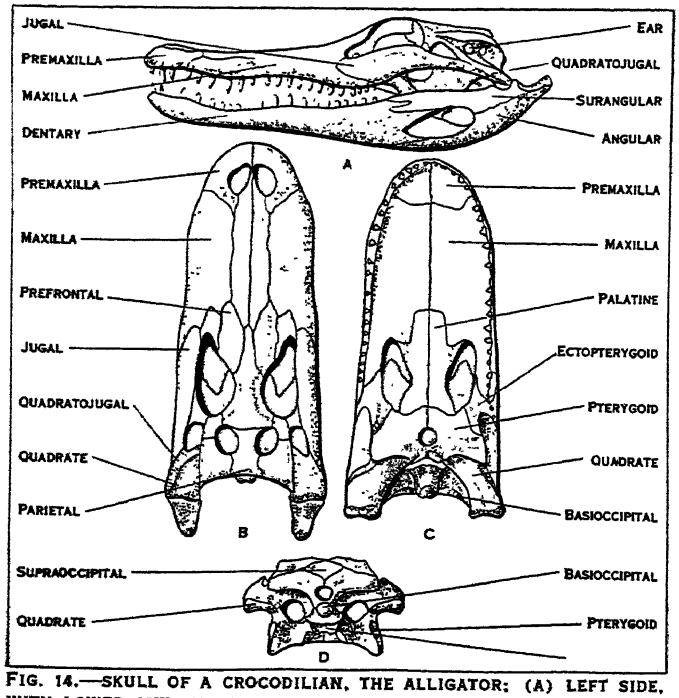


FIG. 14.—SKULL OF A CROCODILIAN, THE ALLIGATOR: (A) LEFT SIDE, WITH LOWER JAW, (B) FROM ABOVE, (C) FROM BELOW, (D) OCCIPUT (AFTER ANDREWS)

of skin which is supported by the greatly extended fourth finger and by the hind leg; it may or may not have connected the hind legs together, either directly or by passing on to the base of the tail. The structure of the fore limbs, which enabled these animals to perform automatically the many carefully-adjusted movements which are necessary for flight, is so strictly determined by mechanical considerations that it is practically uniform in all known species of the group.

In all of them, the scapula is an elongated narrow rod of bone which may articulate with the neural spine of the dorsal vertebrae. Its lower end forms the upper half of the glenoid cavity and is fused with the coracoid. This bone is elongated and straight, its distal end rests in a groove in the front of the large sternum, so that it is enabled to take directly the stresses resulting from the powerful wing muscles. The humerus is short, and the radius and ulna lie parallel to one another. The carpus consists of three bones, with the distal of which the wing metacarpal is articulated, so that it can revolve on its axis. The main joint at which the wing was folded lay between the metacarpal and first phalanx. The movements at the elbow and wrist are inseparably connected, and serve to alter the camber and angle of attack of the wing, thus enabling the animal to fly at varying speeds. It is interesting to note that a successful aeroplane, with an unusual range of flying speed, has been designed on lines suggested by the tailless pterodactyls.

Swimming.—Two extreme modes of swimming are open to a tetrapod. It may convert its limbs into paddles by whose actions it rows itself through the water, or it may use its tail as a propeller, either flattening it and causing waves to pass along its length or producing a fin at the extreme tip, which can be used like a screw propeller. Both types are found in reptiles.

The Chelonia include amongst the fresh water tortoises a number of animals which swim well with limbs which, except for the webbing of the toes, are much like those of a land animal. But in the marine turtles and in the fresh water Carettochelys from New Guinea, the limbs are transformed into paddles, mere bags of skin surrounding the whole of the elongated digits.

The Plesiosaurs carried this principle to its limit; in them each limb is a rigid oar, flattened and widened distally, circular in section where attached to the body. It was feathered when brought forward, then turned so that its broad plane was vertical for the swimming stroke.

The crocodiles, the semi-marine lizard Amblyrhynchus, and the sea snakes are the living exponents of the second mode of swimming. In them the powerful tail is laterally flattened, and is swung from side to side so that a series of waves passes along its length. The limbs are used for steering and for maintaining stability in the water. The only groups of reptiles which have formed a caudal fin are the Ichthyosaurs and the marine crocodiles of the family Metriorhynchidae. In each case the end of the vertebral column is suddenly turned down so that it passes into the lower lobe of a forked fin whose upper lobe is supported only by non-ossified structures. These animals show a reduction of the limbs, the pelvic limb of Ichthyosaurs and the pectoral limb of the crocodiles being reduced to a tiny paddle.

Limblessness.—Many lizards belonging to unrelated families, but chiefly of burrowing or sand living habits, exhibit a reduction of limbs associated with an elongation of the body. The process takes place gradually, all stages being known in one or other form between normally developed limbs and their complete absence. In snakes the reduction is always complete in the case of the fore limbs, whilst the hind limbs may be represented by a claw-like spur on each side of the vent. In some cases all three bones of the pelvis and the femur may be present. Normally, all trace of limbs, except for a rudimentary nerve plexus, is lost.

Skin.—The fact that the reptiles were originally distinguished from the amphibians by their more completely terrestrial habits, implies that in them the skin had become capable of withstanding desiccation, and the serious wear to which it became exposed.

The skin of amphibians is maintained in good condition by a coat of mucus, poured out from glands which lie all over it; that of reptiles is dry and covered by a watertight layer of horn, very well adapted for resisting abrasion. The horny layer, though continuous, is not of the same thickness throughout, but is divided into specially thickened areas, the scales which are connected by flexible regions. The scales may be flat, fitting together like a mosaic or separated widely, or they may be prolonged backwards so that they overlap and are overlapped by others, like slates on a roof. The scales often have a definite arrangement, which is used in the classification of Squamata.

The skin, as in other Amniotes, consists of a compound squamous epithelium which rests on a corium built of connective tissues. The actual scale consists of the keratinized outer layers of the epidermis, its thickness is increased by additions to its inner surface, and it grows in area either all round or at one end. The area of the scale is always raised by a special papilla of the corium, which may project so far that the scale overlaps that behind it. The scale is colourless, its transparency allowing the pigment in the cutis to show through.

The outer layer of the keratinized epithelium is worn away in crocodiles and Chelonia, but in the Rhynchocephalia and Squamata it comes away either in flakes or, in some lizards and snakes, in one piece. Such cast skins exhibit perfectly the continuity of the horny skin, which in them even covers the eyes. This process of shedding the skin is facilitated in some or all of these reptiles by a special mechanism which allows the head to be distended with blood. The papilla of the corium which fills the centre of each scale may, in crocodiles, some lizards and many fossil reptiles, be ossified as a bony scute.

The carapace and plastron of the Chelonia consist essentially of such scutes. Each ossifies in the corium, the bone finally occupying nearly the whole thickness of that layer, leaving only a thin sheet of connective tissue to support the peritoneum, and a similar sheet containing pigment cells below the epidermis in which the horny shields are developed. The originally dermal ossifications of the carapace extend so far down into the body of the animal that, in the end, they completely surround the middle parts of the ribs, which first calcify and are then ossified by ex-

tension of membrane bone from the scute.

Most of the glands found in the skin of reptiles are scent glands, which give to these animals their characteristic odour of musk, which has, no doubt, a sexual significance. All these glands are sac-shaped, multicellular structures opening by a pore on the surface, and their secretion is set free by disruption of cells.

The musk glands have the following distribution:—In crocodiles there is a pair which open by longitudinal slits on the inner sides of the lower jaws, and another pair lie within the lips of the cloaca; these are present in both sexes. Crocodiles possess also a row of small sac-like glands without external openings along each side of the back.

In Chelonia there is a pair of inguinal glands opening near the hypoplastra, and sometimes an anterior pair similarly related to the hyoplastra. Sphenodon has a pair of cloacal glands. Lizards have cloacal glands and, in addition, in certain forms there are the so-called femoral pores, which extend along the lower and hinder surface of the thigh to pass on to the belly in front of the cloaca. They are present in both sexes, but best developed in males. Each pore opens in the middle of a scale and leads into a canal which ends in a pocket with many shallow diverticula. The cells of the walls of these become detached, filling up the lumen of the gland and duct, and forming a rod which may project beyond the surface of the skin. It is possible that these structures are of assistance in copulation.

Muscular System.—No useful account of the muscles of reptiles can be given here, the functional effects of those used in locomotion are described in the section *Locomotion.*

Body Cavity.—The body cavity of reptiles is always more or less completely divided into sacs. A completely closed pericardium is always present. In lizards, a post-hepatic septum built up by special folds of the mesentery and suspensory ligament of the liver, may reach the ventral surface and bring about an almost complete division of the peritoneal cavity into two. In snakes, similar folds enclose the two lobes of the liver and the stomach in separate sacs. In Chelonia, the lungs lie above a fold of peritoneum which reaches the liver, excluding them from the general cavity. In crocodiles, there are two pleural cavities and a combination of other folds connected with the liver forms a complete transverse partition separating the pericardium, lungs and liver from the rest of the peritoneal cavity. This sheet is muscular, and probably functions in respiration like the non-homologous mammalian diaphragm.

Digestive System: Teeth.—The teeth of reptiles may be found on the pre-maxillae, maxillae, on all the bones of the palate, and on the dentary and coronoid bones of the lower jaw. Individual teeth are generally simple cones with a conical pulp which produces dentine and an enamel cap. They may be set in sockets (thecodont) or fused to their supporting bone (acrodont or pleurodont). In the majority of reptiles they are shed periodically, and replaced as often as necessary. In reptiles, the marginal teeth of both jaws appear to belong to two series, whose members alternate with one another, and in primitive forms were functional alternately.

Thus, in these animals two teeth are usually separated by an empty emplacement in which a new tooth will arise, the original pair being shed together when it has grown to its full size. When the original teeth have been shed a new dental papilla passes outward from the lingual side to the empty socket and there produces a new tooth. In crocodiles this process has already happened before the tooth is shed, so that these new tooth crowns may often be found in the pulp cavity of the original tooth. Sphenodon, and some other recent reptiles with acrodont teeth, exhibit no replacement after maturity has been reached. The mammal-like reptiles in their various orders show all stages in the reduction of tooth change from the primitive unlimited replacement of all teeth to a mammalian condition in Cynodonts, where the incisors, canines and pre-molars are replaced once during the animal's life, and the molars, when once formed, are never shed.

The dentition of reptiles is usually homodont, that is, uniform or regularly varying from front to back of the jaw, but the Theriodont dentition is heterodont and mammal-like. The tooth crown may be elaborated into a crushing mechanism, in Placodonts, some Ichthyosaurs, and very effectively in the Trachodont dinosaurs, where several successive series of teeth are in use at one time, forming a splendid triturating surface, in Cotylosaurs, Theromorpha, and even, though imperfectly, in some lizards. The peculiarly specialized fangs of poisonous snakes are described in the article on these animals.

Tongue.—A tongue is present in all reptiles. In crocodiles and Chelonia, it is a short, broad, fleshy structure attached to the floor of the mouth over a large area. In crocodiles, a fold on the hinder margin of the tongue engages with a similar structure of the palate, so as completely to separate the air passage from that for food. In lizards the tongue may be flat, broad and not protrusible; it may be narrow, cylindrical and capable of being extended out of the mouth, or its cylindrical anterior half may telescope into the posterior portion, so that the whole can be projected far in front of the snout. This last type reaches its climax in the chameleon (*q.v.*).

Buccal Glands.—The only salivary gland of universal occurrence in reptiles is a sub-lingual. Upper and lower labial glands occur only in lizards and snakes, where they are arranged in rows between the lips and the teeth. The poison glands of the lizard Heloderma, and of the snakes, are special developments of such upper labial glands. They are described in the article SNAKE.

Gut.—In Chelonia, Sphenodon, lizards and snakes, the oesophagus passes gradually into the stomach, which is, in them, usually spindle-shaped, with its openings widely removed from one another. In crocodiles, the stomach is placed more transversely, the opening of the oesophagus and the pylorus being approximated. This stomach is an oval sac whose proximal portion is very muscular, recalling, in its arrangement, the gizzard of a bird; indeed, it customarily contains pebbles used for triturating food. The pyloric end of the stomach is distinct. The stomach always contains gastric glands.

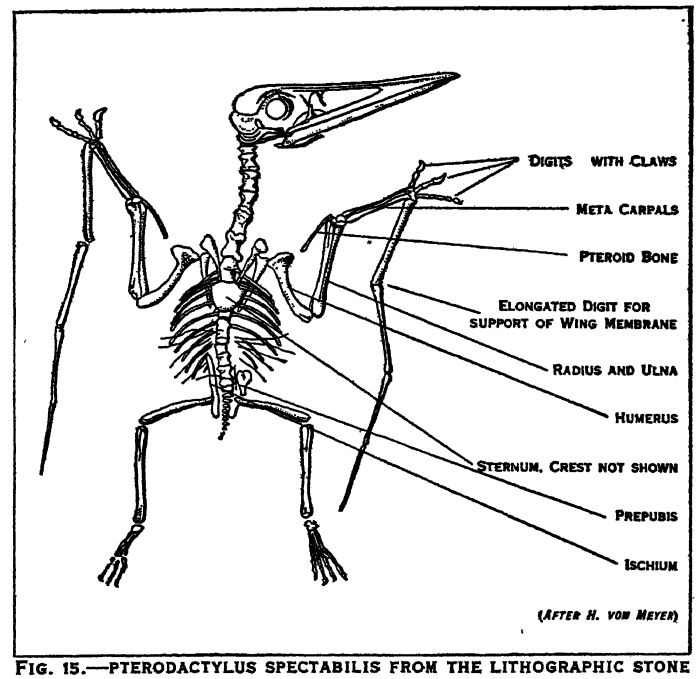


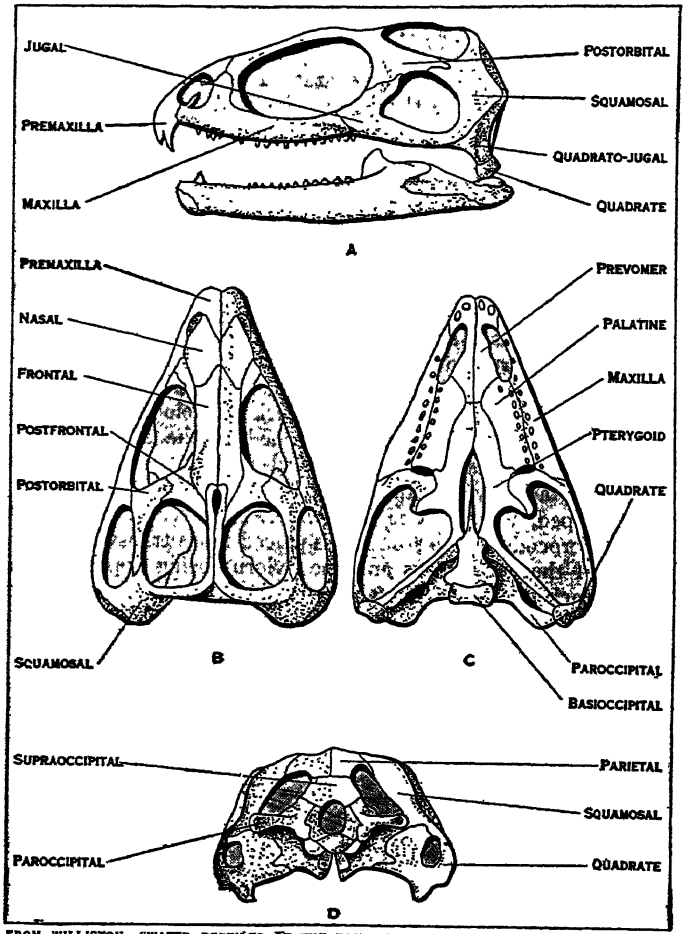
FIG. 15.—PTERODACTYLUS SPECTABILIS FROM THE LITHOGRAPHIC STONE

A pyloric valve usually exists, and the duodenum is not usually sharply marked off from the rest of the small intestine; only in crocodiles does it form a loop round the pancreas as it does in birds and mammals. The walls of the mid gut are usually thrown into folds or ridges, but seem to contain few or no glands. There is usually or always an ilio-colic valve separating the mid from the hind gut; immediately beyond this the latter gives rise to a caecum in some lizards and snakes. The rectum ends in a cloaca which is usually of elaborate structure.

Cloaca.—The cloacal opening leads into a proctodeum, a cham-

ber whose walls give origin to the copulatory organ or organs in the male, and their representative in the female duct to the pair of anal glands; the peritoneal canals when present open into it.

Copulatory organs are absent in Sphenodon, in Squamata they are a pair of papillae capable of being protruded through the lateral ends of the transverse cloacal slit, and of being retracted, being turned inside out by the contraction of special muscles



FROM WILLISTON, "WATER REPTILES OF THE PAST AND PRESENT" (UNIVERSITY OF CHICAGO PRESS)

FIG. 16.—SKULL OF THE RHYNCHOCEPHALIAN, SPHENODON; (A) LEFT SIDE, (B) FROM ABOVE, (C) FROM BELOW, (D) OCCIPUT

derived from the tail musculature. Each has a groove on its lateral surface which extends on the wall of the cloaca nearly to the opening of the vas deferens. In crocodiles and Chelonia, a median unpaired penis arises from the ventral wall of the proctodeum; it can be erected through the activities of corpora cavernosa, and is then extruded through the anterior end of the longitudinal cloacal slit. The dorsal or posterior surface of the penis is furrowed by a deep groove, which is probably converted into a canal during erection. The groove leads backward to the openings of the seminal ducts.

The proctodeum is separated by a ridge which is, in effect, a sphincter, from the urodaeum, into which the ureters, vasa deferentia, oviducts and bladder open. A bladder is found in Sphenodon, Chelonia and most lizards; it is absent in all other reptiles. The urodaeum is partially subdivided in many reptiles; in snakes a dorsal recess receives the ureters and gonoducts; in crocodiles they open into the dorsal side of the urodaeum, whilst in Chelonia they discharge directly into the neck of the bladder. In Sphenodon, lizards and snakes, the oviducts open rather dorsally, in crocodiles and Chelonia ventrally, the vasa deferentia having a similar opening in all forms.

The urodaeum is, in some aquatic Chelonia, produced into a pair of their walled sacs on the dorsal side, which are constantly filled and emptied of water, thus serving as accessory respiratory organs. In all reptiles except crocodiles and Chelonia there is an additional cloacal chamber, the coprodeum, which serves for the storage of faeces.

Urogenital System.—The kidney of an adult reptile is always a metanephros, discharging by a single ureter. The kidney may be elongated and its surface furrowed, or it may be a small compact organ. The urine of Chelonia and Crocodilia is fluid, that which is voided by snakes and lizards contains crystals of insoluble urates, an arrangement which prevents waste of water in these animals, which often live in very arid surroundings.

The ovaries are always paired, and large owing to the size of the yolky eggs. Interstitial tissue is small in amount. The oviducts have independent funnel-shaped ostia, and are usually provided with glandular walls which secrete the albumen and shell. In some viviparous forms they can combine with the faetal membranes to form a placenta. The elongated testes are connected with an epididymis of mesonephric origin.

Respiratory System.—All reptiles breathe by lungs. These are always produced by the elaboration of a median ventral outgrowth of the pharynx. The glottis lies immediately behind the tongue and is sometimes protected by a rudimentary upstanding epiglottis. There is a larynx, supported by arytenoid and cricoid cartilages, there being no thyroid cartilages; muscles passing from the laryngeal cartilages to the "hyoid" enable the glottis to be opened and closed. There are often vocal chords, which give to Sphenodon, crocodiles, some tortoises and lizards a voice, usually a grunt or squeak. The trachea is often long and its cavity is kept open by cartilaginous rings. The bronchi may be very short in Sphenodon or very long in tortoises. The lung is very variable in its structure; it may be almost as primitive as in Amphibia or become comparable to that of a bird.

In Sphenodon and snakes the cavity of the lung is single, but the walls are divided up into a series of cells by upstanding ridges or septa. In some lizards certain of these septa elongate so that the original single sac begins to be cut up into lobes, each with cellular walls. In crocodiles, this process has gone on so far that the lung is definitely divided into a number of chambers each of which receives a number of wide side canals, the parabronchi, in whose walls lie the alveoli. In Chelonia this process has gone so much further that the whole lung is spongy, the alveoli, through whose walls the whole of the respiratory exchange takes place, being connected with an irregularly branched series of bronchial tubes.

Not only is the actual structure of the lung altered in this way, but reptiles show an advance over the Amphibia in an increased size of the lung resulting from the development of a special anterior projection, the prebronchial part, which, very small in Sphenodon, becomes much more extensive in more advanced reptiles. In chameleons, long, hollow non-respiratory process of the lungs pass backward among the viscera; they are important as morphological forerunners of the air sacs of birds and Pterodactyls. In elongated legless reptiles one of the lungs is usually reduced, and may be absent.

The mode of respiration in Reptilia is not well known. In all except the Chelonia, movements of the ribs may be expected to draw air into the lungs, whilst the muscular post-hepatic diaphragm of crocodiles is, no doubt, used as is the comparable structure in mammals. In Chelonia, and probably also in other reptiles, air is actively forced down into the lungs by movements of the floor of the buccal cavity brought about by the hyoid and its musculature. In Chelonia, the protrusion and withdrawal from the shell of the neck and legs gives a pumping action which, by creating a virtual vacuum, draws air into the lungs.

Vascular System.—The heart of reptiles lies in the thoracic region, usually between the lungs. There is a sinus venosus, at least in most, which opens by a valve guarded slit into the right auricle. Right and left auricles are completely separated, and open independently into the ventricle or ventricles. The lower edge of the interauricular septum is expanded laterally into, usually, very large right and left membranous valves, which direct the arterial blood to the left, the venous to the right side of the ventricular cavity. The ventricle is incompletely, or, in Crocodilia, completely divided by an upstanding ridge into right and left

halves. Except for a possible relic in Sphenodon, there is no trace of a conus arteriosus nor of a truncus. Three arteries arise independently from the ventricle, and are then twisted round one another like a rope, so that they cross one another. That vessel whose origin is most to the right is the left systemic arch, the next is the pulmonary arch, and the third is the right systemico-carotid, from which arise both carotids. As a result of this arrangement, in Chelonia the pulmonary arch arises from a partially separated cavum pulmonale, and the two systemics from a cavum venosum, which has to be traversed during systole by the blood from the left auricle, which is originally discharged into the cavum arteriosum on the left side of the ventricle. In crocodiles, the right systemico-carotid alone leaves the left ventricle, whilst both pulmonary arch and left systemic come off from the venous right ventricle: but in them the left and right systemics are connected by a special opening, the foramen of Panizzi at the point where they cross. Although it has been shown by the electrocardiograph that the nature of the contraction of the heart in tortoises is much as in mammals, very little is known of its general physiology.

Arterial System.—The pulmonary arch soon divides into two branches, one to each lung; in Sphenodon and some lizards it gives off a paired laryngotracheal artery which is a relic of a

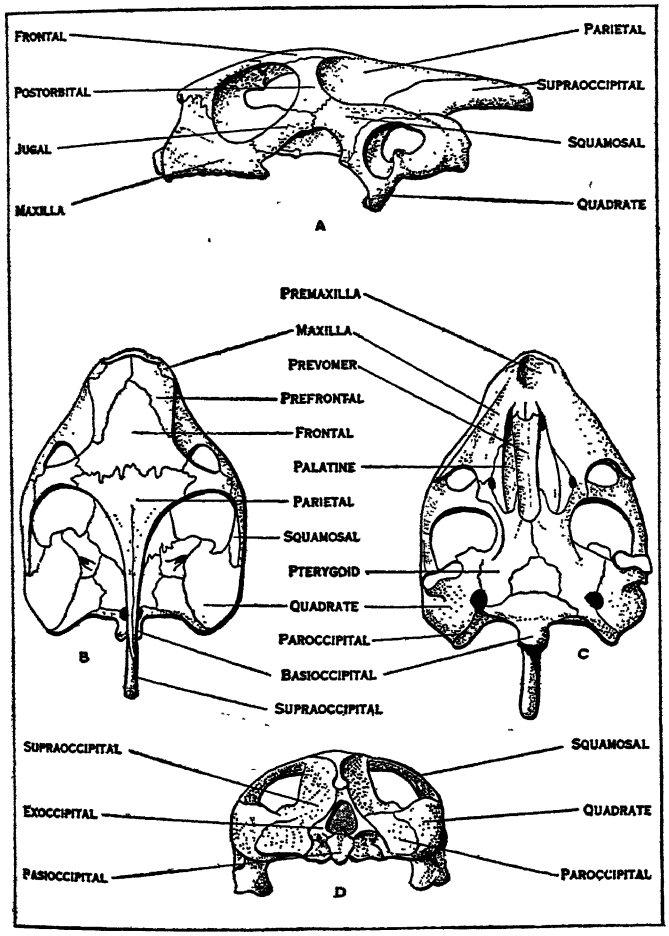


FIG. 17.—SKULL OF A TORTOISE, TESTUDO
A. Left side, B. from above, C. from below, D. occiput

Urodela structure. The systemic arches unite to form the dorsal aorta; from one or both of them arise coronary arteries to the heart. From the right come off both subclavians, and the left usually gives off a coelic branch. The carotids may arise independently from the right systemico-carotid, or may be formed by the branching of a single primary carotid. In snakes the right carotid is usually much reduced or absent.

Venous System.—The venous system is exceedingly complicated, differing in details in the four orders but with a common ground plan. The pulmonary veins pass straight from the lungs into the left auricle.

The venous blood is returned to the heart by the pair of precaval, and single postcaval veins which open into the sinus venosus. The branches of the precavals come from the head and fore limb, the subclavian often receiving an azygous vein from the anterior part of the body wall which represents part of the embryonic posterior cardinal. Nearly the whole of the blood which

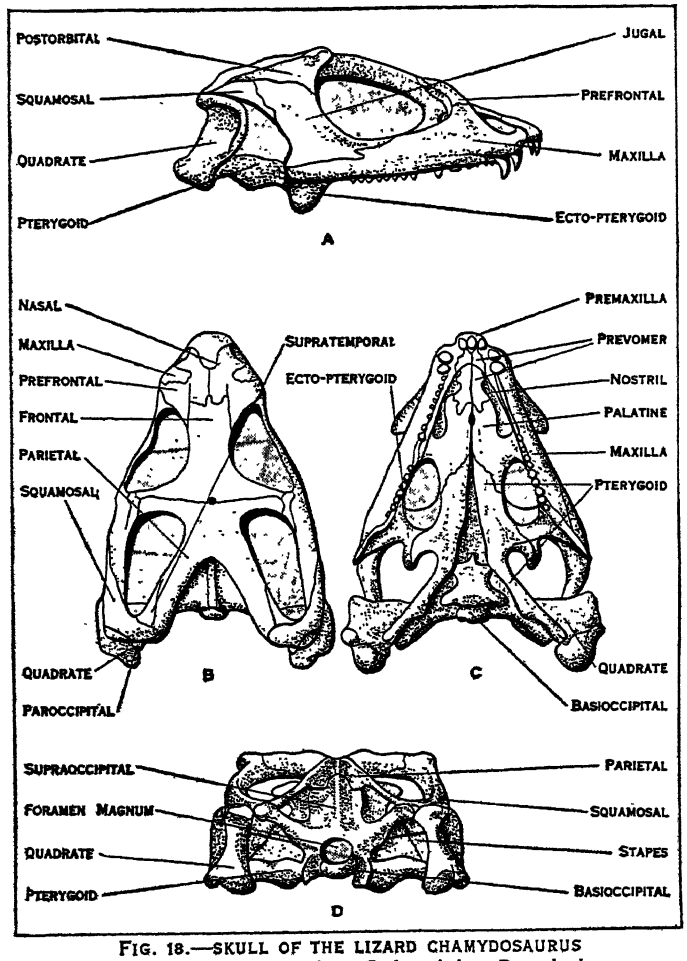


FIG. 18.—SKULL OF THE LIZARD CHAMYDOSAURUS
A. Right side, B. from above, C. from below, D. occiput

enters the heart through the postcaval has previously passed through one of the portal systems.

The renal portal system drains the tail, and part of the hind limbs, the afferent renals arising from the bifurcated anterior end of the caudal vein and the iliacs. The efferent renals open into the postcaval, whose hinder end is formed by them. The supra renal portal system consists of a series of afferent veins which come from the body wall; the efferents discharge with the gonadial veins into the postcaval.

The hepatic portal system includes the series of veins from the gut, which form the true hepatic portal vein and also the median anterior abdominal vein, which is originally formed by a fusion in the middle line of pelvic veins, themselves built up from the iliacs and a series of vessels from the hinder part of the body wall of the abdomen. The anterior abdominal passes along in a mesenteric sheet in the ventral part of the body cavity to enter the liver and there receive the hepatic portal or a branch from it. Finally, the whole of the blood in the liver passes by the hepatic veins into the posterior cardinal.

Lymphatic System.—Definite lymphatic canals are well developed in reptiles; those of the head unite into thoracic ducts which open into the innominate veins. There is a pair of posterior lymph hearts discharging into the iliacs.

Blood.—The red blood corpuscles are oval, biconvex and nucleated; they are larger than those of birds and mammals, smaller than those of Amphibia.

"Ductless Glands."—A spleen is constantly present in reptiles, placed near the stomach or within the loop of the duodenum behind the pancreas. The reptilian thyroid is a median structure placed somewhere on the ventral surface of the trachea.

There are two pairs of thymuses in Sphenodon and lizards, derived from the second and third pharyngeal pouches in the latter. In snakes there are usually two pairs derived from the

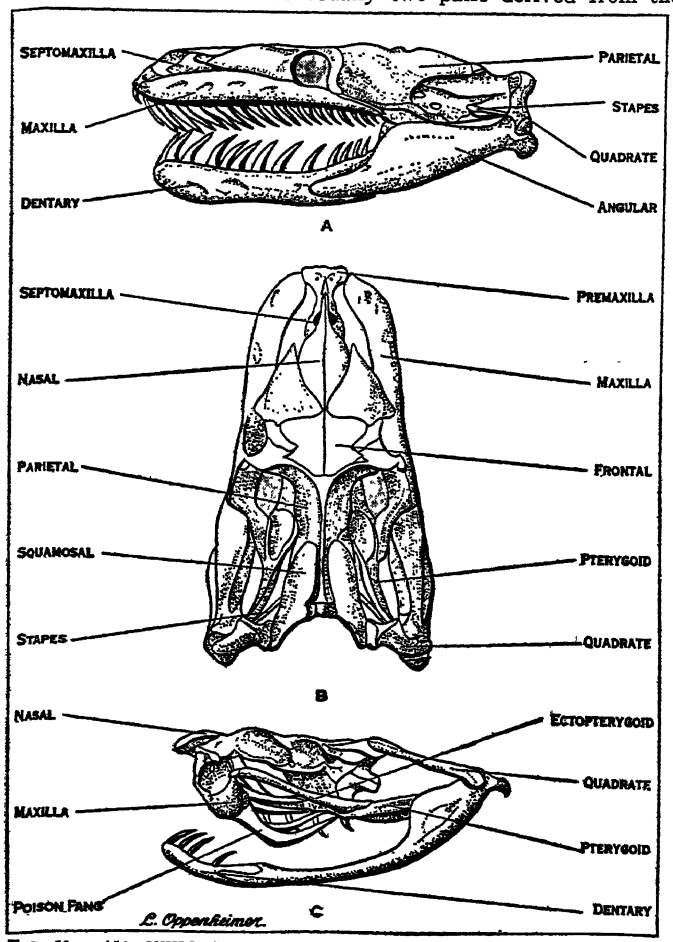


FIG. 19.—(A) SKULL AND LOWER JAW OF PYTHON (NON-POISONOUS). (B) SAME FROM ABOVE. (C) LEFT SIDE OF SKULL AND LOWER JAW OF RATTLESNAKE (POISONOUS)

dorsal extremities of the fourth and fifth pouches. A variable series of epithelial bodies, either dorsal or ventral, is present, and there is an ultimobranchial body of the left side, at any rate, in lizards.

Nervous System: *Sense Organs.*—Skin. Tactile corpuscles are found in the cutis of all reptiles. In crocodiles a group of them lies at the bottom of a pit, filled with non-conified cells near the anterior border of each of the large ventral scales. In Chelonia they lie in the thin layer of connective tissue between the epidermal scutes and the bony shell. In certain Agamids some of the scales of the dorsal surface bear long rod-like projections and are surrounded by nerve endings so that they may function as specialized tactile organs as do some mammalian hairs.

Taste.—It is clear that some sense of taste exists, the taste buds being probably on the tongue.

Smell.—The sense of smell is well developed in all recent reptiles, although it was much reduced or absent in the later Pterodactyls.

The external nostril, often provided with a valve, leads into a short vestibule, which opens out into the true olfactory chamber, whose wall is lined with the sensory epithelium which contain the olfactory cells. The area of the surface of this epithelium is increased by the presence of a ridge, the concha, which stretches into the cavity from the outer side. In crocodiles there is an additional concha, and there are reasons for believing that in Cynodonts, ethmo- and naso-turbinals were developed as in mammals. The nasal cavity finally opens to the palate by the internal nostril, which may be carried far back by the formation of a secondary palate.

Jacobsen's organ is, in Chelonia, a mere diverticulum of the ventral part of the nasal cavity. In Squamata it becomes an independent chamber, separated from the nasal cavity by the septomaxillary bone; it then has a special opening to the palate and may be very highly developed, receiving a large proportion of the olfactory nerve fibres. Its function is clearly to smell food after it has been taken into the mouth.

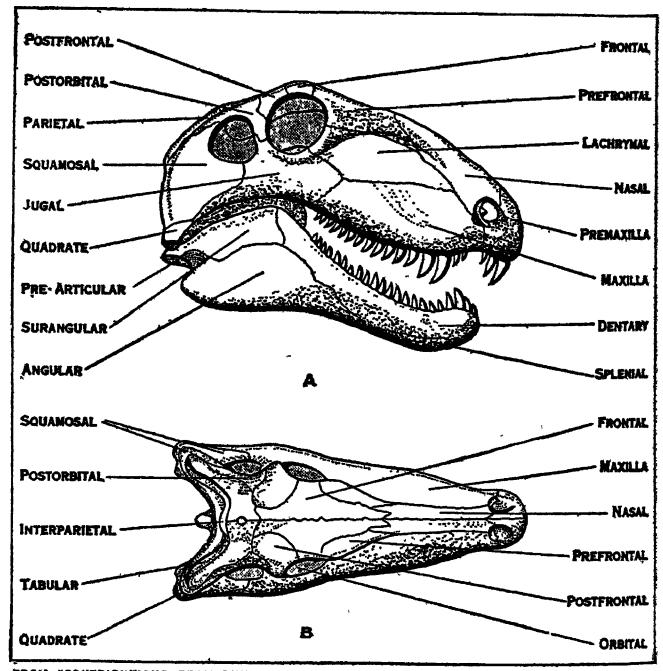
Jacobsen's organ soon vanishes in crocodiles. A special nasal gland is developed in the concha of reptiles, and the naso-lachrimal duct opens on the lateral wall of the nasal cavity.

Eye.—The eyes of reptiles are normally provided with movable upper and lower eyelids, and a nictitating membrane which is usually transparent and can be drawn across the cornea. The nictitating membrane may vanish in some lizards; in snakes it is permanently drawn across the eye, fuses with the remnant of the upper eyelid, and has a cornified scale on its outer surface, which is shed with the rest at ecdysis.

In some desert lizards the lower eyelid has a transparent window in the middle and is fused with the upper. In chameleons there is no nictitating membrane, and the upper and lower eyelids fuse, leaving only a small hole the size of the pupil. There are Harderian, conjunctival and lachrimal glands, whose secretion is discharged into the nose and palate by the naso-lachrimal duct.

The sclerotic coat of the eye ball often contains a ring of supporting ossicles, the cornea is convex. The crystalline lens is supported in a capsule by ciliary muscles, and accommodation can be carried out over a wide range.

The iris is usually brightly-coloured, and the pupil can contract either to a circular or a slit-like condition. The pupilary reflex to light is usually difficult to evoke. The retina is built up of



FROM "CONTRIBUTIONS FROM THE WALKER MUSEUM, CHICAGO UNIVERSITY"

FIG. 20.—SKULL OF THE PELYIOSAUR, SPHENACODON; (A) RIGHT SIDE, WITH LOWER JAW, (B) FROM ABOVE

small elements, both rods and cones being present in some forms, rods or cones alone in others. The retina, like that of birds, often contains pigmented oil granules, yellow, red, green, and, in Chelonia, blue and violet. Nutrition of the contents of the eye ball is secured, in many reptiles, by the presence of a pecten, a pigmented vascular projection, at first conical and when more highly developed fanshaped which arises from the fundus. A pecten is absent in Sphenodon and rudimentary in Chelonia. In snakes its place is taken functionally by a vascularization of the choroid. In chameleon there is a macula and fossa like that of

birds or primates. The eyes of reptiles are always laterally directed, but can be moved through a small arc of about 20°. They possess the normal series of six eye muscles and a retractor bulbi in addition. Reptiles appear to possess a colour sense, but accurate observations are lacking.

Pineal Eye.—In Sphenodon and lizards the epiphysis of the brain lies in a foramen between the parietal bones, and is covered by a transparent scale. It ends in a vesicle whose outer wall is lens-shaped, whilst the lower surface is a pigmented retina. It appears to exhibit no perception of light. The immense size of the pineal foramen in some fossil reptiles suggests that the pineal eye was functional in them.

Ear.—All reptiles have an inner and middle ear, an outer ear being present in crocodiles and the extinct Cynodonts. The inner ear is more advanced than that of Amphibia in that the utriculus is connected to the swollen sacculus by a duct from which the endolymphatic duct rises. There is a lagena which, in crocodiles, becomes much elongated and provided with a rudimentary organ of Corti seated on a basilar membrane.

The endolymphatic duct ends blindly, usually within the skull, but in Geckos is extended into a sac under the skin of the neck. There is a special perilymphatic duct which forms a closed tube definitely associated with the lagena. In crocodiles this begins to form definite scalae comparable to those of the mammalian cochlea.

The cavity of the middle ear is formed by an upgrowth from the first visceral pouch; in Sphenodon and lizards the cavity communicates with the pharynx by a wide opening, in Chelonia by a narrow Eustachian tube. In crocodiles the Eustachian tubes of the two ears meet and form a duct running in a special canal between the basisphenoid and basioccipital to open in the middle line just behind the choanae; lateral branches from the duct pass in canals between the basisphenoid and the pterygoids up into the supraoccipital and cranial roof, there enlarging into air spaces which again communicate with the tympanic cavities. Finally, a tube rising from each cavity leads air down into the quadrate and lower jaw. The history of this elaborate arrangement can be made out from fossil materials. In snakes, the tympanic cavity is totally obliterated. The outer wall of the tympanic cavity is the tympanic membrane, which, in crocodiles and most lizards, is a thin sheet sunk below the surface of the head at the lower end of an external auditory meatus. In Sphenodon and Chelonia it lies flush with the surface, and its outer surface is indistinguishable from that of the neck. In snakes and chameleons it is absent.

The tympanic membrane is connected with the fenestra ovalis by a rod, whose inner end is an ossified columella or stapes, whilst the unossified outer end is the extra columella. This is small and simple in Chelonia, absent in snakes, where the end of the stapes articulates with the quadrate, and in Amphisbaenans. In lizards, the extra columella has a dorsal process attached to the end of the paroccipital process, and often detached, a ventral process applied to the quadrate, and a plate for insertion in the tympanic membrane. The whole structure is of hyoidean origin, and the hyoid articulates with the end of the paroccipital process. In Sphenodon it fuses with the end of the extra columella, and in crocodiles it arises from its shaft to pass down the air canal to the lower jaw and become continuous with Meckel's cartilage.

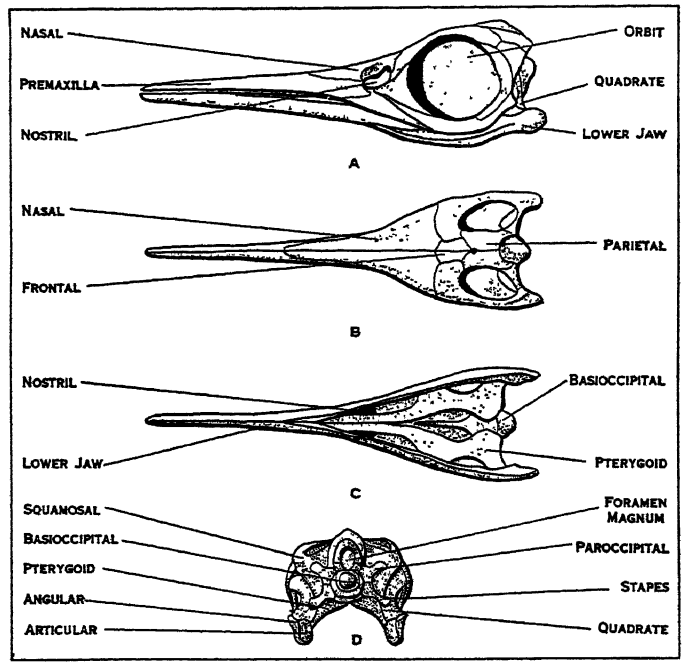
Most or all reptiles are capable of hearing, but we know nothing of their ability to discriminate musical notes.

Peripheral Nervous System.—The spinal nerves of reptiles agree in all important characters with those of other Tetrapods, the only interesting peculiarity being the presence in snakes of rudimentary pectoral and pelvic plexuses, relics of the limbs of their ancestors.

The sympathetic system presents an advance over that of most Amphibia in that many of the ganglia in the thoracic region are fused into a single large ganglion, and that the cervical sympathetic is separated into deep and superficial portions, each running continuously from the ganglion of the vagus to the thorax, the details varying in different orders. This arrangement is derived from that of Urodeles and leads directly to birds.

The cranial nerves of reptiles differ from those of living Amphibia in the absence of all trace of the lateral line system, except the auditory nerve, in the presence of a spinal accessory nerve XI. and in the fact that the hypoglossal nerve XII. passes out through the exoccipital bone.

Brain.—The reptilian brain is larger proportionately than that of an amphibian of the same size. The cerebral hemispheres



BY COURTESY OF THE CARNEGIE MUSEUM

FIG. 21.—SKULL AND LOWER JAW OF THE ICHTHYOSAUR OPHTHALMOSAURUS: (A) LEFT SIDE, (B) FROM ABOVE, (C) FROM BELOW

are pointed and usually pass gradually into the olfactory lobes. Their hinder ends are free and often project posteriorly so as to conceal the diencephalon.

In Sphenodon and in Chelonia the whole of the upper surface of the hemisphere, from the hippocampus on the inner surface to the lateral face, is covered by a pallium, devoted to the sense of smell. This layer of cells then turns inward from the surface, and lies on the top of the corpus striatum, forming a hypopallium. In lizards, and especially in crocodiles, the dorsal surface of the hemisphere becomes less and less nervous until, in birds, it is a mere membrane playing no part in the functioning of the brain. In these reptiles the hypopallium becomes broken up by a penetration of nerve fibres, loses its pallial appearance and becomes assimilated to the corpus striatum. Thus, presumably in these animals, and certainly in birds, behaviour is controlled and memory exercised by a part of the brain quite different from that which fulfils these functions in mammals. In some reptiles, at any rate, the first trace of the neopallium, which is the important and developing part of the brain in mammals, is represented by a small cortical area in which alone other senses than smell gain a direct representation.

The mid brain of reptiles has its roof thickened and raised into a pair of optic lobes, which not only receive the endings of the optic nerves from the retina but are the motor area, stimulation of which brings about movements of the body.

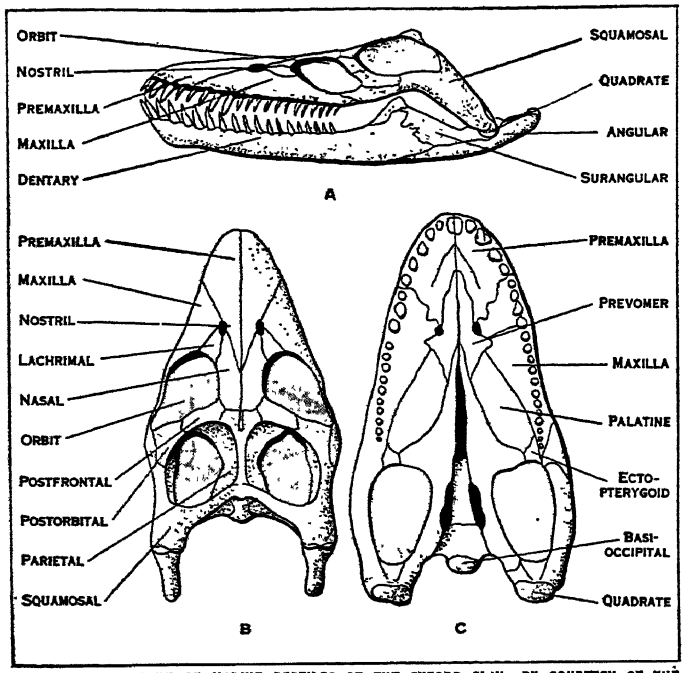
The cerebellum of reptiles is always larger and better developed than that of Amphibia, though in living forms it is not externally divided into regions, as is that of a bird or mammal.

The brain of the extinct pterodactyls is interesting because, in the reduction of the olfactory lobe, the large size of the cerebellum and the lateral position of the optic lobes, it exactly resembles that of a bird, is indeed more like that of recent birds than is the brain of Archaeopteryx, which is the most primitive member of that class.

Reproduction.—Fertilization of the reptilian egg always takes place internally, in contrast to the condition in many Amphibia.

The egg is always large and provided with so large a store of food materials in the form of yolk that the growing embryo, without any additional materials, can hatch in a form capable of fending for itself, and is, indeed, usually a miniature copy of its parents.

This ovum is surrounded by a semi-fluid layer of albumen, and enclosed in a membranous shell which may be calcified as is



FROM THE CATALOGUE OF MARINE REPTILES OF THE OXFORD CLAY, BY COURTESY OF THE BRITISH MUSEUM

FIG. 22.—SKULL OF THE PLESIOSAUR, MURAENOSAURUS
A. From the left side, B. from above, C. from below

that of a bird. Usually the egg is laid before development has gone far, but in some cases it is retained within the oviduct until the foetus is ready to be born. These animals, including many lizards and snakes, are thus viviparous. In their case the egg shell is thin, and food materials may pass through it; indeed, in some cases it is practically absent, and the little lizard secures nourishment from its mother through a special placenta.

Cleavage is meroblastic, resulting only in the formation of a primitive plate of cells. Gastrulation involves an actual invagination, resulting in the formation of an archenteron which has both floor and roof. The process is, indeed, similar in principle to that in the Gymnophionan Amphibia. No primitive streak is formed behind the blastopore in Chelonia, Sphenodon, lizards or snakes.

The later development much resembles that of birds or monotremes. A headfold is formed, followed by tail and lateral folds, which gradually raise the embryo from the yolk and extra-embryonic structures. An amnion arises from the extra embryonic somatopleure, as in birds, and an allantois is formed later by a ventral outpushing of the hind gut. It serves not only as a reservoir for the excretory products of the embryo, but also as a respiratory organ. The embryo breaks its way out of the shell by the aid either of an egg-tooth, placed mesially on its nose or of a caruncula on its head.

Further details will be found in the article VERTEBRATE EMBRYOLOGY.

Mode of Life.—No general statements can be made about the habits of reptiles. If the extinct forms be taken into account it will be found that they have occupied all the habitats which are to-day filled with mammals, except that they are excluded from polar regions by the impossibility of hatching their eggs there, and in extreme cases of achieving a sufficiently high rate of metabolism. The temperature of the body of reptiles, like that of Amphibia, and unlike that of the birds and mammals, is determined by that of their surroundings, rising when the animal is in a warm place, and sometimes becoming very high in bright sunlight, and falling at night, perhaps to freezing point. The animal's muscular activity always keeps it a very few degrees above the air temperature. Some idea of the variety of habit of reptiles may be gathered from the section on *Locomotion* in this article, and further facts from the articles: LIZARD, TORTOISE, CROCODILE, SNAKE and SPHENODON.

Geographical Distribution.—Apart from the limitation imposed by temperature, no general statements can be made about reptilian distribution; any useful account would occupy much space, and involve a discussion of the interrelationships of the families of lizards and snakes, a disputed field.

Geological Distribution.—The earliest bone which has been referred to a reptile is an isolated femur from the Lower Carboniferous of Scotland. Eosauravus, from the Upper Carboniferous (Middle Coal Measures) of Ohio, is probably a reptile, and Solenodonsaurus, from the top of the Upper Carboniferous of Czechoslovakia is certainly one.

The evolution of the reptiles was rapid, nearly all orders being fully established by the end of Triassic times. Several important orders became extinct at the end of the Trias, but the reptiles were the dominant group of vertebrates to the end of the Mesozoic, when, within a short period though not simultaneously, many orders became extinct, leaving only the four which still survive.

Economic Importance.—Reptiles are of slight importance to man. Poisonous snakes are responsible for many deaths of man and domesticated animals in all tropical and some temperate regions.

The marine turtle, *Chelone midas*, found in tropical waters of the Atlantic, Indian and Pacific oceans, provides the best of all soups; several other forms found in fresh water are often eaten, the most familiar of these being the terrapins, of the genus *Chrysemys*. The eggs of various species are also eaten by uncivilized peoples.

The skins of crocodiles, and of certain of the larger lizards and snakes, are tanned and used as leather. This consists only of the cutis, the horny epidermis being removed. This leather is extraordinarily tough and wear resisting, and the presence in it of the papillae which underlie the scales gives it a most attractive surface. The pigment, or at any rate such of it as

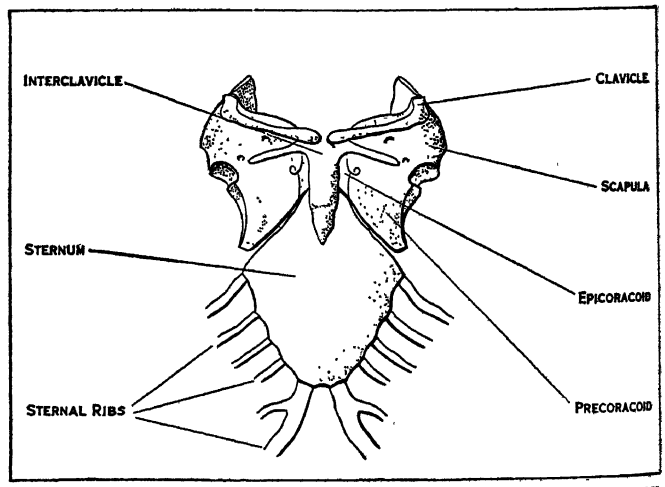


FIG. 23.—SHOULDER GIRDLE OF A LIZARD AMBLYRHYNCHUS FROM BELOW, SHOWING THE RELATIONS OF THE CLAVICLES, INTERCLAVICLE PRECORACOID AND STERNUM TO ONE ANOTHER

is melanine, may remain in the leather and give it characteristic patterns. The use of reptilian leathers for ladies' shoes and handbags has become popular and led to the destruction of many of these animals. That of alligators, however, is derived in part from animals bred for the purpose.

Further information about reptiles will be found in the separate articles: CROCODILE, DINOSAURIA, LIZARD, SNAKE, SPHENODON, ICHTHYOSAURUS, PLESIOSAURUS, PTERODACTYL, TORTOISE, etc., and in the general articles, EMBRYOLOGY, ANATOMY, PHYSIOLOGY, NEUROLOGY, ZOOLOGICAL DISTRIBUTION, etc. (D. M. S. W.)

REPTON, a village in Derbyshire, England, 8 m. S.W. of Derby, on the L.M.S. railway. Pop. (1921) 1,929. Its famous school was founded in 1557 by Sir John Port. Its modern buildings incorporate considerable portions of an Augustinian priory established in 1172. There was an ecclesiastical establishment on this site in the 7th century, the first bishop of Mercia being established here. The parish church of St. Wystan retains pre-Conquest work in the chancel. Pop. of rural district (1931) 18,178.

REPUBLIC, a state in which the supreme power rests in the people, or in officers elected by them, to whom the people have delegated powers sufficient to enable them to perform the duties required of them. In the small republics of antiquity the people usually expressed their preferences directly, but in the larger republics of modern times representatives are elected to sit in law-making bodies. The head of the state is usually elected directly, and in modern usage this fact distinguishes a republic from a monarchy in which the head is hereditary.

In the ancient world of Greece and Rome the franchise was in the hands of a minority, who were surrounded by, and who governed, a majority composed of men personally free but not possessed of the franchise, and of slaves. Modern writers have often used the literal translation of the Latin *respublica,* as meaning only the state, even when the head was an absolute king, provided that he held his place according to law and ruled by law. "Republic," to quote one example only of many, was so used by Jean Bodin, whose treatise, commonly known by its Latin name *De Republica Libri Sex,* first appeared in French in 1577. Englishmen of the middle ages habitually spoke of the commonwealth of England, though they had no conception that they could be governed except by a king with hereditary right. The coins of Napoleon bear the inscription *"République française, Napoléon Empereur."* Except as an arbitrary term of art, or as a rhetorical expression, "republic" has, however, always been understood to mean a state in which the head holds his place by the choice of his subjects. Poland was a republic because its king had in earlier times to be accepted, and in later times was chosen by a democracy composed of gentry. Venice was a republic, though after the "closing of the great council" the franchise was confined to a strictly limited aristocracy, which was itself in practice dominated by a small oligarchy. The seven states which formed the confederation of the United Netherlands were republics from the time they renounced their allegiance to Philip II., though they chose to be governed by a stadtholder to whom they delegated large powers, and though the choice of the stadtholder was made by a small body of burghers who alone had the franchise. The varieties are many. What, however, is emphatically not a republic is a state in which the ruler can truly tell his subjects that the sovereignty resides in his royal person, and that he is king, or tsar, "pure and absolute," by the grace of God, even though he may hasten to add that "absolute" is not "despotic," which means government without regard to law. The case of Great Britain, where the king reigns theoretically by the grace of God, but in fact by a parliamentary title and under the Act of Settlement, is, like the whole British constitution, unique.

There is in fact a fundamental incompatibility between the conceptions of a government as a commonwealth and as an institution based upon a right superior to the people's will. Where these two views endeavor to live together either the ruler will confiscate the rights of the community to himself or the community, acting through some representative body, will confine the head of the government to defined functions.

The conception of a republic in which all males, who do not belong to an inferior and barbarous race, share in the suffrage is one which would never have been accepted in the ancient or mediæval world, for it is based on a foundation of which they knew nothing,—the political rights of man. When the Scottish reformer John Knox based his claim to speak on the government of the realm on the fact that he was "a subject born within the same" he advanced a pretension very new to his generation. But it was one which was fated to achieve a great fortune. The right of the subject, simply as a member of the community, to a voice in the community in which he was born, and on which his happiness depended, implied all "the rights of man" as they were to be stated by the American Declaration of Independence, and again by the French in 1789. They could be vindicated only by revolt against monarchical governments in the old world and the new. They were incompatible with all the convictions which make monarchy possible as they embodied themselves in the modern democratic republics of Europe and America. It is a form of government not much more like the republic of antiquity and the middle ages than the French *sansculottes* was like Harmodius and Aristogeiton, whom he admired for being what they most decidedly were not—believers in equality and fraternity. But it does, subject to the imperfections of human nature, set up a government in which all, theoretically at least, have a voice in what concerns all.

One of the major results of the World War was the discrediting of monarchical government in many European States. There swept over Europe a desire on the part of people for self-government which led to the adoption of republican forms of government by a number of previously monarchical states. As early as March 12, 1917, when the Emperor Nicholas II. abdicated, the Russian people began the conferences that led to the formation of the U.S.S.R. For analysis of this form of government *see* the articles UNION OF SOCIALIST SOVIET REPUBLICS and RUSSIA.

Germany became a republic on Nov. 9, 1918, on the announcement of the abdication of the Emperor William II. The president is elected by direct vote of all the citizens over 20 years of age regardless of sex, and the members of the legislature are chosen by universal suffrage on the proportional system. (*See* GERMANY.) Three days later the Austrian Republic was declared, and on Nov. 10, 1920, the new Constitution drawn up by the National Constitional Assembly went into effect. (*See* AUSTRIA.)

On Nov. 14, 1918, the National Assembly of Czechoslovakia proclaimed the republican Czechoslovak State. The constitution passed Feb. 29, 1920, provided a Senate elected by a vote of all citizens over 26 years of age and a Chamber of Deputies elected by vote of all citizens over 21 years of age. (*See* CZECHOSLOVAKIA.) Between 1918 and 1925, in the order named, Finland, Estonia, Poland, Latvia, Lithuania, Turkey and Greece declared themselves to be republics. For details of franchise and representation *see* under separate articles.

REPUBLICAN PARTY, THE, in the United States was organized in 1854. In 1860, it elected its first president, Abraham Lincoln, and since that time, in a very large measure, has directed the political history of the country. In the 68 years (1861–1929) a Republican president has been in office all but 16 years, and in Congress the party has been in the majority in the Senate all but 12 years and in the House all but 22 years. The Republican Party has emphasized *nationalism,* first as against the doctrine of sectionalism and possible secession, later as against what is generally termed *internationalism.* A cardinal principle of its creed is the protective tariff. To the credit of its leadership are the first trans-continental railway and the Panama canal; the acquisition of all U.S. possessions abroad; promulgation of the "open door" oriental policy; the maintenance of financial stability. It opposed entrance into the League of Nations, and opposes adherence to any form of super-government. Since the World War, under its leadership, the United States has established a record for payment of national debt unequalled by any country in the world's history, and for rigorous economy in governmental management.

Origin.—Intense opposition in non-slave States to the further extension of the slavery system, and the breakdown of the compromise policy of Clay, with the Kansas-Nebraska bill and repeal of the Missouri Compromise as the incidental causes, brought the Party into being. The first actual meeting was possibly the one at Ripon, Wis., Feb. 28, 1854. The first convention was held at Jackson, Mich., July 6, 1854. All opposed to slavery extension were welcome. An informal gathering, national in scope, meeting in Pittsburgh Feb. 22, 1856 planned the first national convention which assembled in Philadelphia, June 17. The chairman, E. D. Morgan of New York, declared the party's purpose to be to determine "not whether the South is to rule or the North . . . but whether the broad national policy our fathers established, cherished and maintained is to be permitted

to descend to her sons." Opposition to slavery extension and to polygamy, the imperative necessity of a railroad to the Pacific ocean, and approval of Congressional appropriations for improvement of rivers and harbours, were the platform subjects. Gen. John C. Frémont, of California, and William L. Dayton were the nominees, but were defeated after a vigorous campaign. Many events rapidly consolidated and intensified the anti-slavery movement, and on May 16, 1860, probably the most historic of all Republican national conventions assembled in the "wigwam" at Chicago. It established a majority rule for nominations in contrast to the Democratic two-thirds. Threats of secession were denounced by the platform, which favoured restriction of slavery, opposed re-opening the slave trade, and favoured a protective tariff. Abraham Lincoln was elected president, Hannibal Hamlin vice-president. The story of the Lincoln administration is very largely the story of the Civil War. Preservation of the Union at any cost was Lincoln's policy, and emancipation and other policies were largely incidental. In the midst of war, however, the party found time to establish in 1862 a national currency through a national banking system; to pass a high tariff law and internal revenue acts; and to begin construction of the first transcontinental railway. Despite earlier doubts, due to opposition to the extent of the war and its terrific cost in life, President Lincoln was re-nominated by acclamation and re-elected in 1864, Andrew Johnson, of Tennessee, being selected as vice-president to secure the border States' support. The war was continued to a successful conclusion, but the assassination of Lincoln on April 14, 1865, quickly terminated the celebrations of victory.

Reconstruction.—Johnson's outstanding problems, and those of the two following administrations, had to do with the so-called "reconstruction" of the seceded States. A marked difference of opinion as to the treatment to be accorded these States developed. Johnson's policy was not rigorous to the extent demanded by powerful Congressional leaders. The result was a contest between the Executive and Congress, culminating in Johnson's impeachment and acquittal by one vote. Before he went out of office, Congress submitted the 14th and 15th amendments.

"Let us have peace" was the slogan under which Gen. Ulysses S. Grant was elected president in 1868, with Schuyler Colfax of Indiana as vice-president. The problems of reconstruction, enactment of bills designed to enforce provisions of the 14th amendment and paving the way for a national civil service, together with the Senate's refusal to ratify a treaty to annex Santo Domingo, were outstanding features of Grant's administration. In 1872, certain Republicans opposed Grant's re-election, and a liberal Republican party nominated Horace Greeley to run against him. The Democratic national convention endorsed Greeley, but only six States were carried by the fusion ticket. Despite two troublesome years, with panic and scandal, there was much of credit in constructive achievement and the U.S. foreign policies won especial respect abroad. In 1874, President Grant vetoed an inflation bill and a year later approved the resumption of specie payments. Economy and lower taxes were emphasized.

Making capital out of scandals and with the slogan, "Turn the rascals out," the Democratic party won the House in 1874 and almost won the presidential election of 1876. Rutherford B. Hayes, of Ohio, Republican nominee for president, won after an electoral commission, especially created, had decided one of the most bitter political contests. William A. Wheeler, of New York, became vice-president. President Hayes completed "reconstruction" in the South by withdrawing Federal troops, a policy which brought him Northern criticism because immediately after the troops were withdrawn Democratic leaders in Southern States inaugurated the policy of negro disfranchisement. Specie payments were resumed. Chinese immigration was restricted.

Domestic Questions.—James A. Garfield, of Ohio, was elected president in 1880, and upon his assassination in 1881, Chester A. Arthur, of New York, succeeded. A further extension of civil service laws, establishment of the Department of Labour, two-cent first class postage rates, the beginnings of a new navy and steps looking toward an inter-oceanic canal were brought about. The campaign of 1884 was most bitter in personal recriminations, both nominees, James G. Blaine, Republican, and Grover Cleveland, Democratic, suffering unparalleled attacks. Certain Republican elements refused to support Blaine, and at the end, one famous sentence, "Rum, Romanism and Rebellion," lost for him the State of New York by 1,149 votes and so lost the electoral college. In 1888, Benjamin Harrison, of Indiana, defeated Cleveland, and Levi P. Morton, of New York, became vice-president. The tariff was a chief issue, but enactment of a higher rate bill, known as the McKinley Act, was delayed until just before the election of 1890. As a result, the country did not have time to correctly appraise its effects and an overwhelming Republican defeat followed. The Harrison administration was noted for enactment of the Sherman anti-trust laws, additional coinage of silver, admission of several new States, among them Wyoming with the first provision for woman suffrage, and the famous Reed enforcement of new rules in the House designed to prevent minority obstruction. Personal dislike of the president by certain prominent leaders was a large factor in bringing about Harrison's defeat for re-election in 1892, when Cleveland was returned to office with his party in control of both Houses of Congress for the first time since the Civil War. A drastically lower tariff bill was enacted; one of the worst panics and unemployment periods in U.S. history occurred. This made the tariff a major issue for the campaign of 1896, but as this battle approached, much greater prominence was given the question of the coinage of silver in relation to gold. William McKinley, of Ohio, was nominated by the Republicans on a gold standard platform, with Garrett A. Hobart, of New Jersey, vice-president. William Jennings Bryan, of Nebraska, won the Democratic nomination and stood upon the issue of the free coinage of silver at the ratio of sixteen to one. McKinley won. Soon after he took office, enactment of higher protective rates in the Dingley bill was followed by a tremendous revival of business and general prosperity.

Expansion Abroad.—The outstanding event of the McKinley administration, however, was the war with Spain over Cuban liberation. Resulting from this, the United States acquired the Philippines, Porto Rico, Guam and other possessions; Hawaii was annexed. The policy of continental isolation necessarily came to an end with this expansion, and citizens of the United States began to take an interest in problems abroad. With McKinley's assassination, after his re-election, Theodore Roosevelt, of New York, became president, and he was also the successful candidate in 1904. One of the most popular and vigorous men ever in the presidency, Roosevelt's administration was characterized by the policies: strong emphasis on conservation of national resources; beginning of the Panama canal; enactment of pure food and meat inspection legislation; legislation enlarging the functions of the interstate commerce commission so it could regulate railway rates against discriminatory practices; settlement of the anthracite coal strike; intervention to bring peace in the Russian-Japanese war; creation of a monetary commission; sending the American fleet around the world. Seldom has a president or an administration had a hand in so many issues that appealed so generally to the people.

William Howard Taft, of Ohio, was elected president in 1908, and James S. Sherman, of New York, vice-president. A new tariff law failed to appeal to the people as making good party pledges for lower rates, and a Democratic House was elected in 1910. The House was the scene of a so-called war against Cannonism, with modified powers for the speaker resulting. The 16th amendment to the Constitution, making possible a national income tax law, was submitted, and the parcel post system established. A division of the party came between the followers of Roosevelt and Taft in 1912, and the formation of the Progressive party with Roosevelt as leader brought about the election of Woodrow Wilson, Democratic candidate for president in 1912. His party won control of both houses of Congress and retained it for four years for the first time since 1860. A lower tariff bill

was enacted and new banking laws creating the Federal Reserve system.

The World War.—The World War occupied the attention of the world 1914 to 1918. The rallying cry, "he kept us out of war" proved sufficient to re-elect Wilson in 1916, but soon thereafter it was apparent that this campaign slogan was not prophetic, as the people had believed. The Republicans, while losing the presidency in 1916, won the House, but when President Wilson asked for the participation of the United States in the war in 1917, Republicans vied with Democrats in support of the war programme. An appeal by the President for a Democratic Congress in 1918 startled and angered the country, resulting in Republican control of both Houses by large majorities in the 66th Congress. The President did not appear to regard this as a rebuke of his personal leadership but went abroad and participated in the treaty negotiations at Versailles, his influence incorporating in the treaty provisions for a League of Nations. The Covenant of the League was considered by numerous leaders, some Republicans, some Democrats, as failing to protect American interests, but proposed clarifying reservations were refused by President Wilson. A long fight resulted, and the issue was projected into the campaign of 1920. The result was a great Republican victory, electing Warren G. Harding, of Ohio, president, and Calvin Coolidge, of Massachusetts, vice-president.

President Harding's administration made a separate treaty of peace with Germany and Austria, summoned a naval arms conference resulting in an international agreement limiting naval construction, made vast reductions in government personnel, established the budget system, and placed strong emphasis on the utmost national economy. Loans were made to relieve farm depression. A debt commission was appointed to adjust World War loans to foreign nations. Higher tariff legislation was enacted. President Harding made the first visit to Alaska ever made by an American president in Aug. 1923, but died very suddenly on his return. Calvin Coolidge succeeded him, and in 1924 was nominated and elected, with Charles G. Dawes, of Illinois, as vice-president. This administration was especially noted for its insistence upon rigid economy and payment of the national debt. There was widespread business development, which had been fostered and encouraged by the administration's policy. The president's proposal for adherence to the World Court was approved, but the United States has not become a member, as reservations insisted upon by Congress have not been accepted by the Court. The party was the victim of unfortunate scandals, in connection with what are known as the Tea Pot Dome oil leases, carried out by Albert B. Fall, secretary of the interior under President Harding. President Coolidge enjoyed the widespread confidence of his countrymen, but when urged to run for re-election in 1928, he announced that he "did not choose to run for President in 1928." When efforts to "draft Coolidge" failed there was a widespread movement toward Herbert Hoover, secretary of Commerce in the Coolidge administration, a movement which the president approved of although he made no actual pronouncement to that effect previous to the meeting of the Republican Convention. Hoover was nominated and carried the party to victory by an electoral majority unprecedented in Republican history. For the first time since the Civil War, Virginia, North Carolina, Florida and Texas, of the hitherto solidly Democratic South, were found in the Republican column. Hoover entered office on March 4, 1929.

BIBLIOGRAPHY.—James G. Blaine, *Twenty Years of Congress* (1886); John Sherman, *Recollections of Forty Years in the House, Senate and Cabinet* (1895); Francis Curtis, *The Republican Party* (1904); John Hay, *Fifty Years of the Republican Party* (1907); Henry Luther Stoddard, *As I Knew Them* (1927); Harold R. Bruce, *American Parties and Politics* (1927); William Starr Myers, *The Republican Party, A History* (1928). (F. B. W.; X.)

REQUEST, LETTERS OF. The legal terms "letters rogatory," or "of request" (*commission rogatoire*), express a request made by one judge for the assistance of another in serving a citation, taking the deposition of a witness, executing a judgment, or the doing of any other judicial act. The only trace of such a practice to be found in England or the United States, independent of statutory enactment, is in the admiralty doctrine that the sentence of a foreign court of admiralty may be executed on letters of request from the foreign judge or on a libel by a party for its execution. *See* the authorities collected by Sir R. Phillimore in *The City of Mecca*, 5 P.D. 28. The British and United States courts issue commissions to private persons, generally, however, to consular officers, but sometimes to foreign judges in their private capacities, for the purpose of taking the depositions of witnesses. Many countries object to this process and require letters of request, which have to be forwarded through diplomatic channels (see *Rules of the Supreme Court*, O.37). In ecclesiastical law, letters of request are issued for the purpose of sending causes from one court to another. Letters of request are also issued for other purposes: to examine witnesses who are out of the jurisdiction, to enforce a monition, etc.

REQUESTS, COURT OF, originally a committee of the king's council in England. Petitions of poor persons were heard by the justices in eyre and on the fall of the eyre were referred by the council to the chancery. By an Order in Council of 1390 these petitions were transferred to a committee of the council and the lord privy seal became its president. At first the court followed the king, but about 1516 Wolsey assigned to it a permanent seat in Whitehall, when it became known as the court of Whitehall or the court of poor men's causes. Lastly, it obtained its official title of the court of requests. The judges were at first those privy councillors who happened to be present, together with judges and masters as assessors. Eventually four privy councillors, known as masters of requests, were appointed at fixed salaries.

See I. S. Leadam, *Select Cases in the Court of Requests* (Selden Society, 1898).

REQUISITION OF SHIPPING: *see* SHIPPING, MINISTRY OF; SHIPPING CONTROL COMMITTEE.

REREDOS (rēr'dŏs), an ornamental screen of stone or wood built up, or forming a facing to the wall behind an altar in a church. Reredoses are frequently decorated with representations of the Passion, niches containing statues of saints, and the like. In small churches the reredos is usually replaced by a hanging or parament behind the altar, known as a dossal or dorsal. (*See* also ALTAR.) The use of the word reredos for the iron or brick back of an open fire-place is obsolescent.

RESACA DE LA PALMA, a battlefield of the War between Mexico and the United States (1846–48), about 4 m. N. of Brownsville, Texas. On the morning of May 9, 1846, the day after the battle of Palo Alto, which had been indecisive, the United States' troops under Brig. Gen. Zachary Taylor, ready to renew the conflict, were surprised to see the column under the Mexican Gen. Arista disappearing through the *chaparral* toward Matamoras. Unable to pursue with more than a few hundred men, because he must first put his wagon train in a state of defence, Taylor was slow in following his adversary. The latter had entered a dense growth that continued interruptedly to the Rio Grande, 7 m. to the south.

After having marched about half-way through the thickets, Arista disposed his command behind an old river channel which crossed the road at right angles. The bed (Resaca de Guerrero) was full of ponds and mud, impassable in many places. The Americans, about 1,700, came upon the Mexican guns planted in the road and almost immediately thereafter there was a collision. The dense growth of mesquite and cactus made it impossible for companies to see each other and it was difficult for Taylor's artillery to operate. His soldiers, losing touch with one another, floundered and hacked their way toward their enemy. Although there was little direction or plan to the encounter, the discipline and training of his subordinates kept them pressing forward. The vigour of the U.S. troops in their assault dismayed the Mexicans. When one of Arista's flanks was accidentally turned, a panic seized his whole force. It is estimated that about 4,000 out of some 5,000 succeeded in reaching the river where many were drowned in crossing. The American loss was comparatively small.

BIBLIOGRAPHY.—J. H. Smith, *The War with Mexico*, vol. i. (1919); G. B. McClellan, *The Mexican War Diary* (1917); C. M. Wilcox, *History of the Mexican War* (1892); W. A. Ganoe, *The History of the United States Army* (1924); Original Correspondence and Reports in

Old Files Section, Adjutant General's Office (Washington, D.C.).
(W. A. G.)

RESCHEN SCHEIDECK. This Alpine pass is in a way the pendant of the Brenner Pass, but leads from the lower Engadine to the upper valley of the Adige. Near the summit (4,902 ft.) is the hamlet of Reschen, while some way below is the former hospice of St. Valentin auf der Haid, mentioned as early as 1140. Starting from Landeck, the motor road runs up the Inn valley to Pfunds, whence it mounts above the gorge of Finstermünz to the village of Nauders (27¼ m.) joining the road from the Swiss Engadine (53½ m. from St. Moritz). Thence it mounts gently to the pass, and then descends, with the Adige, to Mals (15½ m.), whence the pass is sometimes wrongly named Malserheide. The road now descends the upper Adige valley, or Vintschgau, past Meran (37¼ m.) to Botzen (20 m. from Meran) where the Brenner route is joined.

RESEARCH, INDUSTRIAL. Industrial research aims at applying to industry the truths wrested from nature by workers in science. In 1893 Sir W. Anderson wrote "The days are past when an engineer can acquit himself respectably by the aid of mother wit alone or of those constructive instincts which in the past led our predecessors to such brilliant results." Each year makes the truth of his words more manifest; industrial research is one important stone in the foundation of our modern civilization.

But appreciation of this truth has been slow of growth, at any rate in England. In Germany during the later years of the 19th century the Reichsanstalt and the Materials Prüfungs Amt were founded, and their work, along with investigations at technical institutes, had no small effect on German industry. The beginning of the 20th century saw the establishment of the National Physical Laboratory in Great Britain, followed almost immediately by that of the Bureau of Standards at Washington, while in Paris there was the Laboratoire Central d'Électricité and much renewed activity at the Laboratoire d'Essais in the Conservatoire des Arts et Métiers. But it needed the shock given by the World War before the truth of Sir W. Anderson's words was fully grasped.

Industrial research does not necessarily differ from so-called pure research in its methods; it is the object with which the investigation is made that constitutes the difference; and of course much work is necessary before the laboratory discovery, or the brilliant intuition of the inventor, verified by striking experiments, can be translated into the practice.

Mendel's Work.—It was the desire for knowledge, pure and simple, that led the Abbé Mendel in his monastery at Brünn to unravel some of the laws of heredity (*q.v.*) by crossing various kinds of peas. When, at an agricultural institute, the laws that he discovered and the methods he employed are utilized to improve the breed of cattle or to produce new and more valuable forms of wheat, the research has become industrial.

The Structure of Matter.—At present physicists in many countries are investigating the properties of matter by X-ray analysis, determining the forms of lattice in which the atoms which constitute the substance are arranged and endeavouring to draw conclusions applicable to all matter; this is a great work of pure research. The metallurgist employed in some works or industrial research laboratory seeks to use the results of the physicist and the methods which have been devised to enable him to learn, for example, why steel is hardened by quenching, what is the cause of the deleterious effect of phosphorus on copper, or why cast metal which is brittle can be made soft and ductile by heat treatment and mechanical work. This is industrial research. Such a worker must carry his investigations further in order that they may be of use to industry. In his laboratory some method devised for making and treating a new and valuable alloy works perfectly or some instrument designed to register the course of a factory process appears foolproof and without a fault; in the factory the alloy cannot be worked or the instrument fails under the first real test; it is his business to find out why; to make the advances of science—advances due in part to his own researches—available for industrial purposes.

Here a distinction should be drawn between the research laboratory of a works and the works laboratory; where both exist there may well be close co-operation, and possibly joint control, but the spheres are distinct. In any modern factory a works laboratory of some sort is essential, to check the purity of the materials employed and to ensure that the product is up to standard; an engineering works will have its chemical laboratory for this and similar purposes, its testing laboratory where the strength and character of its manufactures are sampled before they are put upon the market; but such work is not research; though it often may indicate where research is necessary, and lead up to original investigations of high value to the firm.

The works manager knows that for success the temperature at some point in a complicated process must be kept within narrow limits, whereas during other operations large variations of temperature have little effect. Samples which fail come to the works laboratory for examination, and inquiry shows that the temperature limits at this critical stage have been exceeded. Such an occurrence naturally leads a competent chemist to inquire what is the nature of the action which takes place at this critical temperature; how does the product produced, when the temperature limits are over-stepped, differ from the proper article? This inquiry may lead to a long and intricate investigation with results of the utmost importance to the firm. It may be found, for example, that a slight change in the composition of the material will render the close limits unnecessary and will reduce greatly the care and attention required for the manufacture. The problem has become one for industrial research, not merely for routine testing, and the consequences of that research have proved to be simplification of manufacture and cheapening of the product.

In Great Britain nearly 50,000,000 people must be supplied with food, mostly brought from beyond the seas, and this food must be paid for with the products of industry at home, by the goods manufactured in great part from materials purchased from abroad but dependent on the coal and iron of English mines and by the knowledge and skill of English manufacturers. It is of the utmost importance that the high quality of those goods should be maintained, the methods of their manufacture improved and the costs of production reduced. In the words of a recent report: "Scientific and industrial research is an essential factor in the national effort on which the continued maintenance of our present population unquestionably depends." And these words, though used here for England, apply to the other nations of the world as well.

And now we come to consider the means taken to promote industrial research and its present position and work in various lands.

These means are various; the state in a number of instances has organized research laboratories devoted mainly to industrial problems; large private firms have established similar laboratories under their own control, while attempts have been made by the formation of research associations to combine the efforts of a number of firms concerned in the same industry. The universities, too, and technical colleges have aided the endeavour by organizing more fully the teaching of science and giving facilities for the training of research workers.

Germany.—It needed a catastrophe to produce the results which have been attained. The Reichsanstalt in Berlin was a direct outcome of the war of 1870. Established in two divisions, the one devoted to pure science, the other to its applications, its founders realised the close interdependence of the two, and while the first division dealt to a large extent in questions bearing on the fundamental units and standards of measurement whether in heat, electricity, light or any other branch of physics, the second division was concerned mostly in the application of the principles which resulted from these investigations to the advancement of German industry and manufacture.

At the same time technical colleges were established in a number of centres; of these, perhaps the colleges at Charlottenburg and Darmstadt were the most important, and from their professors and students came a stream of scientific facts and discoveries, many of great value to industry, which were eagerly seized upon and assimilated by men at the head of great industrial concerns who had realised that science was the foundation of their success.

In their own factories these men were no less active and far-

seeing. Charlottenburg and the Materials Prüfungs Amt at Gross Lichterfelde which developed from it taught the engineer and the metallurgist the value of research. Its professors devised delicate instruments for use in investigating the properties of materials; the Martens Extensometer is an example. Sorby, of Sheffield, in 1864 was the first to investigate the structure of metals and alloys by the aid of the microscope, but his work was not pursued until, at a later date, Osmond in France and Martens in Germany took up the study independently and showed its importance to the industrialist.

In electrical science, also, the work of the Reichsanstalt had a marked effect and the great electrical firms—the Allgemeine Electricitäts Gesellschaft, Siemens and Halske and others—established research laboratories to develop for their own purposes and private benefit the results of scientific investigations.

Nor should the great chemical firms be forgotten. Perkin, in England, was the founder of the modern dye industry, but it was in Germany that this teaching first bore practical results. The Badische Anilin Fabric and other similar works were founded and huge sums were spent in developing new methods and inventing new dyes. Artificial indigo took the place of the natural product, with the inevitable result to the Indian industry. Germany had learned the lesson, and industrial research promised, unless other countries woke up, to give her the leading position among the manufacturing nations of the world.

Great Britain.—In England, until towards the end of the 19th century, the danger was hardly appreciated. At meetings of the British Association and elsewhere Sir O. Lodge and others had pointed out the value of the Reichsanstalt to Germany, the need that England should have a similar institution. In 1900 the National Physical Laboratory began in a small way—the expenditure during the first year was £5,479—in the old buildings of the Kew Observatory at Richmond. In 1901 the work was transferred to Bushy House, Teddington, with a staff of eight scientific assistants and six attendants in addition to the director. The scientific character of its work was secured by placing the ultimate control in the hands of the Royal Society, while a close connection with industry was maintained by having representatives of the great engineering societies on its governing body. The laboratory, at the time the only public institution in the country devoted to the application of science to industry—to industrial research—grew slowly and prospered for the next 12 or 14 years, and when the World War came, it was in a position to be of material service to the country.

About the same time, the British Engineering Standards Committee was founded, chiefly at the instance of Sir John Wolfe Barry, who had realised the loss caused by the infinite number of standards used by engineers and the advantages to be gained by a system based on accurate measurement and a careful investigation of the properties of the materials employed in constructures. In this work the National Physical Laboratory co-operated very fully. Meanwhile at an earlier date industrial research of importance had gone on in a few laboratories attached to firms in Sheffield and elsewhere. The work of Sorby on the micrographic structure of metals has already been referred to and at a later date Roberts Austen of the Mint utilized this method of inquiry in his investigation of a broken rail which had led to a serious accident on the Great Northern Railway. Manganese steel was produced from the laboratory of Sir Robert Hadfield in 1882 as an outcome of a scientific inquiry into the properties of alloys; many results of high value have since come from the same source.

France.—In France, work of value was being done in various places; the Laboratoire d'Essais and the Laboratoire Central d'Électricité both contributed. The metallurgical work of Osmond and Le Chatellier was of marked importance, while the discovery of the special properties of Invar—an alloy of nickel steel—by Gulleaume has proved of value in many industries.

International Standards.—One of the marked consequences of industrial research has been the realisation of the importance of international standards of measurement, and as a result international co-operation between the standardizing laboratories in various countries and other bodies concerned with standards has become necessary. From this need arose the Bureau International des Poids et Mesures at Sèvres and various international associations such as the International Electrotechnical Association or the Association for Testing Material. In 1908 the British Government summoned an International Congress in London at which the system of electrical units, now universal throughout the world, was adopted.

War Problems.—This is not the place to give any account of the influence of science on war; experience showed it to be vital and the phrase that Science won the War, interpreted to mean that without science the War would have been lost, only expresses the truth. In the Allied countries on both sides of the Atlantic, men and women were at work solving problems of vital importance. Facilities for research were open to them, funds undreamed of in peace time were at their disposal, and the results of their endeavours contributed to a more general acceptance of the view that in peace time industry would benefit in the same way from scientific inquiries wisely guided and pursued.

Department of Scientific and Industrial Research.—And so, in Great Britain as elsewhere, a movement was started to organize in some more definite way the connection between science and industry. The establishment of the Department of Scientific and Industrial Research was the outcome of this movement. This was announced by Lord Crewe, Lord President of the Council, at the end of 1916 in reply to a deputation from the Joint Board of Scientific Societies headed by Sir Joseph J. Thomson, P.R.S. An advisory council of scientific men was established and the sum of £1,000,000 was placed at the disposal of the department to be used in the application of science to industry.

The financial responsibility for the National Physical Laboratory, with a staff which before the end of the War had grown to 600, was transferred to the department; boards were set up for fuel research, food investigation, building research and various other subjects, while a number of co-ordinating bodies were established to deal with researches of importance to Government departments, especially those bearing on industry. These researches are carried on either in special laboratories or at one or other of the national laboratories; the Geological Survey and Museum became one of the activities of the new department, which thus undertook the task of guiding and supervising the various official agencies for making the advances of science of service to national progress. The department also aids the work of the Aeronautical Research Committee which—at first as the advisory committee for aeronautics—has contributed in no small degree to the science of aviation.

Co-operative Research.—But the department has done more than this. In Germany and America many of the great industrial firms have their own research laboratories; reference has already been made to some of the results on German industry. But research laboratories are costly; in many industries in England the firms concerned are small, a private research laboratory is too expensive to be contemplated, besides a number would produce wasteful overlapping. Hence the attempt was made to introduce a system of co-operative research. In an effort to lead manufacturers to rely more on scientific results, research associations have been set up. Each of these consists of a body of men engaged in the same industry who associate themselves for the purposes of research bearing on their industry. Each association has its own director of research, or similar official, under whose guidance the work planned by its council is carried on either in their private laboratory or by arrangement at the National Physical Laboratory or in the laboratories of some university or technical college.

The work is financed in part by the associated firms, in part from the million fund, usually on a pound to pound basis guaranteed under certain conditions for five years and with a limit of £5,000 a year to its amount. In 1927 there were 24 such associations in existence; the balance in the million fund is now £352,292; a substantial part of this is required to complete the payments already promised. In a number of cases the first five years for which the grant was made have elapsed and the department, with a view to determining its future course, has arranged for a report from some independent body on the work and progress in each

case. In a recent report to the committee of the Privy Council responsible for the work of the department, the advisory council writes of the associations:

"We have no doubt that they have already produced results of financial value far greater than their whole expenditure and have been instrumental in introducing scientific methods and encouraging scientific spirit in industry."

It is clear from the general tenor of these reports that 5 years is insufficiently long even under the most favourable conditions to set a research association on its feet and make it independent of government assistance. To devise a programme, collect an efficient staff and obtain results all take time. Besides, there is much educational work to be done; half-hearted supporters need to be converted by results before they will contribute freely; trade rivalries tend to prevent complete co-operation; trade has been bad and returns barely sufficient to keep old ventures going; there has been little to spare towards an expenditure of whose value the manufacturer is only half convinced. And so the department has now under consideration the steps that can be taken to maintain the work for some years to come and, in the case of some important associations, has already settled the terms of future grants (*see* report of the Department for 1925–6).

Training of Workers.—But there are other ways in which official support is being given to industrial research, and among these the schemes for training research workers is most important. Under this scheme young graduates are assisted to carry out researches under the guidance of some competent professor, while, in a number of cases, funds have been granted to prominent workers to enable them to pursue inquiries of importance.

The royal commission for the exhibition of 1851 administers for the advancement of education and research funds arising from the balance left when the exhibition closed. For many years past its scholarships and studentships have been of great value. The commission has inaugurated a number of Industrial bursaries given on the recommendations of the universities and technical schools to men trained in science who were prepared to enter, as apprentices or students, engineering or other works. In this way, a stream of trained workers in science is provided for industry.

Private Research Laboratories.—Before concluding, reference should be made again to the research laboratories of prominent firms; in England, the laboratory of the General Electric Co. at Wembley occupies a leading place; but it is to Germany and America that we turn for striking examples of what a works research laboratory can do (*see* below). (R. T. GL.)

THE UNITED STATES

The history of American technology reveals plainly that within the past four or five decades, and mostly within the last 25 years, manufacturing practice has progressed vastly more than in any previous era. In all the important branches of industry empiricism has been supplanted by industrial research. It was estimated in 1927 that there were at least 16,000 scientists and engineers engaged in research on behalf of the industries of the United States. Assuming this figure to be approximately correct, as it undoubtedly is, over $100,000,000, probably $110,000,000, is being expended annually in supporting industrial research. About half of this amount is spent on chemical laboratory investigations, most of which are conducted by companies in their own plant laboratories.

Industrial Research by Companies.—The largest research establishment in the United States is the Bell Telephone Laboratories, Inc., in New York City, which employs about 2,000 physicists, chemists and engineers for original investigation and development of new forms and improvement of existing forms of apparatus and equipment for electrical communication. Next in collective size are the five laboratories and the main-office chemical organizations of E. I. du Pont de Nemours and Co., Wilmington, Del., wherein over 850 chemists and engineers are studying problems of the heavy chemical, paint, lacquer, solvent, dye, rubber and explosive industries. Other great laboratories are operated by the International Harvester Company of America, Chicago, Ill.; the General Electric Co., Schenectady, N.Y., Lynn and Pittsfield, Mass., and Cleveland, O.; the Goodyear Tire and Rubber Co., Akron, O.; the General Motors Corporation, Detroit, Mich.; Thomas A. Edison, Orange, N.J.; the B. F. Goodrich Co., Akron, O.; the Westinghouse Lamp Co., Bloomfield, N.J.; the New York Edison Co., New York city; the United States Rubber Co., New York city and Detroit, Mich.; the Eastman Kodak Co., Rochester, N.Y.; and the National Carbon Co., Inc., Cleveland, O.

In the last 20 years numerous companies have taken advantage of the *industrial fellowship system* of Mellon Institute of Industrial Research (*q.v.*) as a means of solving problems in manufacturing practice. In 1928, 53 fellowships were being sustained by as many different companies, largely chemical manufacturers, while 12 more fellowships were being supported by trade associations.

About 70 individual companies in the field of chemical industry are making research grants to educational institutions. Chief among them in 1928 are E. I. du Pont de Nemours and Co., supporting 20 fellowships, and the Grasselli Chemical Co., which sustains five university researches. The American Petroleum Institute is administering a research contribution of $100,000 annually for five years from John D. Rockefeller and the Universal Oil Products Co. The fund is distributed among selected institutions to support investigations of basic problems in petroleum technology.

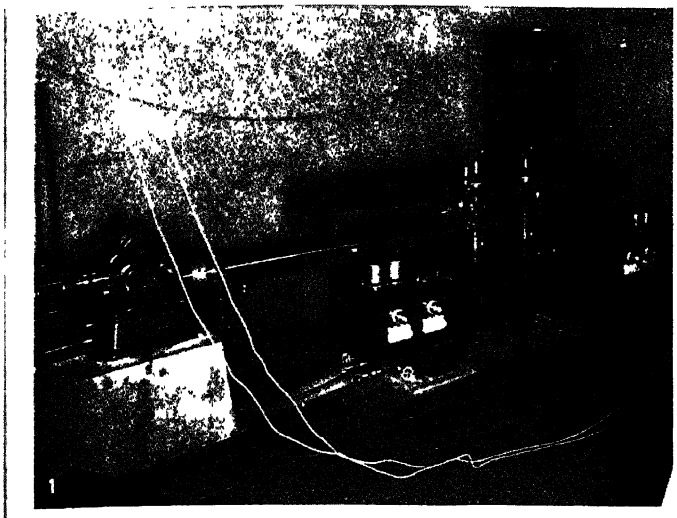
There are at least 190 college laboratories that are used not only for purposes of instruction, but also to a considerable extent for industrial research work and for commercial testing.

A considerable number of companies, mostly small concerns that have no laboratories of their own, or larger companies that encounter few problems or are engaging in research for the first time, are regular or occasional clients of consulting laboratories. There are about 300 of these commercial laboratories in the country, and some of them are strongly staffed and excellently equipped for scientific investigation, particularly in specific industries. For example, a Western firm of consultants, which has a main laboratory and also three branches in other cities, employs 180 scientists and their assistants for varied research. Another firm operates nine laboratories. Most of these commercial organizations do testing as well as research work.

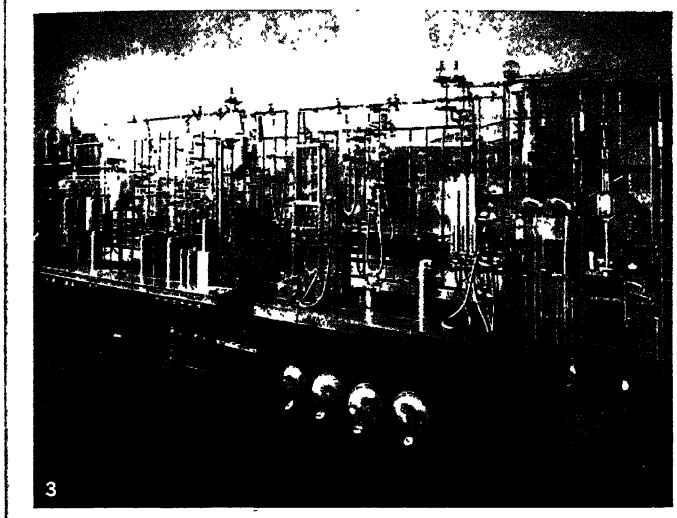
Trade Association Research.—The U.S. Department of Commerce has expressed the opinion that "among constructive activities of trade associations none is more fitting nor more profitable than scientific research." The study of production and distribution problems to evolve more efficient and more economical methods has in fact become a leading association activity. We shall describe here associative industrial or technological research, and not commercial or economic investigations, which, while entirely different in nature, are often related to the former.

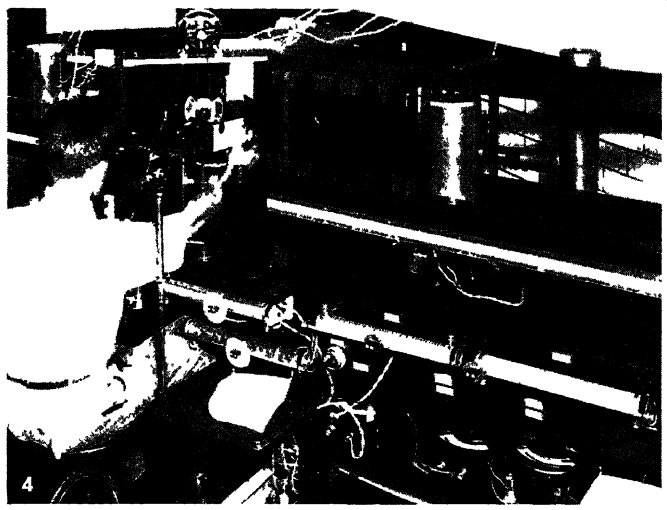
Five different procedures are being applied with success in conducting associative industrial research. (1) A number of associations are co-operating with Government departments and bureaus in accordance with the *research associate plan.* (2) Other associations are sustaining scientific investigations in Mellon Institute of Industrial Research at Pittsburgh, according to the *industrial fellowship system* of this institution. (3) Some associations are supporting fellowships or scholarships in educational institutions. (4) Still other associations are carrying on research in commercial establishments, such as the laboratories of professional consultants. (5) A few associations have founded their own laboratories.

The Research Associate Plan.—For about 35 years the scientific and technical research facilities of various Governmental departments have been available, by legislative enactment, to duly qualified workers (Supp. Rev. Stat., 2, 71–2, 1532; Stat. L., 27, 1010; Bureau of Standards Circular No. 296). This plan has been developed especially in the National Bureau of Standards, where there were in 1928 over 100 research associates employed by 63 associations or specific groups. Each associate is subject to the bureau's regulations and has most of the rights and privileges of the members of the bureau staff. The investigational results are immediately accessible to the industry concerned and are published by the bureau. The bureau's staff of specialists may be consulted by the association and its research worker, and the latter

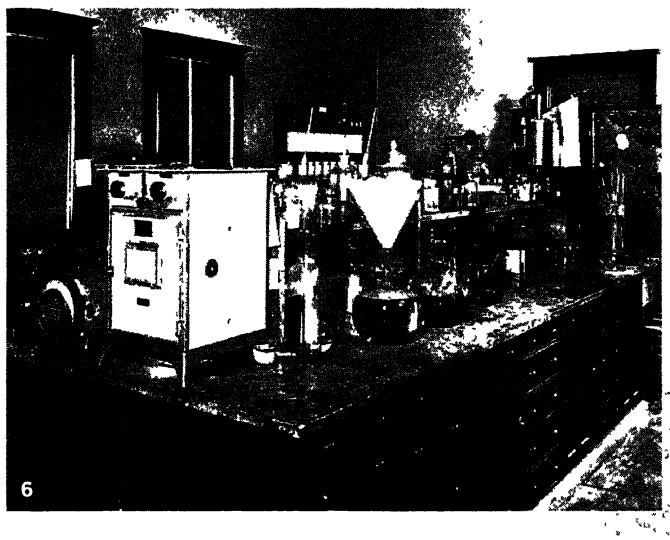










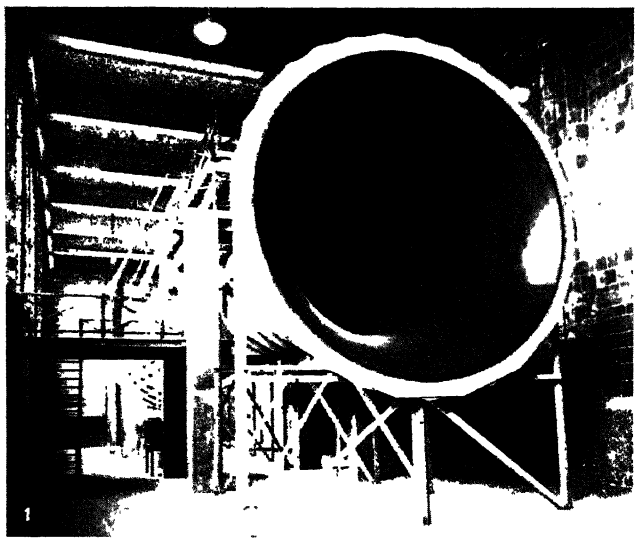


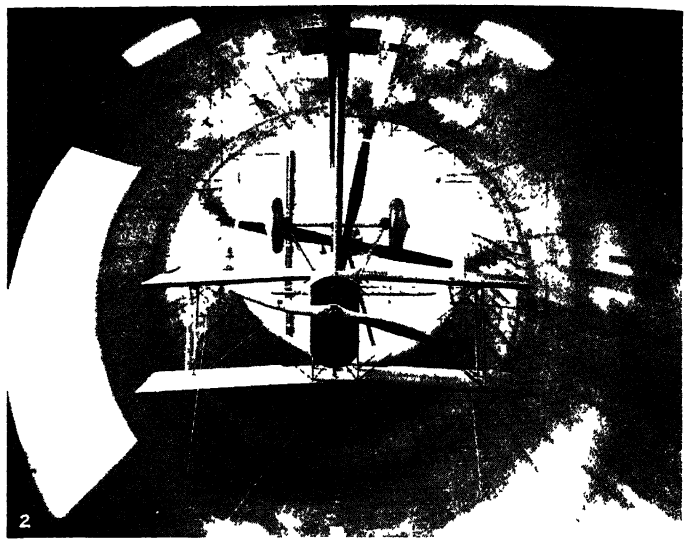
BY COURTESY OF THE U.S. DEPARTMENT OF COMMERCE, BUREAU OF STANDARDS, WASHINGTON, D.C.

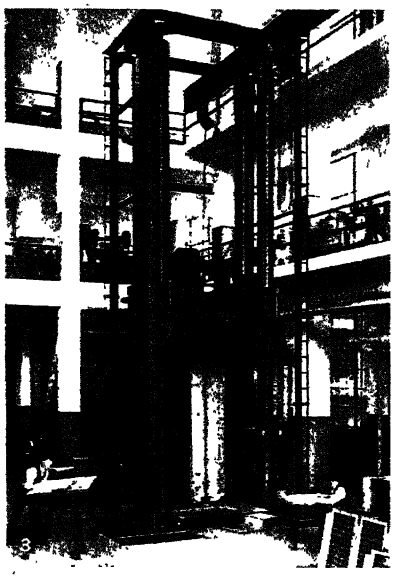
LABORATORIES OF THE BUREAU OF STANDARDS, WASHINGTON, D.C.

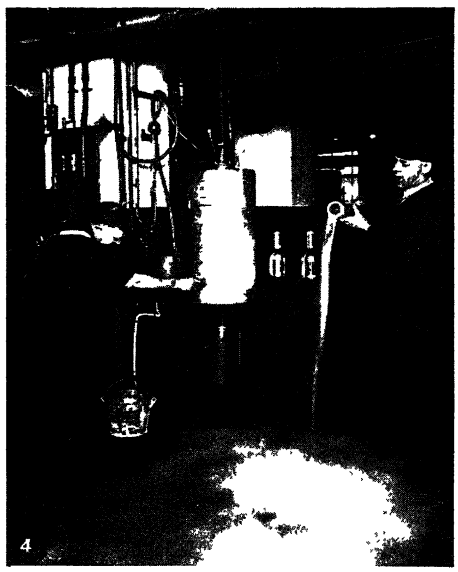
1. Precision longitudinal comparator for measuring line standards of length
2. View of 88-in. integrating sphere used in illumination studies, for measuring mean spherical candlepower
3. An elaborate blown-glass apparatus constructed by the Bureau of Standards for the fractional distillation of gases at low temperature
4. Apparatus for determination of colour in terms of dominant wave length, purity and brightness
5. Capacity and Density Laboratory
6. Analytical sugar laboratory of the polarimetry section

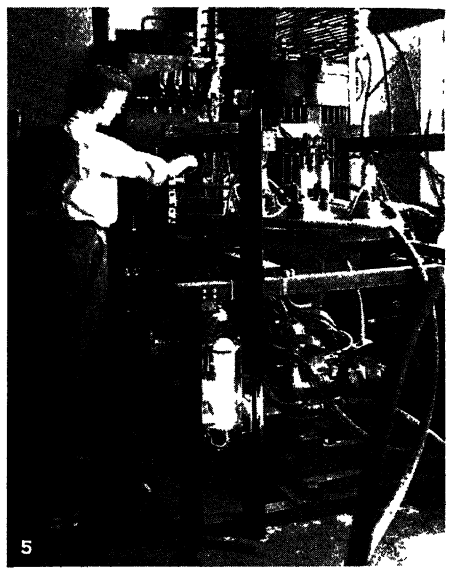
RESEARCH

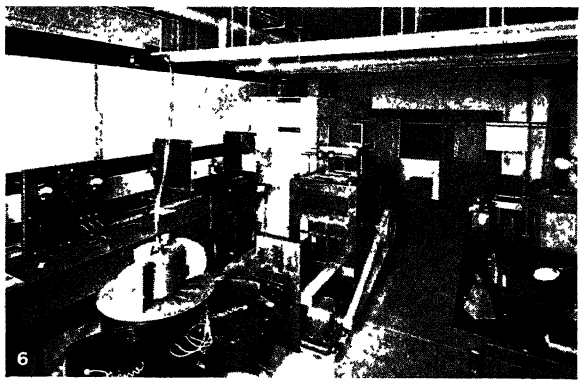


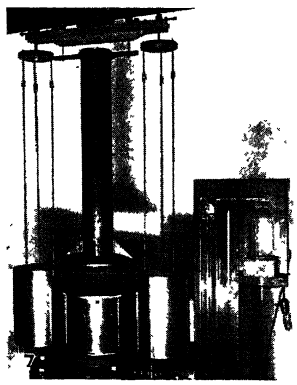


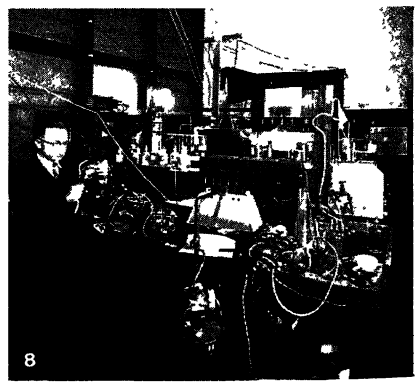












BY COURTESY OF (1, 2, 6, 8) THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY, (4, 5) THE GENERAL ELECTRIC COMPANY (U.S.A.), (3, 7) THE U.S. DEPARTMENT OF COMMERCE

SCENES IN SOME OF THE RESEARCH LABORATORIES OF THE UNITED STATES

1. One of the huge wind tunnels used for aeronautical research at Massachusetts Institute of Technology. The tunnel is 80 ft. long and 7 ft. in diameter at centre sections. Model planes are tested under artificial wind velocities up to 90 m. per hour. 2. Scale model of an airplane underground airport test in one of the big wind tunnels at Massachusetts Institute of Technology. The various wire cables leading up from the models are connected with instruments which register the pressure on various parts of the plane. A 14-ft. propeller at end of tunnel generates the gales in which models are tested. 3. World's largest testing machine, at the Bureau of Standards, Washington, D.C.; capable of exerting a force of 10,000,000 lb. in compression. 4. Liquid air experiments at the General Electric Research Laboratory. The white cloud is due to the condensation and freezing of water vapor and carbon dioxide of the air at the extremely low temperature of the liquid. 5. Experimenting with mercury arc rectifiers, the function of which is to connect alternating current to direct current. 6. An X-ray research laboratory in the Department of Physics at the Massachusetts Institute of Technology. 7. Apparatus used to measure the gravitation constant at the Bureau of Standards. 8. An individual physics research laboratory in the Department of Physics at the Massachusetts Institute of Technology

is also permitted to use the scientific equipment, special laboratories and shops of the institution.

In general, this flexible, closely co-operative plan has been successfully applied. There are in fact several notable instances of economic savings to technology from research in the bureau. It is reported (Department of Commerce, Domestic Commerce Series No. 20, "Trade Association Activities," 1927) that $15,000,000 is being annually saved to industry and the public from the bureau's brake-lining research, that the annual savings from its tire investigations amount to $40,000,000, and that the motor-fuel studies are saving $100,000,000 each year. Research in the bureau also eventuated in the founding of a dextrose industry in the United States. The following are among the outstanding investigations in progress in 1928: portland cement, paper, headlighting, welded rail joints, metal roofing, textiles, elevator safety equipment, gas appliances, gypsum, tile, steam, terra cotta, and fuels.

The Bureau of Chemistry and Soils and the Forest Products Laboratory of the Department of Agriculture and the Bureau of Mines of the Department of Commerce have also advanced technology by researches on behalf of various industries. The Bureau of Mines is conducting various investigations in mining, metallurgy, health and safety, and on the economics of the production, preparation and utilization of minerals. The research laboratory of the American Society of Heating and Ventilating Engineers is located in the Pittsburgh station of this bureau. The American Gas Association and also 28 companies representing the electrical, mining and metallurgical industries are supporting jointly ten research studies in mining and metallurgy at Carnegie Institute of Technology in co-operation with the Bureau of Mines. Certain researches of the Public Health Service of the Department of the Treasury—particularly the investigations of dusty trades, illumination of buildings, and motor fuels—have likewise benefited industry.

The Industrial Fellowship System.—About 23% of the research of Mellon Institute (in 1928) is sustained by associations of manufacturers, according to the institution's industrial fellowship system (*see* MELLON INSTITUTE OF INDUSTRIAL RESEARCH). These association fellowships pertain to hat technology, sewer pipe, garment renovation, insecticides, refractories, laundering, pine products, alcohol denaturation, fur, iodine and stearic acid. The Laundryowners' National Association, constituted of 2,000 members, has been supporting extensive investigation in the institute since 1915. Its fellows have contributed much to the knowledge of the properties of textiles and of the uses and effects of laundry supplies; they have eliminated defects in laundering practise, have worked out washroom procedures that are now standard, and have drawn purchase specifications for soaps, sodas, bleaches, starches and blues. The American Refractories Institute's multiple industrial fellowship has been in continuous operation since 1917. Its incumbents have enriched both refractories technology and metallurgy by their broad studies of the evaluation of refractories for specific purposes and by the improvements that they have made in manufacturing and testing methods.

An association fellowship of this type enables direct research service to a number of industrial concerns instead of to an individual company. Its activities also give rise to stable relations of co-operation among the members of the association by the exchange of technical experience and research results. An association fellowship usually acts as a clearing-house of information for the sustaining organization, and gives technical assistance and scientific advice to the company-members. One of the prominent advantages of association research is that it enables a small manufacturer, who cannot afford to have a research laboratory of his own, to profit from the investigational work in the same way as a larger manufacturer. Association research reduces the cost factor to a minimum and thus promotes the welfare of manufacturers in the field concerned, without respect to size. Moreover, problems may be studied that require more time and expense than should be borne by a single manufacturer or company, in view of the wider application of the results. The correlation of research effort, such as is done in the fellowships supported by associations, prevents unnecessary duplication in scientific inquiries.

Association Fellowships in Educational Institutions.—This class of research has become important in many industrial fields. It serves to train technical specialists as well as to aid in solving production problems. Columbia university, Iowa State college, and the universities of Illinois, Michigan, Wisconsin, Minnesota, Chicago, Cincinnati and Pittsburgh are in the fore of the institutions that are encouraging industrial research by associations and also by individual companies.

Association Owned Laboratories.—Industrial research is not conducted in any set type of laboratory or in accordance with any fixed plan. The nature of the problems, the financial support available and the uses to which the research findings are to be put mainly determine the method. If the problems are extensive and the association members are so appreciative of the value of research that they will contribute to the building and maintenance of a laboratory, it is often advisable for an association to do its own research.

Co-operating Agencies.—The National Research Council serves as a general clearing-house of information regarding research work undertaken throughout the country. Its division of engineering and industrial research endeavours to co-ordinate the scientific resources of the nation as regards engineering and secures the co-operation of engineering agencies in which investigational facilities are available. It works in co-operation with the Engineering Foundation (*q.v.*) and the various national engineering and technical societies. Associations or companies undertaking research may ascertain from the council what work has already been done or is in progress along similar lines, thus avoiding duplication of effort.

The American Engineering Standards Committee, the American Society for Testing Materials and the American Engineering Council are some of the organizations whose effectiveness depends in many cases on the collaboration that they receive from trade associations as well as individual concerns that carry on research.

(W. A. HA.)

RESEDACEAE, in botany, the mignonette family, dicotyledonous plants, mostly xerophytic herbs. There are six genera and about 60 species. *Reseda odorata* is the mignonette (*q.v.*); *R. lutea* is dyer's woad. (*See* WOAD.)

RESENDE, ANDRÉ DE (1498–1573), the father of archaeology in Portugal, began life as a Dominican friar, but about 1540 passed over to the ranks of the secular clergy. He travelled in Spain, France and Belgium, where he corresponded with Erasmus and other learned men. He was also intimate with King John III. and his sons, and acted as tutor to the Infante D. Duarte. In Portuguese he wrote: (1) *Historia da antiguidade da cidade de Evora* (1553); (2) *Vida do Infante D. Duarte* (1789). His chief Latin work is the *De Antiquitatibus Lusitaniae* (Evora, 1593).

See the Life in Farinha's *Collecção das antiguidades de Evora* (1785).

RESENDE, GARCIA DE (1470–1536), Portuguese poet and editor, was born at Evora, and began to serve John II. as a page at the age of ten, becoming his private secretary in 1491. He was present at his death at Alvor on Oct. 25, 1495. He continued to enjoy the same favour with King Manoel, whom he accompanied to Castile in 1498, and from whom he obtained a knighthood of the Order of Christ. In 1514 Resende went to Rome with Tristão da Cunha, as secretary and treasurer of the famous embassy sent by the king to offer the tribute of the East at the feet of Pope Leo X. In 1516 he was given the rank of a nobleman of the royal household, and became *escrivão da fazenda* to Prince John, afterwards King John III., from whom he received further pensions in 1525. Resende built a chapel in the monastery of Espinheiro near Evora, the pantheon of the Alemtejo nobility, where he was buried.

Resende collected the best court verse of the time in the *Cancioneiro Geral,* probably begun in 1483 though not printed until 1516.

The *Cancioneiro* is redeemed from complete insipidity by Resende himself, and his fine verses on the death of D. Ignez de Castro inspired the great episode in the *Lusiads* of Camoens (*q.v.*). Resende is the compiler of a gossiping chronicle of his

patron John II., which, though plagiarized from the chronicle by Ruy de Pina (*q.v.*), has a value of its own. Resende's *Miscellanea,* a rhymed commentary on the most notable events of his time, which is annexed to his *Chronicle,* is a document full of historical interest, and as a poem not without merit.

His *Cancioneiro* appeared in 1516, and was reprinted by Kausler at Stuttgart (3 vols., 1846–52). A new edition was published by the Hispanic Society of America in 1904. The editions of his *Chronicle* are those of 1545, 1554, 1596, 1607, 1622, 1752 and 1798. For a critical study of his work, *see* Antonio de Castilho, *Excerptos, seguidos de uma noticia sobre sua vida e obras, um juizo critico, apreciação de bellezas e defeitos e estudo da lingua* (Paris, 1865). Also Anselmo Braamcamp, *As sepulturas do Espinheiro* (1901) *passim,* especially pp. 67–80, where the salient dates in Resende's life are set out from documents recently discovered; and Dr. Sousa Viterbo, *Diccionario dos Architectos . . . Portuguezes,* ii. 361–74.

RESERVE: *see* ARMY and the sections "Defence" of FRANCE, GERMANY, UNITED STATES and other countries.

RESERVES: *see* BANKING AND CREDIT.

RESERVES, NATURAL: *see* PHYSICAL RESOURCES.

RESERVOIRS. These may be divided into two classes, "impounding reservoirs" and "service reservoirs," the latter being concerned with the distribution of water (*see* WATER SUPPLY).

Impounding Reservoirs.—Owing to the fact that the flow of streams and rivers varies greatly throughout the year, it is necessary to provide works to store water if any substantial use is to be made of the annual discharge. Such works are known as impounding reservoirs, their function being to store water when the stream flow is ample for the purpose of augmenting the natural flow in dry weather.

The urgency for the construction of such reservoirs must have become apparent in very early times in countries where the climatic conditions were such that the streams ran dry for a portion of the year, and records exist of one being made in Ceylon as early as 504 B.C. Anciently reservoirs were formed by an embankment across the valley through which a stream flowed, and were sometimes of vast extent, the Padavil-Colan Tank in Ceylon, for instance, having an embankment 11 m. long and, in parts, 70 ft. high.

Storage.—Having selected a catchment area capable of yielding sufficient water, the capacity of the reservoir has next to be determined. This will depend upon the incidence and intensity of the rainfall and the loss by evaporation and absorption, conditions which vary within wide limits. In countries subject to long periods of drought, the necessary capacity will be greater than in those enjoying a temperate climate, and in India, for instance, where the rain falls only during monsoon periods, two years' storage of the daily quantity may be necessary.

Few records exist of the flow of streams in the British Isles taken over a sufficiently lengthy period to be of service, and recourse has generally to be made to the annual rainfall records, from which the annual discharge of the stream is deduced. Long period rainfall gaugings show that the rainfall of the driest year is about two-thirds, the mean fall of the two driest years about three-quarters, and the rainfall of the three driest consecutive years about four-fifths, of the average annual rainfall. Notwithstanding the wide variation of climatic conditions, these proportions hold fairly well over a large portion of the land surface of the globe (*see* "The Variations of Rainfall," by A. R. Binnie, *Proc. Inst. C.E.,* vol. 109).

As storage increases in relation to the average flow of a stream, the maintainable yield increases in a decreasing ratio until a maximum is reached where there would be little advantage in further increase, and in the British Isles the economic limit is generally taken as that capacity which would be sufficient to equalize the flow of the three driest consecutive years.

The average annual rainfall of the three driest consecutive years, being approximately four-fifths of the average annual rainfall; and the average annual loss by evaporation and absorption being about 14 inches; the average annual discharge of the stream during the three driest consecutive years would be that due to $\frac{4}{5}$ average rainfall—14 inches running off the catchment area, which may be denoted by f. The formula known, from its author, as the Hawksley Formula gives the number of days storage which should be provided to maintain this flow $=\frac{1000}{\sqrt{f}}$. In many cases it is not necessary to provide so large a storage, as some quantity may be required which is less than the average flow of the stream during the three driest consecutive years.

Fig. 1 gives the relation between the maintainable yield and the capacity to be provided for catchment areas in the British

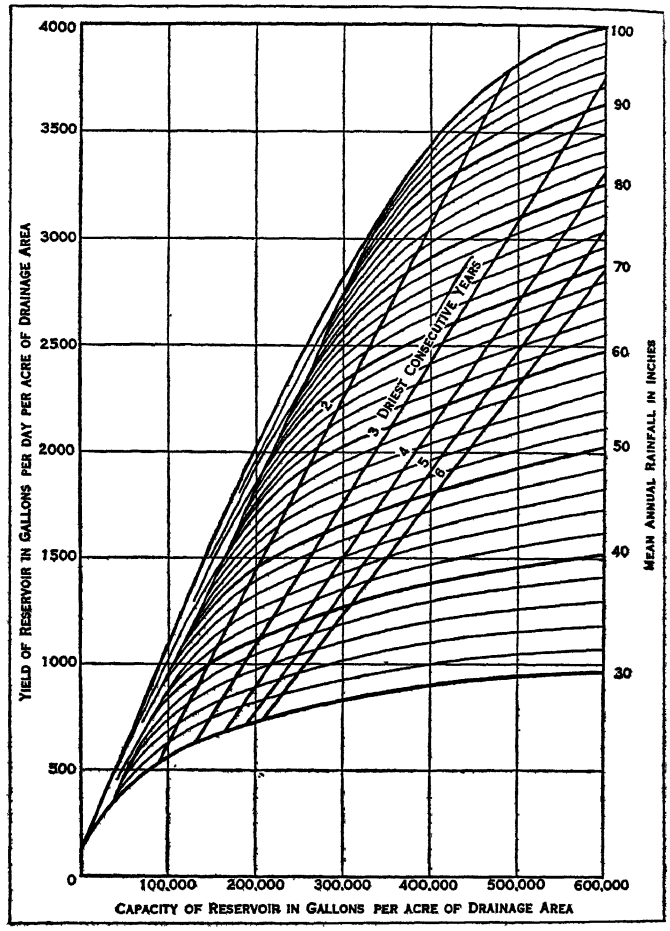


FIG. 1

Isles having a mean annual rainfall varying from 100 to 30 in., and is due to the investigations of Dr. G. F. Deacon. The capacity of the reservoir in gal. per ac. of catchment area is shown on the base line, and the yield of the reservoir in gal. per ac. per diem is given by the length of the vertical line between that capacity and the curve of average rainfall, the yield in gal. per ac. per diem being read from the vertical scale at the left-hand side. The storage required for any particular average rainfall to balance the average stream discharge during different series of consecutive dry years, is given by the diagonal lines which intersect the curve of rainfall on the diagram.

The diagram gives the capacity above the lowest draw-off level of the reservoir, and as it is undesirable to abstract muddy water for supply, this level should be well above the bottom of the reservoir. The loss by evaporation from a water surface is greater than the loss on the catchment area, and in the British Isles the depth of the reservoir should be about 6 in. more than would be required to give the gross storage, whereas in tropical countries the allowance may be as much as 6 ft.

TYPES OF DAMS

Dams may be divided into two classes, masonry or embankments; and the selection of the particular type will depend upon the nature of the materials on which they will rest, and which are available for construction.

Where good sound rock exists at no great depth from the surface, a masonry dam is to be preferred, but where the rock can

only be reached at a considerable depth, the cost is prohibitive.

Masonry Dams.—Masonry dams should be arched in plan concave to the water face where the length of the dam is not too great, as such a form adds to the stability, and the pressure of the water tends to close temperature or contraction cracks at right angles to the axis of the dam. It is desirable to slope the foundations towards the water face, especially where the depth below the surface is moderate, as this reduces the tendency to slide on the foundations and the possibility of overturning due to the uplifting pressure of water penetrating between the masonry and the rock. The design should avoid the development of tension in the masonry, tending to rupture the dam on a horizontal plane; and the maximum pressure at any point in the masonry should be limited to 10–15 tons per sq.ft., depending on the materials used for construction and the nature of the underlying rock. Prof. Rankine pointed out the importance of avoiding tension, and evolved the theory on which most modern dams have been designed, viz.: that the resultant pressure due to the weight of the masonry and the water thrust must fall within the inner third of the dam if tension is to be avoided. Any fissure developing at the water face due to tension tends to increase owing to the water pressure, and may ultimately lead to the failure of the dam (*see* Prof. Unwin, *Proc. Inst. C.E.*, vol. 126, and E. P. Hill, vol. 129).

The masonry of a dam is not isotropic as horizontal planes of weakness, where new work is superimposed upon that which has set, are difficult to avoid. It is advisable therefore to step the masonry at the water face so as to avoid the construction of a horizontal joint between old and new work.

The arched form of dam is economical when the radius of curvature is comparatively small, as the sectional area can be decreased by designing the dam as a horizontal arch transmitting the water thrust to its abutments. For reasons of economy modifications of the simple type of masonry dam have been introduced; these dams are of ferro-concrete construction, the pressure of the water being transmitted to buttresses by means of steel reinforced slabs or arches.

Earth Embankments.—The profile of the embankment requires careful study of the materials of which it will be composed, and slips have frequently occurred, leading to the complete or partial failure of banks, due to lack of local study and the adoption of a design which was unstable. Light sandy soils will stand at a high angle of repose, but clays or plastic materials require flatter slopes, the inclination decreasing as the base of the embankment is approached. On fig. 2 the inner line profile would apply to good banking material, and the outer line to clay or plastic material.

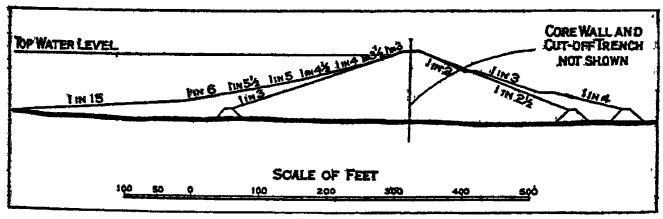


FIG. 2

Care must be exercised to prevent the saturation of the outer slope of the bank, and when possible it should be composed of freely draining material. When such materials are not available, the outer portion should rest on a layer of stone terminating in a stone toe, vertical drains of dry stone being carried up through the bank at intervals.

Cut-off Trench.—In order to prevent percolation below the bottom of the embankment, a trench is first excavated across the valley bottom, carried down—if possible—to an impermeable substratum and continued into the hillsides, so as to cut off any percolation below top water level. This is filled with impermeable material, preferably concrete, so as to form a barrier to percolation below the bank; and an impermeable core wall is brought up in continuity with this barrier to prevent percolation through the bank.

Core Walls.—Puddle is the material generally used in the British Isles to form the core wall, and reinforced concrete in America. Puddle is not an absolutely impermeable material, and the thickness of a puddle core wall must be much greater than that of a concrete core wall. The use of concrete core walls has been limited in the British Isles owing to the apprehension that such walls would crack under pressure due to unequal settlement of the embankment. That such fears are unfounded is proved by the numerous successful examples of such construction in America.

The very greatest care must be exercised in the construction of a puddle core wall to prevent the occurrence of any layer through which water could pass owing to the erosion which may take place, causing the formation of a cavity and the failure of the bank; whereas no erosion of the concrete would take place, and a crack would soon be sealed by earth carried in suspension by the water.

Tunnel Outlets.—It is necessary to divert the stream during construction, and for this purpose it is advisable to construct a tunnel round one end of the bank through which the stream may flow, and through which the supply pipe can ultimately be laid from the Valve Tower. A cheaper form of construction is to build a culvert under the bank, but many cases of whole or partial failure of such culverts have occurred due to the varying earth pressure. (*See* C. J. Wood, "Tunnel Outlets," *Proc. Inst. C.E.*, vol. 59.)

Flood Works.—When a reservoir formed by a masonry dam overflows, water passes harmlessly over the top of the masonry into the stream below. It is obvious, however, that water cannot be allowed to overflow an earth embankment, as the material would rapidly erode, leading to the failure of the bank. It is therefore necessary to allow for the escape of flood water in such a way that the water level can never rise to a height that would endanger the bank.

The usual flood escape is provided by a weir of such a length and placed at such a level below the top of the bank as will ensure that the water in the reservoir can never rise above it, the weir discharging into a masonry channel placed in the hillside at one end of the bank. Another and more economical escape consists of a vertical shaft communicating below with the tunnel through which the stream was diverted during construction and terminating above in a bell-mouthed opening, the periphery of which forms the overflow weir.

Flood Intensity.—The maximum intensity of the flood discharge over the weir will depend on the extent of the catchment area, the maximum intensity of rainfall during a period bearing relationship to that area, and many other factors, such as the inclination of the valley, the steepness of the slopes, the permeability of the surface, and the presence of lakes or obstructions which would delay the discharge. It is impossible to determine the exact effect of many of these factors, and therefore recourse must be made to actual records of the maximum discharge from catchments of different areas.

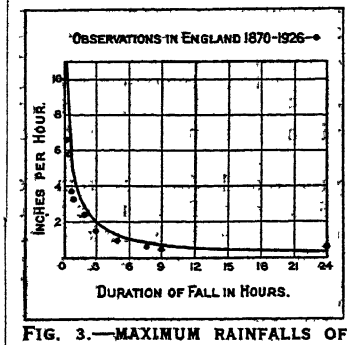


FIG. 3.—MAXIMUM RAINFALLS OF RARE INTENSITY

The main factor in determining the maximum intensity of a flood must obviously be the amount of rain which fell in a given period, a condition which varies so widely in different parts of the globe, that records of flood discharge in one country would not be applicable to another.

The curve on fig. 3 shows the relationship between rainfall and period, and is derived from the formula determined by Prof. Talbot as applicable to the Eastern United States for maximum rainfalls during different periods. The small circles show actual observations made in the British Isles, from which it appears that Talbot's curve fits British conditions fairly well. This fact is of importance as indicating that records of floods in the Eastern

States are of assistance in arriving at the maximum intensity of discharge from different catchment areas in the British Isles. The larger the catchment, the smaller is the flood discharge per unit of area.

Unfortunately, the estimates of maximum flood discharges from small catchment areas, are scanty and not very reliable. Most reservoirs are placed at comparatively high altitudes, where the catchment area is small, in order to impound water free from pollution and to furnish water to the district of supply by gravity. Failures of such reservoirs, due to insufficient provision for the discharge of flood water, are not infrequent, and demand serious consideration owing to the consequent loss of life and property.

The formula $Q=750/\sqrt[3]{M}$, where Q denotes the maximum flood intensity in cu.ft. per sec. per sq.m. and M the drainage area in sq.m., agrees fairly well with the records of maximum flood intensity in Great Britain. (*See* WATER SUPPLY; DAM; CATCHMENT AREA.) (W. J. E. B.)

RESHT, the capital of the province of Gilan in Persia, in 37° 17′ N., and 49° 36′ E., on the left bank of the Siah Rud which is a branch of the Safid Rud and flows into the *murdab* or lagoon of Pahlavi (Enzeli). The population in 1928 exceeded 70,000, chiefly Gilakis, with a few merchants and officials, known locally as Iraqis. During the Bolshevik invasion in 1920 about 8,000 refugees left the town, but have since returned; and a large part of the bazaar was burnt. The town is situated in low malarious ground and was originally buried in jungle, but the Russians during their occupation of the place in 1723–24, cleared most of the jungle and it is now surrounded by rice fields. The summer climate is damp, sultry and unhealthy, with an average minimum temperature of 84·5° in August and a rainfall of 32 to 59 inches. The houses are red-tiled or thatched, and raised from the ground, with broad verandahs and overhanging eaves. Most of the streets are paved with cobble stones, an improvement which was begun in 1910; and Resht is almost unique in Persia in having the nucleus of a sewerage system running from the bazaar to the river. There are many caravanserais.

Resht is the centre of important roads in Gilan. The metalled road from Tehran (226 m. distant) via Kazvin to Pahlavi skirts the town on the east, upon which a regular motor transport service is in operation. There is a similar road to Pir i Bazar (4 m. up the river of the same name which runs into the lagoon), whence there is a regular daily service of flat-bottomed sailing boats to Pahlavi. Launches also run between the bar at the mouth of the Pir i Bazar river and Pahlavi. A narrow gauge railway runs alongside the Resht-Pir i Bazar road. A carriageable road also runs laterally from Kasma through Resht to Lahijan, Langarud and Rud-i-Sar on the Caspian sea, following in great part a raised causeway through rice fields, with innumerable wooden bridges over irrigation canals. Resht is a centre of the rice trade and of the activities of the silk industry of Gilan, but the principal centre of the latter is Lahijan. There is a town telephone service with trunk lines to Pahlavi, to Rud-i-Sar, to Pir i Bazar and to Kasma. The Imperial bank of Persia has a branch at Resht and the town is lit by electric light.

Resht suffered a good deal during the World War, first from the Russian army and, afterwards in 1918, when the Dunsterville force had to fight its way to Pahlavi, strongly opposed by Kuchak Khan.

BIBLIOGRAPHY.—G. N. Curzon, *Persia and the Persian Question* (1892); G. Ferrand, "Notes sur Resht et le Guilan," *Bull. Soc. Geogr. d'Alger* (1902); A. V. Williams Jackson, *Persia past and present* (1906); H. R. d'Allemagne, *Du Khorassan au pays des Backhtiaris. Trois mois de voyage en Perse* (1911); H. L. Rabino, "A journey in Mazanderan (from Resht to Sari)," *Geogr. J.* (1913); L. C. Dunsterville, "From Baghdad to the Caspian in 1918," *Geogr. J.* (1921); and *The Adventures of Dunsterforce* (1920); L. S. Fortescue, "The western Elburz and Persian Azerbaijan," *Geogr. J.* (1924); and "Les provinces caspiennes de la Perse," *La Géographie* (1925). (P. Z. C.)

RESIDENCE, in general, a place of abode. In law, it usually means continuance in a place. The ordinary meaning of the word has been defined as "the place where an individual eats, drinks and sleeps, or where his family or his servants eat, drink and sleep" (*R.* v. *North Curry,* 1825, 4 B. & C. 959). For certain purposes, however, a man may be said to have his residence not only where he sleeps, but also at his place of business. (*See* ABODE; DOMICIL.)

RESIDENT, a political agent or officer representing the Indian government in certain native states in India; he resides in the state and advises on all matters of government, legislative or executive. In certain other dependencies or protectorates of the British Empire the representative of the government is termed a resident or political agent, notably in Nepāl, Aden, Sarawak, British North Borneo, etc. In general, where the state to which a resident is attached is not an independent one, he exercises consular and magisterial functions.

For "Resident" as the title of a diplomatic agent *see* DIPLOMACY.

RESINS. A natural resin is a sticky substance exuded in brown gummy drops by trees (Greek ῥέειν, to flow), especially pines and firs. These drops gradually harden in the air and form what most people recognize as a resin. Rosin, the commonest type of resin, is well known as a material for treating violin bows. Resins of industrial importance are obtained from trees of varied types growing in different parts of the world. Varnishes contain resin as an important constituent, and the long established connection between resins and varnishes is seen in the derivation of the word varnish, which has been considered to originate from *Berenice,* the golden-haired queen of Cyrene (mediaeval Latin, *verenice* and *vernis*) whose name the Greeks applied to the golden-coloured amber, a resin now mainly employed for beads and decorative ware, but used in earlier times for varnish.

I. NATURAL RESINS

The natural resins are mostly obtained by collecting the gummy substance which exudes from cuts made in the bark of the tree; some are fossil in origin, being found in a hard condition buried in the ground; shellac is distinct in being formed as a secretion by insects feeding on certain trees. There are also other sticky secretions of trees known particularly as *gums.* True gums, as distinct from resins, are soluble in water, as, for example, *gum arabic* (*q.v.*) used for making adhesives. The term resin is technically restricted to products which are insoluble in water but which will dissolve in liquids like methylated spirit, or which by special treatment will dissolve in oils, like linseed oil and turpentine, to form varnishes. To differentiate clearly between such resins (which are also spoken of as "gums" by the varnish maker) and the water-soluble gums, the former are often referred to more definitely as varnish resins.

Properties and Classification.—Varnish resins are to be recognized by their transparency and translucency, their brittleness and glass-like fracture, and the brown or yellow colour. They possess as a rule no taste or smell in the solid condition; on heating, they melt or soften and finally burn with a smoky flame giving an aromatic odour. Solutions of such resins can be made in methylated spirit, turpentine and other essential oils. In using resins with oils, such as linseed oil, a special treatment of the resin, known as "running," is usually necessary in order to make it soluble; this involves heating in the molten condition for some time, when some decomposition and loss of weight occurs, and the resin is considered to assume a simpler molecular structure, undergoing what is known as a depolymerizing process, thus becoming more readily soluble in the oil.

Solubility and hardness are the chief criteria used technically in classifying a resin, and on these lines resins may be divided into:—

Spirit-soluble resins which are (1) soft, such as the balsams and Burgundy pitch; (2) medium, such as mastic; (3) hard, such as damar, sandarac and shellac.

Oil-soluble resins which are (1) soft, such as some Manila copals; (2) medium, such as Kauri copal; (3) hard, such as Zanzibar copal and amber.

Much overlapping necessarily occurs in such a classification.

The Spirit-soluble Resins.—As the name *balsam,* or balm, suggests, these resins, of a fluid character, are of chief use as healing preparations in pharmacy. They are also called oleo-resins, containing a large proportion of volatile essential oil which usually consists of esters of cinnamic or benzoic acid. A hard

resin can as a rule be obtained from balsams by evaporating the essential oil. Turpentine, for example, as obtained from the tree, is an oleo-resin which yields solid rosin by evaporating or distilling away the essential oil of turpentine. Burgundy pitch, from Bordeaux turpentine, is used in medical plasters. Elemi is a fluid or semi-solid balsam, in a condition approaching that of an ordinary solid resin; it is sometimes used in special spirit varnishes.

A medium resin, such as *mastic,* is still of a soft nature but not fluid like the oleo-resins. It is mainly used in the preparation of high-grade varnishes of pale colour for the protection of paintings. It is obtained from one of the islands in the Grecian archipelago, from a tree of the Pistachia genus. A solution of mastic in turpentine, with linseed oil added, produces the artist's medium known as "megilp." Mastic is soluble in alcohol to the extent of about 90%, and melts at about 95° C. *Acaroid* or gum accroides, melting at about 100° C, is obtained from the Australian grass tree as a yellow or red resin. It contains phenolic compounds which give it medicinal value as a tincture suitable for treating affections of the mucous membrane. The crimson-red resin known as *Dragon's Blood* exudes from the fruits of the rattan palm, growing in the East Indies. It was used as a varnish by Italian violin makers.

Among the hard resins, *damar* is usually met with in the form of clear pale yellow nodules (melting point about 140° C), although varieties of various colours are collected. It is obtained from coniferous trees of the Dipterocarpaceae family in the Malay States. Damar varnish is prepared as a solution in turpentine, in which about 30% of the resin dissolves. It can be used as a paper varnish on account of its lustre and pale colour. North African and Australian cypress pines are the source of *sandarac,* a hard resin from which a colourless spirit varnish can be produced, suitable for coating paper labels, leather, wood and metals. It melts between 135° C and 145° C, after previous softening at about 100° C. It is completely soluble in ether and methylated spirit, but only slightly soluble in turpentine, benzene and petrol.

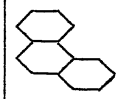
Shellac requires an animal intermediary for its production, thus differentiating this resin from other natural resins. Insects (*Tachardia lacca*), belonging to the Coccidae or scale insects, attach themselves for feeding purposes to certain Indian trees of the acacia family, and produce a scaly covering consisting of an amber-like material, which is the basis of lac or shellac. This resinous secretion is ground, washed and filtered, by squeezing while hot and molten through a cotton bag, on to hot plates or water-cooled rollers from which it is removed in the familiar flaky form. Lac is one of the most widely used resins in industry, providing an electrical insulating material, a stiffening agent for felt hats, etc., a preservative coating for wood and metal, and a binding agent for moulding compositions. The gramophone record industry absorbs about 60% of the output of shellac. It is marketed in various grades and under various descriptions, *e.g.*, stick lac, seed lac, button lac and garnet lac. The bulk of the shellac manufactured bears the mark "T.N.," a term the origin of which is lost in antiquity, although presumably the letters are the initials of an early manufacturer. The melting point lies between 77° C and 82° C. Chemically, shellac consists largely of esters of aleuritic acid, $HO{\cdot}CH_2{\cdot}(CH_2)_5{\cdot}CH(OH){\cdot}CH(OH){\cdot}(CH_2)_7{\cdot}COOH$, together with a red colouring matter, wax and moisture. It dissolves in methylated spirit forming a cloudy solution which clarifies on standing. For hat-stiffening, shellac is dissolved in a water solution of borax. A white shellac can be obtained by a bleaching process, from which colourless transparent lacquers can be made.

The Oil-soluble Resins.—Useful varnishes can be made with rosin and China wood oil, an oil of somewhat similar character to linseed oil. Soap and paper-making are also responsible for the consumption of considerable quantities of rosin. Compounds of rosin with certain metals known as resinates provide the important ingredients in paint and varnish called "driers" (*see* VARNISH). Rosin as the sole resin basis of a varnish is not desirable on account of its susceptibility to the action of air and moisture. It is used as a flux in melting the harder resins and preparing them for use in varnishes.

French rosin is obtained from the *Pinus maritima.* The flow of oleo-resin is stimulated by cutting the bark in a manner systematically controlled as to size of incision, position on the tree trunk, and season at which the cutting takes place. One tree can be made to yield rosin for three or four years, after which several years' rest are given. The annual production in France of rosin is about 100,000 tons, and turpentine 25,000 tons. American products are obtained from various kinds of pine grown in the south-eastern portions of the United States. The long leaf pine, *Pinus palustris,* is the most important.

Rosin remains in the still after removing, by distillation (*q.v.*) in the presence of water, the turpentine spirit or essential oil of turpentine from the oleo-resin exudation. The vapours liberated are condensed into two layers, one of turpentine and the other of water. The best grade of French rosin is clear and of a pale amber colour. American grades vary from WW (water white), WG (window-glass), through brown to black. The specific gravity of rosin lies between 1·070 and 1·080. Good qualities melt at 120°–135° C, and dissolve in all the usual solvents, except water.

Abietic acid, $C_{20}H_{30}O_2$, melting at 166° C, is the chief constituent of rosin, together with certain inert substances known as *resenes.* Current chemical opinion attributes a phenanthrene



nucleus (*see* CHEMISTRY: *Organic,* "Homocyclic Division") to resin acids of the abietic acid type. The properties of rosin as a varnish resin may be modified by heating with metallic oxides, such as lime or zinc oxide, or with glycerine, the products being known respectively as hardened rosin or ester gum. Rosin modified in these ways is present in spar, boat and other varnishes.

The *copals* form an important group of varnish resins (Spanish, from Mexican *copalli,* incense). They vary from soft to hard according to their age. Soft Manila copal collected direct from the tree is easily soluble in methylated spirit and oils, whilst the hard fossil varieties such as Pontianak require heat treatment before they can be mixed with linseed oil. Oil varnishes containing Manila resin are used for interior work. Kauri copal, melting at about 150° C, a valuable varnish resin from a New Zealand pine, is usually obtained as a fossil about 4 ft. underground, but sometimes is found buried as deep as 20 feet. The cheaper Congo copal, also a fossil resin, melting at about 200° C, is becoming a rival of Kauri. Sierra Leone copal, obtained by tapping the tree, and consequently not so hard as the fossil Congo copal, finds a use in making good pale-coloured varnishes. Zanzibar copal is one of the hardest resins used by the varnish maker, and is dug up now mostly from the mainland opposite the island of Zanzibar. Nodules of this resin, marked with distinctive "goose-flesh" markings, are found as a rule about 3 ft. in the ground. The melting point may be as high as 360° C.

Amber, the hardest resin known, is little used in the varnish industry. It is found in the ground in East Prussia, in the Baltic region, and efforts are being made in Germany to develop more fully the uses of this natural product.

Japanese and Chinese lacquer are obtained chiefly from the *Rhus vernicifera* (Urushi No-ki or Tsi-chou, varnish tree). The sap collected is a grey-brown viscous fluid, darkening in the air and forming a tough skin. A remarkably protective coating is obtained by using this fluid as a varnish. It is peculiar in requiring a moist atmosphere to enable the hardening process to take place. Chemically, the lacquer contains compounds of a phenolic character, of which urishiol $C_6H_3\begin{cases}OH(1)\\OH(2)\\C_{15}H_{37}(4)\end{cases}$, is the chief.

II. SYNTHETIC RESINS

Synthetic or artificial resins possess most of the physical characteristics of natural resins, and in addition may have, in certain types, the unique property of becoming infusible and insoluble after heat treatment. Chemically, a certain degree of resemblance is traceable between the phenolic synthetic resins and Japan lacquer and acaroid among natural resins, compounds of phenolic

character having been shown to be present in the latter products. Although produced by the chemical interaction of substances of definite composition, synthetic resins are usually of complicated and indeterminate composition. They are of industrial interest as substitutes for natural resins in the varnish industry, as insulating material in the electrical industry, and as a basis for the production of moulded articles for decorative purposes, such as umbrella handles, buttons, beads, brush backs, door-plates, knobs, etc.

Physical Classification.—It is possible to group synthetic resins according to solubility. There are resins which always remain soluble and those which are initially soluble but become finally insoluble under the action of heat, so called "heat-hardening" resins. The resins from formaldehyde and phenol, such as Bakelite, are of the latter class. Resins in the permanently soluble class may be further divided into (*a*) alcohol- or spirit-soluble resins, and (*b*) benzene- and oil-soluble resins.

The resins suitable for varnishes are either spirit-soluble (chiefly of formaldehyde-phenolic type), forming substitutes for shellac and the softer varnish resins; or oil-soluble (chiefly the coumarone type, and also modified formaldehyde-phenolic types), forming substitutes for hard natural resins. The modified oil-soluble formaldehyde-phenolic types referred to are produced from the spirit-soluble phenolic resins, by a process of melting with a natural resin akin to the "running" process adopted with natural resins.

Moulded Compositions.—Artificial resins are used extensively in preparing moulding compositions. Moulding resins, usually of heat-hardening phenolic type, are used either as pure unmixed resin, producing as a rule transparent mouldings, or incorporated with some inert "filling" material, such as sawdust, asbestos or clay, and pressed in heated moulds; or they may be used for impregnating paper or woven fabrics. By submitting these preparations to a process of pressing in heated moulds, highly durable mouldings in almost any desired form can be obtained. In order to give them maximum resistance to heat, chemical action and electrical forces, the mouldings, on removal from the moulds, are baked further, thus completing the chemical reaction in the resin. A material of considerable value for insulating purposes in the electrical industry is thereby obtained. The electrical properties are somewhat similar to those of ebonite.

Moulding compositions can also be prepared in a form suitable for the production of domestic articles, cups and saucers, bowls and plates, and the like. Textile materials can be decorated with beads made from artificial resin. Numerous other decorative uses are continually being found for artificial resins.

Chemical Classification.—Two main classes may be distinguished, (*a*) condensation resins, such as those of the formaldehyde-phenolic type, condensation being, in its simplest form, the chemical process whereby molecules unite, with elimination of water; (*b*) polymerization resins, such as those of the coumarone type. Polymerization is the chemical process in which relatively simple molecules of a compound become complex by combination amongst themselves. The term "polymerization resin" is used to distinguish a resin which is formed directly by the polymerization of a chemical compound, without passing through a preliminary stage of condensation. Polymerization is usually initiated by the action of light, heat, strong acids or alkalis.

Formaldehyde-phenolic Resins.—*Bakelite,* invented by L. H. Baekeland in 1909, is the leading representative of one main class of synthetic resins produced to-day in most countries in one form or another. The preparation involves the interaction of phenolic substances, such as phenol (*see* CARBOLIC ACID) and cresol (*q.v.*), with aldehydes, particularly formaldehyde (*q.v.*). The output of such resins and their derivative moulding compositions is a growing one. In America alone nearly 7,000 tons were manufactured in 1925, representing double the production of 1922. Other countries, of which Germany, France and Great Britain are the chief, manufacture something like an equal amount between them.

The process of manufacture is one of condensation, usually facilitated by the use of a small addition of acid or alkali. The details of one method of procedure are as follows: Equal parts of pure phenol and formaldehyde solution (formalin) with a small quantity of caustic soda are heated together in a steam-jacketed pan with stirring gear. The mixture gradually becomes cloudy and finally an oily layer separates. This layer is removed, and from it, by further heating, sometimes under diminished pressure, a molten resin is obtained. This resin, on cooling, sets to a brittle, transparent product. In this condition it is ready for dissolving in alcohol for use as an impregnating solution for sawdust or other "filler," to form moulding compositions. Mouldings made by pressing such a composition are then baked to bring about the final change to the inert resistant condition.

The simplest condensation products of phenol and formaldehyde are saligenin or *o*-hydroxybenzyl alcohol and *p*-hydroxybenzyl alcohol. Further mutual condensation of these compounds leads to a syrupy product which, on continued heating, gives a resin somewhat akin to Bakelite. No definite conclusions have yet been made as to chemical constitution, owing to the small reactivity of the resin in its final form. The fully polymerized formaldehyde-phenolic resin is insoluble in all the usual solvents and chemical reagents, except nitric acid and caustic alkali. It is more than probable that the final fully polymerized resin, prepared industrially, contains, in addition to a polymerized molecule of high molecular weight, a mixture of other substances, which are retained by the resin during hardening, such as free phenols and formaldehyde and crystalline intermediates formed during the condensation reaction. A number of mouldings are made with resins of the Bakelite type. A variety of useful mouldings are obtained from wood-meal-resin moulding composition, and also from laminated resin-paper and fabric compositions. The advantages of this type of material consist in its power to withstand temperatures at which rubber, ebonite, celluloid and natural resins soften and liquefy, or even decompose, together with the accuracy and high finish of the mouldings. For electrical insulation it is used in wireless apparatus, telephones, electric lamp sockets, generators, transformers and other electrical equipment. Paper or woven fabric compositions have been used for silent transmission gears and also, experimentally, for aeroplane propellers. Grinding wheels containing resin and emery, and self-lubricating bearings containing resin and graphite, can be built up. Laboratory apparatus for handling corrosive acids, especially hydrofluoric acid, has also been made.

Modified Formaldehyde-phenolic Resins.—The German *Albertols* and American *Amberols* are soluble in linseed oil and are prepared from formaldehyde-phenolic resins by heating with common rosin. They are now being further modified by the inventors by neutralizing the acidic part of the rosin component with glycerin. One such modified resin softens at 100° C and melts at 120° C, whereas the rosin used in its preparation softened at 59° C and melted at 65° C. These resins are used mostly as substitutes for oil-soluble natural resins in varnishes, although some varieties are proposed for the replacement of shellac in the preparation of bonded mica sheets, such as micanite. Certain formaldehyde-phenolic resins containing sulphur have some application in electrical insulation; *thiolite,* a resin of French origin, is prepared by the action of sulphur chloride on a condensation product of formaldehyde and cresol. It contains 12% of sulphur.

Formaldehyde-urea Resins.—Formaldehyde may also be condensed with urea, or its sulphur analogue, *thiourea.* Thiourea can be made from a by-product in gas manufacture. Opaque or transparent colourless resins are produced which, by continued heating, become insoluble. They are finding application in Great Britain, particularly the *Beetle* resin, in moulding powders from which table and decorative ware, very artistically tinted with delicate colours, can be produced. The transparent variety, particularly the German *Pollopas,* is proposed for use as a substitute for glass in motor-car wind-screens. Efforts are being made to render them suitable for electrical insulation. The moulded tableware can be washed with soap or weak soda solution without ill effect, and will stand temperatures of 110°–120° C. The specific gravity varies from 1·4–1·5. The chemical basis of this form of resin is probably a dimethylol derivative of urea or thiourea.

Glycerin Resins.—Glycerin and phthalic anhydride (*q.v.*)

react to give a resin of industrial interest, which in America is known as *Glyptal*. It is transparent, pale yellow and soluble in acetone, but becomes insoluble on heating to 220° C. In the insoluble condition it retains some degree of flexibility and finds application in the electrical industry, especially for amalgamating mica flakes to form insulating sheets. Such sheets when properly prepared compare favourably in electrical properties with similar sheets in which shellac is used as the binding resin. Pure *acrolein*, obtained from glycerin, is polymerized in the cold by the addition of an alkali, forming a white powder melting between 80° C and 100° C. It can be dissolved in alcohol and used as a varnish. Acrolein also reacts with phenol to form a hard resin in the presence of about 1% of caustic soda. These resins of French origin have electrical properties of the order of those of ebonite. An American resin, *acrolite*, can be prepared from glycerin and phenol by heating to between 160° C and 190° C, in the presence of a small quantity of sulphuric acid.

Coumarone Resins.—Coumarone resins are prepared from certain fractions distilled from coal-tar naphtha, and are used in varnishes, and also to some extent as softening agents in rubber mixing. Their method of production involves no preliminary condensation but consists in direct polymerization of coumarone, indene and unsaturated cyclic compounds of this class, contained in the naphtha distillate, by means of strong sulphuric acid. They vary in colour from light yellow to black. They are miscible with drying oils and will dissolve in benzene but not in alcohol.

BIBLIOGRAPHY.—General: C. Ellis, *Synthetic Resins and their Plastics* (1923); Clément and Rivière, *Matières Plastiques* (1924); Barry, Drummond and Morrell, *The Chemistry of the Natural and Synthetic Resins* (1926). Manufacture and Application: E. Hemming, *Plastics and Moulded Electrical Insulation* (1923); H. W. Rowell, *Jour. Soc. Chem. Ind.* (1927). Constitution of Phenolic Resins: L. H. Baekeland, *Industrial and Engineering Chemistry* (1909 and 1925). Physical Properties: A. V. Mory, *Industrial and Eng. Chem.* (1927). Viscosity and Solubility: A. A. Drummond, *Jour. Soc. Chem. Ind.* (1924); *Jour. Oil and Colour Chemists' Assoc.* (1927). (A. A. D.)

RESISTANCE, MEASUREMENT OF. That bodies offer resistance to the passage of the electric current through them is shown by the heat developed when the current passes. This heat production was made the basis of a method of comparison by Henley (1774) and Nairne (1780) who concluded from his experiments that "iron wire resists the passage of the electric fluid much more than copper." (*Phil. Trans.* [Hutton] *14* p. 688.) Davy (*Phil. Trans.*, 1821, p. 430) showed that the conducting power of wires is proportional to their cross-sectional area divided by their length, but exact ideas were lacking until the importance of Ohm's Law (1827) was appreciated. An absolute unit of resistance could then be defined as the resistance of a conductor in which unit potential difference produces unit current.

The practical unit of resistance is the International Standard Ohm defined (1894 and 1908) as "the resistance offered to an invariable electric current by a column of mercury at the temperature of melting ice, 14·4521 grammes in mass, of a constant cross-sectional area, and a length of 106·300 centimetres." This unit is equal to about $1{\cdot}0005\times10^9$ absolute C.G.S. units. The megohm is one million ohms, and the microhm one millionth of an ohm. Specific resistance, or resistivity, is defined by ρ in the equation

$$\text{Resistance} = \rho\,\frac{\text{length}}{\text{area of cross-section}}$$

and is therefore measured in ohm-cm.

The practical measurement of resistivity involves many processes and instruments (*see* INSTRUMENTS, ELECTRICAL); but the methods employed may be classified as Comparison Methods and Absolute Methods. In the former a comparison is effected between the resistance of the material in a known form and some standard resistance, in the latter, the resistivity is determined with reference to the fundamental units of length, mass and time. Special methods are required to determine the resistance of insulating materials and of electrolytes. (*See* INSTRUMENTS, ELECTRICAL; ELECTROLYSIS; ELECTRICITY, CONDUCTION OF: *Solids*.)

RESONANCE, a term used in physics and related fields denoting a prolongation or increase of sound due to sympathetic vibration of some body capable of moving in the proper period. An illustration of resonance is seen when two heavy pendulums of the same period are mounted upon a wooden frame which yields slightly to their motion and one pendulum is set vibrating. In a few minutes it will be seen that the second pendulum is acquiring vibratory motion through the support. Its motion gradually increases until the two are swinging with equal amplitude but with a phase difference of a quarter period. The second pendulum continues to lag behind the first, gradually absorbing its energy until the first is brought to rest, after which the phenomenon is repeated in the reverse order. *See* PHYSICS, ARTICLES ON. The counterpart of this phenomenon is applied to electricity (*q.v.*). *See* ELECTRIC WAVES and articles related to radio.

RESONANCE POTENTIALS. We are brought to the consideration of resonance potentials, which are also called critical potentials or excitation potentials, by the consideration of the passage of an electron through a gas. We must first premise that the energy, and consequently the velocity, of an electron is usually expressed in volts, a velocity of so many volts meaning the velocity which an electron would acquire in moving *freely* through a potential difference of that number of volts. It has been established by the experiments of J. Franck and G. Hertz that electrons of small energy, *i.e.*, with velocities of a few volts only, behave like minute gas atoms when they strike a gaseous atom. The impact follows the laws of the impact between two perfectly elastic spheres, the electron bouncing off with practically no loss of velocity, since the mass of the gas atom is relatively so great. When we are considering the passage of electrons through inert gases, metallic vapours of small electron affinity, and certain other gases, it is found, however, that, as the velocity of the electrons is raised, a certain critical value is reached; for all velocities greater than this critical velocity the electron loses a definite amount of energy in the collision, or makes what is known as an inelastic impact. The kinetic energy so lost goes temporarily to increase the internal energy of the atom, and ultimately appears in some other form. If the velocity of the electron be further increased the loss of energy at impact remains the same until a step is reached when another sudden loss of energy takes place on impact, this time of greater magnitude. In general, as the potential which accelerates the electron is increased a series of values will be found, at each of which a different type of inelastic collision with the gaseous atom first takes place. These particular values are the resonance potentials characteristic of the gas in question: they vary in magnitude from gas to gas. Finally, a potential can be found which gives the electron sufficient energy for it to be able to ionise the gas atom which it strikes, that is, displace an electron from it. This potential is the *ionisation potential* of the gas.

Theoretical Importance of Resonance Potentials.—The resonance potentials have assumed great importance in modern physics from the direct confirmation which they give of the most fundamental assumption of Bohr's theory of atomic structure. (*See* ATOM, QUANTUM THEORY.) On this theory an atom can exist in a series of stable states—or stationary states, as they are called —to each of which pertains a given energy, but cannot exist in any state of energy intermediate between these. We can get a picture of these states by assuming that the electrons of the atomic structures have certain preferential orbits, to each one of which corresponds a certain energy of the atom (*see* ATOM), but this picture is not indispensable for our present purpose. To transform the atom from its normal state, of energy E, to a stationary state of greater energy E′, clearly demands a certain input of energy: when the atom returns from this excited state to its normal state —either in one step or more steps—the energy is given out again, in general in the form of radiation (in general, because it is possible for the energy to appear as kinetic energy of another particle), the frequency of the radiation being given by

$$h\nu = E' - E$$

where h is Planck's constant, ν the frequency. We should therefore expect that if an electron strikes an atom, and its energy is less than that required to raise the atom to the first stationary state above the normal, it will be unable to communicate any-

thing to the internal energy of the atom, and will spring off elastically. If, however, the energy E_e of the electron in question equals or exceeds E'_1—E, where E'_1 is the energy of the first stationary state, it can raise the atom to that stationary state, and will proceed after the collision with diminished energy $E_e-(E'_1-E)$. We neglect the kinetic energy communicated to the atom as a whole, since, on account of the great mass of the atom, this is negligible. Similarly, if the energy of the electron exceeds E'_2-E, when E'_2 is the energy of the second stationary state, the electron can raise the atom to that state, experiencing itself a correspondingly greater loss of energy. In the first case the atom, on returning to its normal state, should emit the first spectral line of a series, in the second case the second line, of higher frequency, and higher critical potentials should be able to excite lines of still higher frequency. The resonance potentials therefore provide a double experimental check on Bohr's hypothesis. In the first place we can, by electrical methods, measure the velocity of the electron before and after impact with the gas atom, observe at what potentials the abrupt losses of velocity take place, and compare these potentials with those to be anticipated from the known values of $h\nu$ for the appropriate lines of the spectrum of the atom. In the second place we can observe the radiations from the gas which attend the passage of electrons of different velocities, and find out at what potentials the different lines first appear—*i.e.*, we can carry out the so-called step-by-step excitation of spectra, and measure the excitation potentials. Both methods lead to brilliant quantitative confirmation of Bohr's hypothesis of stationary states, and of the quantum theory of spectral series. The electrons lose energy in steps, at the stages to be anticipated from the theory, and the spectral lines appear in turn at the potentials calculated.

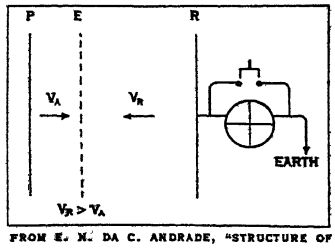
Experimental Methods.—The pioneer worker on the subject was Lenard, who in 1902, long before Bohr's theory was put forward, showed that an electron must possess a minimum energy before it can produce ionisation in a gas. He released the electrons from a metal plate P photoelectrically (*see* PHOTOELECTRICITY), and accelerated them by means of a parallel gauze E maintained at the desired potential, the gas pressure being low enough for the greater part of the electrons to pass through the space between P and E without a collision (fig. 1). He detected the formation of ions by means of a plate R, charged negatively, so that, while electrons cannot reach it direct, any positive ions formed are at once attracted, and make their presence known by a sudden change in the current from R. In this way he found that no ions were produced unless the accelerating potential exceeded a certain threshold value. However, as pointed out by Bohr and van der Bijl, a change in the current from R does not necessarily indicate ionisation in the gas between E and R, for if the electron impact is not sufficiently energetic to make the atoms struck lose an electron, but merely makes them emit radiation, then this radiation will act photoelectrically on the plate R, causing it to lose electrons. As far as current effects go, loss of electrons by R or gain of positive ions by R come to the same thing. Lenard's original method has therefore been modified in various ways, to enable a distinction to be made between a resonance potential and an ionisation potential. It is also usual nowadays to produce the electrons by means of a hot wire (*see* THERMIONICS) instead of photoelectrically. Davis and Goucher introduced a second gauze E′ (fig. 2) and arranged the potentials as follows: a potential V_R, greater than the accelerating potential V_A, acts so as to stop the electrons reaching R, while a small potential V_1, which can be reversed, is maintained between E′ and R. When E′ is negative to R, photoelectric electrons cannot escape from R, when E′ is positive to R they can, so that the photoelectric effect of radiation on R can be detected at once. Reversal of the direction of the small field between E′ and R has, however, little effect on the passage of positive ions to R, because these are accelerated by a comparatively large potential fall, and have sufficient energy to overcome the opposing field. In this way radiation potential and ionisation potential can be clearly distinguished. Lenard's method has also been modified by Franck and Hertz in a famous series of experiments which dealt especially with the resonance potentials of mercury vapour. This vapour has yielded particularly clear confirmation of Bohr's theory. There are, for instance, resonance potentials at 4·9 volts and 6·7 volts. The wave-lengths which correspond, on the quantum theory of spectra, to these potentials can be calculated from the fundamental equation

$$\text{energy} = eV\frac{1}{300} = h\nu = \frac{hc}{\lambda}$$

when e is the electronic charge, V the potential *in volts*, h is Planck's constant, c the velocity of light, λ the wave length. To 4·9 volts corresponds a wave-length of 2520 Å.U., to 6·7 volts a wave-length of 1844 Å.U., which agree, within the experimental error of these measurements, with 2536 Å.U. and 1849 Å.U., the wave-lengths of the two strong lines of the mercury spectrum to be anticipated on the theory.

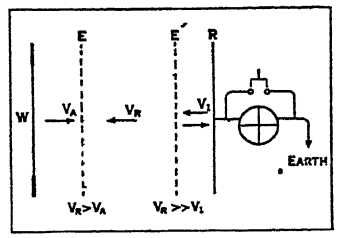
G. Hertz has more recently worked out some very delicate methods of measuring both resonance and ionisation potentials. One of the methods detects, by a skilful disposition of the gauzes, the abrupt loss of velocity of electrons which takes place when the accelerating potential reaches a critical value: this method therefore measures radiation potentials. The other method depends upon an annulment of the so-called space charge, which surrounds a hot wire, by the positive ions produced when, but not before, the accelerated electrons have sufficient energy: this method clearly detects ionisation potentials.

A different type of experiment, that which relies on the excited radiation for a sign that the resonance potential has been reached, is represented by the work of Foote, Meggers, and Mohler. They use the disposition represented in fig. 3. The electrons are produced, as usual, by a hot wire, here of hairpin shape, and accelerated by the field between the wire and the grid, constituted by a close spiral coil. The comparatively large cylinder which surrounds the grid is kept at the same potential as the grid. The region in which the electrons are accelerated is narrow, so that there is little chance of an impact which would prevent an electron attaining its full velocity: the region between the grid and plate is wide, so as to give plenty of opportunity for impacts to produce radiation. The accelerating potential is varied, and the values at which individual spectral lines appear carefully noted. The study of resonance potentials in this way was initiated by Franck and Hertz, who observed the potential which was just sufficient to excite the well-known mercury line of wave-length 2536 Å.U. They were followed by McLennan and his students, who showed that either one or two lines or the whole series could be excited, according to the potential. Since then other workers, notably Newman, have succeeded



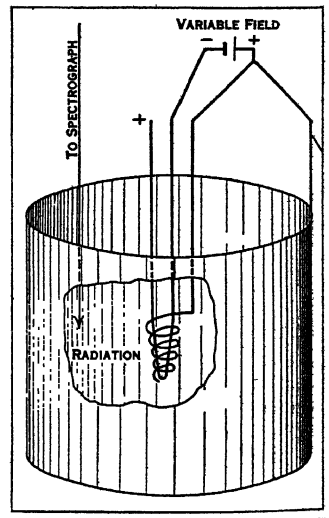
FROM E. N. DA C. ANDRADE, "STRUCTURE OF THE ATOM" (BELL)

FIG. 1.—LENARD'S METHOD OF INVESTIGATING IONISATION POTENTIALS



FROM E. N. DA C. ANDRADE, "STRUCTURE OF THE ATOM" (BELL)

FIG. 2.—GOUCHER'S ARRANGEMENT FOR DISTINGUISHING RESONANCE POTENTIALS AND IONISATION POTENTIALS



FROM ANDRADE, "STRUCTURE OF THE ATOM" (BELL)

FIG. 3.—APPARATUS FOR MEASURING RESONANCE POTENTIALS, AS DEVISED BY FOOTE, MEGGERS AND MOHLER

in producing certain spectral series line by line, each new line first appearing at the potential indicated by Bohr's theory.

All these experiments clearly show that energy can be communicated to atoms in definite amounts only, and that the communication of a definite amount of energy to an atom is followed by the emission of a spectral line or lines, the wave-length of these lines being connected with the energy communicated exactly as indicated by the quantum theory of spectra. It should be added that not only can one electron be completely removed from an atom at the ionisation potential, but that a higher potential can be measured which suffices to remove two electrons, and so excite the so-called spark spectrum. (*See* SPECTROSCOPY.)

Applications of the Theory of Resonance Potentials.—The established fact that a perfectly definite energy is needed to excite any given spectral line, or to separate an electron from an atom and so ionise it, has found wide application. The energy with which one atom strikes another at room temperatures is far below that which corresponds to the first resonance potential of any gas, and so we can expect no luminosity of gases at ordinary temperatures. In a flame the temperature is already sufficient for an appreciable fraction of the atoms to collide with sufficient energy to excite spectral lines. If metal atoms are introduced into a flame, the lines which are detected at the lowest temperatures are the lines with the lowest excitation potentials, and as the temperature of the flame is raised more and more lines appear, in accordance with the theory, the increased energy of the atomic impacts corresponding to the increased energy of electron impact which we get as we raise the potential. Again, elements with spectra of low resonance potentials show in the flame more lines at a given temperature than those with high resonance potentials. More striking still are applications of the conception of ionisation and resonance potentials to astrophysical problems. By considering the ionisation of an atom as a chemical problem, in which the ionisation potential takes the place of the heat of dissociation, Saha has worked out the percentage ionisation to be expected under different conditions of temperatures and pressure, and applied his result to the spectrum of the sun, with very interesting results. He has especially considered the ionisation of calcium atoms in the sun's atmosphere, and explained many peculiarities of the apparent distribution of the element. This work has been much extended, especially by R. H. Fowler and E. A. Milne. (*See* STAR.)

BIBLIOGRAPHY.—P. D. Foote and F. L. Mohler, *The Origin of Spectra* (1922); K. T. Compton and F. L. Mohler, *Critical Potentials* (1924); L. Bloch, *Ionisation et résonance des gaz et des vapeurs* (1925); J. Franck, *Anregung von Quantensprunge durch Stosse* (1926); E. N. da C. Andrade, *The Structure of the Atom* (1927). (E. N. DA C. A.)

RESORCINOL, one of the three dihydric phenols (*q.v.*), was first obtained by Hlasiwetz and Barth (1864) by the potash fusion of certain natural resins (galbanum, asafoetida, etc.). It crystallises in colourless, odourless plates or rhombic prisms having a sweet taste; it melts at 118° and boils at 178°/16 mm. or at 276·5° C/760 mm. Its specific gravity is 1·2717, and 100 parts of water dissolve 147 parts at 12·5° C. It is an important intermediate in the colour industry and for this purpose is prepared synthetically from benzene. This hydrocarbon is sulphonated with fuming sulphuric acid to benzene *meta*-disulphonic acid and the sodium salt of this acid is heated with caustic soda or potash (2½ parts) containing a little water to 270° C for 8 to 9 hours. The cooled fusion is dissolved in water, acidified with hydrochloric acid and extracted with amyl alcohol or preferably ether. After distilling off the solvent from the extract the resorcinol is obtained by distillation *in vacuo* and purified by sublimation or by crystallisation from benzene. It is also called resorcin, and is m-dihydroxybenzene, $C_6H_4(OH)_2$.

Use in Dye Manufacture.—Resorcinol is largely employed in the manufacture of xanthone dyes. When heated with phthalic anhydride it furnishes fluorescein which on bromination and iodination yields the dyes eosin and erythrosin respectively. It couples with many diazo-compounds giving rise to technically important azo-dyes. Its dinitroso-compound is Fast Green or Alsace Green. Resorcinol serves as a developer in dyeing and printing. By heating with ammonia under pressure resorcinol is converted into *meta*-aminophenol, a dye component, and the substitution of ammonia by the alkylamines and dialkylamines in the autoclave leads to the production of mono- and di-alkyl-*meta*-aminophenols, these substances being essential intermediates in the manufacture of the rhodamine series of colouring matters. (*See* DYES, SYNTHETIC.)

Resorcinol has had varied uses in medicine. It possesses valuable antiseptic properties. In weak solution it is non-irritant to the skin and is used up to 5 or 10% in ointments for chronic skin diseases such as psoriasis, eczema and ichthyosis. Epithelioma and rodent ulcer have been treated with resorcinol ointments and plasters and it is applied locally to condylomata and mucous patches. When formerly employed in the United States as an antiseptic, the dose was 2 to 8 grains. A 2% solution is used as a spray in hay fever and whooping cough. In large doses resorcinol is a poison causing giddiness, deafness, salivation, sweating and convulsions. When applied externally to large surfaces it has proved dangerous and even fatal.

Resorcinol monacetate, prepared by the action of acetyl chloride, is used under the name of euresol in a 10 to 30% acetone solution in the treatment of acne, dandruff, seborrhoea and sycosis.

For the detection of resorcinol the fluorescein reaction is the most delicate. Bromine produces a precipitate of tribromoresorcinol. Formaldehyde in hydrochloric acid gives an insoluble amorphous condensation product with an aqueous solution containing 0·001% of resorcinol.

BIBLIOGRAPHY.—J. C. Cain, *The Manufacture of Intermediate Products for Dyes* (1919), and *The Manufacture of Dyes* (1922); F. Ullmann, *Enzyklopädie der Technischen Chemie,* vol. 9 (1921).

(G. T. M.)

RESPIGHI, OTTORINO (1879–), Italian composer, was born at Bologna on July 9, 1879, and studied at the Liceo of Bologna, at St. Petersburg (Leningrad), under Rimsky-Korsakov, and in Berlin under Max Bruch. In 1913 he was made professor at the Royal Liceo di S. Cecilia in Rome, and in 1923 director. The operas *Semirama* (1910) and *La bella addormentata* (1922) were followed by the successful *Belfagor* (1923), which reflects in the eclecticism of its style the cosmopolitan character of the composer's training. His orchestral music includes the symphonic poems *Aretusa* (1911), *Le fontane di Roma* (1916) and *Pini di Roma* (1924); in the way of chamber music he has written a sonata for violin and pianoforte, and two string quartets, while a "concerto Gregoriana" for violin and orchestra may also be mentioned.

RESPIRATION. The conception of life is so closely bound up with that of respiration that the very word "expiration" has come to connote the extinction of life, and "inspiration" its elevation to a super-human level. Respiration is a process common to all forms of animal life, the reason for which is that the chemical basis of life is essentially an oxidation of tissue. Rightly, we speak of the "flame" of life, for in the body, as in the fire, material is all the while being consumed, with concurrent consumption of oxygen, and the production of carbon dioxide. Respiration consists essentially in the transport of oxygen from the air to the place where the oxygen is used up by the body, and the transport of carbon dioxide from the place where it is produced to the external air. Many animals, of course, live in water; indeed, life presumably began in that medium. But even for them the ultimate source of oxygen is the atmosphere; from it the water acquires fresh stocks of oxygen as the animals which inhabit it use up the gas. The oxygen in water is for the most part in solution, not in bubbles; but in the sea the constant breaking of the waves has a most potent effect in oxygenating the surface layers of the water.

In the most primitive forms of life respiration is very simple. In the amoeba, which is little more than a minute particle of jelly, the respiratory process is carried on in this way: The amoeba lives in water, from the water oxygen soaks into the body of this animalcule, where it is always being used up, and because it is always being so used the potential of oxygen inside the amoeba is always less than the potential of oxygen in the water outside. The oxygen, therefore, by a simple process of diffusion, is ever tending to migrate from the place of higher to that of lower

potential, *i.e.*, from the water to the interior of the amoeba, so a constant stream of gas is maintained. So also with the carbon dioxide; it is produced in the amoeba, from the interior of which it diffuses out, through the surface into the surrounding water.

In the higher forms of life, there is no different principle involved, so far as is known, from that of the amoeba. The apparatus for effecting respiration becomes more complicated, but the actual process is the same, namely, the *diffusion* of gas, oxygen or carbon dioxide from the place of higher to the place of lower potential.

THE SUPPLY OF BLOOD TO THE LUNG

The necessity for some definite system of transport arises partly from the greater size of animals as compared with the amoeba, and partly from the greater intensity of their oxidative processes. The inhabitants of an island a mile square would need no special transport system for the carriage of their fish, but the population of a continent does, and not only the mere machinery for moving the fish but all the accessory apparatus of cold storage and the rest for moving it in good condition. Moreover, if the continent be inhabited by persons with an insatiable craving for fish the capacity of the transport system must be correspondingly increased.

In the more lowly organized aquatic animals the system of transport is as follows: A circulation is maintained throughout the animal of fluid which differs little from seawater. At some point, known as the gill, this circulation comes very near to the surface, being only separated from the seawater by the wall of the vessel in which it is coursing. That wall is no thicker than the body of the amoeba, and so the gases, oxygen and carbon dioxide, have no difficulty in diffusing into and out of the circulating fluid. The amount of gas which can be dealt with depends principally on the extent of the surface of circulating fluid that can be exposed at any one time to the water. Therefore, for the purpose of creating the maximal surface, the gills of some creatures take on curious and feathery forms. Such are those of the lobster, which may be seen by breaking away the shell at the side. Indeed, the surface is so great that the water around the gill would be completely denuded of oxygen were there not a special mechanism for ensuring a constant circulation of fresh water, carrying a continuous supply of oxygen-charged water over the surface of the gill feathers.

The gill system of the lobster exhibits the principles on which the respiratory systems of almost all the higher animals are based, *i.e.*, the exposure of a large surface of fluid which circulates in the animal (the blood) to a corresponding large surface of either air or water which is constantly being replenished. The oxygen-containing medium and the circulating blood are not in actual contact, but are separated from one another by a membrane through which the oxygen (and carbon dioxide) must diffuse. One section of the animal kingdom has attempted a respiratory system on different lines, namely, the insects. In them the air is piped all over the interior body to, or almost to, the actual functioning cells. There is no intermediary circulating fluid. The whole tissues of the insects are therefore permeated by an elaborate system of tubes, the tracheae, with walls stiff enough to prevent their collapsing. The tracheal tubes are often extremely narrow in bore. This system has grave limitations. The rate at which gases can diffuse along very fine tubes is very slow, and sufficient oxygen can only penetrate, therefore, for a short length. No portion of the insect, therefore, can be far removed from the external air, and for that reason all insects are small; the largest development of which they seem capable is that of the dragon.fly, which has a relatively long but extremely attenuated body. Developmentally the insects are side-tracked.

To return to the normal line of development, the principles of respiration are simply portrayed in such an air breathing animal as the newt (fig. 1*a*). Imagine a grape with a tubular stalk and with air inside the skin instead of fruit, and you have something like the lung of the newt. In the substance of the wall the blood circulates, a large surface being exposed in a close network of capillaries to the air in the lung, which air is intermittently forced in and out of the lung by swallowing movements on the part of the newt, the stalk of the lung (or trachea) being an outgrowth of the gullet.

Leaving for the moment the consideration of the circulating fluid, we may follow two other lines of development: (1) the mechanism for increasing the amount of surface of fluid exposed to air and (2) the mechanism for perfecting the ventilation of the lung.

Mechanism for Increasing Exposed Surface of Fluid.—In the lung of the frog a much larger surface of blood can be exposed than in that of the newt, for the inner surface of the lung is thrown up into ridges, called septa. These again give rise to secondary and even tertiary septa, as is shown in fig. 1*b*. All these septa are richly supplied with blood capillaries.

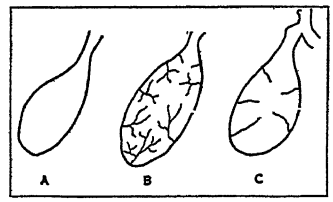


FIG. 1.—SCHEMATIC REPRESENTATION OF SECTIONS THROUGH LUNGS (A) Lung of the newt with no septa, (B) lung of frog showing primary, secondary and tertiary septa, (C) infundibulum of human lung showing primary septa

The lung of the warm blood animals is more complicated still. It may be likened, not to a grape, but to a bunch of grapes—indeed to several bunches of grapes. The unit corresponding to a single grape is called the infundibulum. That corresponding to a bunch the lobule. Each infundibulum is intermediate in structure between the whole lung of the newt and that of the frog. It contains septa, but only primary septa (fig. 1*c*). These divide the margin of the infundibulum into a number of chambers, the alveoli. The interior of the infundibulum is, therefore, a sort of honeycomb, the alveoli corresponding to the cells of the comb; indeed, they are often called the air cells. In microscopical sections of the lung the air cells are cut across in all sorts of quite irregular ways, but the general appearance much resembles that of a section of a rather broken honeycomb (fig. 2).

Before birth the whole lung is folded up, the opposing walls of the air cells are in contact with one another and there is, of course, no air in the lung. Such a lung will sink if thrown into water, in which respect it is in marked contrast to the normal organ. It is one of the abiding mysteries of creation, that, when the new born child expands his lungs for the first time, the whole system of lobulae, infundibula and alveoli unfolds and fills with air. From that time onwards air is always passing into and out of the lung. The quantity taken in at each respiration is called the tidal air and is normally about 300–550 cu.cm. Of this about 150 cu.cm. never goes further than the respiratory passages; the remainder becomes mixed up with the air in the air cells (alveolar air) of which there is, perhaps, three litres in the lung. The following table gives the percentage composition of inspired and alveolar air:—

Component	CO_2	N_2	O_2	H_2O (vapour)
Inspired air . . .	0·04	79	20·94	1
Alveolar air . . .	5·3	74·1	14·4	6·2

There are several ways of measuring the composition of alveolar air. That of Haldane and Priestley consists of blowing with extreme suddenness and force down a rubber tube about 5 ft. in length and about 1 in. in diameter. The air from the respiratory passages passes first along the tube and is washed out by the air from the deeper parts of the lung. If the subject has emptied his lung to the maximum the tube, or at least, the portion next to his mouth will contain pure alveolar air. Immediately after the expiration, the tube is closed with the tongue. To it, about 1 in. from the mouth, is fitted a vacuous sampling tube; by the opening of a tap a sample of the air in the alveolar air tube can be taken into the sampling tube for analysis.

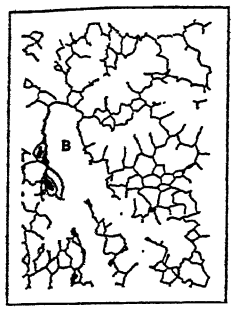
Residual air is the volume of air remaining in the chest after the most complete respiratory effort. It ranges from 1,600–2,100 cu.cm.

Reserve or *Supplemental Air* is the volume of air which can be expelled from the chest after an ordinary quiet respiration—about

1,500 cu.cm.

Complemental air is the volume of air that can be forcibly inspired over and above what is taken in by normal inspiration and is 1,600–2,100 cu.cm.

Vital capacity is the quantity of air which can be expelled from the lungs by the deepest possible expiration, after the deepest possible inspiration. It obviously includes the complemental, tidal and reserve airs. The vital capacity of 73 Air Force pilots in the British army, tabulated by Col. Flack, varied between 5,500 cu.cm. and 2,800 cu.cm. Considerable importance is attached to the vital capacity as an index of the suitability of pilots for high flying. *Vital capacity* is measured by means of a *spirometer*, a graduated gasometer into which air is blown from the lungs.



FROM REPORT OF THE CHEMICAL WARFARE COMMITTEE (H.M. STATIONERY OFFICE)

FIG. 2.—SECTION OF A NORMAL LUNG OF GOAT (B) The termination of a small branchiole

Lung Surface.—The whole surface presented by the walls of all the alveoli of a single human lung has been computed at about 1,000 sq.ft.; over the whole of this there is a compact network of capillaries, spread like a close pattern on a carpet. The blood in this vessel is separated from the air in the alveoli only by a membrane of almost inconceivable thinness.

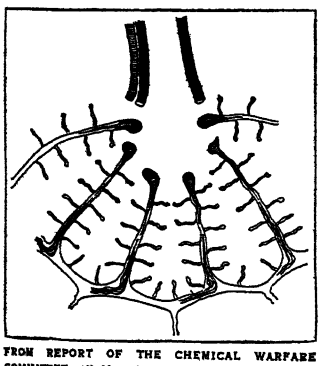
Minute Volume of Blood.—The quantity of blood which reaches the lung in man is variously computed as being from 3–7 litres per minute during rest, and may be increased probably to 20 or 30 litres per minute or even more during exercise and in athletic persons. This blood comes from the right side of the heart, along the pulmonary artery, and parts with about 50 cu.cm. of carbon dioxide per litre in its transit of the lung. Simultaneously it picks up about the same amount of oxygen or rather more.

Provision, therefore, is required for air to ventilate the lung in sufficient quantity to carry off about 250 cu.cm. of carbon dioxide per minute during rest, and to supply about 300 cu.cm. of oxygen. Moreover this oxygen must be contributed without so far depleting the air itself as seriously to reduce the rate of diffusion.

In practice, the level of carbon dioxide in air of the alveoli is not allowed to rise above 5·5%, nor the oxygen to sink below about 14% at the sea level.

THE SUPPLY OF AIR TO THE LUNG

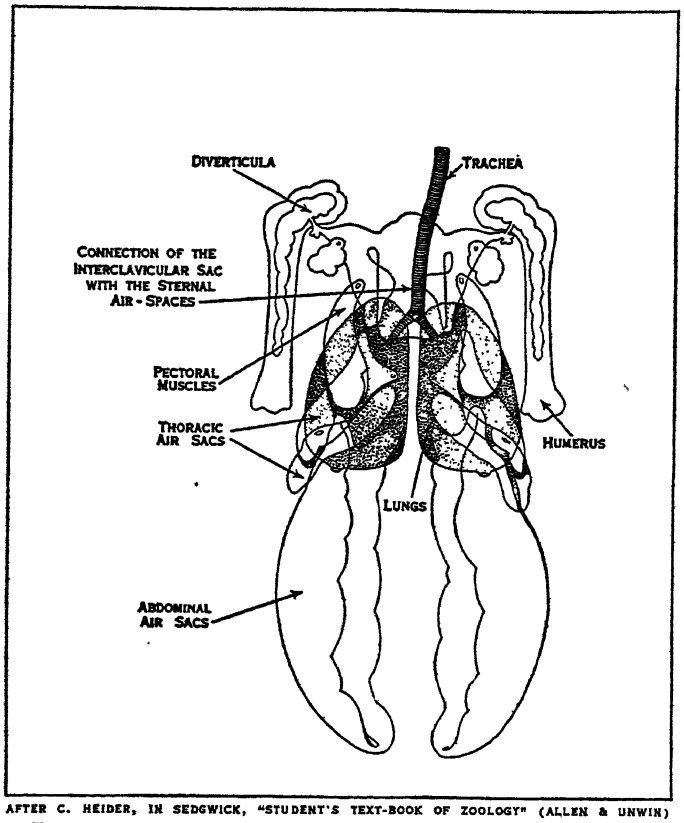
To accomplish these ends a ventilation through the respiratory system of about 7 litres of air per minute must be maintained during rest, which may be increased up to something like 100 litres per minute during violent exercise. The primitive method of ventilation is quite inadequate for the needs of warm blooded animals. The frog carries out the following routine: (1) It fills its mouth with air; (2) closes its nostrils; (3) forces the air in the mouth into the lungs, which become distended; (4) opens the nostrils and lets out the air so that the lung partially collapses. Both the bird and the mammal have invoked the muscles of the body for the purpose of evolving special and efficient mechanisms by which to ventilate the lungs. Their mechanisms are, however, very different, not to say contrary. The bird, like the mammal, possesses a trachea which branches into bronchi, but whereas in the vertebrate each bronchus supplies one lung and that alone, in the birds each bronchus leads not only to a lung but to a series of air sacs which ramify over a great part of the body, even penetrating the bones (see *Diverticula* in fig. 3), which gives an idea of the size and situation of the air sacs. The function of the air sacs appears to the present author to be incompletely understood. The following quotation expresses the state of knowledge on the subject:—



FROM REPORT OF THE CHEMICAL WARFARE COMMITTEE (H.M. STATIONERY OFFICE)

FIG. 2A.—DIAGRAM OF BRONCHIOLAR TERMINATION OR ATRIUM WITH INFUNDIBULA OPENING OFF

"In the bird the chest does not exist as a separate chamber. Expiration is effected by the thoracic and abdominal muscles,



AFTER C. HEIDER, IN SEDGWICK, "STUDENT'S TEXT-BOOK OF ZOOLOGY" (ALLEN & UNWIN)

FIG. 3.—DIAGRAM OF THE LUNGS AND AIR SACS OF THE PIGEON

which compress the thorax and abdomen, driving the air from the air sacs, through the lungs and trachea. Inspiration is effected by the elastic expansion of the thorax and abdomen on relaxation of the muscles; this expansion causes an inrush of air along the

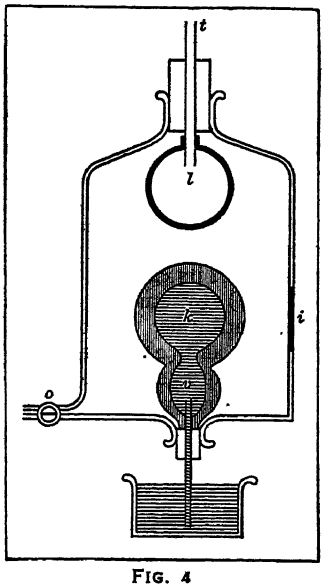


FIG. 4

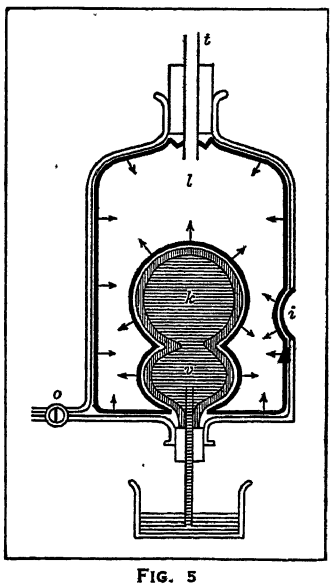


FIG. 5

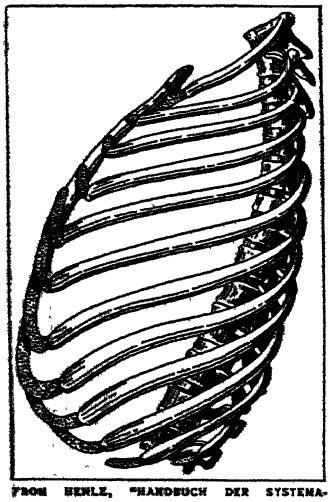
trachea and lungs into the air sacs, the lungs being thus filled with fresh air." The above description, given by Marshall and Hurst, refers to the bird at rest; when flying the movements of the wings probably have an important effect on inflating and deflating the chest.

Mechanics of Respiration.—The mammal has elaborated a very special mechanism for the inhalation and exhalation of air.

By means of the diaphragm the portion of the body cavity which contains the lungs, the heart and the great vessels is shut off from the rest. The thorax is practically a closed box entirely filled by the lungs, heart and other structures contained within it. If we were to freeze a dead body until all its tissues were rigid, and then were to remove a portion of the chest wall, we should observe that every corner of the thorax is accurately filled by some portion or other of its contents. If we were to perform the same operation of removing a part of the chest wall in a body not first frozen we should find, on the other hand, that the contents of the thorax are not by any means in such circumstances bulky enough to fill up the space provided for them. If we were to measure the organs carefully we should find that those which are hollow and whose cavities communicate with the regions outside the thorax are all larger in the frozen corpse than in that which was not frozen. In other words the organs in the thorax are distended somewhat in order that they may completely fill the chest cavity; and the nature of this curious and important condition may best be illustrated by the simple diagrams figs. 4 and 5 (from Hermann's *Physiologie des Menschen*) where *t* is the trachea, *l* the lung, *v* the auricle of the heart, *k* the ventricle, *i* an intercostal space with its flexible membranous covering. When the interior of the vessel is rendered vacuous by exhaustion through the tube *o*, the walls of the lungs and heart are expanded until the limits of the containing vessel are accurately filled, while all flexible portions of the walls of the vessel (corresponding to the intercostal membranes of the diaphragm of the thorax) are sucked inwards.

From this description it follows that the lungs, even when the thorax is most contracted, are constantly over-distended, and that when the cause of this over-distension is removed, the lungs, being elastic, collapse. It further follows that if the thorax is dilated, the flexible hollow organs it contains must perforce be still more distended—a distention which, in the case of the lungs, is followed by an indrawing of air through the trachea in all cases where the trachea is open. Thus, as the act of respiration is primarily a dilatation of the thorax, the part played by the lungs is, as Galen knew, a purely passive one.

How is dilatation of the thorax effected? It has been pointed out that the rib-planes decline from the horizontal in two directions, viz., from behind forwards, and from the antero-posterior mesial plane outwards; a glance at fig. 6 will make this double sloping clear to the reader. It has, moreover, been explained that the diaphragm arches upwards into the thorax in such a manner that the lateral parts of the arch are vertical and in contact with the inner face of the thoracic walls. This being the structure of the thorax, the enlargement of its cavity is brought about (1) by raising the rib-planes until they approach the horizontal, and (2) by depressing the diaphragm and making its rounded dome more cone-like in outline. A moment's consideration will show how these actions enlarge the boundaries of the thorax.



FROM HENLE, "HANDBUCH DER SYSTEMATISCHEN ANATOMIE" (VIEWEG & SOHN)

FIG. 6.—DIAGRAM SHOWING SLOPE OF RIBS

Nervous Mechanism of Respiration.—The chest, then, for purposes of respiration, consists of a box which dilates and contracts rhythmically; the actual rhythm is supplied by the nervous system. Physiologists are not agreed as to the precise rôle which the brain plays, but the following conception has much to recommend it. There is in the medulla oblongata a "centre," *i.e.*, something analogous to a telephone exchange from which rhythmical messages pass down the nerves which connect it with the muscles of respiration. The principal nerves in question are the phrenic (4th cervical) nerves which supply the diaphragm and the intercostal nerves which supply the intercostal muscles. If the mechanism consisted merely of this centre and the motor nerves which it operates, respiration would be of a very curious type; for, apart from controlling influences, the natural rhythm of the centre is one which produces a series of gasps at slow intervals. Pursuing the analogy of the telephone exchange, the particular centre immediately responsible for the primitive gasping type of respiration, and known as the "respiratory" centre, is of the nature of a local exchange and is governed by two other centres in the brain, each of which modifies the natural gasping rhythm. One such centre imparts an inspiratory bias to the gasping rhythm, so that the respiration of an animal possessing these two centres, and these only, consists of infrequent respiratory efforts between which the lung is distended and therefore full of air. The third centre in the brain imparts the smoothness and a rate which gives respiration a more normal character.

Even so, there are other influences which conspire to impart the usual rhythm to breathing. They come from without the central nervous system, and the most important of them arrive from the lung itself, along the vagus nerve.

As has been shown by Hering and Breuer, and by Head, at each phase of respiration a message is sent from the lung up the vagus. The precise nature of this message is unknown, whether it merely demands the termination of that particular phase, or whether it demands the initiation of the next, or both, is uncertain; the certain thing is that the change from inspiration to expiration (and vice versa) which would take place in time apart from vagus influences, is accelerated by them, so that respiration is more rapid and less deep with the vagi intact than with them cut. Animals will, however, live for a long time without their vagi, and when they die it is not because the power of respiration is deficient. Of the other nerves which lead to the brain, that which most influences respiration is the fifth cranial nerve, as is shown when strong ammonia is placed beneath the nose. The sensory nerves from almost any part of the skin, too, can influence respiration, as when cold water is suddenly dashed on to the surface of the body.

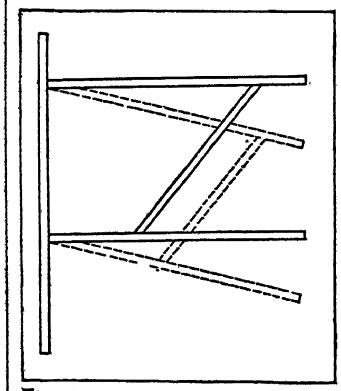


FIG. 7.—MODEL OF PAIR OF RIBS

Types of Respiration.—The visible characters of respiration in man vary considerably according to age and sex. In men, while there is a moderate degree of upheaval of the chest, there is a considerable, although not preponderating, degree of excursion of the abdominal walls. In women the chest movements are decidedly most marked, the excursion of the abdominal walls being comparatively small. Hence we may distinguish two types of respiration, the costal and the abdominal, according to the preponderance of movement of one or the other part of the body wall. In forced respiration the type is costal in both sexes, and so it is also in sleep. The cause of this difference between men and women has been variously ascribed (*a*) to constriction of the chest by corsets in women, (*b*) to a natural adaptation to the needs of childbearing in women, and (*c*) to the greater relative flexibility of the ribs in women permitting a wider displacement under the action of the inspiratory muscles.

In healthy breathing the mouth should be closed and the ingoing current should all pass through the nose. When this happens the nostrils become slightly expanded with each inspiration, probably by the action of the M. dilatores naris. In some people this movement is hardly perceptible unless breathing be heavy or laboured. As the air passes at the back of the throat behind the soft palate it causes the velum to wave very gently in the current; this is a purely passive movement. If we look at the glottis or opening into the larynx during respiration, as we may readily do with the help of a small mirror held at the back of the throat, we may notice that the glottis is wide open during inspiration and that it

becomes narrower by the approximation of the vocal chords during expiration. This alteration is produced by the action of the laryngeal muscles. Like the movements of the nostril, those of the larynx are almost imperceptible in some people during ordinary breathing, but are very well marked in all during forced respiration.

GASEOUS EXCHANGE

The extent of gaseous exchange in man varies greatly with the size and age of the person, the degree of activity, etc.

	O_2 consumption in cu. cm. per min. at 0° C and 76 mm. (Haldane)	CO_2 production in cu. cm. per min. at 0° C and 76 mm. (Haldane)	Litres of air breathed per min. at 37° C, moist and at the prevailing barometric pressure
Rest in bed . . .	237	197	7·67
Rest—standing . . .	328	264	10·4
Walking on grass:			
2 miles an hour . .	780	662	18·6
3 " " " . .	1,065	992	24·8
4 " " " . .	1,595	1,398	37·3
4½ " " " . .	2,005	1,788	46·5
5 " " " . .	2,543	2,386	60·9

The absolute minimum of oxygen consumption for any person is known as the basal metabolism and is that which takes place when the person is at rest in bed some ten hours after a meal. The basal metabolism in persons of different size, but otherwise comparable, varies not proportionately to the weight but to the body surface (*see* ANIMAL HEAT) and is therefore expressed in calories (*i.e.*, in units of heat produced) or in oxygen consumed per square metre of body surface per hour.

The basal metabolism varies with age, thus:

Mean age (years)	Basal metabolism per sq. metre per hour	
	Calories	Oxygen used litres (approx.)
6.	57·5	11·7
12·6	50·4	10·3
13·7	49·4	10·1
16·5	43	8·73
19·25	40·7	8·30

In warm blooded animals the total ventilation varies with the size of the organism, being more intense the smaller the creature.

	Man	Goat	Rabbit	Guinea pig	Rat	Mouse
Total ventilation in litres per kg. per minute	·1	·2	·4	·6	1·5	5·1

The reason is as follows: The capacity for heat loss depends upon the superficial area of the animal. The heat production naturally must equal the heat loss; therefore the heat production must also vary with the superficial area, *i.e.*, in some way proportionally to the square of the linear dimensions on the animal. The weight, however, bears in proportion not to the square but to the cube; therefore, as the animal gets larger its area becomes relatively less proportionally to its weight, *i.e.*, the heat production, and therefore the degree of oxidation per gram of animal diminishes as the size increases. If the amount of oxygen required per gram of animal diminishes, the whole mechanism for its supply and therefore the total ventilation will diminish correspondingly.

The exchange of gases in the lung is regarded by almost all authorities as being a process of *diffusion*, the oxygen diffusing from the alveolar air through the pulmonary epithelium into the blood which circulates through the capillaries in the alveolar wall. (The most notable opponents of this view are Dr. J. S. Haldane, F.R.S., and some of those who have been associated with him. His views are fully set forth in his book *Respiration*.) The carbon dioxide likewise is regarded as passing by diffusion out of the blood into the alveolar air.

Transport of the Oxygen.—Oxygen constitutes about 14% of the moist air which fills the pulmonary alveoli and therefore exerts a pressure of a little over 100 mm. of mercury. In order that blood exposed to so low a pressure should carry away any considerable quantity of the gas, it must needs be a fluid possessing very special qualities. These qualities blood owes to the red pigment in the corpuscles—haemoglobin. This material can unite with large quantities of oxygen at a pressure not exceeding 100 mm. of mercury and so leaves the lung charged with oxygen. But what is more remarkable—haemoglobin gives up this oxygen again when exposed to lower oxygen pressures. Thus, at about 30 mm. of mercury the blood surrenders one-half of the oxygen united to it; at 20 mm. it gives up about three-quarters and so on. The curve which represents the relation between the quantity of oxygen united with the haemoglobin in blood, and the pressure of oxygen to which the blood is exposed, is called the oxygen dissociation curve.

There is one synthetic substance which attaches oxygen to itself if exposed to more than a certain critical pressure of that gas and from which the oxygen escapes if the oxygen pressure drops below the critical point—that substance which has recently been discovered by Prof. Moureu is rubrine, a complicated hydrocarbon. Though rubrine and haemoglobin seem to unite with oxygen after a manner not wholly dissimilar and, so far as other oxides are concerned, unique, they are otherwise not at all alike. Rubrine consists of three benzine rings united in a way not at present ascertained. Haemoglobin consists of a protein united with haematin, a substance which contains iron on the one hand and four pyrrol rings on the other. Moreover, it is clear from spectroscopic and other evidence, that the attachment of the oxygen to the haemoglobin has some relation both to the iron and to the pyrrol constitution of the substance. The constitution and properties of haemoglobin are of great theoretical importance because, but for it, the warm blooded animal could never have developed the high degree of vitality which he possesses. Oxygen is so insoluble in water that, apart from haemoglobin, blood could only carry to the tissues about one-sixtieth part of the quantity of oxygen which it does; therefore to maintain oxidation in the tissues at its normal level 60 times as much blood would have to circulate as at present. As the blood already forms one-fifteenth of the weight of the body, without haemoglobin it must needs form four times the weight of the rest of the body—an impossible burden. There are in the lower forms of life some respiratory pigments not altogether dissimilar from haemoglobin. In the blood of some worms, for instance, is found a ma-

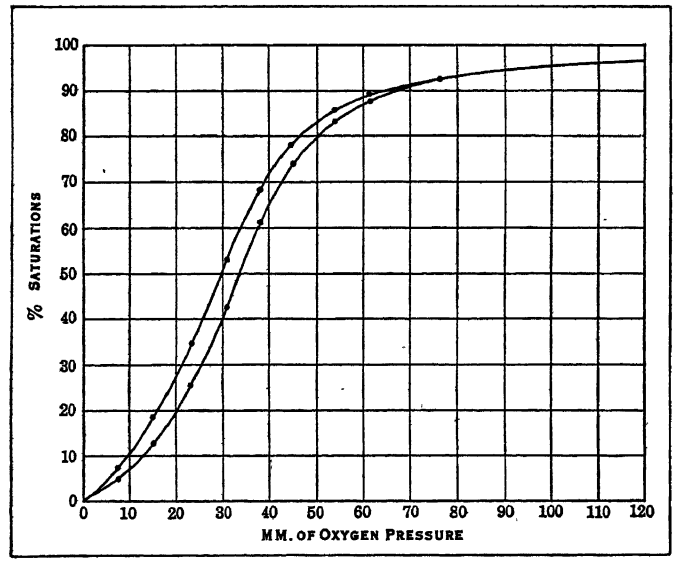


FIG. 8.—OXYGEN DISSOCIATION CURVES—ARTERIAL BLOOD AND VENOUS BLOOD (ADAPTED FROM HALDANE)
Ordinate represents percentage and saturation with oxygen, Abscisse, pressure of oxygen in mm. of mercury

terial chlorocronorin, which is really a form of haemoglobin, but possessed of a somewhat different scaffold of porphyrin. In some of the molluscs is found haemocyanin, also a protein body containing not iron but copper, and which, moreover, contains no porphyrin. These bodies like haemoglobin possess the power of condensing, transporting and yielding oxygen under suitable conditions. The exact affinity of haemoglobin for oxygen is an example of nice adjustment of the conditions under which the haemoglobin is found to the needs of the body. The affinity varies according to the saline concentration of the medium in which the haemoglobin is dissolved, according to the hydrogen ion concentration and according to the temperature. Moreover, there appears to be an assortment of haemoglobins specific to the forms of life in which they are found, and which have affinities for oxygen suitable to those forms of life.

Transport of the Carbon Dioxide.—Carbon dioxide, unlike oxygen, is carried largely in the plasma; a small quantity is in physical solution, but the major portion is in chemical combination as sodium bicarbonate. The relative quantities in solution and in chemical combination regulate the reaction (degree of acidity or alkalinity) of the blood. The equation which connects the concentration of hydrogen ions (*see* HYDROGEN IONS, DETERMINATION OF) c_H to the concentration of carbon dioxide (CO_2) in solution, V_{CO_2} and in chemical combination B_{CO_2} is

$$c_H = k_1 \frac{V_{CO_2}}{B_{CO_2}}$$

It is often expressed logarithmically as:

$$-P_H = Pk_1 + \log V_{CO_2} - \log B_{CO_2}.$$

To say that the carbon dioxide is present chiefly in chemical combination as sodium bicarbonate ($NaHCO_3$) gives but a partial picture of its relation to the blood. Such a combination by itself would be very stable, and while it might provide a medium of suitable hydrogen ion concentration would not present the all-important property of absorbing and parting with large quantities of carbon-dioxide with very little reaction and with very little alteration in the partial pressure of carbon dioxide to which the blood is exposed. This double purpose is achieved by the presence in the blood of other acids, notably haemoglobin, which do not unite with carbon dioxide, but which compete with it for the sodium. The full beauty of the mechanism is only seen, however, when it is realized that haemoglobin is a stronger acid in combination with oxygen than when reduced. Now in passing through the tissues the moment when the blood requires to unite with carbon dioxide is also the moment at which it looses oxygen; at that moment, therefore, the haemoglobin becomes less strongly acid, and a base is therefore liberated with which the carbon dioxide can unite. The reverse series of changes takes place in the lung. As the oxygen unites with the haemoglobin, that material becomes more strongly acid, claims more of the base, and so displaces carbon dioxide, raising the partial pressure of that gas and therefore assisting its diffusion from the blood.

Diffusion of Gases Through the Pulmonary Epithelium.—With this understanding of the chemical processes which enable large quantities both of oxygen and carbon dioxide to pass into and out of the blood, as the result of only very small alterations in the pressure of those gases in the medium to which the blood is exposed, let us return to the proof of the general thesis that the passage of gases through the pulmonary epithelium is due simply to diffusion.

The basal principle of diffusion is that the quantity of gas which passes through a given membrane depends upon the difference of pressure of the gas on the two sides of the membrane. Regarding the lung as a membrane through which gas diffuses, Q being the quantity of oxygen which will pass through it per minute, P the pressure of oxygen in the pulmonary alveoli, T the mean pressure of oxygen in the capillaries of the lung, and k a coefficient depending upon the area and nature of the lung, then

$$Q = k(P-T);$$

k may be defined as the quantity of gas in cubic centimetres which will pass through the pulmonary epithelium per minute, with a difference of pressure of 1 mm. of mercury between the oxygen on the two sides of the membrane.

If the diffusion theory is correct, then not only must P be always greater than T, but their relations must be such as to allow of quantities of oxygen ranging from 200 cu.cm. at rest to perhaps 3,000 during extreme activity, being driven through the pulmonary epithelium per minute. As all the quantities Q, k, P and T are susceptible of independent measurement, it should be possible to form a judgment of the applicability of the equation. The simplest case is the condition of rest. The following measurements of k are given for 11 men, all of good physique at rest.

DIFFUSION COEFFICIENT OF LUNG CU.CM. OF O_2

Individual .	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
D. C. of L.	25	32	36	38	42	43	43	43	45	45	65

Assuming that each of these men was absorbing 250 cu.cm. per minute, the mean difference of pressure $(P-T)$ between the oxygen in the alveolar air and capillary blood would have to be

MEAN DIFFERENCE OF PRESSURE IN MM.

Individual .	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Mean . .	10	8	7	7	6	6	6	6	6·5	5·5	4

These figures lead to the conclusion that at rest the pressure of oxygen in the alveolar air exceeds the average pressure in the capillary blood by about 6 mm. of mercury in the majority of well-developed persons. The average pressure in the capillaries is, of course, less than the pressure in the arteries and greater than that in the veins. Other data known concerning the individuals on whom these experiments were made lead to the conclusion that 6 mm. for the value of $(P-T)$ when Q is 250 cu.cm. may likely enough be correct. Greater difficulties arise when Q becomes, say, 2,500 cu.cm. during degrees of activity of which probably all the above persons would have been capable. If the diffusion coefficient still remains on the average 40 cu.cm. the value of $(P-T)$ would become 62·5 mm. It is hardly possible that the pressure of oxygen in the lungs should exceed the average pressure in the capillaries by so great an amount. We are therefore thrown back upon the position that in violent exercise the diffusion coefficient must alter, and there seems little doubt that an alteration on a sufficient scale takes place.

The Regulation of Respiration.—When active exercise is taken both the depth and the rate of respiration are as a rule increased. The increase is effected by one or both of two mechanisms; of these the first to be considered is nervous, the second chemical. The nervous factor in the regulation of respiration has been well illustrated by the following experiment, devised by Krogh and Lindhart. The subject is placed on a bicycle ergometer of a special type, *i.e.*, a bicycle which, instead of progressing, is made to work against a brake, the actual work done being measured by the brake. In this case the brake was an electromotor, the resistance to the worker and hence the work which he performed in overcoming it could be regulated by adjustment of the current passed through the motor. When work was commenced there was an immediate increase in the rate of depth of respiration and also in the pulse rate. Had these alterations been due to the stimulating action of chemical products formed in the muscle on the respiratory centre, enough time must have elapsed to allow of the products being taken up by the blood, carried to the heart, passed through the lungs and driven to the brain. These processes would have occupied upwards of half a minute. In point of fact, the augmentation of respiration came about much more quickly—in about five seconds from the commencement of the exercise. An even more striking experiment of the same sort was the following: The apparatus being as before the subject was lead to suppose that the load on the machine (and consequently the exercise he was to take) was to be suddenly and largely increased by throwing in a powerful current. Actually the current was not thrown in, though the pantomime of closing the switches,

etc., was gone through. The pulse and respirations were augmented as before, though no extra work was done by the subject. Clearly, therefore, the increased respiratory efforts were not due to chemical products produced by the work.

The chemical regulation of respiration was first clearly set forth by Haldane and Priestly, the demonstration of it following immediately on their discovery of a satisfactory method of determining the composition of alveolar air. The essential point emerged that at various altitudes which ranged between that of the top of Ben Nevis and the bottom of the Dolcoath mine, although the percentage of carbon dioxide in the alveolar air alters, the percentage becoming lower as the barometric pressure increases, the actual partial pressure of carbon dioxide in the alveoli and hence the concentration of that gas in the blood remains at such altitudes almost unchanged. This constancy of the pressure of carbon dioxide in the alveolar air means that the greater the barometric pressure the more the carbon dioxide produced by the body is diluted in the lung. As the carbon dioxide produced by the body is approximately constant in amount, the total ventilation of the lung, and hence the respiratory efforts must be greater the higher the barometer and the lower the altitude. Any effort to increase the carbon dioxide pressure in the blood, as by inhaling carbon dioxide or shedding it into the blood as the result of muscular exercise, has the effect of stimulating the respiratory centre and increasing the respiratory efforts more especially as regards the depth of respiration.

Controversy has ranged round the question of whether carbon dioxide is a specific stimulus to the respiratory centre, or whether its presence in the blood acts indirectly and, by increasing the concentration of hydrogen ions, stimulates the centre; the hydrogen ions and not the carbon dioxide acting as the stimulus. In favour of the latter view is the fact that after violent exercise, when the hydrogen ion concentration of the blood is increased and concentration of carbon dioxide diminished (lactic acid being present in considerable quantities), breathing may still be very laboured. It is certain also that, as shown by Winterstein, the administration of other acids to animals will cause dyspnoea (laboured breathing). On the other hand, other acids do not produce at all so striking an effect as carbon dioxide.

It is probable that CO_2 does act not specifically but by virtue of its power of increasing the hydrogen ion concentration in the brain; and that its potency in this respect is due to the ease with which it diffuses from the blood into the tissue of the brain itself. It is ultimately the hydrogen ion concentration inside the nerve cells which constitute the respiratory centre which would affect their stimulation—a fact which has been stressed by Gesell. According to his conception, if the activity of the respiratory centre is heightened as the result of nervous impulses playing upon it, the cells themselves will work harder, produce more CO_2 and undergo a sort of secondary stimulation. In the language of wireless, the original nervous stimulus will be "amplified." Similarly, if the carbon dioxide in the blood be increased, that produced by the cells will be unable to escape and will stimulate the centre.

In the above description it has been assumed that the irritability of the cells, *i.e.*, the degree of response which any particular stimulus will provoke, remains constant. This is not so in all circumstances. Many drugs, such as morphia, depress the centre, but the most interesting case of altered irritability of the centre is that of oxygen want (*see* ANOXAEMIA). If the respiratory centre be insufficiently supplied with oxygen over considerable periods of time the irritability is heightened, a given amount of exercise will then produce a much greater degree of breathlessness than it evokes in normal circumstances.

Temperature has an important effect upon respiration. This is less marked in man than in animals, which do not sweat; if the dog or goat, for instance, lies in the sun, shortly the respiration will become very rapid and shallow, a great volume of air will pass in and out of its respiratory passages, but the amount of air which ventilates the alveoli is not correspondingly increased. This alteration in the type of respiration (tachypnoea) may, in part, be due to rise in the temperature of the blood. If this blood, as it passes through the carotid artery to the brain be warmed, tachypnoea results. But tachypnoea is probably also helped by a reflex nervous mechanism initiated by the actual heating of the skin, for it is claimed that the temperature of the blood may even be lowered. The purpose is clear. The heat loss is, of course, proportional to the amount of aqueous vapour which leaves the body, and the aqueous vapour in its turn is roughly proportional to the total ventilation. Therefore, by establishing a large total ventilation the body temperature is kept from rising, but if there were also a large alveolar ventilation the loss of carbon dioxide would be too great, the respiration being, however, shallow the alveolar ventilation is not greatly increased.

Tissue Respiration.—The ultimate object of respiration is to supply each tissue in the body with the oxygen required, and to carry off the carbon dioxide produced. Different tissues require very different quantities of oxygen, and even the requirements of the same tissue vary greatly according to the degree of activity which they exhibit. Speaking generally, the tissues which show the highest basal metabolism are those which contain the greatest amount of nuclear tissue. Thus glandular organs for the most part have a resting metabolism of from ·05—·01 cu.cm. per gram per minute, while muscle at rest has an oxygen requirement in the next decimal place. The figures below refer to the dog or cat under anaesthetic conditions.

	Oxygen requirement per gram of resting organ per minute
	cc.
Suprarenal gland	0·045
Submaxillary gland	0·03
Pancreas	0·03
Kidney	0·03
Intestines	0·02
Liver (fasting animal)	0·02—0·01
Voluntary muscle	0·003
Unshaped muscle	0·004
Heart	0·007

The exchange of gases between the capillaries and the actual tissue cells is the converse of what takes place in the lungs; oxygen leaves the blood and passes into the tissues; carbon dioxide leaves the tissues and passes into the blood. As there is not known to be any mechanism other than diffusion for effecting this transference, it follows that the oxygen pressure in the tissues must be lower than that in the venous blood, and the carbon dioxide pressure higher.

The pressure of oxygen in the tissues is regulated by (1) the rate at which oxygen is being used, and (2) the rate at which it is being supplied. The former depends upon the activity of the organ, the latter on nature of the blood supply, *i.e.*, the quantity of blood which circulates through the organ, the surface which it presents in the capillaries, and the pressure of oxygen which exists in the capillary blood. All these factors are subject to considerable variations. The mean oxygen pressure in the capillary blood being perhaps the least inconstant, and being in the region of 40 mm. of mercury. The variations in oxygen consumption in various organs are very great. In skeletal muscle the oxygen used per gram of muscle per minute varies from 0·003 to 0·08 cu.cm. The mechanism by which the quantity of blood to organs is regulated is discussed in VASCULAR SYSTEM.

The variations in the surface which the blood presents have been investigated recently by Krogh; in the resting organ relatively few of the capillaries are open; as the activity of the organ increases the number of open capillaries increases also, so that the surface of blood from which diffusion can take place is very much increased. Information on the subject of what happens to the oxygen when it arrives in the cell is still rather obscure, but much work has been carried out since the World War and the following statements may perhaps be made:

(1) As a model the following reaction may be considered: In the presence of a ferrous salt (A) and hydrogen peroxide (B) the oxygen of the air will oxidize butyric into aceto-acetic acid.

(2) In potatoes in the presence of some substance A, which plays the same rôle as a ferrous salt and which is precipitable by alcohol, a lecithin-like substance is turned into a peroxide B which in air will oxidize, guiacum turning it blue. The lecithin-like substance is not precipitated by alcohol. The substance A is called a *peroxidase,* the substance forming B is called an *oxygenase,* or auto-oxidizable substance. The associate *oxygenase* and peroxide are together called an *oxidase system.* This type of system seems to exist in many vegetable cells.

(3) A material glutothione was discovered by Hopkins in 1921 in most animal and some other tissues. This material is probably capable of forming hydrogen peroxide and so playing a rôle similar to an oxygenase. Certain material contents of the animal cell known as "thermostable tissue residues" which are only oxidized very slowly in air, become oxidized rapidly if a little glutothione be added.

(4) Peroxidases are present in most animal tissues; of these one called cytochrome is known in some detail. It contains iron and is nearly related to the haemoglobin of blood.

THE RESPIRATION OF INJURIOUS ATMOSPHERES

Carbon Dioxide.—Until within recent years it was supposed that carbon dioxide was harmful when inhaled even in small quantities. In any but the most recent textbooks the estimates of the quantity of air necessary for the efficient ventilation of a room are based on the assumption that the carbon dioxide present must not rise above a certain level. The figure usually given is 0·1%. This rule is probably not a bad one, but it is now known that carbon dioxide in such small quantities is quite innocuous and even in much greater quantities would have to be breathed before an injurious level was reached. Men can inhale 5% for some hours without suffering from much more than discomfort, and untutored persons would not be conscious of the presence of 2% of carbon dioxide in the air if it were otherwise pure.

The rule that the air of dwelling rooms should not contain more than 0·1% carbon dioxide is therefore useful, because air laden beyond that limit with carbon dioxide is also probably laden with other things to an injurious degree.

Meaning of "Ventilation."—Indeed the connotation of the word "ventilation" has been rendered somewhat vague by the more recent discoveries of science. If the use of the word be stretched to cover such sources of health as may be secured by the practice of opening the window, there are at least four such. (1) The removal of aqueous vapour; (2) the movement of air over the skin; (3) the removal of germs, and (4) the admission of ultra-violet rays of light.

Considering the above points, the benefits of ultra-violet rays are treated elsewhere (LIGHT and RADIATIONS in relation to health). Here it is only necessary to say that ordinary window glass is relatively opaque to ultra-violet light and even specially manufactured glasses are often much less penetrable than is the open window. The beneficial effects of changing the air in a room on the disposition of germs has been demonstrated beyond dispute by experiments carried out by Leonard Hill. He dissipated a certain number of germs into a room with the windows shut; 20 min. later he exposed a plate of gelatine and found on it 39 germs. On a second occasion he dissipated the same number of germs into the room, opened the windows, and on exposure of the plate after 20 min. only one germ settled on it.

The advantage of keeping the air in motion may be illustrated by the following experience. On two successive days (on each of which the outside air was hot and still) a small over-crowded room was occupied for 8 hours by 11 typewriting clerks at work, a doctor and two experimenters. On the first day all avenues of ventilation were as far as possible closed, the chimney stuffed up, curtains put over the doors, etc., but the air in the room was actively circulated by electric fans. The percentage of carbon dioxide rose to about 2%. On the second day the fans were not in motion, but panes were abstracted from the windows. Chemical analysis showed that the air, though still, was pure. The stenographers who were unaware of the point of the experiment agreed that the conditions were more tolerable the first day than the second, and examination of their work bore out that statement. The benefits of movement are probably due to two causes: (1) the actual stimulating effect of moving air passing over the skin, and (2) the fact that moving air evaporates moisture from the skin much more readily than still air. The relative importance of these factors probably differs much in different persons. The moral of the above experiment is not to disparage purity. It is to emphasize the necessity of combining purity with movement.

Carbon Monoxide and Coal Gas.—For the theory of carbon monoxide poisoning see ANOXAEMIA and BLOOD. Here it need only be said that the following are given as the percentages of carbon monoxide in the air which must be inhaled to produce the results stated.

Time and concentration	=	300 or less, no perceptible effect
,, ,, ,,	=	600, a just perceptible effect
,, ,, ,,	=	900, headache and nausea
,, ,, ,,	=	1,500, dangerous.

In the above table time is measured in hours and the concentration in parts of carbon monoxide per million of air. The figures assume that the subject is at rest and inhaling about seven litres of air per minute. If he is active and therefore inspiring greater quantities of air, the time necessary to produce death or unconsciousness is cut down directly in proportion to the magnification of the quantity of air breathed per minute.

In practice it is not easy to attain the concentrations of carbon monoxide necessary to produce fatal results. The experiments of Haldane have shown that the walls of ordinary dwelling rooms are quite permeable to the gas. This fact, together with the gradual movement of air, even through ill-ventilated rooms, as a rule prevents dangerous concentration of carbon monoxide being maintained, even where there is a slight escape of gas.

High Atmosphere Pressure.—Where men work under water at considerable depth, it is necessary to supply them with air at a pressure as great as, or greater than, the combined pressure of the atmosphere and of the water under which they are working. Unless the pressure be very high this in itself has no injurious effects and men may go confidently and quickly into such pressures; great care, however, must be exercised in emerging from a high atmospheric pressure into a normal one. The danger is due to the nitrogen dissolved in the blood. The quantity of this gas held in solution in the blood depends upon the pressure of oxygen to which the body is exposed. Normally, each litre of blood holds about 15 cu.cm. of nitrogen; at depths of 33 ft. under water the pressure of air in the diving apparatus would be two atmospheres, in which case each litre of blood would hold 30 cu.cm. of gas in solution. As the gas is not removed by the formation of any chemical compounds with other materials in the body, when the pressure is lowered it forms minute bubbles of nitrogen in the plasma. These bubbles when carried to the capillaries form emboli. Indeed, the danger is not confined to the blood, for if the worker be long enough exposed to the high pressure, all juices which permeate all the tissues of the body become charged with abnormally large quantities of nitrogen which, when the pressure is reduced, renders itself evident by the formation of small bubbles. These appear in many situations in the body, notably in nerve cells in the brain and elsewhere. Such bubbles are the cause of the condition known as "bends" associated with pain and paralysis, which may be even fatal.

Chlorine.—The inhalation of chlorine in concentration of more than one part per million of air for an indefinite period is dangerous; for half-an-hour the maximum allowable is four parts per milion; 40 to 60 even for short periods is dangerous. Chlorine is typical of a number of gases which produce inflammation of the lungs, death being due not directly to the gas, but to asphyxia. It is of particular historic interest as being the first gas used on a large scale as a lethal weapon in war; clouds of the gas being liberated from cylinders in the German lines were carried by the favourable wind over to the lines of the Allied armies, where it produced the most devastating effect. More potent asphyxiants than chlorine, but much less used in commerce, are phosgene

and chloropicrin. Other gases which act similarly are sulphuretted hydrogen, sulphur dioxide, nitrous acid and acid fumes.

Other Gases Having Deleterious Effects.—*Hydrocyanic or Prussic Acid* is much used for the fumigation of passenger steamers in port; for while poisonous to practically all forms of animal life, including vermin, it does not attack paint work. It is invisible and though it has a distinctive odour, the nose rapidly becomes deadened to the smell, so that persons may easily walk into stronger concentrations of the gas, being deceived by his nose into the idea that he is walking out of it. When the ship is opened up after fumigation particular care must be taken that fatal concentrations of the gas do not remain in pockets. Canaries are much more sensitive to HCN than men, and may be used to detect the gas.

Aniline, Nitrobenzine and other bodies which contain NH_2, NO, and NO_2 groups, are met with in the dye industry and in the manufacture of explosives; their action is to appropriate the haemoglobin of the blood, turning it temporarily into methaemoglobin. (*See* ANOXAEMIA.) The following table gives an idea of their toxicity.

	Parts per million of air		
	Nitrobenzine	Aniline	Toluidine
Slight symptoms after several hours exposure. Maximum amount that can be inhaled for 1 hour without serious disturbance . . .	0·2–0·4 1·0	7·0–26·0 105–170	6–23 91–140

Sulphides of Arsenic, Phosphorus and Hydrogen.—*Arsene* sometimes contaminates the air in the vicinity of storage batteries, for the charging of which impure sulphuric acid is being used. Thus in submarines whole crews may be affected. The poison is a cumulative one; small quantities inhaled accumulate in the body until a toxic concentration is reached. *Phosphine* is evolved when water acts on calcium phosphide and is used as an illuminating gas, in buoys, etc. *Hydrogen sulphide* may contaminate the air in chemical works, but is more frequently the cause of accident in sewers, where sewer gas may accumulate in pockets. Toxicity:

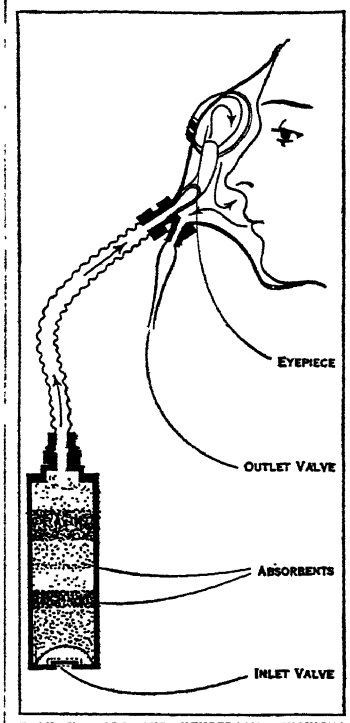
	Parts per million parts of air		
	Arsine	Phosphine	Hydrogen sulphide
Maximum amount which can be inhaled for one hour	50	100–200	200–300
Rapidly fatal . . .	250	2,000	1,000–3,000

Dichlordiethylsulphide—the so-called "mustard gas" or "Yperite"—was by far the most devastating gas used in the World War. It owed its potency largely to the fact that it was extremely indestructible, contaminating the ground and giving off small quantities of vapour which, if breathed for long periods of time, produced an inflammation of the respiratory passages which was either itself fatal or was liable to doom the lung to subsequent infection by bacteria. This gas also caused intense inflammation of the eyes and blistering of the skin.

Toxic Smokes such as dichlorarsine and dicyanarsine which when inhaled caused intense irritation of the nose and throat, leading to uncontrollable fits of sneezing and coughing, were also used as shell fillings in the World War.

Respirators.—Both in war and in industry the entry of poisonous gases into the respiratory system is prevented by the use of respirators. These are of two general types:

1. *The oxygen breathing set* consists of an air-tight mask (*a*) connected to a cylinder supplying oxygen; and (*b*) containing a cartridge of soda-lime or some other absorbent of carbon dioxide. The whole apparatus is self-contained, so that the subject has not and need not have access to the outer air. This form of apparatus is particularly useful in atmospheres containing carbon monoxide, *e.g.*, the air in mine galleries after an explosion, and is indispensable to rescue parties.



FROM HAGGARD AND HENDERSON, "NOXIOUS GASES" (CHEMICAL CATALOG CO.)

FIG. 9.—GAS MASK IN SECTION

2. In various forms of respirators the mask is attached to a canister containing some chemical absorbent. The outer air is inhaled during inspiration, but on its way this air is filtered through the absorbent and so rid of the poisonous principle. The expired air passes out from the mask through a valve. Naturally the absorbent employed depends upon the nature of the poison to be met.

BIBLIOGRAPHY.—E. H. Starling, *Principles of Human Physiology* (1912; 4th ed., 1926); J. Barcroft, *The Respiratory Function of the Blood* (1914; 2nd ed. 1925); J. S. Haldane, "Respiration," *Silliman Memorial Lectures* No. 14 (New Haven, 1922); L. E. Hill, *Sunshine and Open Air* (1924; 2nd ed., 1925); J. C. Meakins and H. W. Davies, *Respiratory Function in Disease* (1925); C. A. L. Evans, *Recent Advances in Physiology* (1925; 2nd ed., 1926); Y. Henderson and H. W. Haggard, *Noxious Gases and the Principle of Respiration Influencing their Action* (1927). *See* also Medical Research Council, "The Medical Problem of Flying," Rep. No. 53 (H.M.S.O., 1920), and "The Acid-Base Equilibrium of the Blood," Rep. No. 72 (H.M.S.O., 1922). (J. BAR.)

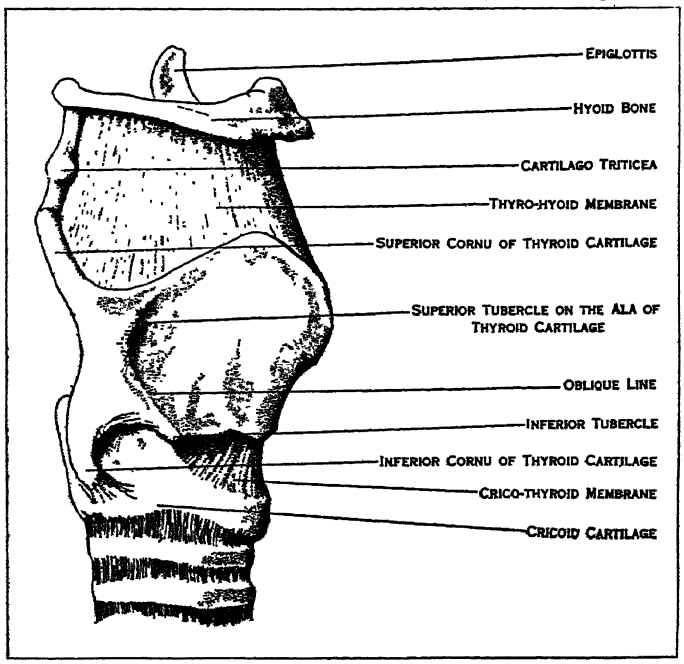
RESPIRATORY SYSTEM, ANATOMY OF. The respiratory tract consists of the nasal cavities, pharynx, larynx, trachea, bronchi and lungs. For the first two parts *see* OLFACTORY SYSTEM and PHARYNX.

Larynx.—The *larynx* is the upper part of the air tube specially modified for the production of notes of varying pitch, though it is not responsible for the whole of the voice. Its framework is made up of cartilages which are moved on one another by muscles, and it is lined internally by mucous membrane. The larynx is situated in the front of the neck and corresponds to the fourth, fifth and sixth cervical vertebrae. For its superficial anatomy *see* ANATOMY, *Superficial and Artistic.*

The *thyroid cartilage* is the largest in the larynx and consists of two plates or *alae* joined in the mid-ventral line. At the upper part of their junction is the *thyroid notch* and just below that is a forward projection, the *pomum Adami* ("Adam's apple"), best marked in adult males. From the upper part of the posterior border of each *ala* the *superior cornu* rises up to be joined to the tip of the great cornu of the hyoid bone by the *lateral thyro-hyoid ligament,* while from the lower part of the same border the *inferior cornu* passes down to be fastened to the cricoid cartilage by the *crico-thyroid* capsule. From the upper border of each ala the *thyro-hyoid membrane* runs up to the hyoid bone, while near the back of the outer surface of each the *oblique line of the thyroid cartilage* runs downward and forward.

The *cricoid cartilage* (*see* figs. 1 and 2) is something like a signet ring with the seal behind; its lower border, however, is horizontal. To the mid-ventral part of its upper border is attached the mesial part of the *crico-thyroid membrane,* which attaches it to the lower border of the thyroid cartilage; the lateral parts of this membrane pass up internally to the thyroid cartilage and their upper free edges form the true *vocal cords.* On the summit of the signet part of the cricoid are placed the two *arytenoid cartilages* (*see* fig. 2), each of which forms a pyramid with its apex upward. The base articulates with the cricoid by a concave facet, surrounded by the *crico-arytenoid capsule,* and the two arytenoids can glide toward or away from one another, while each can rotate

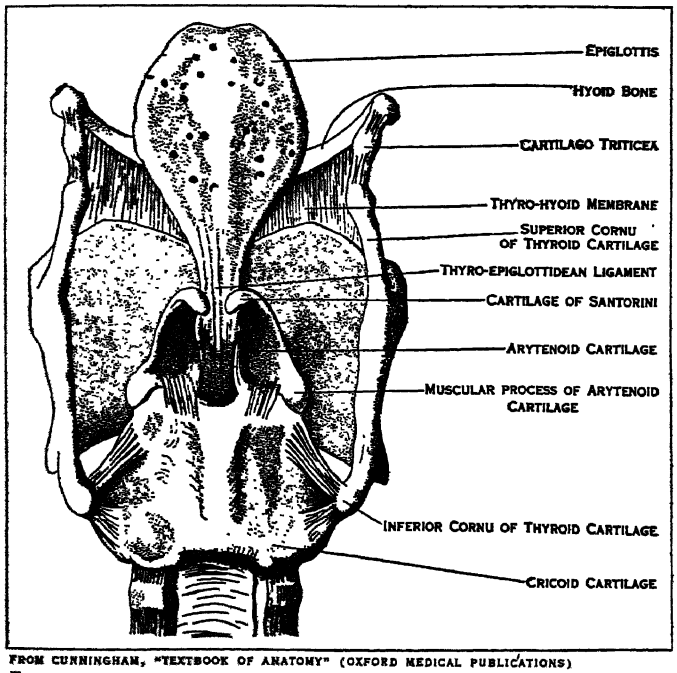
round a vertical axis. From the front of the base a delicate process projects which is attached to the true vocal cord (*vocal process*), while from the outer part of the base a stouter process attaches the two crico-arytenoid muscles (muscular process).



FROM CUNNINGHAM, "TEXTBOOK OF ANATOMY" (OXFORD MEDICAL PUBLICATIONS)

FIG. 1.—PROFILE VIEW OF CARTILAGES AND LIGAMENTS OF LARYNX

The *epiglottis* (*see* fig. 3) forms a lid to the larynx in swallowing; only the box moves up to the lid instead of the lid moving down to the box. It is leaf-shaped, the stalk being attached to the junction of the thyroid cartilages inside the larynx, while the anterior surface of the leaf is closely attached to the root of the

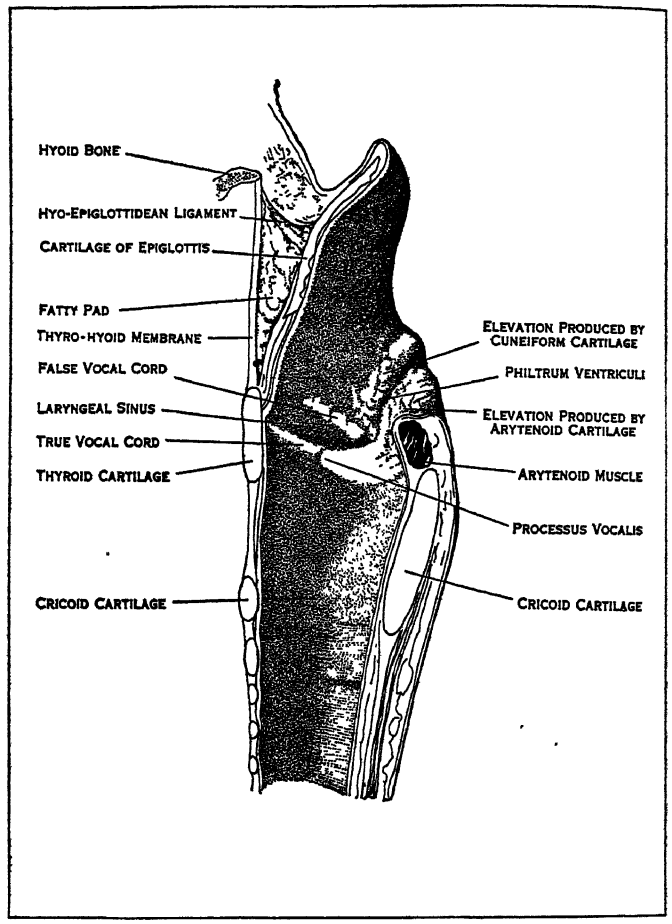


FROM CUNNINGHAM, "TEXTBOOK OF ANATOMY" (OXFORD MEDICAL PUBLICATIONS)

FIG. 2.—CARTILAGES AND LIGAMENTS OF LARYNX SEEN FROM BEHIND

tongue and body of the hyoid bone. The posterior or laryngeal surface is pitted for glands. All the cartilages of the larynx are of the hyaline variety except the epiglottis, the cornicula laryngis and the cuneiform cartilages, which are yellow elastic. The result is that all except these three tend to ossify as middle age is approached.

The *muscles of the larynx* are: (1) the *crico-thyroids*, attached to the lower border of the thyroid and the anterior part of the cricoid, by pulling up which they make the upper part of the signet, with the arytenoids attached to it, move back and so tighten the vocal cords. (2) The *thyro-arytenoids* (*see* fig. 4), which run back from the junction of the thyroid alae to the front of the arytenoids and side of the epiglottis; they pull the arytenoids toward the thyroid and so relax the cords. (3) The single



FROM CUNNINGHAM, "TEXTBOOK OF ANATOMY" (OXFORD MEDICAL PUBLICATIONS)

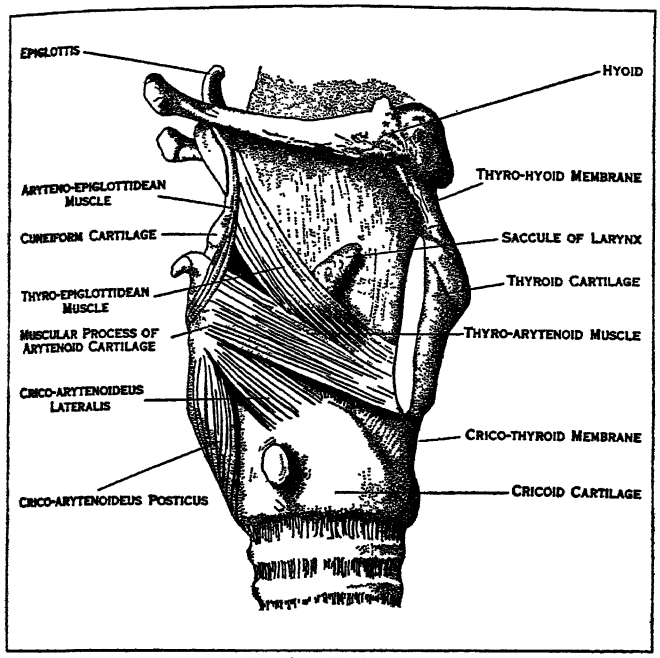
FIG. 3.—MESIAL SECTION THROUGH LARYNX TO SHOW OUTER WALL OF RIGHT HALF

arytenoideus muscle, which runs from the back of one arytenoid to the other and approximates these cartilages. (4) The *lateral crico-arytenoids* (*see* fig. 4) which draw the muscular processes of the arytenoids forward toward the ring of the cricoid and, by so doing, twist the vocal processes, with the cords attached, inward toward one another; and (5) the *posterior crico-arytenoids* (*see* fig. 4) which run from the back of the signet part of the cricoid to the back of the muscular processes of the arytenoid and, by pulling these backward, twist the vocal processes outward and so separate the vocal cords. All these muscles are supplied by the recurrent laryngeal nerve, except the crico-thyroid which is innervated by the external branch of the superior laryngeal (*see* NERVES, *Cranial*).

The *mucous membrane of the larynx* is continuous with that of the pharynx at the *aryteno-epiglottidean folds* which run from the sides of the epiglottis to the top of the arytenoid cartilages (*see* fig. 3). To the outer side of each fold is the *sinus pyriformis* (*see* PHARYNX). From the middle of the junction of the alae of the thyroid cartilage to the vocal processes of the arytenoids the mucous membrane is reflected over, and closely bound to, the true vocal cords which contain elastic tissue and, as has been mentioned, are the upper free edges of the lateral parts of the crico-thyroid membrane. The chink between the two true vocal cords is the *glottis* or *rima glottidis*. Just above the true vocal cords is the opening into a recess on each side which runs upward and backward and is known as the *laryngeal saccule;* its opening is the *laryngeal sinus*. The upper lip of this slit-like opening is

called the *false vocal cord.*

The mucous membrane is closely bound down to the epiglottis and to the true vocal cords, elsewhere there is plenty of submucous tissue. In the upper part of the front and sides of the larynx and over the true vocal cords the mucous membrane is lined by squamous epithelium, but elsewhere the epithelium is columnar and ciliated: it is supplied by the superior laryngeal



FROM CUNNINGHAM, "TEXTBOOK OF ANATOMY" (OXFORD MEDICAL PUBLICATIONS)

FIG. 4.—DISSECTION OF THE MUSCLES IN LATERAL WALL OF LARYNX SHOWN WITH THE RIGHT ALA OF THE THYROID CARTILAGE REMOVED

branch of the vagus nerve and above the glottis is peculiarly sensitive.

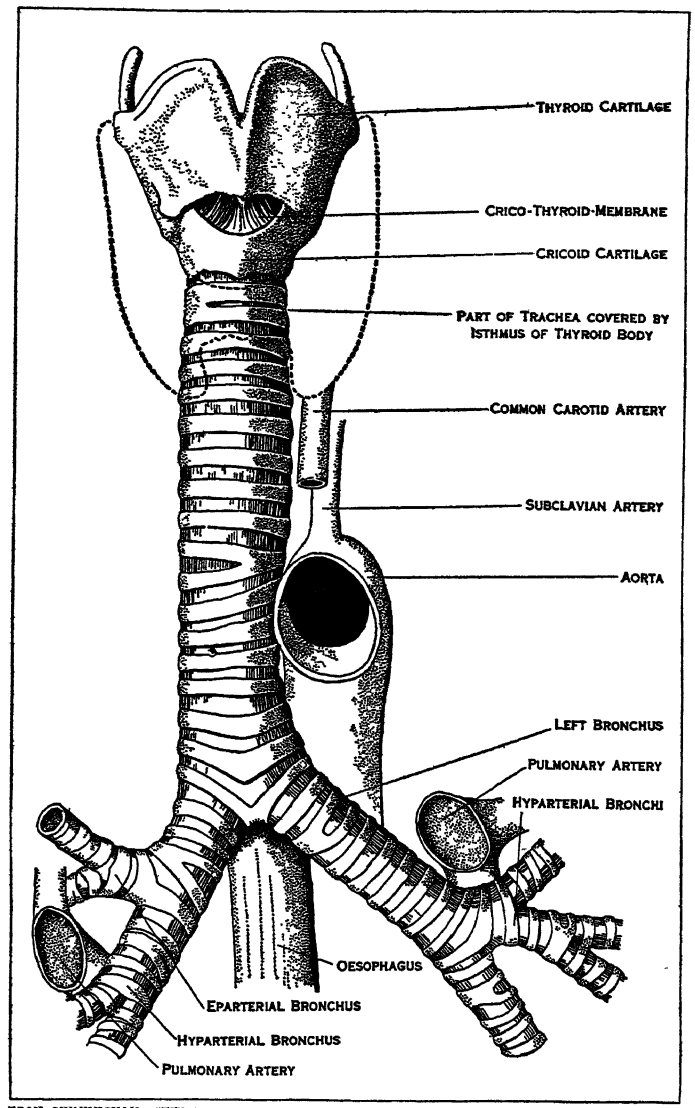
Trachea.—The *Trachea* or windpipe (*see* fig. 5) is the tube which carries the air between the larynx and the bronchi; it is from four to four and a half inches long and lies partly in the neck and partly in the thorax. It begins where the larynx ends at the lower border of the sixth cervical, and divides into its two bronchi opposite the fifth thoracic vertebra. The tube is kept always open by rings of cartilage, which, however, are wanting behind, and, as it passes down, it comes to lie farther and farther from the ventral surface of the body, following the concavity of the thoracic region of the spinal column. In the whole of its downward course it has the oesophagus close behind it, while in front are the isthmus of the thyroid, the left innominate vein, the innominate artery and the arch of the aorta. On each side of it and touching it is the vagus nerve.

The cervical part of the tube is not much more than an inch in length, but it can be lengthened by throwing back the head. This is the region in which tracheotomy is performed, and it should be remembered that in children, and sometimes in adults, the great left innominate vein lies above the level of the top of the sternum.

The trachea is made up of an external fibro-elastic membrane in which the cartilaginous rings lie, while behind, where these rings are wanting, is a layer of unstriped muscle which, when it contracts, draws the hind ends of the rings together and so diminishes the calibre of the tube. Inside these is plentiful submucous tissue containing mucous glands and quantities of lymphoid tissue, while the whole is lined internally by columnar ciliated epithelium.

Bronchi.—The *Bronchi* (*see* fig. 5) are the two tubes into which the trachea divides, but the branches, which these tubes give off later, are also called bronchi. Put shortly, they are two long tapering tubes which run from the bifurcation of the trachea to the lower and back part of each lung, and give off a series of large ventral and small dorsal branches. The upper part of each of these long tubes or *stem bronchi* is outside the lung and in the middle mediastinum of the thorax, the lower part embedded in the substance of the lung. The structure of the bronchi is practically identical with that of the trachea. (*See* G. S. Huntington's "Eparterial Bronchial System of the Mammalia," *Am. Journ. Med. Sci.* [Phila. 1898]. *See* also Quain's *Anatomy,* London, last edition.)

Lungs.—The *Lungs* are two pyramidal, spongy, very vascular organs in which the blood is oxygenated. They are pink normally, but, often in city dwellers are slate-coloured from local deposition of soot particles. Each lies in its own side of the thorax and is surrounded by its own pleural cavity (*see* COELOM AND SEROUS MEMBRANES), and has an *apex* which projects into the side of the root of the neck, a *base* which is hollowed for the convexity of the diaphragm, an outer surface which is convex and lies against the ribs, an inner surface concave for the heart, peri-



FROM CUNNINGHAM, "TEXTBOOK OF ANATOMY" (OXFORD MEDICAL PUBLICATIONS)

FIG. 5.—TRACHEA AND BRONCHI, INDICATING THE THYROID BODY BY A DOTTED LINE

cardium and great vessels, a sharp anterior border which overlaps the pericardium and a broad, rounded posterior border which lies at the side of the spinal column. Each lung is nearly divided into two by a *primary fissure* which runs obliquely downward and forward, while the right lung has a *secondary fissure* which runs horizontally forward from near the middle of the primary fissure. The left lung has therefore an *upper* and *lower or basal lobe,* while the right has *upper, middle* and *lower lobes.* On the inner surface of each lung is the *root* or *hilum* at which alone its vessels, nerves and ducts (bronchi) can enter and leave it.

The structures contained in the root of each lung are the branches and tributaries of (1) the *pulmonary artery,* (2) the *pulmonary veins,* (3) the *bronchi,* (4) the *bronchial arteries* which supply the substance of the lung, (5) the *bronchial veins,* (6) the *bronchial lymphatic vessels and glands,* (7) the *pulmonary plexuses of nerves.* Of these the first three are the largest and, in dividing the root from in front, the veins are first cut, then the arteries and last the bronchi. As the bronchi become smaller and smaller by repeated division, the cartilage completely surrounds them and tends to form irregular plates instead of rings—they are therefore cylindrical, but when the terminal branches (*lobular bronchi*) are reached, the cartilage disappears and hemispherical bulgings called alveoli occur (fig. 6 A). At the very end of each lobular bronchus is an irregular chamber, the *atrium* (fig. 6 B), and from this a number of thin-walled sacs, about 1 mm. in diameter, open out. These are called the *infundibula* (fig. 6 C), and their walls are pouched by hemispherical air-cells or alveoli like those in the lobular bronchi. Each lobular bronchus with its atrium and infundibula forms a *lobule* of the lung, and these lobules are separated by connective tissue, and their outlines are evident on the surface of the lung.

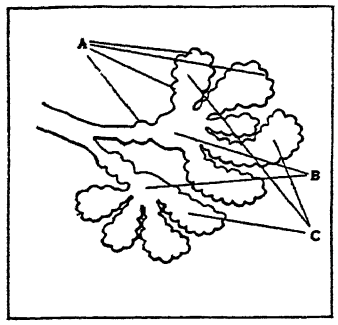


FIG. 6.—DIAGRAM OF TWO LOBULES OF THE LUNG

The muscular tissue, which in the larger tubes was confined to the dorsal part, forms a complete layer in the smaller; but when the lobular bronchi are reached, it stops and the mucous membrane is surrounded by the elastic layer. In the lobular bronchi, too, the lining epithelium gradually changes from the ciliated to the stratified or pavement variety, and this is the only kind found in the infundibula and alveoli. Surrounding each alveolus is a plexus of capillary vessels so rich that the spaces between the capillaries are no wider than the capillaries themselves, and it is here that the exchange of gases takes place between the air and the blood.

Embryology.—The respiratory system is developed from the ventral surface of the foregut as a long gutter-like pouch which reaches from just behind the rudiment of the tongue to the stomach. Limiting the anterior or cephalic end of this is a ∩-shaped elevation in the ventral wall of the pharynx which separates the ventral ends of the third and fourth visceral bars and is known as the *furcula;* it is from this that the epiglottis, aryteno-epiglottidean folds and arytenoid cartilages are developed. Later on the respiratory tube is separated from the digestive by two ridges, one on each side, which, uniting, form a transverse partition. In the region of the furcula, however, the partition stops and here the two tubes communicate. The caudal end of the respiratory tube buds out into the two primary bronchi, and the right one of these, later on, bears three buds, while the left has only two; these are the secondary bronchi, which keep on dividing into two, one branch keeping the line of the parent stem to form the stem bronchus, while the other goes off at an angle. By the repeated divisions of these tubes the complex "bronchial tree" is formed and from the terminal shoots the infundibula bud out. The alveoli only develop in the last three months of foetal life. The thyroid cartilage is probably formed from the fourth and fifth bronchial bars, while the cricoid seems to be the enlarged first ring of the trachea. Before birth the lungs are solid and much less vascular than after breathing is established. (For further details *see* Quain's *Anatomy,* vol. i., Lond. 1908.)

Comparative Anatomy.—In the lower vertebrates respiration is brought about by the blood vessels surrounding the gill clefts (*see* PHARYNX). In the higher fishes (Ganoids and Teleosteans) the "swim bladder" appears as a diverticulum from the dorsal wall of the alimentary canal, and its duct sometimes remains open and at others becomes a solid cord. In the former case it is probable that the blood is to some extent oxygenated in the vascular wall of this bladder. In the Dipnoi (mud-fish) the opening of the swim bladder shifts to the ventral side of the pharynx and the bladder walls become sacculated and very vascular, so that, when the rivers are dried up, the fish can breathe altogether by means of it. In the S. American and African species of mud-fish the bladder or lung, as it may now be called, is divided by a longitudinal septum in its posterior (caudal) part into right and left halves. In this sub-class of Dipnoi, therefore, a general agreement is seen with the embryology or ontogeny of Man's lungs. In the Amphibia the two lungs are quite separate though they are mere sacculated bags without bronchi. A trachea, however, appears in some species (*e.g.,* Siren) and a definite larynx with arytenoid cartilages, vocal cords and complicated muscles is established in the Anura (frogs and toads). In most of the Reptilia the bag-like lungs are elaborated into spongy organs with arborizing bronchi in their interior. From the crocodiles upward a main or stem bronchus passes to the caudal end of the lung, and from this the branches or lateral bronchi come off. The larynx shows little advance on that of the Anura.

The respiratory organs of birds are highly specialized. The larynx is rudimentary, and sound is produced by the *syrinx,* a secondary larynx at the bifurcation of the trachea; this may be tracheal, bronchial or, most often, tracheo-bronchial. The lungs are small and closely connected with the ribs, while from them numerous large air sacs extend among the viscera, muscles and into many of the bones, which, by being filled with hot air, help to maintain the high temperature and lessen the specific gravity of the body. This pneumaticity of the bones is to a certain extent reproduced by the air sinuses of the skull in crocodiles and mammals. Still, the amount of air in the bones does not necessarily correspond with the power of flight, for the Ratitae (ostriches and emeus) have very pneumatic bones, while in the sea-gulls they are hardly pneumatic at all.

In mammals the thyroid cartilage becomes an important element in the larynx, and in the Echidna the upper and lower parts of it, derived respectively from the fourth and fifth bronchial bars, are separate (R. H. Burne, *Journ. Anat. and Phys.* xxxviii. p. xxvii.). The whole larynx is much nearer the head than in Man, and in young animals the epiglottis projects up behind the soft palate. This prevents the milk trickling into the larynx during suckling, and is especially well seen in the Marsupials and Cetacea, though evidences of it are present in the human embryo. In the lower mammals an inter-arytenoid cartilage is very frequent (*see* J. Symington, "The Marsupial Larynx," *J. Anat. and Phys.* xxxiii. 31, also "The Monotreme Larynx," *ib.* xxxiv. 90).

The lungs show much variation in their lobulation; among the porcupines forty lobes have been counted in the right lung, while in other mammals no lobulation at all could be made out. The *azygous lobe* of the right lung is a fairly constant structure and is situated between the post-caval vein and the oesophagus. It is supplied by the terminal branch of the right stem bronchus and, although it is usually absent in Man, the bronchus which should have supplied it is always to be found. (F. G. P.)

RESPIRATORY SYSTEM, DISEASES OF. The great extent of the respiratory system reaching from the lips and nostrils to the ultimate air cells of the lungs, the numerous muscles, intrinsically and extrinsically concerned with respiratory movements, the object of respiration, to wit, aeration of the blood, the manifest interrelationships between heart, kidneys, skin, nervous system and lungs, are sufficient to indicate that diseases of the respiratory system cover a very wide range. Many of the subjects belonging thereto are dealt with in special articles, notably ASTHMA; BRONCHITIS; BRONCHIECTASIS; DIPHTHERIA; EMPHYSEMA; INFLUENZA; LARYNGITIS; MINERS' PHTHISIS; PHTHISIS; PLEURISY; PNEUMONIA; PNEUMOTHORAX; TUBERCULOSIS; WHOOPING COUGH; HEART AND LUNG, SURGERY OF; EAR, NOSE AND THROAT, DISEASES OF; PLEURO-PNEUMONIA IN CATTLE; RADIOTHERAPY.

But viewed from another standpoint these diseases are relatively simple. The pathological processes underlying them are the familiar ones of inflammation and new growths and the symptoms produced depend upon the particular part of the tract involved. For example, in diphtheria the disease may affect the tonsils and

soft palate; in this case the local symptoms are relatively small and the constitutional effects produced by the absorbed diphtheria toxin are great. Or it may affect the larynx when the local obstruction dominates the picture. Or again, from the larynx the disease may extend to the bronchioles by way of the trachea, bronchi and their branches and lead to a bronchopneumonia similar, except for its ultimate aetiology, to that met with in measles, whooping cough or influenza. This bronchopneumonia, in its turn, resembles that constituting pulmonary tuberculosis with such modifications as depend upon the acuteness or chronicity of the tuberculous inflammatory process and the extent to which it is simple or complicated by secondary infections. The same is true with regard to new growths; the type of growth may or may not be histologically the same in different parts of the tract but the symptoms produced depend upon the situation of the growth and its size and behaviour relative to the region it affects.

Wide Inter-relationships.—The far-reaching effects of respiratory diseases may only become obvious on special occasions. The levator ani muscle seems far removed from the possible effects of morbid conditions in the throat or lungs, and yet if an abscess be forming in the neighbourhood of the anus, the act of coughing causes a sharp stab of pain locally because the levator is an extraordinary muscle of respiration and is called into play in coughing. This example serves to show how nerve conditions such as paralysis of the phrenic nerve which supplies the diaphragm (*q.v.*) or of intercostal nerves which supply the intercostal muscles, or morbid processes in other regions such as peritonitis, may interfere with the normal expansion and contraction of the lung tissue and induce pulmonary changes by disturbing the muscular movements that control them.

The pleura, lying between the lung and the thoracic wall, is in the main liable to disease by extension from one side or the other and rarely escapes involvement. Pulmonary tuberculosis is always associated with tubercle of the pleura and in cancer of the breast the disease often extends to the pleura. In both instances nodules in the normally smooth membrane lead to inflammatory changes with exudation of fluid into the serous cavity and adhesions between its walls.

If attention be directed more particularly to the lungs and pleura, the concentration of pulmonary and systemic vascular systems in the heart, with participation of each side of the heart in both circulations, results in a peculiar relationship of diseases of the respiratory system with those of the heart. Regurgitation at the mitral valve is immediately felt throughout the lungs and as far back as the pulmonary valves, as is evidenced by the accentuated pulmonary second sound. (*See* HEART: AUSCULTATION.) The rise of blood pressure within the lungs is borne ultimately by the right ventricle, and failure here, with the resulting incompetence of the tricuspid valve, leads to pulmonary congestion and exudation of oedematous fluid into the air spaces and into the pleural cavities. Similarly, some diseases of the kidney, indirectly by reason of the changes they induce in the heart, and, perhaps, directly by the altered composition of the blood they imply, lead to pulmonary and pleural congestion and exudation. Blood conditions, too, whether dependent upon anaemia or circulation of toxic materials, bacterial or other, act upon the heart muscle and secondarily upon the lungs. It is in this way that so-called hypostatic congestion and pneumonia are produced in the later stages of acute febrile disorders.

Secondary Effects. The various diseases of the respiratory system occasion modifications of respiration in absolute rate, ratio borne by inspiration to expiration and rhythm. Thus the absolute rate is increased in acute pneumonia owing to diminution of the available area for respiration and to the fever; in anaemia when extra exertion is called for, because the necessary oxygen is not provided at a normal rate of breathing owing to the deficient haemoglobin content of the red blood corpuscles. Similarly, expiration is prolonged in emphysema because the elasticity of the lung tissue is impaired, and rhythm is modified in exhaustion of the respiratory centre in the medulla oblongata (Cheyne-Stokes breathing). They lead to the introduction of abnormal respiratory acts, *e.g.*, cough, and to a whole series of constitutional changes, *e.g.*, fever, delirium, altered secretions by virtue of the pathological conditions underlying them, and by the interference they impose upon oxygenation of the blood they induce secondary changes in other organs. The more complex those organs the sooner they show the strain; heart, kidney, brain fail sooner than skin, muscle, bone. Nevertheless in time even the last show changes; skin becomes obviously oedematous, muscle gains or loses water as evidenced by its specific gravity, and bone may undergo associated changes as in the so-called pulmonary osteoarthropathies.

Hitherto the relations considered have been those pertaining to the various parts of the body, but diseases of the respiratory system also are related to the composition of the air inhaled. Irritating gases as ammonia, chlorine, poison gases as used in the World War induce oedema of the glottis, bronchitis, oedema of the lung, pneumonia; even tobacco smoke in excess leads to granular pharyngitis, irritable larynx, excessive secretion of mucus in the bronchi. Air-borne bacteria as B. tuberculosis and possibly the organisms or viruses of influenza, pneumonia, common catarrh, pleuro-pneumonia in cattle induce inflammatory changes, more or less acute, in bronchi and pulmonary tissue. Dust particles inhaled in the course of occupation occasion a whole group of industrial diseases. These affect stone-masons, knife-grinders, miners, wool and cotton spinners, indeed, any trade wherein the air of the factory is heavily laden with dry particles. In all these instances the lung condition is chronic and therefore associated with great formation of fibrous tissue (fibroid pneumonia) and lung damaged in this way is peculiarly liable to tuberculosis. Hence the industrial diseases under consideration consist in the main of fibroid tuberculosis (fibroid phthisis). There is reason to believe that silica particles when inhaled are particularly injurious perhaps by the local formation of small quantities of silicic acid.

(W. S. L.-B.)

Means of Diagnosis.—Some notable advances in the technique of diagnosis and in the means of treatment, both medical and surgical, of diseases of the respiratory system have been evolved in the present century. Many of them are still in the process of development, but the results so far obtained have been encouraging. Direct methods of investigation, so long familiar in regard to the mouth, pharynx and larynx, have been extended to the trachea and bronchi, by means of the bronchoscope. The trachea, the main bronchi and their principal subdivisions can now be directly illuminated and observed. The importance of this in regard to the presence of inhaled foreign bodies is obvious, but it has also proved helpful in connection with obscure pathological conditions of these tubes. A notable application of the same principle of direct illumination has been made by Jacobaeus of Stockholm to the pleura and lungs. To enable this to be done, an artificial pneumothorax (*q.v.*) is first established, whereby the lung retracts from the chest wall except where it is prevented from so doing by adhesions. At a suitable time after this, a small tube is inserted through an intercostal space under local anaesthesia, and a special instrument with electric light and a system of lenses is fitted into it. By this means a clear view of the state of the pleura and of the surface of the lung may be obtained. Small adhesions, preventing the complete collapse of the lung, in the application of the artificial pneumothorax treatment to various conditions, may be successfully divided. The method promises also to be helpful in the diagnosis of certain tumours of the lung and pleura.

Improvements in the technique of X-ray methods have greatly increased their value in diagnosis. Their use is now almost a routine matter in cases of obscure intra-thoracic disease. In the distinction between fluid in the pleura and solid conditions of the lung, in the diagnosis of the extent of the disease in tuberculosis of the lungs and to some degree in the assessment of its type, in the early recognition of tumours of the bronchi, lungs, pleura or mediastinal glands, X-ray investigation is invaluable, and sometimes indispensable.

A recent extension of their use in regard to the diagnosis of bronchiectasis or dilatation of the bronchial tubes is already proving of great value. A measured quantity of lipiodol, a liquid substance opaque to the X-rays, is injected down the trachea, through the crico-thyroid membrane or directly in between two of the car-

tilaginous rings of the trachea, under good local anaesthesia, the patient usually being placed in such a way that the lipiodol goes chiefly into the main bronchus of the side it is desired to investigate. The lipiodol rapidly diffuses into the bronchi of that lung, and in an X-ray film taken shortly afterwards the bronchial tree and its abnormal dilatations, if present, are seen with extraordinary clearness and accuracy. Applications of an old method, the study of so-called "vital capacity," that is, the amount of air it is possible to exhale by a maximum expiration after a maximum inspiration, promise to give valuable information in diagnosis. The further developments of bacteriological and other laboratory methods in the period under consideration have been helpful but not dramatic in their results.

DISEASES OF THE AIR PASSAGES

General Measures.—An important function of the nose is to see that the air reaches the lungs, warmed, moistened and filtered from micro-organisms. In this connection the importance of adequate treatment, either medical or surgical, of conditions causing nasal or pharyngeal obstruction and therefore leading to mouth breathing, has become more generally recognized. For the same reasons, the treatment of septic conditions in the nose and nasal sinuses is more commonly carried out. The value of scientifically devised breathing exercises is also more widely accepted. Such measures lessen the risks of catarrhal infections, and in young people prevent deformities of the chest with their attendant disadvantages. The use of the bronchoscope has proved to be of great value in the extraction of inhaled foreign bodies. In America, Chevalier Jackson of Pittsburgh has pioneered this method with brilliant results. By its means the majority of inhaled foreign bodies can be removed, and the serious and often fatal results so common formerly are obviated.

The use of vaccines (*see* VACCINE THERAPY) in the prevention of the "common cold" and the more serious forms of catarrh of the air passages has given encouraging results. It is usual to employ a "stock" vaccine, containing a mixture of catarrh-producing organisms. An autogenous vaccine, *i.e.*, one made from the patient's own infective organisms, is, however, sometimes employed. At present, however, these protective vaccines have not proved as generally effective as the use of antityphoid and antiparatyphoid vaccines in the prevention of the enteric fever group of diseases. With increasing knowledge of the catarrh-producing organisms, a somewhat large and diverse group, and of the conditions favouring their activity, greater success may be obtained.

In the case of bronchitis, the use of vaccines in treatment has proved somewhat disappointing, except in the form due to the pneumobacillus of Friedländer, though in chronic cases they are helpful.

Gassing.—The employment of irritant and poisonous gases in the World War largely increased our knowledge of their effects, and in some measure led to advances in means for the prevention of such effects and for the treatment of the resultant conditions occurring in civil life from accidental or occupational causes. Some of these, such as chlorine and phosgene, lead to oedema of the lungs; others, such as mustard gas, to acute bronchopneumonia; and others, such as carbon monoxide, to changes in the blood. Tuberculosis as a sequel of gassing has proved to be relatively infrequent, but severe chronic bronchitis and emphysema are common.

Asthma.—The idiosyncrasies of asthmatics are well known, and their susceptibility to the emanations of certain animals was long ago recognized by Hyde Salter. This peculiarity has found a rational explanation in recent work on anaphylaxis (*q.v.*). Some, if not all, cases of asthma seem to fall into a group of toxic idiopathies—*i.e.*, disease conditions due to hypersusceptibility to certain foreign protein substances. These may be derived from animals, such as the horse, dog, cat, etc.; or from articles used as foods; or again they may be toxic agents produced by bacteria.

This aspect of the disease has been closely studied by Chandler Walker in America and by Fleming and Coke in Great Britain. It was hoped that by testing the sensitiveness of the skin of asthmatic patients to large numbers of such substances, collectively called antigens, by means of scratches to which they are applied in solution, it would be possible to discover the particular agents to which the patient was susceptible, with a view either to avoiding contact with them if possible, or to desensitization by inoculation with minute but increasing doses of the particular substances concerned. Some good results are on record, but on the whole this method has been disappointing. Probably hypersensitiveness is not the only factor in asthma, and there may be, in addition, an inherited or acquired instability of the centre in the brain controlling the innervation of the bronchi.

The non-specific method of treatment of hypersusceptibility called protein shock therapy (*see* THERAPEUTICS) has been extensively tried in this disease, with some benefit in certain cases, but on the whole also with disappointing results. Of medicinal agents, apart from the iodides and the antispasmodic group of drugs such as belladonna, stramonium, grindelia and lobelia, small injections of adrenalin or of pituitrin, alone or together, have proved most useful.

Bronchiectasis.—Bronchiectasis (*q.v.*), was for a long period almost the despair of treatment. The application of surgical methods in suitable cases, if employed sufficiently early, seems to promise hope of real amelioration, or even of actual cure. In a small proportion of the cases, where pleural adhesion has not occurred, artificial pneumothorax may be sufficient; but, in the majority phrenicotomy or a more or less extensive thoracoplasty may be necessary. By these means the sputum may be lessened or entirely lost, and its offensive character ended.

DISEASES OF THE LUNGS

Pneumonia.—Study of the causal organism, the pneumococcus, by Duchez, Gillespie and Cole in America, served to explain in some degree the failure of serum treatment in this disease in the past. They have shown that there are at least four types of pneumococcus, each with different serum reactions, called respectively types I., II., III. and IV. Attempts have been made to prepare specific anti-sera for each of these, but so far only that for type I. has proved to be of real value in treatment, though a serum has been used in type II. Unfortunately, no effective antiserum has been obtained for type III., which is responsible for the most serious and fatal form of pneumonia. Pneumococcal vaccines have been used in the treatment of acute pneumonia, but though sometimes successful they have not achieved any widespread recognition. If they are to be of real value they must be employed early in the course of the disease. It has been recommended to use a stock vaccine as soon as the disease is recognized, and then if possible to prepare and use an autogenous one. Vaccines seem to be more helpful in cases of delayed resolution.

Other Diseases.—As regards abscess and gangrene of the lung, although some cases are successfully treated by medical measures, notably in the case of gangrene by injections of arsphenamine, the greatest success has been achieved from improved surgical methods.

In the case of tumours of the lung, mediastinum and pleura, the application of artificial pneumothorax promises to render some of these more easy to recognize and to deal with surgically.

With respect to pulmonary mycoses and spirochaetosis, improved laboratory methods have enlarged our knowledge of conditions due to some organisms such as moulds and spirochaetes, which occasionally cause pulmonary infections. (For pulmonary tuberculosis *see* TUBERCULOSIS.)

DISEASES OF THE PLEURA

Pleurisy with Effusion and Empyema.—New methods of tapping the pleura have been introduced, including the replacement of the fluid by sterile air or oxygen by means of an apparatus like that for inducing pneumothorax. This may be particularly helpful in regard to chronic or recurrent effusions, more especially such as occur in association with malignant disease.

As regards empyema, the treatment of collections of pus in the pleura has changed considerably. The method employed varies with the cause of the empyema. In cases due to the pneumococcus, early drainage by means of removal of a small piece of rib is now

the rule. In those due to streptococcal invasion repeated aspiration is adopted, until the process is localized, or until the fluid withdrawn is actually pus instead of thin turbid fluid, after which drainage by removal of a piece of rib is employed. In both cases many surgeons now employ special appliances for drainage, whereby a negative pressure is maintained in the pleural space to promote re-expansion of the lung. In empyema associated with tuberculosis, aspiration with gas replacement is the rule.

Surgery of the Pleura and Lungs.—War experience gave a valuable impetus to the surgical treatment of respiratory conditions. The treatment of empyema has already been referred to. Haemothorax or blood effused into the pleural space is now treated like any other effusion, and aspirated or gas-replaced if necessary. If infected it is treated like empyema (*q.v.*). Artificial pneumothorax is proving of great value as a preliminary to other operative procedures, apart from its uses as a means of treatment of pulmonary tuberculosis. The operation of exairesis or avulsion of the distal part of the phrenic nerve as a means of treatment of chronic basic lung conditions, including pulmonary tuberculosis, is on its trial and bids fair to be useful. More extensive operative procedures are ligature of branches of the pulmonary artery, and lobectomy or removal of diseased portions of the lung.

Operations designed to promote collapse of the lung when this is impracticable by artificial pneumothorax are pneumolysis and thoracoplasty. In pneumolysis attempts are made to collapse the lung, by the insertion outside the pleura of fat tissue or some extraneous substance such as paraffin. In thoracoplasty, sufficient portions of as many ribs as may be necessary are removed to allow the chest wall to fall in and thereby collapse the lung. The outlook in regard to the surgery of the lung and pleura is distinctly encouraging.

BIBLIOGRAPHY.—Sir R. D. Powell and Sir P. H. S. Hartley, *Diseases of the Lungs and Pleura* (6th ed. London, 1921, bibl.); F. W. Price (ed.), *Textbook of the Practice of Medicine* (1922); G. W. Norris and H. R. M. Landis, *Diseases of the Chest* (3rd ed. Philadelphia, 1924, bibl.); M. Fishberg *Pulmonary Tuberculosis* (3rd ed. London, 1922, bibl.); E. L. Opie and others, *Epidemic Respiratory Disease* (London, 1921, bibl.); Sir W. Osler and T. McCrae *Modern Medicine* (3rd ed., vol. iv., London, 1927, bibl.); S. E. Jelliffe *Postencephalitic Respiratory Disorders* (New York, 1927, bibl.); J. G. Townsend and E. Sydenstricker, *Epidemiological Study of Minor Respiratory Diseases* (Pub. Health Rep. 1927, xlii., 99); M. W. Hall, "Respiratory Group of Diseases as they Affect Soldiers and Sailors" (*Mic. Surgeon*, 1927, ix., 1 bibl.). (R. A. Y.)

RESTAURANT. This term was first used for an establishment where refreshments and meals were provided by one Boulanger, or Champ d'Oiseau, who opened the first establishment of the kind in the rue des Poulies, Paris, about 1765. The success of the house was almost instantaneous, and brought imitators, other restaurants being opened by chefs and stewards who left their employers. A notable advance followed the Revolution, when ruined aristocracy could no longer afford large retinues. Amongst the early restaurants was one managed by Antoine Beauvilliers.

The "Ordinary."—The earliest predecessors in England of the modern restaurant were the old coffee-houses and taverns which had a daily "ordinary"—a mid-day dinner or supper, generally noted for a particular dish, and served at a common table at a fixed price and time. Some of the more ancient of these arose in the middle of the 17th century. The first coffee-house was opened in St. Michael's alley, Cornhill, by Pasqua Rosee, a Greek. This youth was the first to teach the method of roasting coffee and to introduce the drink into England.

Nearly 100 years before it was burnt down in the Great Fire of 1666, the Castle ordinary, off Paternoster Row, was a great place for booksellers and literary men. It was rebuilt after the Great Fire, and attained its greatest fame as Dolly's Chop House, in Queen's Head Passage, Paternoster Row, when "Dolly," a proprietress, introduced pretty serving maids in place of men. For 150 years it was famous for its beef steaks and gill ales, and among its customers were Fielding, Defoe, Smollett, Richardson, Swift, Dryden, Pope, Gainsborough and Handel. It was demolished in 1885. Jonathan's Coffee House in Change alley, opened at the time of the South Sea Bubble speculation, was a luncheon rendezvous for stock jobbers long prior to the establishment of the Stock Exchange, and similarly Lloyds' Coffee House in Lombard street and Abchurch lane was the underwriters' headquarters and the cradle of Lloyds of to-day.

Other famous ordinaries were the Rainbow, in Fleet street, frequented by Dr. Johnson, Boswell and other notables, the Old Cock, Nando's, the Goose and Gridiron, also near St. Paul's, which, as the Mitre, was the first "musick house," and Simpson's Fish Dinner House, Bird-in-Hand court, Cheapside. The last-named was founded in 1723. It served a 2/– "fish ordinary" of soup, three fish courses, haunch of mutton and cheese 200 years ago, and was doing the same in 1929. Though no ordinary is served there, the Cheshire Cheese in Fleet street retains the atmosphere, and the steak, kidney, lark and oyster pudding of the days of Dr. Johnson.

Reference to the "ordinaries" may be found as long ago as 1577 (Hollinshed). In the 17th century the more expensive ordinaries were frequented by men of fashion, and gambling usually followed, so that the term "ordinary," by which was understood either the establishment or the meal was then more synonymous with the gambling house than the tavern. In the early part of the 18th century, however, the character changed again, and the choice of such establishments was great in number and varied in quality. Steele in the *Tatler* (1709) refers to a board being hung out of a window announcing "an excellent ordinary on Saturdays and Sundays." In the *Journey through England* (1714) it is remarked, "At two we generally go to dinner. Ordinaries are not so common here as abroad yet the French have set up two or three good ones in Suffolk street, where one is tolerably well served." Pontack's was considered one of the finest, and Defoe says that dinner there cost from 4s. to 5s. each, or anything up to a guinea. In addition a man could "dive," take his food in a mixed company of footmen and chair men for 2½d., have a sausage at a "farthing fry," or go to one of the taverns where the real "ordinary," a very good dinner of several courses, was served at from 6d. to 1s. Johnson records that he used to dine regularly for 7d. The usual hours for the meal were between 1 and 4, and there were 33 taverns serving ordinaries in the area between Threadneedle and Lombard streets and Gracechurch and Bishopgate streets.

Some of these have lasted until now, but the majority have had to give way to bank and office premises. Of the old ones, Birch's, formerly in Cornhill, dates from 1700, and Stone's Chop House in Panton street W., from 1770.

The restaurant habit as known to-day in London dates from the later decades of the 19th century when large fashionable hotels began to cater to the needs of fastidious diners on an elaborate scale. Suppers after the theatre became popular, and the establishments attached to hotels competed at widely varying prices while small restaurants sprang up in Soho, run by French and Italian proprietors, and provided good dinners tastefully served, at reasonable prices.

Modern grill rooms are an even later offshoot of the hotels and restaurants, and owe their existence largely to the travelling American who, with his own ideas of comfort, felt he did not wish to dress every night, but that otherwise he would be out of place in a fashionable restaurant. The grill room made no demand for dress, and offered an excellent dinner, long or short as required, served with rapidity in luxurious surroundings. London's first grill room was opened by Spiers and Pond in the '60s under the arch at Ludgate Hill, and the Savoy hotel was the first of the large hotels to inaugurate a similar room.

One of the first restaurants in London was that opened at Whiteleys in 1873, purely for the benefit of customers, but that it was not enthusiastically received is shown in the first year's loss of £183 on £1,629 turnover. But from then on the idea grew in favour and the takings annually. Soup or fish, meat and vegetables were served for 1s. 6d. In 1884 the first A.B.C. teashop was opened near London Bridge Station, and was ridiculed, the coffee shops with their high-backed benches being still popular. Ten years later J. Lyons and Co. (*q.v.*) opened at 213 Piccadilly, their first teashop which was still open in 1928.

All the larger restaurants have banqueting halls and other rooms where Masonic, regimental, club and other festival dinners may be

had at varying prices. Among the "classic" restaurants are the Carlton, Savoy, Berkeley, Ritz, Claridge's, Oddenino's, Verrey's and the Café Royal, and latterly the May Fair, the Devonshire, and the Green Park.

UNITED STATES

The word restaurant in America was first applied to the dining rooms of the better class hotels and to a few high class à la carte restaurants. As establishments of different types came into being their character was fixed by some such expression as coffee-house, as in England. Then came cafés, lunch rooms, dairy lunch rooms, cafeterias, tea rooms, waffle houses, fountain lunches, sandwich shops and many others, all included in the general use of the word restaurant.

The early American eating places were patterned after the inns, taverns and coffee houses in England and on the Continent. In Philadelphia there was the Blue Anchor Tavern, opened as early as 1683 or 1684. Ye Coffee House was opened in 1700, the proprietor being Henry Flower, who was also the postmaster of the province. In fact, the Coffee House was in all probability used as the post office for a time. The London Coffee House, opened in 1702, and the second London Coffee House, established in 1754 by William Bradford, printer of the Pennsylvania journal, and the City Tavern (1773) were meeting places for the sea captains, merchants and others who went there to transact their business, as well as social gathering places for the leading citizens. The City Tavern, later known as the Merchants Coffee House, was long considered the largest and best coffee house in America.

Ye Crown Coffee House, in Boston, was built in 1711 on the Boston Pier, or Long Wharf, by Jonathan Belcher.

In New York the famous old Fraunces' Tavern at Broad and Pearl streets near the Battery still stands, only the ground floor being used as a restaurant. Upstairs the Sons of the Revolution protect the collection of mementoes of Washington's life and times in the room in which he said farewell to his officers. Brown's Chop House was famous for many generations not only for its chops and steaks but for its unique collection of old photographs, prints and autographs. For years it was the rendezvous of journalists, authors, actors and painters. The Old St. Denis on Broadway at 11th street in the 90's; Fleischman's Vienna Garden, opposite the St. Denis, with its continental touch; Dorlon's on 23rd St., famous for its sea food; the old Hoffman House; Café Martin and the Holland House should be at least mentioned. But supreme over all until Sherry opened was Delmonico, first built on Broad street, later moved to 26th street and finally to 44th street and Fifth avenue. Soon after Delmonico moved to 44th street, Sherry opened diagonally across the avenue and, attracting the younger generation, threatened for a time to usurp the crown so long worn by Delmonico. But the two great restaurants were both destined to go. Delmonico closed its doors, and the Sherry of to-day is not the old-time Sherry.

Bégué's, opened over 60 years ago in New Orleans for the butchers of the city, is now a fashionable rendezvous.

Don's and the El Dorado House, famous for their Spanish cooking, were the earliest eating places in San Francisco in the pioneer days. Lavish feasts and exorbitant prices were the order of the day. The most fashionable restaurant was the Iron House made of sheet iron which had been brought in a sailing vessel around the Horn. Unique among the restaurants was the Bazzuro, opened by an Italian. The first restaurant by that name was a sailing vessel which had run aground in the bay. Later this spot was filled in with land and a house built on the same site. The restaurant is still run by members of the original family. Other eating places of special interest were the Tehama House, frequented by the army and navy officers; Marchand's, where the food was cooked in the window to entice the passerby; and the Mint, which boasted an old Southern mammy in the kitchen. Few of these famous places survived the San Francisco fire of 1906.

A full description of chain restaurants and mass feeding is given in the article FOOD SERVICE OF THE WORLD.

RESTIF, NICOLAS EDME (1734–1806), called RESTIF DE LA BRETONNE, French novelist, son of a farmer, was born at Sacy (Yonne) on Oct. 23, 1734. He was educated by the Jansenists at Bicêtre, and on the expulsion of the Jansenists was received by one of his brothers, who was a curé. Owing to a scandal in which he was involved, he was apprenticed to a printer at Auxerre, and, having served his time, went to Paris. Here he worked as a journeyman printer, and in 1760 he married Anne or Agnes Lebègue, a relation of his former master at Auxerre. Restif produced about two hundred volumes, many of them printed with his own hand, on almost every conceivable subject. He drew on the episodes of his own life for his books, which display an extraordinary licence in choice of subject and in treatment. They provide useful documents for the history of the underworld of the period. They include: *Le Pied de Fanchette*, a novel (1769); *Le Pornographe* (1769), a plan for regulating prostitution which is said to have been actually carried out by the Emperor Joseph II., while not a few detached hints have been adopted by continental nations; *Le Paysan perverti* (1775), a novel with a moral purpose, sufficiently horrible in detail; *La Vie de mon père* (1779); *Les Contemporaines* (42 vols., 1780–1785), a vast collection of short stories; *Ingénue Saxancour*, also a novel (1785); and, lastly, the extraordinary autobiography of *Monsieur Nicolas* (16 vols., 1794–1797; the last two are practically a separate and much less interesting work), in which at the age of sixty he has set down his remembrances, his notions on ethical and social points, his hatreds, and above all his numerous loves, real and fancied. The original editions of these, and indeed of all his books, have long been bibliographical curiosities owing to their rarity, the beautiful and curious illustrations which many of them contain, and the quaint typographic system in which most are composed. Just before his death (Feb. 2, 1806) Napoleon gave him a place in the ministry of police.

See J. Assézat's selection from the *Contemporaines*, with excellent introductions (3 vols., 1875), and the valuable reprint of *Monsieur Nicolas* (14 vols., 1883–84); also Eugen Dühren, *Rétif de la Bretonne, der Mensch, der Schriftsteller, der Reformator* (Berlin, 1906), and *Rétif-Bibliothek* (Berlin, 1906).

RESTITUTION: *see* DIVORCE; LARCENY.

RESTRAINT, in law, a restriction or limitation. The word is used primarily in four connections:

Restraints on Alienation.—When real property is conveyed in fee simple, restricting the right of the grantee to alienate it, thereby derogating from the grant, it was considered by the common law so inimicable to the policy of permitting the ready transfer of land that such restrictions were stricken down by the courts as illegal. A general restraint upon alienation was thus void, though the courts would uphold restraint limited with reference to time or to a class of persons. *See* Gray, *Restraints on the Alienation of Property* (2nd ed. 1895).

Restraints on Anticipation.—A restraint on anticipation consists of an attempt by the grantor of an estate for life to prevent the grantee from anticipating the income by alienating it voluntarily or involuntarily prior to its acquisition. In England such restraints are invalid save with reference to restraints imposed upon a married woman as to her separate estate during the period of coverture. *See* Conveyancing Act, 1881, s. 39; Married Women's Property Act, 1883, s. 29. In the United States such restraints accompanying the creation of a spendthrift trust are valid in many States. *See* TRUST.

Restraint of Marriage.—A gift or bequest to a person may have a condition attached in restraint of marriage. A condition in general restraint of marriage is void, as being contrary to public policy, although a condition in restraint of a second marriage is not void. A condition in partial restraint of marriage is valid, and may be either to restrain marriage with a particular class of persons, *e.g.*, a papist, a domestic servant or a Scotsman, or under a certain age.

Restraint of Trade.—A contract in general restraint of trade was deemed void at common law as against public policy (*Mitchel* v. *Reynolds*, 1 P. Wms. 181 [1711]), though a contract in partial restraint of trade accompanying the sale of a business or the employment of an individual is valid (*United States* v. *Addyston Pipe and Steel Co.*, 85 Fed. 271 [1898]). The modern attitude, however, is that the test that should determine the validity of con-

tracts in restraint of trade should be whether they are reasonably necessary to protect the interests of the parties and not unnecessarily harmful to the general public (*Nordenfelt* v. *Nordenfelt Guns and Ammunition Co.* [1894], Appeal Cases 535). Legislation and judicial decision in recent years have widely affected the doctrines of restraint of trade. *See* TRUSTS.

For the United States *see* Kales, *Contracts and Combinations in Restraint of Trade* (1918); Henderson, *The Federal Trade Commission* (1924); National Industrial Conference Board, *Trade Associations. Their Economic Significance and Legal Status* (1925).

RESTRICTION OF ENEMY SUPPLIES DEPARTMENT, a department of the British Ministry of Blockade created in May, 1916. On the outbreak of the World War, the British Government set up an advisory committee, known as the Restriction of Enemy Supplies committee, to examine and report upon blockade matters. In Sept. 1915, this was merged into the War Trade Advisory committee, in order to co-ordinate the work of the War Trade Department, the Contraband committee, the Restriction of Enemy Supplies committee and the committee controlling the export of Coal, Cotton, Rubber and Tin. Neither the Restriction of Enemy Supplies committee nor the War Trade Advisory committee had any executive power. They carried out investigations, examined reports and drew up recommendations for submission to the cabinet on questions of policy, but the execution of the schemes recommended and adopted continued to devolve upon various executive departments. But as the work of the blockade required to be consolidated and brought under a single control in charge of a recognized minister who should be a member of the Government, the Ministry of Blockade was formed in May 1916, with Lord Robert Cecil at its head. A department of that ministry was organized under the name of the Restriction of Enemy Supplies department, with the late Rt. Hon. F. Leverton Harris as director. He was succeeded in Jan. 1917 by Sir William Mitchell-Thomson, Bart. The functions of the department were to bring effective pressure to bear upon those neutral countries situated within the ring of the naval blockade, so as to limit as far as possible their exports to Germany of home products, manufactures and minerals. The department took over the administration of certain agreements which had previously been entered into, and laid before the minister of blockade, for submission to the cabinet, further proposals designed to meet the end in view. When sanctioned, the work of carrying them into effect devolved upon the department.

Practical Work.—The Restriction of Enemy Supplies Department began operations by sending a mission to Holland, the outcome of which was an agreement whereby Dutch dairy and agricultural produce, which, until then, had been going almost entirely to Germany, was thereafter divided in agreed proportions. This result was attained, partly by using the supply of fertilizers and similar commodities as a lever, and partly by employing a system of purchase and bonus. By this means, not only was the quantity of produce available for Germany substantially reduced, but the supply of foodstuffs to Great Britain was materially augmented. Between Aug. 1916, and Dec. 1918, the amount of dairy and agricultural produce diverted from Germany came to nearly 200,000 tons and, in addition, the non-export from Holland of certain important commodities was secured. The department also concluded agreements with the Dutch trawler owners and the Dutch herring drifter owners, in order to restrict the export of fish to Germany. It is computed that not less than 40,000 tons of herrings and 14,000 tons of trawl fish were prevented from being exported to the enemy. In the course of time, owing to the losses sustained by the Dutch trawlers by submarines and mines, the amount of fish available for export from Holland diminished, until it became a negligible quantity.

As regards Norway, the department took over from an earlier committee the administration of an agreement which had been in operation, and they also made a new agreement with the Norwegian Government by which only 15% of all fish and fish oil landed in Norway could be exported, and even that quantity was subject to conditions rendering the export difficult. A staff of British employees was organized throughout Norway to control the operations of the agreement. A total of nearly 330,000 tons of herrings, salt fish, fish oil, etc., was diverted from Germany. In view of the supreme importance to Germany of steel hardening material, particularly in connection with high-speed tools, the department also obtained the control of practically the whole of the output of molybdenum from Norway.

The department also successfully carried out the salvage of certain extremely valuable supplies of tin, copper, ferro-tungsten and nickel destined for Russia, which were lying derelict along the Finnish frontier, and which were in danger of falling into enemy hands. In the case of Sweden, the department was able to secure the total prohibition of the export of fish to Germany, and, later on, the prohibition of the export of mica.

Under the arrangements adopted in the case of Denmark, upwards of 160,000 tons of bacon and eggs were exported to the United Kingdom up to October, 1917. Earlier in that year, all fodder and feeding stuffs were stopped from going to Denmark and Holland and thereafter the export of dairy produce in any direction from both those countries fell off rapidly. (C. J. HI.)

See also BLOCKADE; RATIONING (BLOCKADE).

RESURRECTION-PLANT (*Anastatica hierochuntina*), a small herb of the family Cruciferae, called also rose of Jericho, native to Arabia, Persia and Egypt. Upon the ripening of the seeds during the dry season, the leaves fall off and the branches curve inward so that the dry plant assumes a globular form. It then rolls about in the manner of a tumble-weed (*q.v.*), until the rainy season. When wetted the branches unfold and it assumes for a time the appearance of a living plant. The name is also given to several moss-like species of *Selaginella,* which also dry up into a ball and expand when wetted, as *S. lepidophylla,* called also bird's-nest moss, found from Texas southward to Peru, which, even when dead, will expand when placed in water.

RESZKE, JEAN DE (1850–1925), operatic singer, was born at Warsaw on Jan. 14, 1850. His parents were Poles; his father was a State official and his mother a capable amateur singer, their house being a recognized musical centre. He studied law before adopting singing as his profession and going to Italy to study. He made his first public appearance, as a baritone, at Venice in Jan. 1874, as Alfonso in *La Favorita,* and in the following April he sang for the first time in London, appearing at Drury Lane theatre, and a little later in Paris. He was not entirely successful and retired for a further period of study, during which his voice gained remarkably in the upper register; so that when he made his first reappearance at Madrid in 1879 it was as a tenor, in the title-rôle of *Robert le Diable.* His great fame as a singer, especially in Wagnerian parts, dates from this time. He appeared at the Metropolitan Opera House, New York, from 1893 to 1899. In 1904 he retired, but he continued teaching almost to the day of his death, on April 3, 1925.

RETABLE, a term of ecclesiastical art and architecture, applied in modern English usage to an altar-ledge or shelf, raised slightly above the back of the altar or communion table, on which are placed the cross, ceremonial candlesticks and other ornaments. Retables may be lawfully used in the church of England (*Liddell & Beale,* 1860, 14 P.C.).

RETAILING is that part of the distributive process that is concerned with the selection, purchase, display and sale at retail of commodities to the consumer. The object of retailing is to obtain for a given community appropriate merchandise in such grades and in such quantities that it will give the purchaser complete satisfaction and that it can be sold at a profit. The units of merchandise sold in the greatest volume at retail are food products, clothing, clothing accessories and articles for the furnishing of homes.

The most significant developments in retailing in the five years ending in 1929 have been:

(a.) The rapid changes in style and design of many commodities that were formerly relatively staple;

(b.) The inauguration of hand-to-mouth buying because of the need for greater turnover in sales and also because of the quicker obsolescence of merchandise caused by its rapid style changes;

(c) The elimination of the wholesaler in certain lines as an important link in the chain of distribution, caused by more and more retailers purchasing direct from manufacturers;

(d) The rapidly increasing cost of distribution, and,

(e) The phenomenal growth of chain store or multiple shop systems which are becoming very important factors in reducing the cost of distribution.

It is authoritatively estimated that in the United States of America, the volume of sales at retail for the year 1928 aggregated $41,000,000,000. Of this volume, it is estimated that:

$25,200,000,000 or 61¼%	represents sales by small independent specialty and neighbourhood stores;
6,500,000,000 or 16%	represents sales by large departmental stores;
6,200,000,000 or 15%	represents sales by chain stores;
1,400,000,000 or 3½%	represents sales by mail order concerns;
800,000,000 or 2%	represents sales by company stores operated by various firms for their staffs;
800,000,000 or 2%	represents sales by house to house canvassers;
100,000,000 or ¼ of 1%	represents sales by consumers' cooperative stores.

The volume of retailing carried on by small independent stores is exceedingly large because it has been easy for anyone with very small capital to engage in retailing. But out of every 100 independent retail stores opened during the past 25 years, not over 10 have been really successful. A recent survey made by the University of Buffalo revealed that of 7,225 *independent* retail grocery stores which engaged in business in Buffalo between 1918 and 1926, only 242 had survived—a mortality of approximately 97%!

In the past three years it has been especially difficult for the small independent retailer in spite of affiliating with other independent retailers in group buying and thus obtaining price concessions from the manufacturers, to succeed in competition either with the large department stores or with the chain stores or multiple shops. Consequently, it is safe to predict that the trend of distribution both in America and in Europe will be toward a decreasing proportion of commodities sold by the small independent specialty stores and an increased volume of merchandise distributed by departmental and chain stores.

The growth of group buying and the development of central buying by the chain stores is tending toward the elimination of the wholesaler in some lines. The effect of this change has been to transfer the wholesaling function to the manufacturer, who in many lines must manufacture in advance and carry "fill in" stocks to render the services to the retailer that the wholesaler formerly rendered. Some wholesalers have maintained their positions in the distributive process by acquiring a financial interest in a number of retail stores.

The amount of merchandise sold at retail through the chain stores is increasing more rapidly each year than that sold through departmental stores. This is due to the fact that the chain store unit can distribute merchandise at a lower overhead expense than the departmental store. The principal commodities distributed by chains are hosiery and underwear, women's ready-to-wear, women's and men's shoes, men's clothing and furnishings, household utensils, hardware, millinery, furniture, drugs and toilet articles, groceries and sweets.

The tremendous purchasing power of these chains enables them to buy in such quantities that manufacturers are impelled to quote them prices as low as those formerly quoted to wholesalers. Since the chain stores do not provide the convenience either of charge accounts or free delivery they usually are able to sell their standardized articles more cheaply than those independent department stores which provide complete assortments of new merchandise, delivery service and the privilege of returning merchandise that is not satisfactory.

The competition from the chain stores is resulting in affiliations and combinations of department stores for the purpose of reducing overhead expense through research activities and of reducing the cost of merchandise through group buying or central buying. Most department stores in America and many in England are now combined either in associations or in financially controlled combinations. The future will determine whether public opinion will support both the department store and the chain store. The chain store represents a standard but rigid type of store with limited selections of merchandise at standardized prices which is sold, generally speaking, on a cash and carry basis. Certain of the chain stores distributing food products deliver merchandise. The department store represents an institution with policies that are more flexible and more in harmony with the needs of its locality as these change from time to time.

As the competition between chains becomes increasingly keen and as department stores attempt to meet chain store competition through overhead economies effected by mergers and the savings effected through central buying and group buying, there may develop again in distribution a place for the independent retailer.

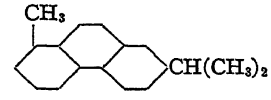
See CHAIN STORES and DEPARTMENT STORES. (P. J. R.)

RETAINER, properly the act of retaining or keeping for oneself, or a person or object which retains or keeps; historically, a follower of a house or family, and particularly used of armed followers attached to the barons of the middle ages.

Retainer of Counsel.—When it is considered desirable by a litigant that the services of any particular counsel (barrister) should be obtained for the conduct of his case, it is necessary to deposit with counsel a form of retainer together with the necessary fee in cash, from which time counsel is bound to give the party who has thus retained him the first call on his services in the matter in which he has been retained. Retainers are either *general* or *special*. A general retainer retains counsel for all proceedings in which the person retaining is a party. A special retainer is one which only applies to some particular cause or action. In the United States, the retainer is much less formal than in England, and is used to refer to the preliminary fee given a counsel to take or defend proceedings. *See* ADVOCATE; BARRISTER.

Retainer of Debt.—In connection with the administration of an estate under a will, it is the right of the personal representative—whether executor or administrator—of a deceased person to retain in respect of all assets which have come into his hands a debt due to himself in his own right whether solely or jointly with another person as against creditors of an equal degree, and this even though his debt is barred by the Statutes of Limitation (*see* Administration of Estates Act 1925, s. 34; *Taylor* v. *Deblois*, Fed. Cas. No. 13,790). The appointment of a receiver deprives the representative of his right except as regards assets which come to his hands prior to the appointment of the receiver.

RETENE, an aromatic hydrocarbon occurring in wood tars and obtained by distilling resinous woods. It crystallises in colourless plates melting at 98·5° C and boiling at 394° C. Chromic acid oxidises the hydrocarbon to retene quinone (an *ortho*-diketone) and permanganate oxidises the quinone to 3-hydroxy-*iso*propyldiphenyl-1:1′:2′-tricarboxylic acid. These reactions show that retene is ethyl*iso*propylphenanthrene, $C_{18}H_{18}$, with the adjacent structural formula. *See* A. E. Everest, *The Higher Coal Tar Hydrocarbons* (1927).



RETFORD (officially EAST RETFORD), a market town and municipal borough in Nottinghamshire, England, 138½ m. N. by W. from London by the L.N.E.R., the station being a junction. Pop. (1931) 14,228. Retford (*Redforde, Ratford*) owes its importance to its position near one of the Roman roads and on the river Idle, where there was a ford. In 1086 the archbishop of York owned a mill at Retford, and Roger de Busli had rights here. Retford was a borough by prescription, and was in the hands of the crown when, in 1276, Edward I. granted it to the burgesses in fee-farm with the right of electing bailiffs. This charter was confirmed by Edward III., Henry VI. and Elizabeth. In 1607

James I. granted a charter of incorporation to the bailiffs and burgesses, under which the town was governed until 1835, when it was reincorporated under a mayor. East Retford returned two members to parliament in 1315, and again from 1572 till 1885, when it was disfranchised. There is a large trade in corn and cheese, and the town possesses iron foundries and works, paper and corn mills and rubber works. Coal is mined in the vicinity.

RETHEL, ALFRED (1816–1859), German historical painter, was born at Diepenbend near Aix-la-Chapelle on May 15, 1816. At the age of 13 he executed a drawing which procured his admission to the academy of Düsseldorf, where he studied for several years. In 1836 he removed to Frankfürt, and was selected to decorate the walls of the imperial hall in the Römer with figures of famous men. Four years later he was commissioned to ornament the restored council house of his native city with frescoes from the life of Charlemagne, but the execution of this work was delayed for some six years. Returning to Aix, in 1846, he commenced his Charlemagne frescoes. But mental derangement, remotely attributable to an accident in childhood, began to manifest itself. While he hovered between madness and sanity, Rethel produced some of his most impressive work—"Nemesis pursuing a Murderer," "Death the Avenger," and by contrast "Death the Friend." Rethel also executed a powerful series of drawings—"The Dance of Death"—suggested by the Belgian insurrections of 1848. He died at Düsseldorf on Dec. 1, 1859.

His "Peter and John at the Beautiful Gate of the Temple," is in the Leipzig museum, and his "St. Boniface" and several cartoons for the frescoes at Aix are in the Berlin national gallery. *See* his *Life*, by Wolfgang Müller von Königswinter (1861); *Art Journal*, Nov. 1865; and the monograph by Max Schmid in Knackfuss's *Künstlerbiographien*, vol. 32 (1898).

RETHEL, a town of France, capital of an arrondissement in the department of Ardennes, on the Aisne and the Ardennes canal, 31 m. S.W. of Mézières by rail. Pop. (1926) 5,586. Rethel, of Roman origin, was from the 10th century the seat of a countship held successively by the families of Flanders, Burgundy, Cleves, Foix and Gonzaga. In 1581 it was erected into a duchy in favour of the latter. In 1663 it was sold by Charles VI. de Gonzaga to Mazarin, whose family held it till the Revolution. Rethel has a subprefecture, a board of trade arbitrators, a chamber of arts and manufactures, and carries on wool-spinning, the weaving of light woollen fabrics, and the manufacture of farm implements.

RETZ, JEAN FRANÇOIS PAUL DE GONDI, CARDINAL DE (1614–1679), French churchman and agitator, was born at Montmirail in 1614. The family had acquired great estates in Brittany, and Retz himself always spelt his designation "Rais." He was a third son, and was destined for the church. He studied at the Sorbonne, and when he was scarcely eighteen wrote the remarkable *Conjuration de Fiesque*, a little historical essay, of which he drew the material from the Italian of Augustino Mascardi, but which is all his own in the negligent vigour of the style and the audacious insinuation, if nothing more, of revolutionary principles. Anne of Austria appointed him in 1643 to the coadjutorship and the reversion to the archbishopric of Paris. Retz acquired great influence with the Parisians, which he gradually turned against Mazarin. No one had more to do than Retz with the outbreak of the Fronde in October 1648, and his history for the next four years is the history of that confused and, as a rule, much misunderstood movement. Of the two parties who joined in it Retz could only depend on the bourgeoisie of Paris. But although he had some speculative tendencies in favour of popular liberties, and even perhaps of republicanism, Retz represented no real political principle, and when the break up of the Fronde came he was left in the lurch. In 1652 he was arrested and imprisoned, first at Vincennes, then at Nantes; he escaped, however, after two years' captivity, and for some time wandered about in various countries. He had been made a cardinal before his downfall, and had no small influence in the election of Alexander VII. In 1662, he was received back again into favour by Louis XIV. and on more than one occasion he served as envoy to Rome. Retz, however, was glad in making his peace to resign his claims to the archbishopric of Paris. In compensation he received the rich abbacy of St. Denis and restoration to his other benefices with the payment of arrears.

The last seventeen years of Retz's life were passed partly in his diplomatic duties (he was again in Rome at the papal election of 1668), partly at Paris, partly at his estate of Commercy, but latterly at St. Mihiel in Lorraine. His debts were enormous, and in 1675 he resolved to make over to his creditors all his income except twenty thousand livres, and, as he said, to "live for" them. He died in Paris on Aug. 24, 1679. One of the chief authorities for the last years of Retz is Madame de Sévigné, whose connection he was by marriage. De Retz's *Memoirs* were certainly not written till the last ten years of his life, and they do not go farther than the year 1655. They are addressed in the form of narrative to a lady who is not known, though guesses have been made at her identity, some even suggesting Madame de Sévigné herself. They display extraordinary narrative skill.

The *Memoirs* of the Cardinal de Retz were first published in a very imperfect condition in 1717 at Nancy. The first satisfactory edition was that which appeared in the twenty-fourth volume of the collection of Michaud and Poujoulat (Paris, 1836). They were then re-edited from the autograph manuscript by Géruzez (Paris, 1844), and by Champollion-Figeac with the Mazarinades, etc. (Paris, 1859). In 1870 a complete edition of the works of Retz was begun by M. A. Feillet in the collection of *Grands Écrivains*. The editor dying, this passed into the hands of M. Gourdault and then into those of M. Chantelauze, who had already published studies on the connection of St. Vincent de Paul with the Gondi family, etc. (1882).

See also L. Batiffol, *Le Cardinal de Retz* (1927).

REUBEN, according to Gen. xxix. 32, was the eldest son of Jacob, by his first wife, Leah. From this it may be inferred that at one time Reuben ranked as the foremost of the Hebrew tribes. But for reasons which are obscure the tribe lost this preeminence at an early period of the history. In Gen. xxxv. 22 Reuben is said to have been intimate with his father's concubine, and the story, which breaks off abruptly, probably went on to record a curse pronounced upon him in consequence. This would be regarded as a sufficient explanation of the decline of the tribe (*cf.* Gen. xlix. 4, and *see* I. Chron. v. 1). It is possible that the story may be a personification of some aggressive move made by the tribe Reuben against the Bilhah clan. The subsequent history of the tribe is obscure. The territory which later traditions assign to it east of the Dead Sea is not clearly delimited or distinguished from the territories of Gad and Moab. A Reubenite name is found on the west of the Jordan (Josh. xv. 6, xviii. 17), and the reference to Reuben in the Song of Deborah (Judges v. 15–17) would naturally mean that Reuben was a pastoral tribe on the west of the Jordan, since of the next tribe mentioned it is definitely stated "Gilead abode beyond Jordan."

(*See* C. F. Burney, *Israel's Settlement in Canaan*, pp. 50–52.)

(W. L. W.)

REUCHLIN, JOHANN (1455–1522), German humanist and Hebraist, was born on Feb. 22, 1455, at Pforzheim in the Black Forest, where his father was an official of the Dominican monastery. The name was graecized by his Italian friends into Capnion. Reuchlin constantly writes himself Phorcensis. He learned Latin at the monastery school at Pforzheim, and spent a short time in 1470 at the university of Freiburg. His fine voice gained him a place in the household of Charles I., margrave of Baden, and he was chosen to accompany to the university of Paris the young prince Frederick. In Paris he learned Greek, and he attached himself to the leader of the Paris realists, Jean Heynlin, or à Lapide (d. 1496), whom he followed to the vigorous young university of Basel in 1474. At Basel Reuchlin took his master's degree (1477), and began to lecture, teaching a more classical Latin than was then common in German schools, and also explaining Aristotle in Greek. His Greek studies were continued at Basel under Andronicus Contoblacas, and he became acquainted with the bookseller, Johann Amorbach, for whom he prepared a Latin lexicon (*Vocabularius Breviloquus*, 1st. ed., 1475–76). Reuchlin soon left Basel to study under George Hieronymus at Paris. He then studied law at Orleans (1478), and at Poitiers, where he became licentiate in July 1481. On his return to Germany he was engaged as interpreter by Count Eberhard of Württemberg, for a tour in Italy. They started for Florence and Rome in February 1482. His connection with the count became permanent,

and after his return to Stuttgart he received important posts at Eberhard's court. About this time he appears to have married, but little is known of his married life. He left no children; but in later years his sister's grandson Melanchthon was almost as a son to him till the Reformation estranged them.

In 1490 he was again in Italy. Here he saw Pico della Mirandola, to whose Cabbalistic doctrines he afterwards became heir, and also made the friendship of the pope's secretary, Jakob Questenberg. On an embassy to the emperor Frederick at Linz in 1492, he began to read Hebrew with the emperor's Jewish physician Jakob ben Jehiel Loans. In 1494 his rising reputation had been greatly enhanced by the publication of *De Verbo Mirifico*.

In 1496 Eberhard of Württemberg died, and Reuchlin was glad to accept the invitation of Johann von Dalberg (1445–1503), bishop of Worms, to Heidelberg, which was then the seat of the "Rhenish Society." In this court of letters Reuchlin made translations from the Greek authors. He was during a great part of his life the real centre of all Greek teaching as well as of all Hebrew teaching in Germany. Reuchlin pronounced Greek as his native teachers had taught him to do, *i.e.*, in the modern Greek fashion. This pronunciation, which he defends in *Dialogus de Recta Lat. Graecique Serm. Pron.* (1519), came to be known, in contrast to that used by Erasmus, as the Reuchlinian.

At Heidelberg Reuchlin had many private pupils, among whom Franz von Sickingen is the best known name. With the monks he had never been liked; at Stuttgart also his great enemy was the Augustinian Conrad Holzinger. On this man he took a scholar's revenge in his first Latin comedy *Sergius*, a satire on worthless monks and false relics.

Through Dalberg, Reuchlin came into contact with Philip, elector palatine of the Rhine, who employed him to direct the studies of his sons, and in 1498 sent him on a mission to Rome. He came back laden with Hebrew books, and found when he reached Heidelberg that a change of government had opened the way for his return to Stuttgart, where his wife had remained all along. His friends had now again the upper hand, and knew Reuchlin's value. In 1500, or perhaps in 1502, he was given high judicial office in the Swabian League, which he held till 1512, when he retired to a small estate near Stuttgart.

For many years Reuchlin had been increasingly absorbed in Hebrew studies, which had for him more than a mere philological interest for as a good humanist he could not rest satisfied with the Vulgate text of the Old Testament. In 1506 appeared his epoch-making *De Rudimentis Hebraicis*—grammar and lexicon—mainly after Kimhi, yet not a mere copy of one man's teaching. The edition was costly and sold slowly. One great difficulty was that the wars of Maximilian I. in Italy prevented Hebrew Bibles coming into Germany. But for this also Reuchlin found help by printing the Penitential Psalms with grammatical explanations (1512), and other helps followed from time to time. But his Greek studies had interested him in those fantastical and mystical systems of later times with which the Cabbala has no small affinity. Reuchlin's mystico-cabbalistic ideas and objects were expounded in the *De Verbo Mirifico*, and in the *De Arte Cabbalistica* (1517).

Unhappily many of his contemporaries thought that the first step to the conversion of the Jews was to take from them their books. This view had for its chief advocate the bigoted Johann Pfefferkorn (1469–1521), who secured the ear of the emperor Maximilian. In 1510 Reuchlin was summoned in the name of the emperor to give his opinion on the suppression of the Jewish books. He proposed that the emperor should decree that for ten years there be two Hebrew chairs at every German university for which the Jews should furnish books. The other experts proposed that all books should be taken from the Jews; and, as the emperor still hesitated, the bigots threw on Reuchlin the whole blame of their ill success. Pfefferkorn circulated at the Frankfort fair of 1511 a gross libel (*Handspiegel wider und gegen die Juden*) declaring that Reuchlin had been bribed; and Reuchlin retorted as warmly in the *Augenspiegel* (1511). His adversary's next move was to declare the *Augenspiegel* a dangerous book; the Cologne theological faculty, with the inquisitor Jakob von Hochstraten (d. 1527), took up this cry, and on Oct. 7, 1512, they obtained an imperial order confiscating the *Augenspiegel*. Reuchlin was timid, but he was honesty itself. He was willing to receive corrections in theology, which was not his subject, but he could not unsay what he had said; and as his enemies tried to press him into a corner he met them with open defiance in a *Defensio contra Calumniatores* (1513). The universities were now appealed to for opinions, and were all against Reuchlin. Even Paris (August 1514) condemned the *Augenspiegel*, and called on Reuchlin to recant. Meantime a formal process had begun at Mainz before the grand inquisitor, but Reuchlin by an appeal succeeded in transferring the question to Rome. Judgment was given in July 1516; and then, though the decision was really for Reuchlin, the trial was simply quashed. The result had cost Reuchlin years of trouble and no small part of his modest fortune, but the obscurantists received a crushing blow in Germany. No party could survive the ridicule that was poured on them in the *Epistolae Obscurorum Virorum*.

Reuchlin did not long enjoy his victory in peace. In 1519 Stuttgart was visited by famine, civil war and pestilence. Reuchlin sought refuge in Ingolstadt and taught there for a year as professor of Greek and Hebrew. He was now called to Tübingen and again spent the winter of 1521–22 teaching in his own systematic way. He died at the baths of Liebenzell on June 30, 1522, leaving in the history of the new learning a name only second to that of his younger contemporary Erasmus.

See L. Geiger, *Johann Reuchlin* (1871), which is the standard biography; also D. F. Strauss, *Ulrich von Hutten;* S. A. Hirsch, "John Reuchlin, the Father of the Study of Hebrew among the Christians," and his "John Pfefferkorn and the Battle of Books," in his *Essays* (London, 1905). Some interesting details about Reuchlin are given in the autobiography of Conrad Pellicanus (*q.v.*), which was not published when Geiger's book appeared. *See* also the article on Reuchlin in Herzog-Hauck, *Realencyklopädie,* and literature there cited.

RÉUNION, known also by its former name BOURBON, an island and French colony in the Indian Ocean, 400 m. S.E. of Tamatave, Madagascar, and 130 S.W. of Port Louis, Mauritius. It is elliptic in form and has an area of 970 sq.m. It lies between 20° 51′ and 21° 22′ S. and 55° 15′ and 55° 54′ E.

The coast-line is little indented, high and difficult of access and the harbours are usually sunken craters. The narrow coast-lands 1 to 3 km. wide are succeeded by hilly ground which gives place to mountain masses and tableland, which occupy the greater part of the island. The main axis runs N.W. and S.E., and divides the island into a windward (E.) district and a leeward (W.) district, the dividing line being practically that of the watershed. The whole relief is very complex owing to vulcanicity. First was formed a mountain whose summit is approximately represented by Piton des Neiges (10,069 ft.), an immense denuded crater, and at a later date another crater opened towards the E., piling up the mountain mass of Le Volcan. The oldest erupted rocks belong to the type of the andesites; the newest are varieties of basalt. The two massifs are united by high tablelands. In the older massif the most striking features are now three areas of subsidence—the cirques of Salazie, Rivière des Galets and Cilaos—which lie N.W. and S. of the Piton des Neiges. The first, which may be taken as typical, is surrounded by high almost perpendicular walls of basaltic lava. Towards the S. lies the vast stratum of rocks which, on November 26, 1875, suddenly sweeping down from the Piton des Neiges and the Gros Morne, buried the little village of Grand Sable.

The second massif, Le Volcan, is cut off from the rest of the island by two "enclosures," each about 500 or 600 ft. deep. The outer enclosure runs across the island in a north and south direction; the inner forms a kind of parabola with its arms stretching E. to the sea and embracing not only the volcano proper but also the great eastward slope known as the Grand Brûlé. The 30 m. of mountain wall round the volcano is perhaps unique in its astonishing regularity. It encloses an area of about 40 sq.m. known as the Grand Enclos. There are two principal craters, each on an elevated cone,—the more westerly, now extinct, known as the Bory Crater (8,612 ft.), after Bory de St. Vincent, the geologist, and the more easterly called the Burning Crater or Fournaise (8,294 ft.). The latter is partially surrounded by an "enclosure" on a small scale with precipices 200 ft. high. Eruptions, though

not infrequent (thirty were registered between 1735 and 1860), are seldom serious; the more noteworthy are those of 1745, 1778, 1791, 1812, 1860, 1870, 1881. After 40 years of inactivity Fournaise was in eruption for four months from Dec. 1925 to April 1926. Hot mineral springs are found on the flanks of the Piton des Neiges: the Source de Salazie, 2,860 ft. above sea-level, has a temperature of 90° F, and discharges water impregnated with bicarbonate of soda, carbonates of magnesium, lime, iron, etc.; that of Cilaos is 3,650 ft. above the sea with a temperature of 100°; and that of Mafate 2,238 ft. and 87°.

Climate.—The year divides into two seasons—that of heat and rain from November to April, that of dry and more bracing weather from May to October. The prevailing wind is the south-east trade wind, which sometimes veers round to the south, and more frequently to the north-east; the west winds are not so steady (three hundred and seven days of east to fifty-eight of west wind in the course of the year). As over all the Indian Ocean cyclonic storms are frequent at the change of seasons. The *raz de marée* occasionally does great damage. The relief of the land causes quite appreciable climatic differences, the leeward side getting much less rain than the windward. On the coast and lower zones on the windward side the mean temperature is about 73° in the "winter" and 78° in the "summer." On the leeward side the heat is somewhat greater. In the Salazie cirque the mean annual average is 66°; at the Plaine des Palmistes 62°. On the mountain heights snow falls every year. In general, the higher parts of the island are healthy, but fever is prevalent on the coast.

Fauna and Flora.—The fauna of Réunion is not very rich in variety of species. The mammals are a brown maki (*Lemur mongoz*, Linn.) from Madagascar, several bats, a wild cat, the tang or tamec (*Centetes setosus*, Denn.), rats, etc. Among the more familiar birds are the "oiseau de la vierge" (*Muscipeta borbonica*), the tectec (*Pratincola sybilla*), *Certhia borbonica*, the cardinal (*Foudia madagascariensis*), various swallows, ducks, etc. The visitants from Madagascar, Mauritius and even India are very numerous. Lizards and frogs of more than one species are common, but there is only one snake (*Lycodon aulicum*) known in the island. Various species of *Gobius*, a native species of mullet, *Nestis cyprinoides*, *Osphronamus olfax* and *Doules rupestris* are among the freshwater fishes.

The heat, humidity and fertility of the volcanic soil have given Réunion an abundant and varied vegetation. In the forest region of the island there is a belt, 4,500–5,000 ft. above the sea, characterized by the prevalence of dwarf bamboo (*Bambusa alpina*); and above that is a similar belt of *Acacia heterophylla*. Besides this last the best timber-trees are *Casuarina laterifolia*, *Foetida mauritiana*, *Imbricaria petiolaris*, *Elaeodendron orientale*, *Calophyllum spurium* (red tacamahac), *Terminalia borbonica*, *Parkia speciosa*. A species of coffee plant is indigenous. Fruits grown are: the banana, the coco-nut, bread-fruit and jack-fruit, etc. Forests originally covered nearly the whole island; the majority of the land has been cleared, but the administration has in part replanted the higher districts with eucalyptus and caoutchouc trees.

Inhabitants.—Réunion, strictly speaking, has no indigenous population. The inhabitants include creoles, mulattoes, negroes, Indians and other Asiatics. The creole population is descended from the first French settlers, chiefly Normans and Bretons, who married Malagasy women. Three quarters of the inhabitants are of European origin. Three kinds of creoles are recognized—those of the towns and coasts, those of the mountains, and the *petits créoles*, originally a class of small farmers living in the uplands, now reduced to a condition of poverty and dependence on the planters. The *créoles blancs de villes*, the typical inhabitants of the island, are in general of a somewhat weak physique, quick-witted and of charming manners, brave and very proud of their island, but not of strong character. The creole patois is French mixed with a considerable number of Malagasy and Indian words, and containing many local idioms. The population, about 35,000 towards the close of the 18th century, now numbers 186,637 inhabitants of whom 180,694 are of French extraction.

Towns and Communication.—St. Denis, pop. (1926) 23,390, the capital of the island, lies on the N. coast. It is built in the form of an amphitheatre, and has several fine public buildings and centrally situated botanic gardens. The only anchorage for vessels is an open roadstead. St. Pierre (pop. 20,479), the chief town on the leeward side of the island, has a small artificial harbour. Between St. Pierre and St. Denis, and both on the leeward shore, are the towns of St. Louis (pop. 15,867) and St. Paul (pop. 21,643). A few miles N. of St. Paul on the S. side of Cape Pointe des Galets is the port of the same name, the only considerable harbour in the island. It was completed in 1886, it covers 40 acres, is well protected, and has 28 ft. of water. A railway serving the port goes round the coast from St. Pierre, by St. Paul, St. Denis, to St. Benoît (a town on the E. side of the island with a pop. of 12,523), a distance of 83¼ m. Telegraphic communication with all parts of the world was established in 1906.

Industries.—The greater part of the land under cultivation on the island is occupied by sugar-cane plantations, the remainder being under either maize, manioc, potatoes, haricots, or coffee, vanilla and cocoa. The sugar-cane, introduced in 1711 by Pierre Parat, is now the staple crop. In the 18th century the first place belonged to coffee (introduced from Arabia in 1715) and to the clove tree, brought from the Dutch Indies by Poivre at the risk of his life. Both are now cultivated on a very limited scale. Vanilla, introduced in 1818, was not extensively cultivated till about 1850. Bourbon vanilla, as it is called, is of high character, and next to sugar is the most important article of cultivation in the island. There are small plantations of cocoa and cinchona; cotton-growing was tried, but proved unsuccessful.

The sugar industry has suffered greatly from the competition with beet sugar and the effects of bounties, also from the scarcity of labour, from the ravages of the phylloxera (which made its appearance in 1878) and from extravagant methods of manufacture. It was not until 1906 that steps were taken for the creation of central sugar mills and refineries, in consequence of the compulsory shutting down of many small mills. Rum is largely distilled and forms an important article of export. There are also manufactories for the making of geranium essence, St. Pierre being the centre of this industry. Other articles exported are aloe fibre and vacoa casks. The mineral wealth of the island has not been exploited, except for the mineral springs which yield waters highly esteemed. Cattle are imported from Madagascar; rice from Saigon and India; petroleum, for factories, from America and Russia; almost everything else comes from France, to which country go most of the exports. Over 75% of the shipping is under the French flag. Fishing is an important occupation.

Commerce.—In 1926 the exports were valued at 164,895,913 francs and the imports at 164,883,564 francs. The currency consists of notes of the Banque de la Réunion with a capital of 6,000,000 francs (guaranteed by the government) and nickel token money.

Administration and Revenue.—Réunion is regarded practically as a department of France. It sends two deputies and one senator to the French legislature, and is governed by laws passed by that body. All inhabitants, not being aliens, enjoy the franchise, no distinction being made between whites, negroes or mulattoes, all of whom are citizens. At the head of the local administration is a governor who is assisted by a secretary-general, a *procureur général*, a privy council and a council-general elected by the suffrages of all citizens. The governor has the right of direct communication and negotiation with the government of South Africa and all states east of the Cape. The council-general has wide powers, including the fixing of the budget. For administrative purposes the island is divided into two arrondissements, the Windward, with five cantons and nine communes, and the Leeward, with four cantons and seven communes. The towns are subject to the French municipal law. The 1926 budget gives receipts as 52,502,932 francs, expenditures 46,076,028 francs.

History.—Réunion is usually said to have been first discovered in April 1513, by the Portuguese navigator Pedro Mascarenhas, and his name, or that of Mascarene islands, is still applied to the archipelago of which it forms a part; but it seems probable that it must be identified with the island of Santa Apollonia discov-

ered by Diego Fernandes Pereira on Feb. 9, 1507. When in 1638 the island was taken possession of by Captain Gaubert, or Gobert, of Dieppe, it was uninhabited; a more formal annexation in the name of Louis XIII. was effected in 1643; and in 1649 Étienne de Flacourt repeated the ceremony. He also changed the name of the island from Mascarenhas to Bourbon. By decree of the Convention in 1793, Bourbon in turn gave place to Réunion, and though during the empire this was discarded in favour of Île Bonaparte, and at the Restoration people naturally went back to Bourbon, Réunion has been the official designation since 1848.

The first inhabitants were a dozen mutineers deported from Madagascar by Pronis, but they remained only three years (1646–49). Other colonists went thither of their own will in 1654 and 1662. In 1664 the *Compagnie des Indes orientales de Madagascar,* to whom a concession of the island was granted, initiated a regular colonization scheme. Their first commandant was Étienne Régnault, who in 1689 received from the French crown the title of governor. The growth of the colony was very slow, and in 1717 there were only some 2,000 inhabitants. It is recorded that they lived on excellent terms with the pirates, who from 1684 frequented the neighbouring seas for many years. The French Revolution effected little change in the island and occasioned no bloodshed; the colonists successfully resisted the attempts of the Convention to abolish slavery, which continued until 1848 (when over 60,000 negroes were freed), the slave trade being, however, abolished in 1817. In 1809 the British attacked the island, and the French were forced to capitulate on July 8, 1810; the island remained in the possession of Great Britain until April 1815, when it was restored to France. From that period the island has had no exterior troubles. The Third Republic conferred the full rights of French citizenship including the vote on the negro population in 1870. The immigration of coolies began in 1860, but in 1882 the Government of India prohibited the further emigration of labourers from that country. Réunion suffered from disastrous cyclones in 1879 and 1904.

BIBLIOGRAPHY.—A. G. Garsault, *Notice sur la Réunion* (1900), a monograph prepared for the Paris exhibition of that year; E. Jacob de Cordemoy, *Étude sur l'île de la Réunion, geographie, richesse naturelles etc.* (Marseilles, 1905); W. D. Oliver, *Crags and Craters; Rambles in the island of Réunion* (1896); C. Keller, *Natur und Volksleben der Insel Réunion* (Basel, 1888); J. D. Brunet, *Histoire de l'association générale des francs créoles de l'île Bourbon* (St. Denis, Réunion, 1885); Trouette, *L'île Bourbon pendant la période révolutionnaire* (1888). Of earlier works consult Demanet, *Nouv. Hist. de l'Afrique française* (1767); P. U. Thomas, *Essai de statistique de l'île Bourbon* (1828); Dejean de la Batie, *Notice sur l'île Bourbon* (1847); J. Mauran, *Impressions dans un voy. de Paris à Bourbon* (1850); Maillard, *Notes sur l'île de la Réunion* (1862); Azéma, *Hist. de l'île Bourbon* (1862). The geology and volcanoes of Réunion were the object of elaborate study by Bory de St. Vincent in 1801 and 1802 (*Voyages dans les quatre principales îles des mers d'Afrique,* 1804), and have since been examined by R. von Drasche (see *Die Insel Réunion,* etc., Vienna, 1878, and C. Vélain, *Descriptions géologique de . . . l'île de la Réunion . . .*, 1878).

REUNION, CHURCH. The movements for the Reunion of the Churches, especially among English-speaking Christians, are due mainly to two causes. In the first place, the reasons for division, which seemed once to be based on spiritual principles about which no compromise was possible, have grown fainter than they were. Few men cling to them so tenaciously as they did, *e.g.,* in the 17th century. Secondly, there is a widespread feeling of the ineffectiveness of the churches in face of the tasks and problems of civilisation since the outbreak of the World War in 1914. To a large extent this is attributed to the divisions and consequent lack of unity of witness and aim among the churches themselves.

These movements for reunion are concerned with the divisions outside the Roman Catholic Church, which takes no part in them. On principle it cannot do so, as it has its own terms, surrender and not adjustment, from which there can be no departure.

An apparent exception to this statement occurred in what are known as the Conversations at Malines (1921–25). At the invitation of Cardinal Mercier a small body of English theologians met a similar body of Roman Catholic scholars for the purpose of exploring their grounds of difference. Begun quite unofficially, at a later stage these conversations were held with the cognisance of the Archbishop of Canterbury. They were carried on in an atmosphere of friendship and respect; but the recent papal encyclical (1928) laid down the only terms of reunion with Rome: unconditional surrender.

The Church of England and the Orthodox Eastern Church.—Negotiations between the Church of England and the Eastern Orthodox Church for mutual recognition and fellowship have a fairly long history, but the pace has been quickened largely owing to events which followed the World War. In Jan. 1920, an Encyclical Letter was issued from the Patriarchate of Constantinople "unto all the Churches of Christ wheresoever they be." It was an earnest plea for closer contact and better mutual understanding; and as a means to this end it suggested that there should be a uniform calendar for Christian feasts, intercourse between theological schools, exchange of students, impartial and more historical examination of doctrinal differences, etc. Following this, a "proposed concordat" was drawn up by the American Episcopal Church. After setting forth points of agreement in faith and order, it concludes:—

"In accordance with the preceding agreements, we do solemnly declare our acceptance of the sacramental acts each of the other, and that they are true and valid. And, holding fast the truth once delivered to the Saints, we pronounce that intercommunion is desirable and authorised for all our members wherever and whenever it is deemed convenient and practicable by the proper local and ecclesiastical authorities."

To this the locum tenens of the Oecumenical Patriarchate sent a sympathetic reply. The next step was the presence of a delegation of the Patriarchate at the Lambeth Conference in July 1920. Their subsequent report to the Holy Synod was marked by a good deal of reserve. The latitude of the Church of England proved to be a source of difficulty. The delegation also pointed out that the Lambeth Appeal puts forward "measures in relation to the non-episcopal Churches which also, in spite of goodwill, manifestly conflict with venerated principles and systems." Subsequently the Eastern Churches committee appointed by the Archbishop of Canterbury issued a statement of terms of intercommunion. In Feb. 1923, the Archbishop announced that the Holy Synod at Constantinople, after careful consideration, had decided in favour of the validity of Anglican ordinations. He pointed out, however, that this decision must be endorsed by all Patriarchates or by a General Council before it could become an oecumenical act.

The Church of England and the Free Churches.—The Lambeth Appeal, though addressed to all Christian people, has has had its most important effect in the field of English ecclesiastical life. It has forced the great nonconformist bodies to reconsider their relations to the Church of England and the grounds of their separation, and to do so in an atmosphere of friendliness and goodwill. The terms on which the appeal believes that union is possible are as follows:—

"We believe that the visible unity of the church will be found to involve the whole-hearted acceptance of—

The Holy Scriptures, as the record of God's revelation of Himself to man, and as being the rule and ultimate standard of faith; and the Creed, commonly called Nicene, as the sufficient statement of the Christian faith, and either it or the Apostle's Creed as the baptismal confession of belief;

The divinely instituted sacraments of Baptism and the Holy Communion, as expressing for all the corporate life of the whole fellowship in and with Christ;

A ministry acknowledged by every part of the Church as possessing not only the inward call of the Spirit, but also the commission of Christ and the authority of the whole body."

It is claimed that the Episcopate is the one means of providing such a ministry. "But we greatly desire," it is added, "that the office of a Bishop should be everywhere exercised in a representative and constitutional manner, and more truly express all that ought to be involved for the life of the Christian family in the title of Father-in-God." These proposals have been the subject of prolonged discussion between representatives of the Church of

England on the one hand and a joint committee of the Federal Council of the Evangelical Free Churches (*q.v.*) and the National Free Church Council (*q.v.*) on the other, but so far no agreement has been found possible on two matters of essential importance, viz., the use of the Creed and the necessity of episcopal ordination.

On the first point, the Free Church position is expressed in the resolutions adopted by the annual assembly of the Federal Council in Sept. 1922:—

"We regard the place given to the two ancient Catholic creeds as . . . subordinate to the inspired Word and living Spirit; and these creeds are received not as a complete expression of the faith, but as preserving 'essential elements' in it 'in the form handed down through many centuries,' and with reasonable liberty as to their interpretation and their use. We hold as not only consistent with this, but as implied in it, alike the fullest freedom in the intellectual investigation of Truth and the most single-hearted discipleship to the Mind of Christ."

In regard to episcopal ordination the difficulty turns upon the question of the validity of the Free Church ministry. There is on the one hand a natural refusal to accept anything which implies that the Free Church minister must be re-ordained before he can administer valid sacraments in a united Church, and on the other there is disinclination on the part of the Church of England to advance beyond the admission that many Free Church ministries have been "manifestly blessed and owned by the Holy Spirit as effective means of grace," and consequently must be regarded as "real ministries of Christ's Word and Sacraments in the Universal Church," though they may be in varying degrees "irregular or defective."

General Results.—The difficulties indicated above are still unsolved, in spite of many discussions and explanatory statements marked by a very conciliatory spirit. In a memorandum signed by the Archbishops of Canterbury and York and the Moderator of the Federal Council in June 1925, it is stated that the joint conference believes that there should be a suspension of its activities in order that the documents already submitted may be studied with care. At its annual meeting in Sept. the Federal Council concurred, and at the same time recorded its conviction that the conferences which have taken place "have done much to bring representative members of the Churches concerned into closer fellowship and to a better understanding of each other's position; and, further, that they have prepared the way to further progress towards unity in the future."

METHODIST AND PRESBYTERIAN REUNION

Methodist Reunion.—The movement for reunion among the three branches of the Methodist Churches in England has reached a stage when it seems likely that it will soon be an accomplished fact. A scheme has been drawn up, and in 1924 the Wesleyan Conference, the Primitive Methodist Conference and the United Methodist Conference passed a practically identical resolution in the following terms:—

"The conference is of opinion that, provided the Methodist people desire the organic union of the three Methodist Churches concerned, the scheme now submitted (which is the result of prolonged deliberation and exhaustive inquiry) affords a basis of union which would ensure harmonious working without the sacrifice of any principle vital to Methodism. The conference therefore commends the scheme to the prayerful consideration of the Methodist people."

In 1925 the Wesleyan conference took the further necessary step of declaring in favour of the union of the three Methodist Churches, provided that substantial agreement can be secured as to the measures to be adopted for effecting union. The required agreement has been secured, and the necessary Act of Parliament passed.

The Churches of Scotland.—The first step towards union between the Church of Scotland and the United Free Church of Scotland was taken in 1908, when the General Assembly of the Church of Scotland resolved "to request the other Presbyterian Churches to confer with them on the present ecclesiastical situation." Conferences followed, and in 1914 a constitution was drafted under which the Church would be both national and free. No further progress was possible till 1919, owing to the War. In 1920, the articles of the constitution were approved and in July 1921, an Enabling Bill was passed by Parliament. Certain questions connected with the property and endowments of the Church of Scotland remained to be dealt with by a departmental committee appointed in 1922 and presided over by Lord Haldane. It reported in 1923, and its recommendations are embodied in The Church of Scotland (Property and Endowments) Bill of 1924. (On reunion in Canada *see* METHODISM; PRESBYTERIANISM.)

REUNION IN THE MISSION FIELD

The need for union in the mission field is illustrated by the negotiations between the Episcopal Synod of India and Ceylon and the South India United Church. The latter is a union of Christian congregations connected with the London Missionary Society and the American Board of Commissioners for Foreign Missions (both Congregational), the Church of Scotland, the United Free Church of Scotland, the Dutch Reformed Church in America and the Basel Mission. A joint committee was constituted in 1920 and several reports have been issued. As in England, the difficulty of agreement turned chiefly to the insistence upon episcopal ordination for all ministers of the United Church. It is suggested that the fact of episcopacy should be recognised without insistence upon any doctrine of its meaning, and that a joint service should be held to commission all ministers who desired full status in the United Church on reciprocally equal terms. The South India United Church also insists that it cannot allow itself to be cut off from these non-episcopal churches with which it is now in full communion.

It treasures its present catholicity too highly to take any step that would diminish or destroy the fellowship which it now enjoys with Evangelical Christendom.—(Resolution, Aug. 1923.)

A brief reference must be made to some of the movements of co-operation among different bodies of Christians, which have grown in strength and number since the end of the World War. Though these movements do not deal directly with the problem of reunion, the same motives lie behind them, viz.: a sense of the weakness of the Christian witness in the world due to division and a desire to co-operate in large fields of Christian enterprise which are recognised as common ground. (*a*) The World Alliance for promoting International Friendship through the Churches, founded at Constance on Aug. 2, 1914.

Its object is set forth in the following resolutions:—

1. That, inasmuch as the work of conciliation and the promotion of amity is esentially a Christian task, it is expedient that the Churches in all lands should use their influence with the peoples, parliaments and governments of the world to bring about good and friendly relations between the nations, so that, along the path of peaceful civilisation, they may reach that universal goodwill which Christianity has taught mankind to aspire after. 2. That inasmuch as all sections of the Church of Christ are equally concerned in the maintenance of peace and the promotion of good feeling among all the races of the world, it is advisable for them to act in concert in their efforts to carry the foregoing resolution into effect.

The Alliance consists of 28 national councils and is representative of the organised Christianity of the world with the exception of the Roman Catholic Church. The international committee meets once every three years. Its meetings in Copenhagen (1922) and Stockholm (1925) did much to focus Christian thought upon the question of peace. The expense of the international work of the Alliance is borne by the American Peace Union.

International Missionary Council.—The functions of this body are defined in the following resolutions adopted in 1921:—

1. To stimulate thinking and investigation on missionary questions, to enlist in the solution of these questions the best knowledge and experience to be found in all countries and to make the results available for all missionary societies and missions.

2. To help to co-ordinate the activities of the national mis-

sionary organisations of the different countries and of the societies they represent, and to bring about united action where necessary in missionary matters.

3. Through common consultation to help to unite Christian public opinion in support of freedom of conscience and religion and of missionary liberty.

4. To help to unite the Christian forces of the world in seeking justice in international and inter-racial relations.

The Council is responsible for the publication of the *International Review of Missions.*

Universal Christian Conference.—The universal Christian conference on Life and Work held its first meeting at Stockholm in Aug. 1925. Six hundred and ten delegates were present, representing 31 communions and 37 nations. As a result, a message to all followers of Christ has been issued, setting forth the findings of the conference in the sphere of economics, of social morality and of international and inter-racial relationships. A continuation committee has been appointed.

BIBLIOGRAPHY.—*Towards Reunion,* being contributions to mutual understanding by Church of England and Free Church Writers (1919); George Eayrs, *British Methodism* (1920); various writers, *The Problem of Christian Unity and Fellowship* (1921); G. K. A. Bell, ed., *Documents on Christian Unity, 1920–24* (1924); G. K. A. Bell and W. L. Robertson, eds., *The Church of England and the Free Churches* (1925). *See* also "The Church in the Twentieth Century" in art. ENGLAND, CHURCH OF; *The Conversations at Malines* (Oxford, 1928); and also the original documents ed. by Lord Halifax (1930) and *Report of Church Congress* (1928). *See* also CHRISTIAN UNITY. (W. H. DR.)

REUS, a city of north-east Spain, in the province of Tarragona, on the Saragossa-Tarragona railway, 4 m. N. of Salou, its port on the Mediterranean. Pop. (1920), 30,266. Reus consists of two parts, the old and the new, separated by the Calle Arrabal, which occupies the site of the old city wall. The earliest records of Reus date from about the middle of the 13th century. Its modern prosperity is traced to about the year 1750, when a colony of English settled here and established a trade in woollens, leather, wine and spirits. The principal incidents in its political history arose out of the occurrences of 1843 (*see* SPAIN, *History*), in connection with which the town received the title of city, and Generals Zurbano and Prim were made counts of Reus. The city was the birthplace of General Prim (1814–1870) and of the painter Mariano Fortuny (1839–1874). The city has important flour, wine and fruit export houses.

REUSCH, FRANZ HEINRICH (1823–1900), German theologian, was born at Brilon, Westphalia, on Dec. 4, 1823. He studied general literature at Paderborn, and theology at Bonn, Tübingen and at Munich, where he was a friend and pupil of Döllinger. In 1854 he became *Privatdozent* in the exegesis of the Old Testament in the Catholic Theological Faculty at Bonn; in 1858 he was made extraordinary, and in 1861 ordinary, professor of theology in the same university. From 1866 to 1877 he was editor of the *Bonner Theologisches Literaturblatt.* In the controversies on the Infallibility of the Pope, Reusch, who had been ordained priest in 1849, attached himself to Döllinger's party, and he and his colleagues Hilgers, Knoodt and Langen were interdicted by the archbishop of Cologne in 1871 from pursuing their courses of lectures. In 1872 he was excommunicated. For many years after this he held the post of Old Catholic *curé* of Bonn, as well as the position of vicar-general to the Old Catholic Bishop Reinkens, but resigned both in 1878, when, with Döllinger, he disapproved of the permission to marry granted by the Old Catholic Church in Germany to its clergy. He was made rector of Bonn university in 1873. In 1874 and 1875 he was official reporter of the Reunion Conferences held at Bonn. He produced with Döllinger the *Geschichte der Moralstreitigkeiten in der Römisch-Katholischen Kirche seit dem XVI. Jahrhundert,* and the *Erörterungen über Leben und Schriften des hl. Liguori.* He died on March 3, 1900.

REUSS, ÉDOUARD GUILLAUME EUGÉNE (1804–1891), German Protestant theologian, was born at Strasbourg on July 18, 1804. He studied philology in his native town (1819–22), theology at Göttingen under J. G. Eichhorn; and Oriental languages at Halle under Wilhelm Gesenius, and afterwards at Paris under Silvestre de Sacy (1827–28). He taught at Strasbourg from 1828 until 1888, for sixty years, having become full professor in 1836. His most important works are: *Geschichte der heiligen Schriften N. Test.* (1842), *Histoire de la théologie chrétienne au siècle apostolique* (1852); *L'Histoire du canon des saintes écritures dans l'église chrétienne* (1863); *La Bible, nouvelle traduction avec commentaire* (1874, etc.); and *Geschichte der heiligen Schriften A. Test.,* a veritable encyclopaedia of the history of Israel from its earliest beginning till the taking of Jerusalem by Titus. He died at Strasbourg on April 15, 1891.

For many years Reuss edited with A. H. Cunitz (b. 1812) the *Beiträge zu den theologischen Wissenschaften.* With A. H. Cunitz and J. W. Baum (1809–1878), and after their death alone, he edited the monumental edition of Calvin's works (38 vols., 1863 ff.). His critical edition of the Old Testament appeared a year after his death.

See the article in Herzog-Hauck, *Realencyklopädie,* and *cf.* Otto Pfleiderer, *Development of Theology in Germany since Kant* (1890).

REUSS, the name of two former German principalities (Reuss-Greiz and Reuss-Schleiz-Gera) which have been, since 1918, amalgamated into Thuringia (*q.v.*).

History.—The princes of Reuss traced their descent to Henry (d. about 1120), who was appointed by the emperor, Henry IV., imperial bailiff (Ger. *Vogt,* from Lat. *advocatus imperii*) of Gera and of Weida. His descendants called themselves lords of Weida. The land under their rule gradually increased in size, and it is said that the name of Reuss was applied to it owing to the fact that one of its princes married a Russian princess, their son being called *der Russe,* or the Russian. In 1564 the family was divided into three branches by the sons of Henry XVI. (d. 1535). One of these died out in 1616, but those of Reuss-Greiz and Reuss-Schleiz-Gera survived as sovereign houses till the revolution of 1918. The lords of Reuss took the title of count in 1673; and the head of the elder line became a prince of the empire in 1778, and the head of the younger line in 1806. In 1807 the two princes joined the confederation of the Rhine, and in 1815 the German confederation. In 1866 both principalities became members of the North German confederation.

A curious custom prevailed in the house of Reuss. The male members of both branches of the family all bore the name of Henry (Heinrich), the individuals being distinguished by numbers.

See H. von Voss, *Die Ahnen des reussischen Hauses* (Lobenstein, 1882); O. Liebmann, *Das Staatsrecht des Fürstenthums Reuss* (1884); C. F. Collmann, *Reussische Geschichte. Das Vogtland im Mittelalter* (Greiz, 1892); B. Schmidt, *Die Reussen, Genealogie des Gesamthauses Reuss* (Schleiz, 1903).

REUTER (roi'ter) **FRITZ** (1810–1874), German novelist, made Plattdeutsch a literary language. Born Nov. 7, 1810, at Stavenhagen, in Mecklenburg-Schwerin, he studied at Rostock and at Jena, where he was a member of the political students' club, or German Burschenschaft, and in 1833 was arrested in Berlin by the Prussian Government. Although the only charge which could be proved against him was that he had been seen wearing the Burschenschaft colours, he was condemned to death for high treason. The sentence was commuted to imprisonment for 30 years in a Prussian fortress. In 1838, through the personal intervention of the grand-duke of Mecklenburg, he was handed over to the authorities of his native state, and in 1840 was set free by a general amnesty.

In 1850 he settled as a private tutor at the little town of Treptow in Pomerania. Here he married Luise Kunze, the daughter of a Mecklenburg pastor. Reuter's first publication was a collection of miscellanies, written in Plattdeutsch, and entitled *Läuschen un Riemels* ("anecdotes and rhymes," 1853; a second collection followed in 1858). There followed *Polterabendgedichte* (1855), and *De Reis' nah Belligen* (1855). In 1856 Reuter left Treptow and established himself at Neubrandenburg. His next book (published in 1858) was *Kein Hüsung,* an epic in which he presents with great force and vividness some of the least attractive aspects of village life in Mecklenburg. This was followed, in 1860, by *Hanne Nüte un de lütte Pudel,* the best of his verse compositions. In 1860 he published the first series of his *Olle Kamellen* ("old stories of bygone days"), which contained *Woans ick tau'ne Frau kam* and *Ut de Franzosentid.* Later volumes were entitled *Ut*

mine Festungstid (1861); *Ut mine Stromtid* (3 vols. 1864); and *Dörchläuchting* (1866)—all written in the Plattdeutsch dialect of the author's home. *Ut mine Stromtid* is by far the greatest of Reuter's writings. *Ut de Franzosentid* describes the deep national impulse under which Germany rose against Napoleon. *Ut mine Stromtid* deals with the revolution of 1848.

In 1863 Reuter moved to Eisenach; and here he died on July 12, 1874.

Reuter's *Sämtliche Werke,* in 13 vols., were first published in 1863–68. To these were added in 1875 two volumes of *Nachgelassene Schriften,* with a biography by A. Wilbrandt; and in 1878 two supplementary volumes to the works appeared. A popular edition in 7 vols. was published in 1877–78 (new edition, 1902); there are also editions by K. F. Müller (18 vols., 1905), and W. Seelmann (7 vols., 1905–06). See *Briefe F. Reuters an seinen Vater,* ed. F. Engel (2 vols., 1895); A. Römer, *F. Reuter in seinem Leben und Schaffen* (1895); G. Raatz, *Wahrheit und Dichtung in Reuters Werken* (1895); E. Brandes, *Aus F. Reuters Leben* (1899); K. F. Müller, *Der Mecklenburger Volksmund und F. Reuters Schriften* (1902). A complete bibl. will be found in the *Niederdeutsche Jahrbuch* for 1896 and 1902.

REUTER, GABRIELE (1859–), German novelist, was born at Alexandria, Egypt, on Feb. 8, 1859. Her first novel, *Glück und Geld,* appeared in 1888. One of her early novels, *Aus guter Familie,* had reached its 25th edition in 1907. Among her works are *Frauenseelen* (1901); *Jugend eines Idealisten* (1916); and *Benedikta* (1923).

REUTER, PAUL JULIUS, Baron de (1816–1899), founder of Reuter's News Agency, was born at Cassel, Germany. At the age of thirteen he became a clerk in his uncle's bank at Göttingen, where he met Gauss, whose experiments in telegraphy were then attracting some attention. In 1849 there was a gap between the end of the new German telegraph line at Aix-la-Chapelle and that of the French and Belgian lines at Verviers. Reuter organized a news-collecting agency at each of these places and bridged the interval by a pigeon-post. On the establishment of through telegraphic communication, Reuter endeavoured to start a news agency in Paris, but finding that the French government's restrictions would render the scheme unworkable, removed in 1851 to England and became a naturalized British subject. The first submarine cable—between Dover and Calais—had just been laid, and Reuter opened a news office in London. At first, however, his business was practically confined to the transmission of private commercial telegrams to places not connected with the new system. He appointed agents at the telegraph termini on the Continent to forward these despatches by rail or pigeon-post to the addresses. His efforts to induce the English papers to publish his foreign news telegrams were unsuccessful, until in 1858 *The Times* published the report of an important speech by Napoleon III. forwarded by Reuter's Paris agent.

Reuter now extended his sphere of operations all over the world. In 1866 he laid down a special cable from Cork to Crookhaven, which enabled him to circulate news of the American Civil War several hours before the steamer could reach Liverpool. A concession for a cable beneath the North Sea to Cuxhaven was granted him by the king of Hanover in 1865, and in the same year a concession was granted him for a cable between France and the United States, the line being worked jointly by Reuter and the Anglo-American Telegraph Company. Reuter was in 1871 given the title of baron by the duke of Saxe-Coburg and Gotha, and by a special grant of Queen Victoria he and his heirs were authorized to have the privileges of this rank in England. Reuter died at Nice on Feb. 25, 1899.

REUTERHOLM, GUSTAF ADOLF, Baron (1756–1813), Swedish statesman. After a brief military career he was appointed *Kammerherr* to Sophia Magdalena, queen consort of Gustavus III., and became intimately connected with the king's brother, Charles, then duke of Sudermania. He was imprisoned for a time in 1789 with other malcontents opposed to Gustavus III. On the death of Gustavus and the assumption of the regency by Charles he was made a member of the council of state and one of the "lords of the realm." His policy became increasingly reactionary and on the accession of Gustavus IV. he was expelled from Stockholm. He died in exile in Schleswig on Dec. 27, 1813.

See *Sveriges Historia* (Stockholm, 1877–81), vol. v.

REUTERS, the principal British and International News Agency, founded over eighty years ago by Baron Julius de Reuter, who established a system of offices and correspondents throughout the world. He concentrated in London the news from these correspondents and then redistributed it. In 1865 de Reuter transferred his business to a joint stock company, of which he became the governing director; he was succeeded in 1879 by his elder son, Baron Herbert de Reuter (d. 1915). The Hon. Mark F. Napier was chairman of the company from 1910 to 1919, and in conjunction with him, Sir Roderick Jones, the present chairman and managing director, for national reasons arising out of the World War, converted the agency from a public company into a private trusteeship. This involved buying out the then existing shareholders for a sum of considerably over half a million sterling. Ten years later Sir Roderick reorganized the trusteeship in conjunction with the Press Association to ensure the passage ultimately of the complete ownership of Reuters to the newspapers of the United Kingdom. The principal news agency in every country in the world is affiliated with Reuters. Reuters' correspondents resident in the respective countries enjoy the exclusive call for Reuters' purposes upon the news of these agencies. Where Reuters do not supply their telegrams direct to the newspapers, they deliver their service to these agencies to be disposed of by them in their territories. In addition to their services of imperial and foreign political news Reuters have greatly extended, especially to the Continent and to the East and the Far East, their services of commercial and financial prices and intelligence; and at the present time (1929) they conduct from the Rugby and Northolt Stations the largest wireless telegraph service of its kind in the world, consisting every twenty-four hours of over 100 emissions which are received simultaneously, and for all practical purposes instantaneously, in each of the great world business centres. (W. L. Mu.)

REUTLINGEN, a town of Germany, in the republic of Württemberg, on the Echatz, an affluent of the Neckar, 36 m. by rail S. of Stuttgart. Pop. (1925) 30,501. Reutlingen, which is first mentioned in 1213, became a free imperial town in the 13th century and was fortified by the emperor Frederick II. It came into the possession of Württemberg in 1802. Its industries include cotton spinning and weaving, dyeing and bleaching; also the manufacture of leather and machinery.

REVEL: *see* Tallinn.

REVELATION, BOOK OF: *see* Apocalypse.

REVELSTOKE, town, British Columbia, on the Columbia river and a divisional station on the Canadian Pacific railway, 381 m. E. of Vancouver. Pop. (1931) 2,736. It is the supply centre for a mining and lumbering district, with railway shops.

REVENTLOW, CHRISTIAN DITLEV FREDERICK, Count (1748–1827), Danish statesman and reformer, born on March 11, 1748, was educated at Sörö and Leipzig, and made an extensive tour of western Europe to study economic conditions before he returned to Denmark in 1770. In 1774 he held a high position in the *Kammerkollegiet,* or board of trade, two years later he entered the Department of Mines, and in 1781 he was a member of the *Overskattedirectionen,* or chief taxing board.

In 1784, he was placed at the head of the *Rentekammeret,* which took cognisance of everything relating to agriculture. He appointed a small agricultural commission to better the condition of the crown serfs, and amongst other things enable them to turn their leaseholds into freeholds.

Reventlow induced the Crown Prince Frederick, in July 1786, to appoint a grand commission to take the condition of all the peasantry in the kingdom into immediate consideration. This agricultural commission resulted in a series of reforms of the highest importance. The ordinance of June 8, 1787, modified the existing leaseholds, greatly to the advantage of the peasantry; the ordinance of June 20, 1788, abolished villenage and completely transformed the much-abused *hoveri* system whereby the feudal tenant was bound to cultivate his lord's land as well as his own; and the ordinance of Dec. 6, 1799, did away with *hoveri* altogether. Reventlow also started public credit banks enabling small cultivators to borrow money on favourable terms.

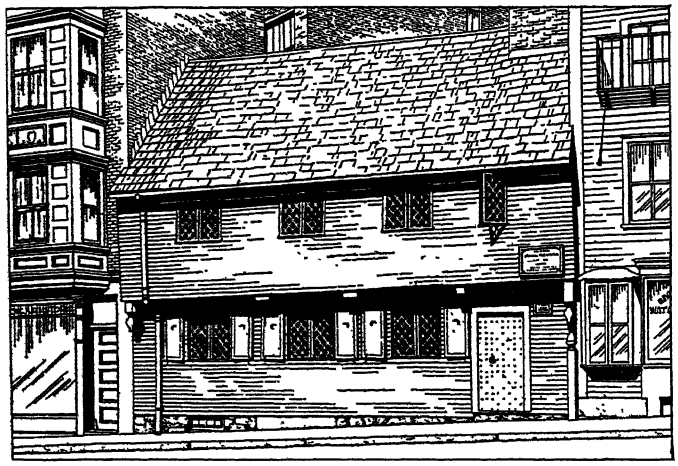
But the financial distress of Denmark, the jealousy of the duchies, the ruinous political complications of the Napoleonic period, and, above all, the Crown Prince Frederick's growing jealousy of his official advisers, prevented Reventlow from completing his reforms. On Dec. 7, 1813, he was dismissed, and retired to his estates in Laaland, where he died on Oct. 11, 1827.

See Adolph Frederik Bergsöe, *Grev. C. D. F. Reventlows Virksomhed* (Copenhagen, 1837); Louis Theodor Alfred Bobe, *Efterl. Papirer fra den Reventlowske Familiekreds* (Copenhagen, 1895–97).

REVENUE, income, return, or profit; more particularly the receipts from all sources of a Government or State (O. Fr. *revenu,* from *revenir,* to return). The revenue of a State is largely made up of taxation, and the general principles of taxes are discussed in TAXATION and in a number of articles to which a guide will be found under FINANCE. In some countries the public or State domain may contribute substantially to the revenue, as do the forests in Russia, while in other countries important contributions are made from the State railways, post and telegraph services, etc. (*See* CUSTOMS AND EXCISE; INLAND REVENUE.)

REVERBERATORY FURNACE: *see* FURNACES, METALLURGICAL.

REVERE, PAUL (1735–1818), American engraver and patriot, was born in Boston, Mass., on Jan. 1, 1735. He had a meagre schooling, and in his father's shop learned the trade of a gold- and silversmith. In 1756 he was 2nd lieutenant of artillery in the expedition against Crown Point, and for several months was stationed at Ft. Edward, in New York. He became a proficient copper engraver, and engraved several anti-British caricatures in the years before the American revolution. He was one of the Boston grand jurors who refused to serve in 1774 because parliament had made the justices independent of the people for their salaries; was a leader in the Boston Tea Party; was one of the 30 north end mechanics who patrolled the streets to watch the movements of the British troops and Tories; and in Dec. 1774 was sent to Portsmouth, N.H., to urge the seizure of military stores there, and induced the colonists to attack and capture Ft. William and Mary—one of the first acts of military force in the war. His midnight ride from Charlestown to Lexington on April 18–19, 1775, to give warning of the approach of British troops from Boston, is Revere's most famous exploit; it is commemorated by Longfellow, who, however, has "paid little attention to exactness of fact" (Justin Winsor). In 1775 Revere was sent by the Massachusetts provincial congress to Philadelphia to study the working of the only powder mill in the colonies, and although he was allowed only to pass through the building, obtained sufficient information to enable him to set up a powder mill at Canton. He was commissioned a major of infantry in the Massachusetts militia in April 1776; was promoted to the rank of lieutenant-colonel of artillery in November; was stationed at Castle William, defending Boston harbour, and finally received command of this fort. He served in an expedition to Rhode Island in 1778, and in the following year participated in the unsuccessful Penobscot expedition. After his return he was accused of having disobeyed the orders of the commanding officer, was tried by court martial, and was acquitted. After the war he engaged in the manufacture of gold- and silverware, and became a pioneer in the production in America of copper-plating and copper spikes for ships. In 1795, as grand master of the Masonic fraternity, he laid the cornerstone of the new State House in Boston. He died in Boston on May 10, 1818.



BY COURTESY OF THE HALLIDAY HISTORICAL PHOTOGRAPH CO., BOSTON

THE HOUSE OF PAUL REVERE IN BOSTON, MASS.: BUILT ABOUT 1676, THE DIAMOND WINDOW PANES BEING A RESTORATION

See Charles F. Gettemy, *The True Story of Paul Revere* (Boston, 1905).

REVERE, a city of Suffolk county, Massachusetts, U.S.A., on Massachusetts bay, adjoining Boston on the north-east. It is served by the Boston and Maine and the Boston, Revere Beach and Lynn railways. Pop. (1920) 28,823 (31% foreign-born white); 1930 Federal census 35,680. It is a residential suburb and pleasure resort. Revere beach, extending from the promontory of Winthrop on the south to the Point of Pines on the north, is to Boston what Coney Island is to New York. The first settlement here (called Rumney Marsh) was made in 1626. It was part of Boston until 1739, and then of the town of Chelsea until in 1846 North Chelsea was set off and incorporated as a separate town. In 1871 North Chelsea changed its name to Revere (in honour of Paul Revere) and in 1914 it was incorporated as a city.

REVEREND, a term of respect or courtesy, now especially used as the ordinary prefix of address to the names of ministers of religion of all denominations. The uses of Med. Lat. *reverendus* do not confine the term to those in orders; Du Cange (*Gloss. s.v.*) defines it as *titulus honorarius, etiam mulieribus potioris dignitatie concessus,* and in the 15th century in English it is found as a term of respectful address. In the Church of England deans are addressed as "very reverend," bishops as "right reverend," archbishops as "most reverend." The Moderator of the Church of Scotland is also styled "right reverend."

REVERSING LAYER, of the sun or stars, the layer where the absorption indicated by the dark lines in the spectrum occurs The reversing layer proper lies near the top of the photosphere where the pressure is usually about $\frac{1}{10,000}$ of an atmosphere; but some of the dark lines are due to absorption at higher levels in the chromosphere.

REVERSION, in biology, the phenomenon of an organism "throwing back" to some remote ancestor. (*See* ATAVISM.)

For reversion in law, *see* REMAINDER.

REVILLAGIGEDO, an isolated, uninhabited group of rocky islands in the North Pacific, 18° N., 112° W., belonging to Mexico, and forming part of the State of Colima. They are about 420m. from the Mexican coast and comprise the large island of Socorro (San Tomás), 24m. long by an average of 9m. wide, and the three widely separated islets of San Benedicto, Roca Partida and Clarion, with a total area of 320sq.m. The island of Socorro has an extinct volcano 3,660ft. high. The archipelago derives its name from the Spanish viceroy who governed Mexico from 1746 to 1755.

REVIVAL, RELIGIOUS, is a renewed interest in religion, coming, as a rule, after a period of indifference or decline. Revivalism and evangelism are frequently used as identical terms, but evangelism stands for a certain interpretation of Christianity, emphasizing the objective atonement of Christ, the necessity of a new birth or conversion, and salvation through faith. *Revivalism,* on the other hand, connotes certain methods of presenting evangelical doctrine, and the religious awakening resulting therefrom.

Revivalism, in the modern sense, begins with the Wesleyan revival in England in the year 1737 when a little group of Oxford students, who had been known as Methodists at the university, moved to London and began to preach to the masses. The leaders of this movement were John and Charles Wesley and George Whitefield. Whitefield above everything else was a preacher; Charles Wesley was one of those sweet spirits gifted in the writing of religious verse, and his hymns were soon being sung in every corner of the kingdom. But the centre of the movement, and the organizer of its results was John Wesley. He was able through

the Methodist movement to offer a permanent contribution, not alone to the religious life of the 18th century, but to the religious life of the world. The method used to bring the gospel to the people was through a system of itinerant preachers, who travelled definite circuits, preaching wherever an opportunity was afforded, and then gathering the converts into small groups for encouragement and instruction, called "classes" under "leaders." The whole work in England, Scotland, Wales and Ireland and finally America was under John Wesley, who by the middle of the century was annually touring the United Kingdom, travelling from 4,000 to 6,000 m. each year, making during his long life 42 visits to Ireland alone. The Methodist revival was, until after the death of John Wesley, a movement within the Church of England, and a strong and permanent evangelical party was developed within the Church. When Wesley died there were 100,000 Methodists.

While the Wesleyan revival was getting under way in England, a great revival known as the Great Awakening was sweeping over the English colonies in America. This revival movement had three distinct phases, the first being the New England revival which began at Northampton, Mass., in 1734 under the earnest preaching of the Congregational minister, Jonathan Edwards. Before the winter was over more than 300 professed conversion in that little frontier town. This was but the beginning of a movement which swept throughout the New England colonies and continued through several years. The second phase of the Great Awakening was in the Middle colonies, where the movement was led by Theodorus J. Frelinghuysen, minister of the Dutch Reformed Church at Raritan, N.J., and the four sons of Rev. William Tennent, Presbyterian minister at Neshameny, Pa., all of whom, with 12 others, had been educated at his "log college." Gilbert Tennent, Presbyterian minister at New Brunswick, N.J., became the centre of the movement. Both in New England and the middle colonies, as well as in Virginia and the other southern colonies, the revival movement was greatly strengthened by the evangelistic tours in America of George Whitefield. Seven times Whitefield visited America from 1739 to 1770, making preaching tours from New England to Georgia. The last phase of the American revival was the Virginia Awakening, first among the Presbyterians, then among the Baptists and finally among the Methodists and continuing from about 1760 to 1790.

One of the most remarkable revivals of modern times was that which swept over the western part of the United States during the years 1797 to 1805 and called the Great Revival of the West or the Kentucky revival. It had its beginnings among the Presbyterians, but soon spread to the Baptists and the Methodists, and eventually affected all the churches. Meetings were held in the woods and were attended by great emotional excitement, people often falling unconscious, or being taken with such strange exercises as the "shakes" and the "jerks," or the "laughing" or "barking" exercise. Out of the western revival came the camp meeting, an institution which was destined to exercise a great influence on the religious life of the newer sections of the United States.

Undoubtedly the outstanding revivalist both in England and America of the last quarter of the 19th century was Dwight L. Moody. He was a layman and without education, but from 1861 to his death in 1899 he was constantly employed and with great success in revivalistic efforts. He made three extensive visits to England and Scotland (1873–75, 1881–83, 1891–92) and thousands of people professed conversion under his persuasive preaching. Associated with Moody was a remarkable singer, Ira D. Sankey, whose gospel songs added greatly to the effectiveness of the meetings. Also associated with Moody in Edinburgh was Henry Drummond, who later, when he became professor of natural science in the University of Glasgow, continued his evangelistic efforts, especially in the interest of young men students in the universities of Scotland.

In more recent years revivals have occurred in Wales (1904–06) and in various parts of the United States and Great Britain. Recent revivalists have been largely imitators of Moody and Sankey, such as J. W. Chapman, William A. Sunday, R. A. Torrey and "Gypsy" Smith. Modern psychology has given considerable attention to the study of *conversion* and the *revival*, especially since the publication of E. D. Starbuck's *Psychology of Religion* in 1899, and of William James' *Varieties of Religious Experience* in 1902.

BIBLIOGRAPHY.—Jonathan Edwards, *Thoughts on the Revival of Religion in New England, 1740* (n.d.); Joseph Tracy, *The Great Awakening: A History of the Revival of Religion in the Time of Edwards and Whitefield* (1842); C. G. Finney, *Autobiography* (1876); A. Ritschl, *Geschichte des Pietismus* (1880–86); J. H. Overton, *Evangelical Revival in the Eighteenth Century* (1886); G. A. Smith, *The Life of Henry Drummond* (1899); E. D. Starbuck, *Psychology of Religion* (1899); J. W. Chapman, *Present Day Evangelism* (1903); F. M. Davenport, *Primitive Traits in Religious Revivals* (1905); Henri Bois, *Le Reveil au Pays de Galles* (1906); H. E. Lewis, *With Christ among the Miners* (1907); C. C. Cleveland, *The Great Revival in the West 1797–1805* (1916); W. W. Sweet, *Rise of Methodism in the West* (1920); C. H. Maxson, *The Great Awakening in the Middle Colonies* (1920); W. M. Gewehr, *The Great Awakening in Virginia*, ms. (1922); S. G. Dimond, *The Psychology of the Methodist Revival* (1926); Gamaliel Bradford, *D. L. Moody, a Worker in Souls* (1928).

(W. W. S.)

REVOLUTIONARY TRIBUNAL, THE (*le tribunal révolutionnaire*), a court which was instituted in Paris by the Convention during the French Revolution for the trial of political offenders, and became one of the most powerful engines of the Terror. The news of the failure of the French arms in Belgium gave rise in Paris to popular movements on March 9 and 10, 1793, and on March 10 on the proposal of Danton, the Convention decreed the establishment in Paris of an extraordinary criminal court, which received the official name of the Revolutionary Tribunal by a decree of Oct. 29, 1793. It was composed of a paid jury, a public prosecutor, and two substitutes, all nominated by the Convention; and from its judgments there was no appeal. With M. J. A. Hermann as president and Fouquier-Tinville as public prosecutor, the tribunal preserved, at first, at least the forms of a court of justice, but on June 10, 1794, was promulgated the infamous law of 22 Prairial, which deprived prisoners of the right to be represented by counsel, suppressed the hearing of witnesses and made death the sole penalty. Before 22 Prairial the tribunal had pronounced 1,220 death-sentences in 13 months; during the 49 days between the passing of the law and the fall of Robespierre 1,376 persons were condemned, including many innocent victims. The tribunal was suppressed on May 31, 1795.

BIBLIOGRAPHY.—*See* C. Berriat Saint-Prix, *La Justice révolutionnaire à Paris, Bordeaux, Brest, Lyons, Nantes . . .* (1861), and *La Justice révolutionnaire (août 1792-prairial an II.) d'après des documents originaux* (1870); E. Campardon, *Le Tribunal révolutionnaire de Paris* (2nd ed., 1866); H. A. Wallon, *Histoire du tribunal révolutionnaire de Paris* (1880–82); also G. Lenôtre, *Le Tribunal révolutionnaire* (1908).

REVUE: *see* MUSICAL COMEDY.

REWA, an Indian state in the Bagelkhand agency of Central India. It is the only large state in Bagelkhand, and the second largest in Central India, having an area of about 13,000 sq.m. The population of the state in 1921 was 1,401,524. Many of the inhabitants of the hilly tracts are Gonds and Kols. More than one-third of the area is covered with forests, yielding timber and lac; but the State possesses also valuable coal deposits in the Umaria field.

The history of the state, until it came under British guarantee in 1812, was a record of almost continuous warfare. In the Mutiny of 1857, the chief gave valuable help to the British. The present ruler has the title of Maharaja and a salute of 15 guns. He is Rajput of the Baghela branch of the Solanki race.

The town of Rewa is 131 m. south of Allahabad. Pop. (1921), 20,977. It has a high school, also the Victoria and Zenana hospitals and a model gaol. The political agent for Bagelkhand resides at Satna, on the East Indian railway: pop. (1921) 7,998.

REWA KANTHA, a political agency or collection of native states in India, subordinate to the government of Bombay. It stretches for about 150 m. between the plain of Gujarat and the hills of Malwa, from the river Tapti to the Mahi, crossing the Narbada or Rewa, from which it takes its name. The number of separate states is 61. The only important one is Rajpipla (*q.v.*). It includes also five second-class states entitled Chota Udaipur, Baria, Santh, Lunavada and Balasinor. Total area, 4,946 sq.m. In 1921 the population was 665,000

REWARD. In English law the offering of rewards presents two distinct aspects: (1) with reference to the nature of the information or act for the giving or doing whereof the reward is offered; (2) with reference to the nature of the relation created between the person offering and the person claiming the reward.

1. Courts of assize and quarter sessions are empowered to order the payment of rewards to persons who have been active in or towards the apprehension of persons charged with certain specified crimes against person and property (Criminal Law, 1826, ss. 28, 29; Criminal Justice Administration act, 1851, ss. 7, 8). The rewards are payable according to a scale fixed by the home secretary. (*See* LARCENY.)

2. Where a reward is lawfully offered for information the person who first supplies the required information, *i.e.*, satisfies the conditions on which the reward is payable, is entitled to recover by action the reward offered. Performance of the conditions is an acceptance of the offer (*Carlill* v. *Carbolic Smoke Ball Co.*, 1893, 1 Q.B. 256,270).

In the United States the law is practically the same.

REWARI, a town of British India, in Gurgaon district of the Punjab, 32 m. S.W., of Gurgaon. Pop. (1921) 23,129. It is an important centre of trade. The chief manufacture is brassware.

REWBELL, JEAN FRANÇOIS (1747–1807), French politician, was born at Colmar (then in the department of Haut-Rhin) on Oct. 8, 1747. He sat in the constituent and legislative assemblies and in the Convention. He took part in the reactionary movement which followed the fall of Robespierre, and became a member of the reorganized committees of public safety and general security. His moderation caused his election by 17 departments to the Council of Five Hundred. Appointed a member of the Directory on Oct. 1, 1795, he became its president in 1796, and retired in 1799. He then entered the Council of Ancients. After the *coup d'état* of 18 Brumaire he retired from public life, and died at Colmar on Nov. 23, 1807.

See L. Sciout, *Le Directoire* (1895–97).

REYMONT, LADISLAS STANISLAS (1867–1925), Polish novelist, was born at Kobiele Wielkie in the county of Piotrkow on May 7, 1867. He spent his youth in various occupations and his first novels were written when he was superintendent of a small railway sector. *The Comédienne* (1896, Eng. trans. 1921), *Ferments* (2 vol., 1897) and *Lily* (1899) were objective novels describing the every day life of a troupe of provincial actors. In 1899 appeared *The Promised Land* (2 vol., Eng. trans. 1928) modelled on Zola and describing industrialism in Łódź. Reymont's best-known work, *The Peasants,* appeared in four volumes 1904–09 (Eng. trans. 1925–26). He describes the four seasons' labours of a peasant and brings to light his primitive instincts, inward dignity and almost religious attachment to the land. This great peasant epic brought Reymont the Nobel Prize for literature in 1924. While *The Peasants* was being prepared, a number of novels and short stories appeared, the most important of which are *Before Dawn* (1902), *Komurasati* (1903), *From a Diary* (1903) and *The Storm* (1907). As a historical novelist, Reymont, primarily an observer of the direct processes of life, was less successful: the trilogy *1794* (*The Last Diet,* 1913, *Nil Desperandum,* 1916 and *The Insurrection,* 1918), though not lacking in literary merit, revealed a lack of historical exactness. He died on Dec. 5, 1925. (*See* POLISH LITERATURE.)

See I. Matuszewski, *Twórczości Twórcy* (Warsaw, 1904); Z. Debicki, *W. S. Reymont* (Warsaw, 1925); J. Lorentowicz, *Ladislas Reymont, prix Nobel 1924* (1925).

REYNARD THE FOX, a beast-epic, current in French, Dutch and German literature. The cycle of animal stories collected round the names of Reynard the Fox and Isengrim the Wolf in the 12th century seems to have arisen on the borderland of France and Flanders. The tales, like those of "Uncle Remus," were amusing in themselves; they were based on widely diffused folklore, and Reynard and his companions were not originally men disguised as animals. Jacob Grimm (*Reinhart Fuchs,* 1834) maintained their popular origin.

The principal names of the Reynard cycle were German. Reynard himself (Raginohardus, strong in counsel), Bruin the Bear, Baldwin the Ass, Tibert the Cat, Hirsent the She-wolf, had German names, most of which were used as person-names in Lorraine. But it was in France that the cycle obtained its greatest vogue. The *Roman de Renart* as printed by Méon (4 vols., 1826) runs to over 40,000 lines. *Renart* was a popular epic parodying feudal institutions as represented in the romances of chivalry.

The early French originals are lost, the most ancient existing fragments being in Latin. The fable of the lion's sickness and his cure by the wolf's skin occurs in the *Ecbasis cujusdam captivi per Tropologiam* (ed. E. Voigt; Strasbourg, 1875), written about 940. *Ysengrimus* (ed. E. Voigt; Halle, 1884), a clerical satire written by Nivard of Ghent about 1148, includes the story of the lion's sickness and the pilgrimages of Bertiliana the Goat. Most later versions of Reynard have been derived from the Flemish *Van den vos Reinarde* (ed. E. Martin, Paderborn, 1874), written about 1250 in East Flanders by Arnout and Willem. The Flemish epic is a poem of 3,476 lines. The corresponding branch of the French *Roman de Renart* (for which *see* FRENCH LITERATURE) is one of the earliest and best of the great French cycle.

The fable was known in England. The English poem of the *Fox and the Wolf* dates from the 13th century; and the "Nonne Preestes Tale" of Chaucer in which, however, the fox is Rossel and the ass Brunel, is a genuine Reynard history. A Dutch version of the Reynard poem, *Hystorie van Reynaert die Vos,* was printed at Gouda in 1479. On this Caxton based his *Historye of reynart the foxe* (reprinted by E. Arber, 1878), which he finished on June 6, 1481. As a satire on the church, especially on monks and nuns, *Reynard* became popular with reformers, and numerous versions followed in England and Germany. The modern German version (1794) of Goethe has been often reprinted, notably in 1846, with illustrations by Wilhelm von Kaulbach.

BIBLIOGRAPHY.—The best edition of the *Roman de Renart* is by Ernest Martin (3 vols., Strasbourg and Paris, 1881–87). *See* also Jacob Grimm, *Sendschreiben an C. Lachmann über Reinhart Fuchs* (Leipzig, 1840); Léopold Sudre, *Les Sources du roman de Renard* (Paris, 1890); Gaston Paris, "Le Roman de Renard" in the *Journal des savants* (Dec. 1894 and Feb. 1895); Kaarle Krohn, *Bär und Fuchs* (Helsingfors, 1888); H. Gagering, *Van den Vos Reynaerde* (Münster, 1910). A modernized version of Caxton's translation appeared in 1926.

REYNOLDS, JOHN FULTON (1820–1863), American soldier, was born at Lancaster (Pa.), Sept. 20, 1820, and graduated from West Point in 1841. He was breveted captain and major for gallantry in the Mexican War. In 1859 he was made commandant of cadets at West Point. At the outbreak of the Civil War in 1861 he was made a lieutenant colonel of infantry and some time later brigadier general of volunteers. In Nov. 1862, after having been in numerous actions, he was commissioned major general of volunteers, and appointed to command the I. Corps of the Army of the Potomac, took part in the battle of Fredericksburg and gave Gen. Meade his whole-hearted support in the three critical days preceding the battle of Gettysburg (*q.v.*). He was placed in command of the left wing and thrown forward to Gettysburg to cover the concentration of the army of the Potomac. The battle which ensued there, July 1, 1863, took its shape from Reynolds's resolution to support Buford's cavalry with the I. and XI. Corps. Reynolds himself was killed very early in the day by a rifle bullet. A bronze statue was placed on the field of Gettysburg and a portrait in the library at West Point by the men of the I. Corps. The State of Pennsylvania erected a granite shaft where he fell, and an equestrian bronze statue stands in Philadelphia.

REYNOLDS, SIR JOSHUA (1723–1792), the most prominent figure in the English school of painting, was born at Plympton Earl, in Devonshire, on July 16, 1723. He received a fairly good education from his father, who was a clergyman and the master of the free grammar school. At seventeen, the lad was apprenticed in London to Thomas Hudson, a native of Devonshire, who, though a mediocre artist, was popular as a portrait painter. Reynolds remained with Hudson for two years, and in 1743 he returned to Devonshire, where, settling at Plymouth Dock, he employed himself in portrait painting. By the end of 1744 he was again in London. He was well received by his old master, from whom he appears previously to have parted with some cold-

ness. Hudson introduced him to the artists' club that met in Old Slaughter's, St. Martin's Lane, and advised him as to his work. Reynolds now painted a portrait of Captain the Hon. John Hamilton, the first that brought him any notice, with those of other people of some repute.

Meanwhile Reynolds had made the acquaintance of Lord Edgcumbe, who introduced him to Captain (afterwards Viscount) Keppel. Keppel was made aware of Reynolds' desire to visit Italy; and, as he had just been appointed to the command of the Mediterranean squadron, he invited the artist to accompany him in his ship, the "Centurion." The offer was gladly accepted. While Keppel was conducting his negotiations with the dey of Algiers, relative to the piracy with which that potentate was charged, Reynolds resided at Port Mahon, the guest of the governor of Minorca, painting portraits; and in December 1749 he sailed for Leghorn, and then made his way to Rome. Of the early Italians he praises the "simplicity and truth" and observes that they "deserve the attention of a student much more than many later artists." In Venice he made memoranda of the gradations of light and shade in the pictures, "and this without any attention to the subject, or to the drawing of the figures."

After more than two years in Rome, where he caught a severe cold which resulted in permanent deafness, Reynolds, in the spring of 1752, spent five months in visiting Parma, Florence, Venice and other important cities of Italy. Returning to England, Reynolds, after a brief stay in Devonshire, established himself as a portrait painter in St. Martin's Lane, London, whence he afterwards removed to Great Newport Street, and finally, in 1760, to Leicester Square, where he continued to paint till his death.

In London, Reynolds stepped at once into a foremost position as the fashionable portrait painter of the day. In this he was greatly helped by his success in society. Throughout his career his social occupations claimed the next place to his painting. Lord Edgcumbe was a generous patron, and exerted himself to obtain commissions for his protégé, of whose ability the portraits which he now produced—especially the famous full-length of his old friend Keppel—were sufficient guarantee. In 1755 his clients for the year numbered 120, and in 1757 the number of sittings recorded reached a total of 677. He maintained his position unimpaired. During his year in London he had made the acquaintance of Dr. Johnson, which became a friendship for life. To him Burke and Goldsmith, Garrick, Sterne and Bishop Percy were before long added. Most of them were members of "The (Literary) Club," established at Reynolds' suggestion, in 1764.

In 1760 the London world of art was greatly interested by the novel proposal of the Society of Artists to exhibit its works to the public. In the month of April a successful exhibition was opened, the precursor of many that followed. Reynolds contributed four portraits. In 1765 the association obtained a royal charter, and became known as "The Incorporated Society of Artists"; but much rivalry and jealousy were occasioned by the management of the various exhibitions, and an influential body of painters withdrew from the society. They had access to the young king, George III., who promised his patronage and help. In December 1768 the Royal Academy was founded, and Reynolds, whose adhesion to the movement was for a time doubtful, was hailed by acclamation its first president. In a few months the king signified his approval of the election by knighting the new president, and intimating that the queen and himself would honour him with sittings for portraits to be presented to the Academy. Reynolds did not take any part in the educational work of the new institution, but on the social side he set the Academy on the lines it has followed with the greatest worldly success ever since. At his suggestion the annual banquet was instituted. To the specified duties of his post he added the delivery of a presidential address at the distribution of the prizes, and his speeches on these occasions form the well-known "Discourses." These discourses entitle their author to literary distinction; indeed, when they were first delivered, it was thought impossible that they could be the production of a painter, and Johnson and Burke have been credited with their composition, in spite of Dr. Johnson's indignant exclamation—"Sir Joshua, sir, would as soon get me to paint for him as to write for him!"

Sir Joshua was too successful an artist to escape the jealousy of his less fortunate brethren, and it must be admitted that his attitude towards some of his contemporaries was wanting in generosity. His relations with Gainsborough, who on his part was in fault, would require more space for discussion than can here be afforded, but he was not just either to Hogarth or to Richard Wilson. Cosmo Monkhouse in the *Dictionary of National Biography* speaks of "the beauty of his disposition and the nobility of his character," but adds: "he was a born diplomatist." In 1784 Reynolds was appointed painter to the king.

In the summer of 1789 his sight began to fail; but he continued occasionally to paint till about the end of 1790, delivering his final discourse at the Academy on Dec. 10. On Feb. 23, 1792, the great artist passed peacefully away.

As a painter Reynolds stands, with Gainsborough, just behind the very first rank. There can be no question of placing him by the side of the greatest Venetians or of the triumvirate of the 17th century, Rubens, Rembrandt, Velasquez. He could not draw the figure properly; nor could he as a rule compose successfully on anything like a monumental scale.

He was all his life devoured by what he calls "a perpetual desire to advance." The weight and power of the art of Reynolds are best seen in those male portraits, "Lord Heathfield," "Johnson," "Sterne," "Goldsmith," "Gibbon," "Burke," "Fox," "Garrick," that are historical monuments as well as sympathetic works of art. In this category must be included his immortal "Mrs. Siddons as the Tragic Muse," now in the Huntington Library and Art Gallery, San Marino, Calif.

In portraits of this order Reynolds holds the field, but he is more generally admired for his studies of women and of children, of which the Althorp portraits of the Spencer family are classic examples. No portrait painter has been more happy in his poses for single figures, or has known better how to control by good taste the piquant, the accidental, the daring, in mien and gesture. "Viscountess Crosbie" is a striking instance. When dealing with more than one figure he was not always so happy, but the "Duchess of Devonshire and her Baby," the "Three Ladies decking a Figure of Hymen," and the "Three Ladies Waldegrave" are brilliant successes. He was felicitous too in his arrangement of drapery. Few painters, again, have equalled the Reynolds in dainty and at the same time firm manipulation of the brush. The richness of his deeper colouring is at times quite Venetian.

In the "Discourses" Reynolds unfolds his artistic theories. The first deals with the establishment of an academy for the fine arts, and of its value as a repository of the traditions of the best of bygone practice. In the second lecture the study of the painter is divided into three stages,—in the first of which he is busied with processes and technicalities, with the grammar of art, while in the second he examines what has been done by other artists, and in the last compares these results with Nature herself. In the third discourse Reynolds treats of "the great and leading principles of the grand style"; and succeeding addresses are devoted to such subjects as "Moderation," "Taste," "Genius," and "Sculpture." The fourteenth has an especial interest as containing a notice of Gainsborough, who had died shortly before its delivery; the concluding discourse is mainly a panegyric on Michelangelo.

His other literary works comprise his three essays in *The Idler* for 1759–1760 ("On the Grand Style in Painting," and "On the True Idea of Beauty"), notes to Du Fresnoy's *Art of Painting*, *Remarks on the Art of the Low Countries*, brief notes in Johnson's *Shakespeare*, and two singularly brilliant fragments, imaginary conversations with Johnson, which were never intended for publication, but, found among his papers after his death, were given to the world by his niece, the marchioness of Thomond.

Sir Joshua left to his niece, Mary Palmer, the bulk of his property, about £100,000, with works of art that sold for £30,000 more. There were, besides, legacies amounting to about £15,000. His body rests in St. Paul's.

In the United States, of the representative paintings by Reynolds, fourteen are in the Metropolitan Museum of Art, and others are as follows: New York Public Library, "Mrs. Billington

as 'St. Cecilia' "; the Frick collection, New York city, "Lady Elizabeth Taylor" and "Lady Selena Skipwith"; the Frick Collection, Prides Crossing (Mass.), "Lady Cecil Rice," "Lady Margaret Beaumont," and "Sir George Howland Beaumont"; the Joseph Widener Collection, Philadelphia, "Portrait of Lady Cornewall" and "Portrait of Nelly O'Brien"; Boston Museum of Fine Arts, "Kitty Fisher" and "Sir Thomas Mills"; A. E. Newton Collection, Philadelphia, "Samuel Johnson"; Chicago Art Institute, "Lady Sarah Bunberry"; Cleveland Museum of Art, "Portrait of Mrs. Collyear"; Detroit Institute of Arts, "Sir Brooke Boothby, Bart."

See J. Northcote, *Memoirs of Sir Joshua Reynolds* (1813), and *Supplement* thereto (1815); J. Farrington, *Memoirs of the Life of Sir Joshua Reynolds* (1839); Leslie and Taylor, *Life and Times of Sir Joshua Reynolds* (2 vols., 1865); R. Reynolds, *Life of Joshua Reynolds, by his son* (1839); E. Hamilton, *A Catalogue Raisonné of the Engraved Works of J. Reynolds (1755–1820)* (1874); Graves and Cronin, *A History of the Works of Sir Joshua Reynolds* (4 vols., 1899–1901); Sir Walter Armstrong, *Sir Joshua Reynolds* (1900; also a shorter work, 1905); Lord Ronald Gower, *Sir Joshua Reynolds* (1902). For Reynolds's literary works, *see* Malone, *The Works of Sir Joshua Reynolds* (3 vols., seven editions 1799–1851); Leisching, *Sir J. Reynolds zur Aesthetik u. Technik der bildenden Künste* (Leipzig, 1893); *Discourses delivered to the Students of the Royal Academy by Sir Joshua Reynolds, Kt.*, ed. by Roger Fry (1905); M. Osborn, *Joshua Reynolds* (Künstler-Monographien, 1908).

REYNOLDS, STEPHEN (1881–1919), English author, was born at Devizes on May 16, 1881, and educated at Manchester university and the École des Mines at Paris. He became sub-editor of an Anglo-French review in 1902, and in 1903 began an association with the Woolley brothers, fishermen of Sidmouth, becoming a recognized authority on fisheries. He was a member of the committee of enquiry into Devon and Cornwall Fisheries (1912), of the departmental committee on Inshore Fisheries (1913), and in that year was appointed adviser on Inshore Fisheries to the Development Commission. In 1914 he became resident inspector of fisheries for the south-western area. He died at Sidmouth on Feb. 14, 1919. His books include *A Poor Man's House* (1908), a classic in its own kind; *Alongshore* (1910); *The Lower Deck, the Navy and the Nation* (1912); *The Holy Mountain* (a novel, 1909).

REYNOLDS, WALTER (d. 1327), archbishop of Canterbury, was the son of a Windsor baker, and became a clerk, or chaplain, in the service of Edward I. In 1307 Reynolds was appointed treasurer of England; in 1308 he became bishop of Worcester and in 1310 chancellor. When Robert Winchelsea, archbishop of Canterbury, died in May 1313 Edward II. prevailed upon Pope Clement V. to appoint his favourite to the vacant archbishopric, and Reynolds was enthroned at Canterbury in Feb. 1314. He continued the struggle for precedence between the archbishops of Canterbury and of York and in 1317 he laid London under an interdict after William de Melton (d. 1340), archbishop of York, had passed through its streets with his cross borne erect before him. Reynolds remained in general loyal to Edward II. until 1324, when with all his suffragans he opposed the king in defence of the bishop of Hereford, Adam of Orlton. In the events which concluded Edward's life and reign the archbishop played a contemptible part. Having fled for safety into Kent he returned to London and declared for Edward III., whom he crowned in Feb. 1327. He died at Mortlake on Nov. 16 following.

REZÁNOV, NICOLAI PETROVICH DE (1764–1807), Russian administrator under Catherine II., Paul I. and Alexander I. He was the first Russian to represent his country in Japan (1804), and instigated the first attempt of Russia to circumnavigate the globe (1803), commanding the expedition himself as far as Kamchatka. But Rezánov's monument for many years after his death was the great Russian-American Fur Company; and his interest to students of history centres round the policy involved in that enterprise.

Meeting (in 1788) Shelikov, chief of the Shelikov-Golikov Fur Company, Rezánov became interested in the merchant's project to obtain a monopoly of the fur trade in those distant dependencies. He became a partner, and, after the death of Shelikov in 1795, the leading spirit of the company, and resolved to obtain privileges analogous to those granted by Great Britain to the East India Company. He had just succeeded in persuading Catherine to sign his charter when she died, and he was obliged to begin again with the ill-balanced and intractable Paul. Rezánov's skill, subtlety and address prevailed, and shortly before the assassination of Paul he obtained his signature to the instrument which granted to the Russian-American Company, for a term of twenty years, dominion over the coast of N.W. America, from latitude 55 degrees northward; and over the chain of islands extending from Kamchatka northward and southward to Japan. This famous "trust," which crowded out all the small companies and independent traders, was a source of large revenue to Rezánov and the other shareholders, including members of the Imperial family, until the first years of the 19th century, when mismanagement and scarcity of food threatened it with ruin. Rezánov, his humiliating embassy to Japan concluded, reached Kamchatka in 1805, and found commands awaiting him to remain in the Russian colonies as Imperial inspector and plenipotentiary of the company, and to correct the abuses that were ruining the great enterprise. He travelled slowly to Sitka by way of the Islands.

At the end of a winter in Sitka, the headquarters of the company, he sailed for the Spanish settlements in California, purposing to trade his tempting American and Russian wares for foodstuffs, and to arrange a treaty for the provisioning of his colonies twice a year from New Spain. He cast anchor in the harbour of San Francisco early in April 1806, after a stormy voyage which had defeated his intention to take possession of the Columbia river in the name of Russia. Although he was received with courtesy, he was told that the laws of Spain forbade her colonies to trade with foreign powers, and that the governor of all the Californias was incorruptible. Rezánov, had it not been for a love affair with the daughter of the *comandante* of San Francisco, Don José Arguëllo, and for his personal address and diplomatic skill, with which he won over the clergy to his cause, would have failed again. As it was, when he sailed for Sitka, six weeks after his arrival, the "Juno's" hold was full of bread-stuffs and dried meats, he had the promise of the perplexed governor to forward a copy of the treaty to Spain at once, and he was affianced to the most beautiful girl in California. Shortly after his arrival in Sitka he proceeded by water to Kamchatka, where he despatched his ships to wrest the island Sakhalin of the lower Kurile group from Japan, then started overland for St. Petersburg to obtain the signature of the tsar to the treaty. He died of fever and exhaustion in Krasnoiarsk, Siberia, on March 8, 1807.

The treaty with California, the bare suggestion of which made such a commotion in New Spain, was the least of Rezánov's projects. It was sincerely conceived, for he was deeply and humanely concerned for his employees and the wretched natives who were little more than the slaves of the company. His correspondence with the company betrays a clearly defined purpose to annex to Russia the western coast of North America, and encourage immediate emigration from the parent country on a large scale. Had he lived, he might have accomplished his object. The treaty was never signed, the reforms of Rezánov died of discouragement, the fortunes of the colonies gradually collapsed, the Spanish girl who had loved Rezánov became a nun; and one of the ablest and most ambitious men of his time was forgotten in the cemetery of a poor Siberian town.

See H. H. Bancroft, *History of California* (1889) and *History of Alaska* (1887); Tikhmener, *Istoricheskoye obozryeniye obrazovaniya Rossiisko-Amerikanskoi Kompanii* (1861–63); T. C. Russell, ed., *The Rezánov Voyage to Nueva California* (1926); A. Yarmotinsky, "A Rambling Note on the Russian Columbus," *New York Public Library Bulletin*, vol. xxxi. (1927). (G. Ar.)

REZEKNE, a town of Latvia in 56° 30′ N., 27° 20′ E., at a railway junction between north-south and east-west lines. In spite of its position on the railway, it has not much trading importance and its population is under 20,000. Founded in 1285, under the name of Roziten, by the Teutonic Knights as a fort against the Lithuanians and Letts, the position of the town has rendered it perpetually subject to attack. In 1561 the Teutonic Knights gave it in pawn to Poland and, though captured by the Russians in 1567 and 1577, and dismantled by the Swedes during

the war of 1656–60, it continued Polish till 1773 when White Russia was united with the Russian empire. During the 1914–20 period the town was in the war zone and again suffered severely. In 1918 it passed from Russian to Latvian rule.

REZONVILLE, BATTLE OF. The name given by the French to the battle of Vionville–Mars-la-Tour (*q.v.*) in the Franco-German War (*q.v.*).

RHADAMANTHUS, in Greek mythology, son of Zeus and Europa, and brother of Minos, king of Crete. Homer represents him as dwelling in the Elysian fields (*Odyssey,* iv. 564). According to later legends, on account of his inflexible integrity, he was made one of the judges of the dead in the lower world, together with Aeacus and Minos.

RHAETO-ROMANCE LANGUAGES. The Rhetic, or Rhaetic, idioms consist of several patois which form three distinct groups separated one from another by tracts of territory in which German and Italian are spoken. They represent the Latin spoken in Raetia, whither it was first brought by the legions of Tiberius and Drusus (subjugation of Raetia 15 B.C.), and the Latin spoken in Noricum after the tribes inhabiting that country had been defeated by Publius Sirius (16 B.C.). From the close of the 5th century Raetia and Noricum became the scene of numerous migrations and Germanic invasions; cut off from the neighbouring romance-speaking populations (French and Italian) they pursued an evolution of their own. They fought hard and ceaselessly to maintain themselves against German and Italian inroads and assaults, but the long struggle resulted in a considerable diminution and disaggregation of the once very extensive and compact Rhaeto-romance domain. The study of documents of diverse kinds and resourceful philological device have established the foregoing facts, the data for which have been recently assembled by C. Pult in a paper entitled "Raetia Prima in the Middle Ages." (*See* LITERATURE.) There is evidence, for instance, of traces of romanization persisting round the Lake of Constance even after the 8th century, whilst at the same time there were still compact groups of *Romani* in the district of Salzburg. In certain areas of central and eastern Tirol, Ladin held out beyond the 13th century and in western Tirol beyond the 16th; it subsisted, indeed, later still in various localities round Venosta and Montafon. On the Rhine the country round Ragaz and Pfävers remained almost undilutedly romance down to the 17th century and in this region the Rhetic dialect lived on till the close of the same century. Sargans, Mels and the principality of Liechtenstein were Germanized at an earlier period. The district of Werdenberg up to Buchs as well as Flums with its environs, as regards romanization, appear to have been in like condition with Ragaz. North of Buchs as far as Hirschensprung the traces of romanization are less numerous. In the Glaris canton Germanization did not take place before the 11th century, and romance survived until considerably later in Kerenzerberg, on the south bank of the Lake of Walenstadt. The Unseren valley continued romance beyond the 11th century. In the Grisons canton, Prättigan and Schamfigg retained their Rhetic dialect till the beginning of the 15th century. The chief town of Grisons, Coire (Chur) clung to Ladin till the beginning of the 15th century. The Rhetic dialect is at present in process of extinction in the basins of the Noce and Avisio.

Manifold reasons explain this gradual shrinkage of the Rhetic idioms: their lack of cohesion, the multiplicity of patois presenting exceptional divergences between places not far apart, the impossibility of efficient literary output for lack of any predominant dialect, their state of general inferiority as towards the strongly constituted languages by which they have been ousted. In these circumstances, the activity displayed by the Rhetic idioms is the more remarkable. Their literature, an entirely artificial product, counts many poets of talent.

The three groups of Rhetic idioms are constituted as follows:—

I. WESTERN GROUP.—Till recently this group was subdivided into *Romansh* and *Engadinian.* The classification now adopted is into (1) *Sursilvanian,* from the sources of the Rhine to Trins; (2) *Central Grison,* including *Subsilvanian* and *Surmeirian* (*super murum*); (3) *Engadinian,* including *Upper Engadinian* and *Lower Engadinian* (with the valley of Münster). A noteworthy fact with regard to this group is that whereas between 1850 and 1890 the population composing it declined from 42,436 to 36,472, it had risen to 37,662 in 1910 and to 39,029 in 1920.

II. CENTRAL GROUP.—This includes the patois of (1) the Burgraviato (Burggrafenamt), (2) the basin of the Noce, (3) the basin of the Avisio, (4) Livinallongo, (5) Ampezzo, (6) Comelico, (7) the basin of the Gardera, (8) Gardena, (9) Pusteria, (10) the valley of the Isarco (11) and of the Rienza; about 12,000 souls.

III. EASTERN GROUP.—Constituted by *Friulian,* at present spoken by some 450,000 persons in the province of Udine. This is divided by C. Battisti as follows:—1. *Friulano del piano,* including (a) the Udinese-goriziano group; (b) the Sacilese group (strongly penetrated with Venetian). 2. *Friulano della Carnia,* including (a) group of the Degano; (b) group of the But; (c) group of the Fella; (d) the Tolmezzano-gemonese group, which might also be called "prealpino."

BIBLIOGRAPHY.—C. Battisti, *Rassegna critica degli studi dialettologici ladinoaltoatesini* (Bibl.), in *Revue de linguistique romane,* T. i. (Juillet—Déc. 1925), p. 414–439; C. Pult, "Historische Untersuchungen über die sprachlichen Verhältnisse einiger Teile der Raetia prima im Mittelalter" (Bibl.), in *Revue de linguistique romane,* T. iii. (Janvier-Juin 1927), p. 157–205. *See* following numbers of the same review which in its issue of January–June 1927 announces: C. Battisti, *Rassegna critica degli studi dialettali sul friulano.* (L. B.)

RHAMPHASTIDAE: *see* TOUCAN.

RHANKAVĒS (commonly also RHANGABE), **ALEXANDROS RHIZOS** (1810–1892), Greek savant, poet and statesman, was born at Constantinople of a Phanariot family on the 25th of December 1810. He was educated at Odessa and the military school at Munich. Having served as an officer of artillery in the Bavarian army, he returned to Greece. He subsequently became ambassador at Washington (1867), Paris (1868), and Berlin (1874–1886), and was one of the Greek plenipotentiaries at the congress of 1878. After his recall he lived at Athens, where he died on June 29, 1892. He was the chief of a school of literary men whose object was to restore as far as possible the ancient classical language. Of his various works the most important are *Hellenic Antiquities* (1842–1855), *Archaeologia* (1865–1866), an illustrated *Archaeological Lexicon* (1888–1891), and a *History of Modern Greek Literature* (1877).

A complete edition of his philological works in nineteen volumes was published at Athens (1874–90), and his Ἀπομνημονεύματα (Memoirs) appeared posthumously in 1894–95.

See Sandys, *History of Classical Scholarship,* vol. iii.

RHAPSODIST, originally an epic poet who recited his own poetry; then, one who recited the poems of others (*see* HOMER).

RHATANY or **KRAMERIA ROOT,** in medicine, the dried root either of Para or of Peruvian rhatany. Its action is due to rhatania-tannic acid, and resembles that of tannic acid, being a powerful astringent. An infusion is used as a gargle for relaxed throats; and lozenges, particularly those containing rhatany and cocaine, are useful in similar cases. The powdered extract may be applied as a local haemostatic. All preparations of rhatany taken internally are powerful astringents in diarrhoea and intestinal haemorrhage.



THE RHEA (RHEA AMERICANA), FOUND ONLY IN SOUTH AMERICA

RHEA, the American "ostrich," a Ratite bird confined to South America. Three species are recognized: *R. americana,* ranging from Paraguay to Patagonia; *R. darwini,* confined to Patagonia; and *R. macrorhyncha,* of north-east Brazil. Considerably smaller than the ostrich, the rheas are further distinguished by the possession of three toes, the absence of fine plumes and the general brownish colour of the feathers, which, in *R. darwini,* are tipped with white. The feathers have a considerable market value. The rhea is polyg-

amous, and the cock bird performs the duties of incubation. Rheas frequently associate with deer or guanacos to form "mixed herds" similar to those formed by the ostrich with zebras and antelopes. *See* also OSTRICH, BIRD, RATITAE.

See C. R. Darwin, *Voyage of the Beagle;* Cunningham, *Natural History of the Straits of Magellan.*

RHEA, a Titaness, sister and consort of Cronus and mother of Zeus. For her legend, *see* CRONUS. Very little cult of Rhea existed, but she was commonly identified in historical times with Cybele (*see* GREAT MOTHER OF THE GODS). Hence such legends as that in Virgil (*Aen.,* iii. 111), that Cybele originally came from Crete; and indeed the various mother goddesses of the Mediterranean, while not actually the same, closely resemble one another and are the product of the same class of ideas and practices.



BY COURTESY OF THE METROPOLITAN MUSEUM OF ART

A JAR SHOWING RHEA, A GODDESS OF THE GREEKS, ENTRUSTING HER INFANT, ZEUS, TO ONE OF THE PRIESTS OF THE CURETES

RHEINBERGER, JOSEPH GABRIEL (1839–1901), German composer, was born at Vaduz, Liechtenstein, on March 17, 1839. He studied at the Munich conservatorium from 1851 to 1854, and in 1859 became a professor there. He was from 1860 to 1866 organist of the Michelskirche, and then court conductor. His compositions include the operas *Die sieben Raben* (Munich, 1869) and *Türmers Töchterlein* (Munich, 1873), the oratorio *Christoforus,* op. 120; the well-known quartet for piano and strings in E flat, op. 38; the nonet for wind and strings, op. 139, and seventeen organ sonatas. Rheinberger's organ music is original in method, and breaks loose from the Bach tradition in many points. He died at Munich on Nov. 25, 1901.

RHEINISCH-WESTFÄLISCHE ELEKTRIZITATS-WERK A.G., THE, is the largest electricity supply concern in Germany. It supplies with its combined undertakings 2·1 milliards of kilowatt hours yearly in its net-work in 115 towns and districts, distributes over 42,000 sq. kilometres in round figures, which are supplied wholly or partly with current. The power works connected by means of high tension lines produce, in round figures, 540,000 kw. or 750,000 h.p. The large power works, Goldenberg-Werk, lying in the Cologne peat coal district, the largest steam-power works in Germany, produce about 290,000 kw. Arrangements have been made to increase this to 390,000 kw.; 2,040 km. high tension lines are working and executed, to which belong 41 high tension stations. Among these there is the first installation in Europe for 220,000 volts, connecting the power works of north-western Germany and the Alps, covering about 800 km. at the utmost. The line is already working from the Rhine up to Stuttgart. The further distribution is obtained by means of medium-tension and lower-tension nets on a total length of 23,000 km. in round figures. This corresponds to about half the circumference of the equator.

The whole territory including the 15 daughter companies is marked off by contracts with the Government electro works and the Prussian State as actual spheres of interest as compared with the State undertakings from the sea coast on the Weser extending up to Frankfort on Main and thereby recognized as a natural electric exploitation district. (E. HK.)

RHENANUS, BEATUS (1485–1547), German humanist, was born in 1485 at Schlettstadt in Alsace, where his father, a native of Rheinau (hence the surname *Rhenanus*), was a butcher. He was educated at the famous Latin school of Schlettstadt, and afterwards (1503) went to Paris. In 1511 he removed to Basel, where he became intimate with Erasmus, and took an active share in the publishing enterprises of Joannes Froben (*q.v.*). In 1526 he returned to Schlettstadt, and devoted himself to a life of learned leisure, enlivened with epistolary and personal intercourse with Erasmus (the printing of whose more important works he personally superintended) and many other scholars of his time. He died at Strassburg on July 20, 1547.

His earliest publication was a biography of Geiler of Kaisersberg (1510). Of his subsequent works the principal are *Rerum Germanicarum Libri III.* (1531), and editions of *Velleius Paterculus* (ed. princeps, from a MS. discovered by himself, 1522); *Tacitus* (1519, exclusive of the *Histories*); *Livius* (1535); and *Erasmus* (with a life, 9 vols. fol., 1540–41).

See A. Horawitz, *Beatus Rhenanus* (1872), and by the same, *Der Beatus Rhenanus literarische Tätigkeit* (2 vols., 1872); also the notice by R. Hartfelder in *Allgemeine deutsche Biographie.*

RHENIUM or **DVI-MANGANESE,** a chemical element, atomic number 75, the existence of which has only been demonstrated spectroscopically; appears to occur in extremely minute traces in salts of manganese. (*See* V. Dolejšek, G. Druce, and J. Heyrovský, *Nature,* 1926.)

RHEOBASE: *see* CHRONAXIE.

RHEOSTAT, a device that is used for readily varying the resistance of an electric circuit. (*See* RESISTANCE, MEASUREMENT OF.)

RHESUS MONKEY (*Macacus rhesus*), probably the best known of all monkeys, a native of India. It is brown in colour, with long hair and a naked area on the buttocks, and is gregarious. (*See* MACAQUE.)

RHETICUS or **RHAETICUS** (1514–1576), a surname adopted by GEORGE JOACHIM, German astronomer and mathematician. Born at Feldkirch on Feb. 15, 1514, he studied at Tiguri with Oswald Mycone and afterwards went to Wittenberg, where he was appointed professor of mathematics in 1537. Being greatly attracted by the new Copernican theory, he resigned the professorship in 1539, and went to Frauenberg to associate himself with Copernicus (*q.v.*), and it was owing to his enthusiasm that Copernicus completed the *De Orbium Revolutione.* Rheticus now began his great treatise, *Opus Palatinum de Triangulis,* published in 1596, and continued to work at it while he occupied his old chair at Wittenberg, and indeed up to his death at Cassovia in Hungary, on Dec. 4, 1576.

RHETORIC, the art of using language in such a way as to produce a desired impression upon the hearer or reader. Rhetoric as an art was taught in Greece by the Sophists (*q.v.*).

The power of eloquent speech is recognized in the earliest Greek writings, but the founder of rhetoric as an art was Corax of Syracuse. In 466 a democracy was established in Syracuse. One of the immediate consequences was a mass of litigation on claims to property, urged by democratic exiles who had been dispossessed by Thrasybulus, Hieron or Gelon. Such claims, going many years back, would often require that a complicated series of details should be stated and arranged. The claimants also, in many instances, would lack documentary support, and rely chiefly on inferential reasoning. Hence the need of professional advice. The facts known as to the "art" of Corax perfectly agree with these conditions. He gave rules for arrangement, dividing the speech into five parts,—proem, narrative, arguments (ἀγῶνες), subsidiary remarks (παρέκβασις) and peroration. Next he illustrated the topic of general probability (εἰκός), showing its two-edged use: *e.g.,* if a puny man is accused of assaulting a stronger, he can say, "Is it likely that I should have attacked him?" If vice versa, the strong man can argue, "Is it likely that I should have committed an assault where the presumption was sure to be against me?" This topic of εἰκός, in its manifold forms, was in fact the great weapon of the earliest Greek rhetoric and it was further developed by Tisias, the pupil of Corax, as we see from Plato's *Phaedrus.*

Its later developments were largely due to Gorgias and Lysias, and in a greater degree to Antiphon and Isocrates (*see* their separate biographies). But the detailed study of the art begins with Aristotle's *Rhetoric* (written 322–320 B.C.)

Aristotle's "Rhetoric."—Aristotle sets out from the proposi-

tion that rhetoric is properly an art, because when a speaker persuades, it is possible to find out why he succeeds in doing so. It is, in fact, the popular branch of logic. Hitherto, Aristotle says, writers on rhetoric have concerned themselves mainly with the exciting of emotions. All this is very well, but "it has nothing to do with the matter in hand; it has regard to the judge." The true aim should be to *prove* your point, or seem to prove it.

Aristotle does not sufficiently regard the question: What, as a matter of experience, is most persuasive? Logic may be more persuasive with the more select hearers of rhetoric; but rhetoric is for the many, and with the many appeals to passion will sometimes, perhaps usually, be more effective than syllogism. No formulation of rhetoric can correspond with fact which does not leave it absolutely to the genius of the speaker whether reasoning (or its phantom) is to be what Aristotle calls it, the "body of proof" (*σῶμα πίστεως*) or whether the stress of persuading effort should not be rather addressed to the emotions of the hearers.

His statement, that the master of logic will be the master of rhetoric, is a truism if we concede the essential primacy of the logical element in rhetoric. Otherwise it is a paradox; and it is not in accord with experience, which teaches that speakers incapable of showing even the ghost of an argument have sometimes been the most completely successful in carrying great audiences along with them. Aristotle never assumes that the hearers of his rhetorician are as *οἱ χαρίεντες*, the cultivated few; on the other hand, he is apt to assume tacitly—and here his individual bent comes out—that these hearers are not the great surging crowd, the *ὄχλος*, but a body of persons with a decided, though imperfectly developed, preference for sound logic.

What is the use of an art of rhetoric? It is fourfold, Aristotle replies. Rhetoric is useful, first of all, because truth and justice are naturally stronger than their opposites. When awards are not duly given, truth and justice must have been worsted by their own fault. This is worth correcting. Rhetoric is then (1) *corrective*. Next, it is (2) *instructive*, as a popular vehicle of persuasion for persons who could not be reached by the severer methods of strict logic. Then it is (3) *suggestive*. Logic and rhetoric are the two impartial arts; that is to say, it is a matter of indifference to them, as arts, whether the conclusion which they draw in any given case is affirmative or negative. Suppose that I am going to plead a cause, and have a sincere conviction that I am on the right side. The art of rhetoric will suggest to me what might be urged on the other side; and this will give me a stronger grasp of the whole situation. Lastly, rhetoric is (4) *defensive*. Mental effort is more distinctive of man than bodily effort; and "it would be absurd that, while incapacity for physical self-defence is a reproach," incapacity for mental defence should be no reproach. Rhetoric, then, is corrective, instructive, suggestive, defensive. But what if it be urged that this art may be abused? The objection, Aristotle answers, applies to all good things, except virtue, and especially to the most useful things. Men may abuse strength, health, wealth, generalship.

The Period from Alexander to Augustus.—Aristotle's method lived on in the Peripatetic school. Meanwhile the fashion of florid declamation or strained conceits prevailed in the rhetorical schools of Asia, where, amid mixed populations, the pure traditions of the best Greek taste had been dissociated from the use of the Greek language. The "Asianism" of style which thus came to be contrasted with "Atticism" found imitators at Rome. Hermagoras of Temnos in Aeolis (*c.* 110 B.C.) did much to revive a higher conception. Using both the practical rhetoric of the time before Aristotle and Aristotle's philosophical rhetoric, he worked up the results of both in a new system—following the philosophers so far as to give the chief prominence to "invention." He thus became the founder of a rhetoric which may be distinguished as the scholastic. Through the influence of his school, Hermagoras did for Roman eloquence very much what Isocrates had done for Athens. Above all, he counteracted the view of "Asianism," that oratory is a mere knack founded on practice, and recalled attention to the study of it as an art.

Cicero's rhetorical works are to some extent based on the technical system to which he had been introduced by Molon at Rhodes. But Cicero further made an independent use of the best among the earlier Greek writers, and he could draw, at least in the later of his treatises, on a vast fund of reflection and experience. The result is certainly to suggest how much less he owed to his studies than to his genius. Some consciousness of this is perhaps implied in the idea which pervades much of his writing on oratory, that the perfect orator is the perfect man. The same thought is present to Quintilian, in whose great work, *De Institutione Oratoria*, the scholastic rhetoric receives its most complete expression (*c.* A.D. 90). He treats oratory as the end to which the entire mental and moral development of the student is to be directed. Thus he devotes his first book to an early discipline which should precede the orator's first studies, and his last book to a discipline of the whole man which lies beyond them. After Quintilian, the next important name is that of Hermogenes of Tarsus, who under Marcus Aurelius made a complete digest of the scholastic rhetoric from the time of Hermagoras of Temnos (110 B.C.) in five extant treatises, remarkable for clearness and acuteness. Hermogenes continued for nearly a century and a half to be one of the chief authorities in the schools. Longinus (*q.v.*) (*c.* A.D. 260) published an *Art of Rhetoric* which is still extant; and the more celebrated treatise *On Sublimity* (*περὶ ὕψους*), if not his work, is at least of the same period. In the later half of the 4th century Aphthonius (*q.v.*) composed the "exercises" (*προγυμνάσματα*) which superseded the work of Hermogenes. At the revival of letters the treatise of Aphthonius once more became a standard text-book. Much popularity was enjoyed also by the exercises of Aelius Theon (of uncertain date; *see* THEON). (*See* further the editions of the *Rhetores Graeci* by L. Spengel and by Ch. Walz.)

Rhetoric Under the Empire.—During the first four centuries of the empire the practice of the art was in greater vogue than ever before or since. First, there was a general dearth of the higher intellectual interests: politics gave no scope to energy; philosophy was stagnant, and literature, as a rule, either arid or frivolous. Then the Greek schools had poured their rhetoricians into Rome, where the same tastes which revelled in coarse luxury welcomed tawdry declamation. The law-courts of the Roman provinces further created a continual demand for forensic speaking. The public teacher of rhetoric was called "sophist," which was now an academic title, similar to "professor" or "doctor." In the 4th century B.C. Isocrates had taken pride in the name of *σοφιστής*, which, indeed, had at no time wholly lost the good, or neutral, sense which originally belonged to it.

Vespasian (A.D. 70–79), according to Suetonius, was the first emperor who gave a public endowment to the teaching of rhetoric. Under Hadrian and the Antonines (A.D. 117–180) the public chairs of rhetoric became objects of the highest ambition. The Rhetorical school (*θρόνοι*) had two chairs, one for "sophistic," the other for "political" rhetoric. By "sophistic" was meant the academic teaching of rhetoric as an art, in distinction from its "political" application to the law-courts. The "sophistical" chair was superior to the "political" in dignity as in emolument, and its occupant was invested with a jurisdiction over the youth of Athens similar to that of the vice-chancellor in a modern university. The Antonines further encouraged rhetoric by granting immunities to its teachers. Three "sophists" in each of the smaller towns, and five in the larger, were exempted from taxation (*Dig.* xxvii. 1, 6, §2). The wealthier sophists affected much personal splendour. The aim of the sophist was to impress the multitude. His whole stock-in-trade was style, and this was directed to astonishing by *tours de force*. The scholastic declamations were chiefly of two classes. (1) The *suasoriae* were usually on historical or legendary subjects, in which some course of action was commended or censured (*cf.* Juv. *Sat.*). These *suasoriae* belonged to deliberative rhetoric (the *βουλευτικὸν γένος*, *deliberativum genus*). (2) The *controversiae* turned especially on legal issues, and represented the forensic rhetoric (*δικανικὸν γένος iudiciale genus*). But it was the general characteristic of this period that all subjects were treated alike in the style and spirit of that third branch which Aristotle distinguished, the rhetoric of *ἐπίδειξις* or "display." This academic oratory is shown under various aspects,

and presumably at its best, by such writers as Dio Chrysostom at the end of the 1st century, Aelius Aristeides (*see* ARISTEIDES, AELIUS) in the 2nd (the chief rhetorician under the Antonines) Themistius, Himerius and Libanius in the 4th. Amid much which is tawdry or vapid, these writings occasionally present passages of true literary beauty, while they constantly offer matter of the highest interest to the student.

The Middle Ages and the Renaissance.—In the mediaeval system of academic studies, grammar, logic and rhetoric were the subjects of the trivium, or course followed during the four years of undergraduateship. Music, arithmetic, geometry and astronomy constituted the quadrivium, or course for the three years from the B.A. to the M.A. degree. These were the seven liberal arts. In the middle ages the chief authorities on rhetoric were the latest Latin epitomists, such as Martianus Capella (5th cent.), Cassiodorus (5th cent.) or Isidorus (7th cent.).

After the revival of learning the better Roman and Greek writers gradually returned into use. Some new treatises were also produced. Leonard Cox (d. 1549) wrote *The Art or Craft of Rhetoryke,* partly compiled, partly original, which was reprinted in Latin at Cracow. The *Art of Rhetorique,* by Thomas Wilson (1553), afterwards secretary of state, embodied rules chiefly from Aristotle, with help from Cicero and Quintilian. About the same time treatises on rhetoric were published in France by Tonquelin (1555) and Courcelles (1557). The general aim at this period was to revive the best teaching of the ancients. At Cambridge in 1570 the study of rhetoric was based on Quintilian, Hermogenes and the speeches of Cicero viewed as works of art. An Oxford statute of 1588 shows that the same books were used there. In 1620 George Herbert was delivering lectures on rhetoric at Cambridge, where he held the office of public orator. The decay of rhetoric as a formal study at the universities set in during the 18th century. The function of the rhetoric lecturer passed over into that of correcting written themes; but his title remained long after his office had lost its primary meaning. If the theory of rhetoric fell into neglect, the practice, however, was encouraged by the public exercises ("acts" and "opponencies") in the schools. The college prizes for "declamations" served the same purpose.

Modern Writers on Rhetoric.—The fortunes of rhetoric in the modern world, as briefly sketched above, may suffice to suggest why few modern writers of ability have given their attention to the subject. One of the most notable modern contributions to the art is the collection of commonplaces framed (in Latin) by Bacon, "to be so many spools from which the threads can be drawn out as occasion serves," a truly curious work of that acute and fertile mind, and quite in the spirit of Aristotle's treatise. The popularity enjoyed by Blair's *Rhetoric* in the latter part of the 18th and the earlier part of the 19th century was merited rather by the form than by the matter. Campbell's *Philosophy of Rhetoric,* which found less wide acceptance than its predecessor, was superior to it in depth, though often marred by an imperfect comprehension of logic. But undoubtedly the best modern book on the subject is Whately's *Elements of Rhetoric.* Starting from Aristotle's view, that rhetoric is "an offshoot from logic," Whately treats it as the art of "argumentative composition." He considers it under four heads: (1) the address to the understanding (= Aristotle's λογικὴ πίστις); (2) the address to the will, or persuasion (=Aristotle's ἠθικὴ and παθητικὴ πίστις); (3) style; (4) elocution, or delivery. But when it is thus urged that

> All a rhetorician's rules
> But teach him how to name his tools,

the assumption is tacitly made that an accurate nomenclature and classification of these tools must be devoid of practical use. The conditions of modern life, and especially the invention of printing, have to some extent diminished the importance which belonged in antiquity to the art of speaking, though modern democratic politics and forensic conditions still make it one which may be cultivated with advantage.

BIBLIOGRAPHY.—Among more modern works are J. Bascom, *Philosophy of Rhetoric* (New York, 1885); and numerous books on voice culture, gesture and elocution. For ancient rhetoric *see* Sir R. C. Jebb's translation of Aristotle's *Rhetoric* (ed. J. E. Sandys, 1909), and his *Attic Orators* (1876); also Spengel, *Artium Scriptores* (1828); Westermann, *Gesch. der Beredtsamkeit* (1833–35); Cope, in the *Cambridge Journal of Classical and Sacred Philology* (1855–57); introductions to Cicero's *De Oratore* (A. S. Wilkins) and *Orator* (J. E. Sandys); Volkmann, *Die Rhetorik der Griechen und Römer in system. Übersicht* (ed. 2, 1885); Norden, *Die Antike Kunstprosa* (1898).

(R. C. J.; X.)

RHEUMATISM, a general term for various forms of disease subdivided more accurately as follows:

Acute Rheumatism or Rheumatic Fever.—This disease, the chief characteristics of which are inflammatory affections of the joints with severe constitutional disturbances, is usually associated with inflammation of the pericardium and of the valves of the heart. In childhood the heart is especially liable to be damaged, whereas in adults joint manifestations and constitutional disturbances are more in evidence. It is essentially a disease of childhood and early adult life, first attacks being most common about the seventh or eighth year of life and later attacks up to about the twenty-fifth year. It never occurs under two years of age and is comparatively rare over forty. Heredity is commonly supposed to be a predisposing cause but it is very doubtful whether this is correct. The importance of climate is shown by the prevalence of the disease in the temperate zone and by its seasonal incidence (October to March) in England; on the other hand, troops in Egypt and South Africa suffer from the disease, Pretoria being notoriously bad. The disease is urban rather than rural in distribution and is essentially one of children of the artisan class living in damp rooms in an industrial town, attending an elementary school and suffering from tonsillar sepsis.

It is now generally agreed that rheumatism is a specific infectious disease, but there is still some difference of opinion as to the exact nature of the causal micro-organism. Most authorities, however, agree that the causative organism belongs to the group of streptococci (*see* BACTERIOLOGY) and gains entrance to the body through the tonsils. Evidence has been produced that in children whose tonsils have been removed a subsequent attack of rheumatism is likely to be less severe in all its manifestations except chorea. (*See* below.)

Symptoms.—Although the main features of the disease in children and adults are different, it is probably all one disease, having periods during which it remains latent for a longer or shorter time between acute exacerbations. In childhood a history of sore throats and indefinite pains—"growing pains"—can usually be obtained; the constitutional symptoms are often ill-marked and the child does not appear very ill. This insidious onset makes the disease of vast importance to the country, as in many cases its presence is not recognized until irreparable damage has been caused to the heart. Chorea or St. Vitus's dance is a common manifestation in children, and in these cases the heart is less likely to be damaged. Small, painless, rather hard subcutaneous nodules attached to tendons may appear and indicate that the disease is passing into a chronic condition.

In adults the most marked feature is the affection of the joints. The onset is abrupt, being fully developed in 24 hours. The attack begins with a feeling of malaise and pain in one or more joints generally of medium or large size. Usually only one or two joints are affected at first, but soon others become attacked very often symmetrically. The affected joints are swollen, hot and acutely painful; the temperature is raised to about 101° to 103° F; the tongue is coated with a thick fur and the body bathed in a profuse perspiration which has a characteristic sour smell; the face is flushed and the pulse rapid. The attacks are of variable duration up to some weeks, and relapses are common during convalescence. The most dangerous complication is hyperpyrenia or rapid and extreme rise of temperature (*see* FEVER) possibly up to 110° F, when death speedily ensues unless prompt measures are taken such as tepid sponging or icepacks. This is not a common complication and for some unknown reason is becoming rarer; it appears most commonly in the second week of the first attack but never in a person under 12 years of age. The disease is not fatal, the mortality not exceeding 3%, and is less virulent than formerly; it is, however, the cause of much chronic disease in later life owing to its effect upon the heart. It is estimated that in England and Wales 25,000 persons die annually

from heart disease of rheumatic origin.

Treatment.—Absolute rest in bed is essential to prevent, if possible, damage to the heart. The patient should lie between blankets and wear flannel garments; the affected joints should be given complete rest and be wrapped in cotton wool and the weight of the bed clothes supported over them. Sodium salicylate appears to have a specific effect in the acute stages by relieving pain, lowering temperature and cutting short the attack. It should be given frequently and in fairly large doses for the first 24 hours and then the interval lengthened and the dose decreased; care must be exercised not to produce toxic symptoms. The drug is of less use in children than in adults as it does not seem to have any influence in arresting the cardiac inflammation. Aspirin may succeed when salicylates fail. Some authorities render the urine alkaline with sodium bicarbonate.

Subacute Rheumatism.—No definite dividing line exists between this and the acute condition. All symptoms are less marked, heart lesions are common and the duration may be long.

Chronic Rheumatism.—This is a term loosely applied to pain and stiffness in the joints. Some think it cannot be separated from rheumatoid arthritis (*q.v.*), others that it is an inflammation of the fibrous tissues round a joint. One or more joints may be affected and become slightly swollen, and after a time they may be felt to creak on movement. It is usually brought on by cold and wet, and the pain is most marked after rest. The general health is little affected unless the pain be severe and continuous. It rarely follows acute rheumatism.

Muscular Rheumatism.—This is a painful affection of voluntary muscles due to inflammation of their fibrous and tendinous attachments. It results from overstrain and exposure to cold and damp. There is intense pain on attempted movement involving the muscles affected; when the muscles are at rest the pain disappears. The commonest forms are: (1) *Lumbago* (*q.v.*), affecting the lower part of the back. Stooping, and more especially rising again, cause severe pain; (2) *Torticollis* or stiff neck, affecting the muscles on one side of the neck. Salicylates are sometimes of use in the chronic varieties, but active treatment is usually required such as the various applications of heat, massage, hot douches or electricity. In chronic rheumatism the waters at various spas are often of great benefit, and wintering in a warm, dry, sunny climate is an advantage when practicable. In muscular rheumatism rest of the affected muscles is essential.

Special clinics for rheumatic diseases are in existence in Europe apart from that treatment given to chronic forms in the various spas. (*See* MINERAL WATERS.) At the time of writing the British Red Cross is proposing to establish in thickly populated centres of the country fully equipped clinics for the treatment of rheumatism in adult sufferers. The project is receiving cordial support by the Ministry of Health, various friendly societies and trade unions and the medical profession.

See H. Warren Crowe, *Chronic Arthritis and Rheumatism* (London, 1926) and *Bacteriology and Surgery of Chronic Arthritis and Rheumatism, with End-results of treatment* (London, 1927).

(P. L.-B.)

RHEUMATOID ARTHRITIS, a disease characterized by destructive changes in the joints. Its origin is unknown but it is probably caused either by micro-organisms themselves affecting the joints or by the absorption of the toxins of micro-organisms in some other site such as the intestine, or mouth. In many cases injury appears to be the determining factor and any condition tending to lower the general health may act as a predisposing cause.

In adults there are two main groups:

(1) *The Acute or peri-articular type* in which the onset is usually between 20 and 40 years of age and women are more often affected than men. It is usually acute and many joints may be affected at the outset, the condition being mistaken for acute rheumatism; pain is variable but often severe except at rest. The joints become swollen and fusiform in shape and tender to the touch; those most frequently attacked are (*a*) hands and feet; (*b*) wrists; (*c*) ankles; (*d*) knees; but any other joint may be affected. The temperature in the acute onset may rise to 103° F but is often less. As the attack subsides the swelling diminishes but there is usually considerable muscular wasting and marked contractures which may result in severe deformity, fixation and loss of function of the joints, the patient becoming a complete cripple.

(2) *The Chronic or Osteo-Arthritic Type.*—The onset is usually between 40 and 60 years of age, the causes assigned being injury, general ill-health and exposure to cold and wet. Pyorrhoea alveolaris or decayed or deficient teeth are practically always present. The onset is chronic and generally polyarticular; pain is variable and may be slight throughout. The swelling of the joints is nodular in shape and practically confined to the joint itself, affection of the periarticular structures being slight. When the condition is polyarticular usually a few large joints are affected, but none are immune; when monarticular the hip or knee is most likely to be affected. The formation of the new bone occurs and may cause great limitation of movement or even ankylosis; when this occurs in the spine the condition known as "pokerback" results. In the later stages the limitation of movement and muscular wasting may render the patient absolutely helpless but the condition is then often quiescent and painless.

(3) A third type of arthritis which occurs in children is known as *Still's disease.* The onset at about three to six years of age is usually insidious but may be acute. The joints become swollen and fusiform in shape and there is severe muscular wasting and limitation of movement. There is generalized enlargement of glands, sweating is common and the temperature is often persistently about 100° F.

The prognosis of all forms is bad, exacerbations and advance being the rule; in children an intercurrent disease is often fatal.

Early diagnosis is essential for successful treatment. Search should be made for a septic focus, which should be removed if found. The general health should be attended to and improved, the diet not being stinted: meat and vegetables may be given freely but indigestible articles avoided. The patient should live on a dry soil. In the acute stage the joints should be given complete rest in a good position and oil of wintergreen applied. In the chronic forms and as the acute stage passes off the joints should not be kept completely at rest, massage and passive movement followed later by active movement up to a moderate amount of exercise being desirable to counteract muscular wasting and contractures. Spa treatment, radiant heat, hot-air baths and electrical treatment are also of use, and in recent years radium has been used. If an X-ray photograph shows that bony outgrowth is limiting movement, an operation for its removal should be considered; similarly adhesions may have to be broken down forcibly under an anaesthetic. Whatever the form of treatment adopted it must be persevered with for some weeks before being given up as of no value.

(P. L.-B.)

RHEYDT, a town in the Prussian Rhine province, situated on the Niers, 19 m. W. of Düsseldorf, on the main line of railway to Aix-la-Chapelle, and at the junction of lines to Crefeld and Stolberg. Pop. (1925) 45,095. Rheydt is an ancient place, but its industrial importance is of very recent growth, and it only received municipal rights in 1856. The principal products of its numerous factories are silk, cotton, woollen and mixed fabrics, velvet, iron goods, machinery, shoes, cables, soap and cigars. Dyeing, brewing and distilling are also carried on.

RHIANUS, Greek poet and grammarian, a native of Crete, friend and contemporary of Eratosthenes (275–195 B.C.). Suidas says he was at first a slave and overseer of a palaestra, but obtained a good education later in life, and devoted himself to grammatical studies, probably in Alexandria. Of his works none have been preserved except eleven epigrams. But he was chiefly known as a writer of epics, the most celebrated of which was the *Messeniaca* in six books, dealing with the second Messenian war and the exploits of Aristomenes. Other similar poems were the *Achaica, Eliaca, Thessalica* and *Heracleia.*

Fragments in A. Meineke, *Analecta Alexandrina* (1843); for Rhianus's work in connection with Homer, *see* C. Mayhoff, *De Rhiani Studiis Homericis* (Dresden, 1870); also W. Christ, *Geschichte der griechischen Literatur* (1898).

RHIGAS, CONSTANTINE, known as Rhigas of Velestinos (Pherae), or Rhigas Pheraios (1760–1798), Greek patriot and poet, was born at Velestinos, and was educated at Zagora and at Constantinople, where he became secretary to Alexander Ypsilanti. In 1786 he entered the service of Nicholas Mavrogenes, hospodar of Wallachia, at Bucharest, and when war broke out between Turkey and Russia in 1787 he was inspector of the troops at Craiova. Rhigas then became interpreter at the French Consulate at Bucharest, where he wrote the famous Greek version of the *Marseillaise,* well known in Byron's paraphrase as "sons of the Greeks, arise." He founded the patriotic society called the Hetaireia. He went to Vienna to organize a revolutionary movement among the exiled Greeks and their foreign supporters in 1793, or possibly earlier. There he founded a Greek press, but his chief glory was the collection of national songs (posthumously printed 1814) which, passed from hand to hand in MS., roused patriotic enthusiasm throughout Greece. While at Vienna Rhigas entered into communication with Bonaparte, to whom he sent a snuff-box made of the root of a laurel tree taken from the temple of Apollo, and he set out to meet him at Venice. But before leaving Vienna he forwarded papers, amongst which is said to have been his correspondence with Bonaparte, to a compatriot at Istria. These fell into the hands of the Austrian government, and Rhigas was arrested at Trieste and handed over with his accomplices to the Turkish authorities at Belgrade. His five companions were secretly drowned, and Rhigas was shot.

See Rizos Néroñlos, *Histoire de la révolution grecque* (Paris, 1829); I. C. Bolanachi, *Hommes illustres de la Grèce moderne* (Paris, 1875); and Mrs. E. M. Edmonds, *Rhigas Pheraios* (London, 1890).

RHINE, one of the most important rivers in Europe. It is about 850 m. in length. It rises in Switzerland, later forms the boundary between Switzerland and Austria, then between Switzerland and Germany, France and Germany, then flows through Germany and finally through Holland to enter the North sea.

Switzerland.—In the Swiss portion two mountain rivers, the *Hinter Rhein* and the *Vorder Rhein,* unite at Reichenau, 6 m. south-west of Coire, to form the main stream. The principal stream the *Hinter Rhein,* issues (7,271 ft.) from the glaciers of the Rheinwaldhorn (Adula group) west of Splügen and flows eastward through the Rheinwald as a subsequent stream, parallel to the strike of the tectonic structures at this point (for geology *see* Alps). On reaching the Schams valley it is diverted northward and flows towards Reichenau parallel to a number of consequent streams (their direction having been determined by the original structural surface of the land) some of which the *Vorder Rhein* has already beheaded. It receives many tributaries, the most important being the Albula (right) below Thusis.

The *Vorder Rhein,* a subsequent stream flowing along the strike of the structures, rises in Toma lake (7,691 ft.) near the Oberalp pass and is joined by a number of consequent (right) and obsequent streams (left) as it flows eastward past Disentis and Ilanz to Reichenau.

The valley of the combined river now becomes wider and is alluvium-filled. The consequent northward direction is again followed below Coire (Chur) as far as Lake Constance. The largest affluents still join it on the right.

Below Buchs the valley becomes wider, the river meanders about, "is corrected" in many places, shortened by a canal at Diepoldsau and finally enters Lake Constance (*q.v.*) across a marshy delta. Between Sargans and the lake it forms the boundary between Switzerland and Liechtenstein and Austria. On leaving the lake at Constance the Rhine flows westward as far as Basle. It drops 400 ft. along this stretch, the first part of which is across the Tertiary and Jurassic rocks of eastern Switzerland.

Between Constance and Basle it receives important affluents along its left bank. Draining the northern slopes of the Glarus and Bernese Alps are a number of consequent streams the most important being the Linth (Limmat), Reuss and the Aar.

Germany.—At Basle the Rhine turns sharply northward and assumes an entirely new complexion. Its course lies through the famous rift valley of the Rhine between the Vosges and the Black forest massifs and was initiated in Lower Oligocene times. It meanders as a wide stream with low banks and containing many islands. The river, which in the interests of navigation has been frequently "corrected," lies in a flat valley 20 m. wide which ends abruptly against the massifs on both sides. Also flowing in the valley is the tributary (left), the Ill, which rises near Basle and flows parallel to the Rhine for over 50 m. to join it below Strasbourg.

The Rhine forms the boundary between France and Germany from Basle to near Lauterbourg, opposite Karlsruhe, beyond which the river, flowing through Germany, passes Mannheim, where it is joined by the Neckar (right), Worms and Mainz, where it is joined by the Main (right). Here its course is blocked by the Armorican range of the Taunus and so the river turns sharply westward through a steep sided gorge to Bingen where it is joined by the Nahe (left). After Bingen it again resumes a northerly course but its valley is still a narrow cut through contorted Devonian slates and greywackes. It is joined by the Lahn (left) and then at Coblenz by the Moselle (left) which rises in the Vosges and drains, with its tributary the Saar, the region between the Vosges and the Ardennes. At Coblenz the valley becomes wider only to narrow again as the river passes on to Bonn, between the Eifel and the Westerwald uplands.

At Bonn the river leaves the Armorican ranges and passes on to Tertiary, glacial and alluvial deposits, but the hills continue to rise on the right of the river as far as Düsseldorf. The Rhine now passes through the great industrial region of western Germany, is very sluggish and meanders over an almost level plain.

Holland.—In Holland its course is again westward. Almost immediately after entering this country the river divides into two arms, the larger of which, carrying off about two-thirds of the water, diverges to the west and is called the Waal, whilst the smaller, which is still called the Rhine, sends off another arm, the Ijssel, to the Zuider Zee. The Waal is joined on the left by the Maas (Meuse) and after passing Nijmegen and Dordrecht enters the North sea by way of the Hollandsch Diep.

Further subdivision takes place and the entire district between the Waal and the Ijssel in reality belongs to the delta of the famous river, built by alluvium from the Alps and Britain in preglacial times, covered by glacial deposits and latterly in places again covered with mud of the great river.

Navigation.—The Rhine has been one of the chief waterways of Europe from the earliest times; and its channel has been comparatively easy to keep open. The position of the river is highly favourable for the development of its trade. It flows through regions rich in mineral resources and the most populous of Europe, to discharge into one of the most frequented seas opposite Great Britain. Besides serving as a natural outlet for Germany, Belgium and Holland, it is connected with a great part of central and southern France by the Rhine-Rhone and the Rhine-Marne and other canals, and with the basin of the Danube by the Ludwigskanal.

In 1831 a system was agreed upon which practically gave free navigation to vessels of the riverine states, while imposing a moderate tariff upon foreign ships. After the war of 1866, Prussia negotiated with Baden, Bavaria and Hesse-Darmstadt with a view to the removal of all tolls, but it was not until 1868 that the river was thrown open without any restriction. The management of the channel and navigation was then vested in a central commission meeting at Mannheim each year. The treaty of Versailles (1920), while deciding that the act of Mannheim should under certain conditions continue to regulate navigation on the Rhine, put the vessels of all nations on the same footing as vessels belonging to the Rhine navigation. The composition of the central commission was modified by the admission of Switzerland, Belgium, Great Britain and Italy. The Versailles terms were completed in 1921 by a protocol of adhesion on the part of the Netherlands. The Barcelona convention (1921) applies to the Rhine and takes precedence, if necessary, over the Mannheim convention. For details of the international régime *see* Inland Water Transport.

The introduction of steam has greatly increased the shipping

on the Rhine, and small steamers ply also on the Main, Neckar, Maas and Moselle. The steamboat traffic has especially encouraged the influx of tourists. Large passenger boats ply regularly between Mainz and Düsseldorf, and sometimes extend their journey as high up as Mannheim, and as far in the other direction as Rotterdam. The river is navigable without interruption from Basle to its mouth, a distance of 550 m. Above Spires, however, the river craft are comparatively small. Between Basle and Strasbourg the depth of water is sometimes not more than 3 ft., between Strasbourg and Mainz it varies from 5 to 25 ft., while below Mainz it is never less than 9 or 10 feet. The efforts of the river authorities are being directed to the deepening and improvement of the navigable channel from the sea to Strasbourg. Two navigable channels of sufficient depth for all vessels which ply up and down that part of the stream, have been blasted out where rapids occur near Bingen. The difficulties in the river channel above Strasbourg, which are augmented by a steep gradient and swift current, are such that any plans to improve the river in this stretch are too expensive to be feasible. A parallel canal in the lateral plains of Alsace to the left is the solution proposed. It will begin at Huningue, where a huge dam will be constructed to regulate the water, and continue to Strasbourg, having at each of its eight locks a gigantic power plant. The total power generated by the plants should be about 700,000 h.p. which will be available for the industrial establishments in the region, and help also to pay the cost of the project.

At the chief river-mouth ports, Rotterdam, Antwerp and Amsterdam, merchandise is transferred from ocean steamers to river steamers or *vice versa*. Nearly three-fourths of the Rhine traffic passes through Rotterdam which is the only one of these ports directly on the Rhine. Amsterdam is connected by the Merwede canal and the difficulties of navigation in the canal have considerably reduced this port's share of the traffic. The passage to Antwerp is indirect and plans are going forward to connect the Belgian city directly with the Rhine by extending the Scheldt-Meuse canal to Ruhrort. Duisburg, Ruhrort and Cologne are the principal export ports in the central reaches of the river. They have expanded rapidly with the exploitation of the coal mines and the building up of the great industrial region of the Ruhr valley. Capacious harbours have been formed in the low-lying basins of the valley, and river facilities are supplemented by the Herne canal which traverses the heart of the Ruhr section and continued as the Ems canal connects with the intricate inland waterway system of central and northern Germany. The chief ports of the Upper Rhine—Mannheim, Rheinau, Ludwigshafen and Strasbourg—are places of transfer from river to railway. They deliver and collect from the southern markets of Germany and Switzerland. From Mainz there is passage via the Main river and the Ludwig canal, which it is expected to improve or supplement, to the Danube river.

Four-fifths of the Rhine traffic is made up of fuels, ores and cereals, all heavy commodities. Trade in them thrives best when they may be shipped by water routes. Coal at present constitutes the principal cargo. Originating in the Ruhr district it supplies Holland and Belgium at the mouth of the river, reaches Switzerland and even Italy to the South and supplies the extensive industrial and domestic demands of the territory in between. Its presence has given value to the ores which form the second most important cargo and the two in combination have given rise to the extensive metallurgical industries of the Rhine region which have built up the Rhine cities and increased the density of population. In the demands of the latter originates the cereal cargo, made necessary since the Rhine raises little of its foodstuffs. The cereals come principally from Russia, Rumania, the United States and Argentina, being trans-shipped from the river-mouth ports. London, Hamburg, Bremen and the chief Baltic ports also participate in the Rhine traffic. These extensive ramifications have made the control of Rhine navigation an international problem rather than one affecting only Rhine states.

The commerce carried on by the river itself is supplemented by the numerous railways which skirt its banks and converge to its principal towns. Before the introduction of railways, there were no permanent bridges across the Rhine below Basle; but now trains cross it at a dozen different points in Germany and Holland.

The Rhine has always exercised a fascination over the German mind. "Father Rhine" is the centre of the German's patriotism and the symbol of his country. In his literature it has played a prominent part from the *Nibelungenlied* to the present day; and its romantic legends have been alternately the awe and delight of his childhood. The Rhine was the classic river of the middle ages.

But of late years the beauties of the Rhine have become sadly marred; the banks in places, especially between Coblenz and Bonn, disfigured by quarrying, the air made dense with the smoke of cement factories and steam-tugs, commanding spots falling a prey to the speculative builder and villages growing up into towns.

For the demilitarization of the Rhine under the Versailles Treaty *see* Rhineland, The, below.

Bibliography.—H. J. Mackinder, *The Rhine* (1908); J. P. Chamberlain, *The Régime of the International Rivers, Danube and Rhine*, Columbia Univ. Studies in History, vol. cv., 1 (1923); G. Haelling, *Le Rhin: politique, économique, commercial* (1921); E. de Martonne, *Conditions physiques et économiques de la navigation rhénane* (1921); A. Antoine, *L'aménagement du Rhin de Bâle à Strasbourg* (1922).

RHINELAND, THE. In the loose political sense the word "Rhineland" is used to designate the Prussian province called *Rhein-provinz* as well as parts of the Prussian province of Hesse-Nassau, parts of the Free State of Hesse, the Bavarian Palatinate and most of the Free State of Baden. The Prussian Rhine province, situated on both banks of the Rhine, embraces 24,547 sq.km. with 7,256,978 inhabitants (exclusive of the nearly 1,910 sq.km. of the Saar with 770,000 inhabitants).

French Plans and the Treaty Settlement.—The old Rhenish territory, a medley of feudal states partly lay, partly clerical, had been annexed by France by the peace of Lunéville 1801. Most of them were handed over to Prussia by the Congress of Vienna on Feb. 10, 1815. On the conclusion of the World War French policy aimed at detaching the left bank of the Rhine, which would cut away from Germany 8% of her territory, 11% of her population, 12% of her coal supply and 80% of her iron ores, including Alsace, in order to ensure the security of France. In the end a compromise was effected: 1. The left bank of the Rhine remained German. 2. It was to be occupied together with the bridgeheads by allied troops in three zones for 15 years, the northern zone to be evacuated after five, the next after ten, the third after 15 years, if Germany faithfully carried out the conditions of the peace. (Art. 428–29.) The left bank of the Rhine and a strip of 50 km. on the right bank was to be completely demilitarized. (Art. 42–44.) The occupation was to serve the double purpose of guarantee for the execution of the treaty, and of security to France against military aggression.

An interallied commission was set up by a separate Rhineland agreement, composed of representatives of France, England, Belgium and the United States, with the right to issue ordinances for the security of the Allied forces. It was not to interfere with the ordinary civil German administration, but might erect a custom barrier in order to safeguard the economic interests of the population (Art. 270).

The Separatist Movement.—France had allowed the Rhineland to remain part of the German republic, on the understanding that a pact of guarantee would be made with her by England and the United States. As the United States refused to ratify it, this guarantee lapsed completely. Even before this failure, French military authorities had fostered separatist movements on the left bank of the Rhine. An old established anti-Prussian prejudice of the Catholic population of the Rhine province had been worked up by a fear of the spread of Bolshevism. A genuine movement for decentralization had arisen, whose demands went as far as the creation of a new Rhineland State within the German republic. The French military authorities strongly supported Dr. Dorten's enterprise to create an independent Rhenish republic though all German parties kept aloof from it. It failed from the start as the commander in chief of the American expeditionary forces refused to have anything to do with it (May 22, 1919). When Dr. Dorten was arrested on German unoccupied territory

(July 24, 1920) the French high commissioner demanded his extradition to the occupied territory and his subsequent release.

The occupation of the Ruhr (*q.v.*) by French and Belgian troops (Jan. 10, 1923) extended to Karlsruhe (March 2, 1923) and to the districts between the bridgeheads on the right bank of the Rhine (Feb. 25). The American army withdrew on Jan. 10, 1923. The British thereafter were in a minority on the Rhineland commission. They prevented however the extension of its rule over the newly occupied districts, which were put under military control. But they could not stop the Rhineland commission from stretching its powers and from issuing decrees for the Rhineland, identical with those made by the military for the Ruhr district, though they did not carry them out in the Cologne zone, a British zone, which for some time was almost blockaded by the French.

The expulsion of German officials and leading citizens and the disarmament of the people gave the Separatist movement new life. Though official cognizance was strongly denied, preparation as well as execution were favoured by the French (and Belgian) military authorities. In many cases the Separatists had been armed with their connivance, whilst the local police when fighting them was either disarmed or arrested or otherwise hampered by the military. Notwithstanding their support, the rising in Düsseldorf (Sept. 30, 1923) was quickly quelled by the local authorities. The Rhineland republic proclaimed in Aix-la-Chapelle (Oct. 21, 1923) lasted until Nov. 2, when under pressure of the British the Belgian government disavowed the movement. The "Putsch" in Coblenz, Wiesbaden and Mainz organized by Dorten and Matthes quickly collapsed in the first month of the new year.

It was only in the Bavarian Palatinate that the movement, which was almost officially fathered by General de Metz, lingered a little longer. He informed the Bavarian government on Oct. 25 that the Palatinate had ceased to be part of Bavaria. The Separatists ejected nearly 20,000 people with French help. The population strongly retaliated and there was a kind of civil war, in which the Separatists fared badly. Early in February the legitimate officials returned. But it was only in March 1924 that complete order was restored. The transfer of General de Metz in Nov. 1924 definitely marked the end of this episode.

The expenditure for the passive resistance in Rhine and Ruhr had completely drained Germany's financial resources. After stabilization it was doubtful whether she would be able to go on supporting the occupied provinces. The complete cessation of all relief was suggested. This being done, the responsibility for Rhine and Ruhr was to be thrown on the Allies. At no time since the armistice, was the French policy of wrenching the Rhineland from the *Reich* nearer its goal than during Nov. 1923.

The Dawes Plan and Locarno.—The acceptance of the Dawes plan led to the evacuation of the Ruhr and later on of Düsseldorf, Duisburg and Ruhrort. The changed attitude of the new French Government placed the discussion of the Rhine problem on a new basis. On Jan. 10, 1925 the evacuation of the northern zone was to take place if Germany had faithfully carried out the conditions of the Treaty (§ 429). The reparation question having been settled for the time being, difference of opinion arose over disarmament. Germany insisted that her disarmament was complete; the Allies announced that evacuation could not take place on the appointed day (Jan. 10), as the final report of the military control commission could not be ready by that time. During the ensuing protracted negotiations England advocated evacuation as soon as Germany had carried out the outstanding disarmament terms, whilst France interpreted the fulfilment clauses in the wider sense of giving her complete security.

The Locarno negotiations for a security pact enabled the Allies to concentrate on disarmament proper. By presenting Germany with a list of her shortcomings as to disarmament, most of which Germany was ready to amend, an agreement was reached. Cologne was evacuated on Nov. 30, 1926, by the British, whilst the last vestiges of the occupation of the northern zone disappeared at midnight Jan. 31, 1926. The occupation had lasted over a year longer than had been foreseen in the Treaty of Versailles. The Locarno treaty had separated the security problem from the occupation problem, basing the former on quite different principles.

After the evacuation of the Ruhr, Germany suggested a pact between the powers interested in the Rhine which should give a mutual guarantee for the existing frontiers. The so-called Locarno Pact was signed on Oct. 16, 1925, and by it this mutual guarantee was given. The conclusion of the Locarno agreement was almost automatically followed, though not immediately, by Germany's entry into the League of Nations.

Immediately after the entry of Germany into the League the possibilities of an early complete evacuation were discussed between Stresemann and Briand. As a price the French suggested the marketing of German reparation bonds, which could not be done without further financial concessions from Germany. This might give France a capital sum, which would enable her to start the stabilization of the franc. The plan failed, being premature from a financial point of view. The German government insisted on a reduction of the strength of the occupying army. They maintained, moreover that, as Germany was a member of the League of Nations, the continuation of occupation was quite illogical. Germany had carried out all her obligations as set down in the Treaty—apart from the reparation payments, which had become subject to a separate régime, to which occupation guarantees were no longer applicable (Art. 430).

At the meeting of the League in Geneva Sept. 1928 and again at the League Council's meeting at Lugano, they strongly pressed their legal point of view that, Germany having complied "with all the undertakings resulting from the (present) Treaty" (Art. 431) —apart from reparations which were rearranged by the Dawes Agreement—the occupying forces should be withdrawn immediately. The French and British Governments interpreted clauses 429 to 431 in a different way. But the British Government declared their willingness to consider the questions involved not as legal, but as political issues, to be settled by negotiations in the spirit of Locarno. The way to such negotiations is opened by the following resolution passed at Geneva:

(1) The opening of official negotiations relating to the request put forward by the German chancellor regarding the early evacuation of the Rhineland,

(2) The necessity for a complete and definite settlement of the reparation problem and for the constitution for this purpose of a committee of financial experts to be nominated by the six Governments.

BIBLIOGRAPHY.—R. S. Baker, *Woodrow Wilson and World Settlement* (New York, 1923); H. Oncken, *Die Rheinpolitik Kaiser Napoleons III. von 1865–1870 und der Ursprung des Krieges von 1870–71* (Stuttgart, 1926); A. Tardieu, *La Paix* (Paris, 1921); A. J. Toynbee, *Survey of International Affairs* (London, 1925 and 1927), Supplement 1925 (London, 1928); K. Strupp, *Das Werk von Locarno* (Berlin, 1926); see also German official publications. (M. Bo.)

RHINELANDER, a city of northern Wisconsin, U.S.A., on the Wisconsin river, 254 m. N.N.W. of Milwaukee; the county seat of Oneida county. It is on Federal highway 8; has a municipal airport; and is served by the Chicago and North Western and the Soo Line railways. Pop. 6,654 in 1920 and 8,019 in 1930. It is in the midst of the great north pine woods, and there are 232 lakes within a radius of 12 miles. The city has important manufacturing industries, including large saw and planing mills, paper mills, veneer works, a refrigerator factory, iron works, boiler shops and creameries. Rhinelander was settled in 1882 and chartered as a city in 1894. Since 1926 it has had a city-manager form of government.

RHINE PROVINCE or RHINELAND, the most westerly province of Prussia, bounded on the north by Holland, on the east by the Prussian provinces of Westphalia and Hesse-Nassau, and the Republic of Hesse, on the south-east by the Bavarian Palatinate, on the south and south-west by Lorraine, and on the west by Luxemburg, Belgium and Holland. The small district of Wetzlar in the midst of the province of Hesse-Nassau also belongs to the Rhine province, which, on the other hand, surrounds the Oldenburg province of Birkenfeld. The districts of Eupen and Malmedy in the West were ceded to Belgium in 1920. The extent of the Rhine province is 9,474 sq.m., excluding the Saar District, which has an area of 574 sq. miles. It includes about 200 m. of the course of the Rhine, which forms the eastern

frontier of the province from Bingen to Coblenz, and then flows through it in a north-westerly direction.

The southern and larger part of the Rhine province, belonging geologically to the Devonian formations of the lower Rhine, is hilly. On the left bank are the elevated plateaus of the Hunsrück and the Eifel, separated from each other by the deep valley of the Mosel, while on the right bank are the spurs of the Westerwald and the Sauerland, the former reaching the river in the picturesque group known as the Seven Mountains (*Siebengebirge*). The highest hill in the province is the Walderbeskopf (2,670 ft.) in the Hochwald, and there are several other summits above 2,000 ft. on the left bank, while on the right there are few which attain a height of 1,600 ft. Most of the hills are covered with trees, but the Eifel (*q.v.*) is a barren and bleak plateau. To the north of a line drawn from Aix-la-Chapelle to Bonn the province is flat, and marshy districts occur near the Dutch frontier. The climate varies considerably with the configuration of the surface. That of the northern lowlands and of the sheltered valleys is the mildest and most equable in Prussia, with a mean annual temperature of 50°, while on the hills of the Eifel the mean does not exceed 44°. The annual rainfall varies in the different districts from 18 to 32 inches. Almost the whole province belongs to the basin of the Rhine, but a small district in the north-west is drained by affluents of the Meuse. Of the numerous tributaries which join the Rhine within the province, the most important are the Nahe, the Mosel and the Ahr on the left bank, and the Sieg, the Wupper, the Ruhr and the Lippe on the right. The only lake of any size is the Laacher See, the largest of the extinct crater lakes of the Eifel.

Little except oats and potatoes can be raised on the high-lying plateaus in the south of the province, but on the lower ground cereal crops and fruit are grown, and tobacco, hops, flax, rape, hemp and beetroot (for sugar) are cultivated for commercial purposes. Vine-culture occupies about 30,000 acres, about half of which are in the valley of the Mosel, a third in that of the Rhine itself, and the rest mainly on the Nahe and the Ahr. The choicest varieties of Rhine wine, however, such as Johannisberger and Steinberger, are produced higher up the river, beyond the limits of the Rhine province. In the hilly districts more than half the surface is sometimes occupied by forests, and large plantations of oak are formed for the use of the bark in tanning. Considerable herds of cattle are reared on the rich pastures of the lower Rhine, but the number of sheep is small. The wooded hills are well stocked with deer, and a stray wolf occasionally finds its way from the forests of the Ardennes into those of the Hunsrück. The salmon fishery of the Rhine is very productive, and trout abound in the mountain streams.

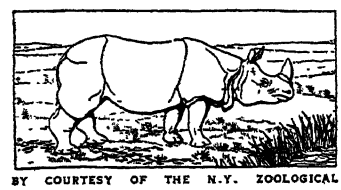
The Rhine province is very rich in mineral resources. Besides parts of the carboniferous measures of the Saar and the Ruhr, it also contains important deposits of coal near Aix-la-Chapelle. Iron ore is found in abundance near Coblenz, the Bleiberg in the Eifel possesses an apparently inexhaustible supply of lead, and zinc is found near Cologne and Aix-la-Chapelle. The mineral products of the district also include lignite, copper, manganese, vitriol, lime, gypsum, volcanic stones (used for millstones) and slates. By far the most important item is coal. Of the numerous mineral springs the best known are those of Aix-la-Chapelle and Kreuznach.

The mineral resources of the Prussian Rhine province, coupled with its favourable situation and the facilities of transit afforded by its great waterway, have made it the most important manufacturing district in Germany. The industry is mainly concentrated round two chief centres, Aix-la-Chapelle and Düsseldorf (with the valley of the Wupper), while there are naturally few manufactures in the hilly districts of the south or the marshy flats of the north. The largest iron and steel works are at Essen, Oberhausen, Duisburg, Düsseldorf and Cologne, while cutlery and other small metallic wares are extensively made at Solingen, Remscheid and Aix-la-Chapelle. The cloth of Aix-la-Chapelle and the silk of Crefeld form important articles of export. The chief industries of Elberfeld-Barmen and the valley of the Wupper are cotton-weaving, calico-printing and the manufacture of turkey red and other dyes. Glass is manufactured in the Saar district and beetroot sugar near Cologne. Though the Rhineland is *par excellence* the country of the vine, beer is largely produced; distilleries are also numerous, and large quantities of sparkling Moselle are made at Coblenz. The imports consist mainly of raw material for working up in the factories of the district, while the principal exports are coal, fruit, wine, dyes, cloth, silk and other manufactured articles of various descriptions.

The population of the Rhine province in 1925 was 7,214,533, excluding the Saar District, then under the administration of the League of Nations, and estimated to contain 571,872 inhabitants. The great bulk of the population is of Teutonic stock, and about a quarter of a million are of Flemish blood. The province contains a greater number of large towns than any other province in Prussia and more than half the population is industrial and commercial. There are universities at Bonn (founded 1786 and refounded 1818) and Cologne (refounded 1918). For purposes of administration the province is divided into the five districts of Coblenz, Düsseldorf, Cologne, Aix-la-Chapelle and Trier. Coblenz is the official capital, though Cologne is the largest and most important town.

The province is a modern creation, formed in 1815 out of the duchies of Cleves, Berg, Gelderland and Jülich, the ecclesiastical principalities of Trier and Cologne, the free cities of Aix-la-Chapelle and Cologne, and nearly a hundred small lordships and abbeys.

RHINOCEROS, the name for such perissodactyle mammals (*see* PERISSODACTYLA) as bear one or two median horns on the head, and for their extinct relatives. Rhinoceroses are large, massively built animals, with little intelligence and a bad temper. The horns, which are composed of modified hairs, are borne on the nose and are used as weapons. The animals are dull of sight, but their hearing and scent are very acute. They are vegetarian in diet and largely nocturnal. The skin is very thick and tough. In the Miocene and Pliocene, rhinoceroses inhabited both eastern and western hemispheres, but they are now restricted to tropical Africa and Asia. An interesting feature is that the horn appears to have been independently evolved in several separate groups of rhinoceroses. Living forms fall into three sub-genera: (1) With a single nasal horn and the thick skin raised into folds on the shoulders and thighs. There are two species. The Indian rhinoceros (*Rhinoceros unicornis*), standing 5–5¾ft. high at the shoulder, with a horn 1ft. in length, is now confined to the Assam plain. The Javan rhinoceros (*R. sondaicus*) is smaller and in the female the horn is often absent. It inhabits Bengal, Burma, the Malay peninsula, Java, Sumatra and Borneo. It prefers hilly forests. (2) With a large nasal and a small frontal horn and the skin not thrown into folds. The only species is the Sumatran rhinoceros (*R.* [*Dicerorhinus*] *sumatrensis*) with the same range as the Javan species, except that it does not extend into Java. It reaches a height of 4½ft. and inhabits hilly forests. A form with hairy ears and skin is regarded as a local race. (3) With two horns, no skin folds and no lower incisors. This group (*Diceros*) is confined to Africa and comprises two species. The black rhinoceros (*R.* [*D.*] *bicornis*) is the smaller, weighing just over a ton, with a pointed, prehensile upper lip. It inhabits Africa south of Abyssinia, though in reduced and diminishing numbers, dwelling in the wooded, watered districts. The white rhinoceros (*R.* [*D.*] *simus*) is the largest living land mammal except the elephant and feeds largely on grass. It now inhabits only a reserve in Zululand and the Lado enclave on the Upper Nile. It may stand 5ft. 8in. at the shoulder and measure 15ft. in length, but is very swift of foot. The flesh is said to be excellent to eat, especially in the autumn and winter.



BY COURTESY OF THE N.Y. ZOOLOGICAL SOCIETY

GREAT INDIAN RHINOCEROS (RHINOCEROS UNICORNIS)

The woolly rhinoceros (*R. antiquitatis*), which inhabited Europe, became extinct during the glacial epoch.

RHINTHON (*c.* 323–285 B.C.), Greek dramatist, son of a potter. He was probably a native of Syracuse and afterwards settled at Tarentum. He invented the *hilarotragoedia,* a burlesque of tragic subjects. He was the author of thirty-eight plays, of which only a few titles (*Amphitryon, Heracles, Orestes*) and lines have been preserved chiefly by the grammarians, as illustrating dialectic Tarentine forms. The metre is iambic, in which the greatest licence is allowed. The *Amphitruo* of Plautus, although probably imitated from a different writer (Archippus of the Middle Comedy), may be taken as a specimen of the manner in which such subjects were treated. There is no doubt that the hilarotragoedia exercised considerable influence on Latin comedy, the *Rhinthonica* (*i.e.* fabula) being mentioned by various authorities amongst other kinds of drama known to the Romans. Scenes from these travesties are probably represented in certain vase paintings from Lower Italy, for which *see* H. Heydemann, "Die Phlyakendarstellungen auf bemalten Vasen," in *Jahrbuch des archäologischen Instituts,* i. (1886).

Fragments in monograph by E. Völker (Leipzig, 1887); *see* also E. Sommerbrodt, *De Phlyacographia Graecorum* (Breslau, 1875); W. Christ, *Geschichte der griechischen Literatur* (1898).

RHIZOPODA, the name given by Dujardin (*pro parte,* 1838) to a group of Sarcodine Protozoa. They are distinguished by their pseudopods, simple or branched, passing by wide bases into the general surface, never fine radial nor fusing into complex networks; skeleton absent or a simple shell ("test," "theca"), never (?) a calcareous shell, nor represented by a siliceous network, nor spicules. Reproduction by binary fission; by division or abstriction of buds after the body has become multi-nucleate; or by the resolution of the body into numerous uninucleate zoospores (amoebulae or flagellulae) which may conjugate as gametes; plasmodium formation unknown; encystment (in "resting cysts" or "hypnocysts") common. Without a knowledge of the history it is impossible to distinguish a naked Lobose from the Amoebula (pseudopodiospore) of a Myxomycete or Proteomyxan. As to the name, Dujardin included the thecate Lobosa, the Filosa, and the Reticularia or Foraminifera. For further particulars *see* PROTOZOA.

RHODE ISLAND, popularly known as "Little Rhody," is a North Atlantic State of the American Union, belonging to the New England group, and lying between 41° 18′ and 42° 3′ N. and 71° 8′ and 71° 53′ W. It is bounded, north and east, by Massachusetts; south, by the Atlantic ocean; and west, by Connecticut, from which it is separated in part by the Pawcatuck river. Rhode Island is the smallest State in the Union, having an extreme length, north and south, of 48 m., an extreme width, east and west, of 37 m. and a total area of 1,248 sq.m., of which 181 sq.m. are water-surface.

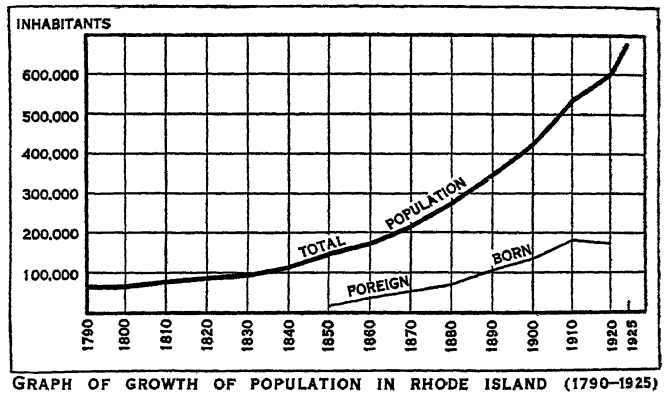
Physical Features.—The region of which Rhode Island is a part was at one time worn down to a gently rolling plain near sea-level, but has since been uplifted and somewhat dissected by stream action. As a result the topography is characterized by low, rounded hills but is nowhere mountainous. Since the uplift and stream dissection a slight depression has allowed the sea to invade the lower portions of the river valleys, forming the bays known as Narragansett bay, Providence "river," Sakonnet "river," etc. Glaciation has disturbed the river systems.

In the north-west is Durfee Hill, which attains an elevation of 805 ft., and is the highest point within Rhode Island. The mean elevation for the entire State is 200 feet. The coast-line, including the shores of the bays and islands, is extensive; its western portion is only slightly indented, but its eastern portion is deeply indented by Narragansett bay, a body of water varying in width from 3 to 12 m., and extending inland for about 28 miles. Within Narragansett bay there are the numerous islands characteristic of an area which has suffered comparatively recent depression, the largest being Rhode Island (or Aquidneck), Conanicut Island and Prudence Island. Of these the most important is Rhode Island, 15 m. long and 3 m. wide, which has given the State its name. Lying about 10 m. off the coast and south of the central part of the State is Block Island.

The rivers of the State are short and of no great volume, but they flow swiftly and are useful in supplying power for manufactories. The Providence river is really an arm of Narragansett bay, into which flow the waters of the Pawtuxet and the Blackstone rivers. The latter stream at Pawtucket has a fall of about 50 ft., and the Pawtuxet river also has a number of falls along its course. Mount Hope bay is a north-eastern arm of Narragansett bay and is also the estuary of the Taunton river. The Sakonnet river is a long bay separating Aquidneck or Rhode Island from the mainland on the east. The Pawcatuck river forms the boundary between Rhode Island and Connecticut.

Climate.—Rhode Island has a more moderate climate than that of the northern sections of New England. There are no great extremes of either heat or cold, and a number of the towns and cities, especially Newport and Narragansett Pier, have become noted summer resorts. Narragansett Pier has a mean annual temperature of 49°, a mean summer temperature (for June, July and August) of 68°, and a mean winter temperature (for December, January and February) of 29°. The mean annual temperature at Providence is 49·8°; the mean for the summer, 70·9°; and for the winter, 29·3°; while the highest and lowest temperatures ever recorded are respectively 100° and −12°. The mean annual precipitation is about 50 in.

Population.—The population of Rhode Island on April 1, 1930 was 687,497, according to the U.S. census. The population of the State at certain of the decennial censuses was as follows: 68,825 in 1790; 69,122 in 1800; 108,830 in 1840; 174,620 in 1860; 276,531 in 1880; 428,556 in 1900; 542,610 in 1910; and 604,397 in 1920. The State enumeration in 1925 showed a population of 679,260; the Federal census of 1930, 687,497. The increase from 1920–30 was 83,100 or 13·7%. Rhode Island was, in 1920, the most densely populated State in the Union, having 566·4 inhabitants to the square mile; in 1930 also with 644·3. The percentages of urban and of rural population in 1925 were 97·8% and 2·2% respectively; as compared with urban, 96·7%, and rural, 3·3% in 1910. The following are the cities of Rhode Island having a population of over 25,000 in 1930 and percentage increase in the 1920–30 period:—



GRAPH OF GROWTH OF POPULATION IN RHODE ISLAND (1790–1925) WITH PERCENTAGE OF FOREIGN BORN

	1930	1920	% Increase 1920–30
Providence	252,981	237,595	6·5
Pawtucket	77,149	64,248	20·1
Woonsocket	49,376	43,496	13·5
Cranston	42,911	29,407	45·9
East Providence (town)	29,995	21,793	37·6
Newport	27,612	30,255	− 8·7
Central Falls	25,898	24,174	7·1

Of the total population in 1920, 98·3% were white and 1·7% were negroes. The proportion of native whites in 1925 was 71·7%, as compared with 69·6% in 1920; of foreign-born whites in 1925, 26·7%, as compared with 28·7% in 1920. The Irish were the largest foreign-born element until 1910. In both 1920 and 1925 the Irish were numerically inferior to the English, the French-Canadian and the Italian. In 1925 the French-Canadian

numbered 35,548; the Italian, 34,671; the English, 26,885; the Irish, 19,800 and the English-Canadian, 5,303.

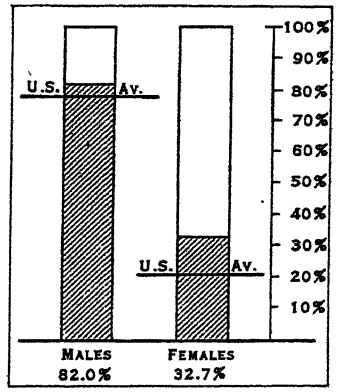
Government.—Rhode Island is governed under the Constitution of 1842, with amendments adopted in 1854, 1864, 1886, 1888, 1889, 1892, 1893, 1900, 1903, 1909, 1911 and 1916. Amendments to the Constitution must be passed by both houses of the general assembly at two consecutive sessions, and must then be ratified by three-fifths of the electors of the State voting thereon.

Citizenship.—All native or naturalized citizens of the United States residing in Rhode Island are citizens of the State. To vote a citizen must be at least 21 years of age and have resided in the State for one year and in a Rhode Island town or city at least six months preceding the election.

Administration.—The executive and administrative officers elected by the people at elections held in November of even-numbered years are a governor, a lieutenant-governor, a secretary of State, an attorney-general and a treasurer. The State auditor is elected by the general assembly triennially, and the commissioner of education is appointed annually by the State board of education. In addition to the officers above named, there are numerous commissions, boards and commissioners, such as the State board of public roads, the public utilities commission, the State board of agriculture, the public welfare commission, the State board of health, the State board of education, the commissioner of labour, the factory inspectors, etc. The powers of the governor are small.

Legislative Power.—The legislative power is vested in the general assembly, which consists of a senate made up of the lieutenant-governor and of one senator from each of the 39 cities and towns in the State, and a house of representatives of 100 members, apportioned according to population, but with the proviso that each town or city shall have at least one member and none shall have more than one-fourth of the total. Members of the general assembly are elected biennially in November.

Judiciary.—At the head of the judicial system is the supreme court with final revisory and appellate jurisdiction. Below this are the superior court, the 12 district courts, the juvenile courts, the town councils, probate courts in the more populous towns and justices of the peace. The five judges of the supreme court, the eight judges of the superior court and the district judges are elected by the general assembly; the supreme and superior court justices hold office until dismissed by the general assembly or found guilty of official misdemeanours, and the district judges hold office for a term of three years. The judges of the district courts also hold the juvenile courts. Probate courts are held by either the town council or a judge appointed by that body. Justices of the peace are appointed by the governor triennially. Each county has a sheriff elected by the general assembly for a term of three years. The town is the unit of local government, the county being recognized only for judicial purposes and to a certain extent in the appointment of several State administrative boards. There are five counties and 39 towns and cities.



PERCENTAGE OF POPULATION (TEN YEARS OF AGE AND OVER) EMPLOYED IN GAINFUL OCCUPATIONS IN RHODE ISLAND (1920)

Finances.—The valuation of ratable property in the several towns and cities, as returned by the boards of assessors, as of June 15, 1926, was $1,237,174,813. The rate of State tax in 1927 was nine cents on each $100, and an additional tax of three cents for the care of State roads. For the fiscal year ending Nov. 30, 1926, receipts were $9,402,766; expenditures $10,196,648; funded debt $14,039,000; and sinking fund $2,978,865. The estimated receipts and expenditures for the fiscal year 1927 were $10,232,253 and $10,748,544 respectively. The chief sources of revenue in the order named were: automobile licences, the direct State tax on local property valuations, the corporate excess and franchise tax, the tax on savings deposits, the tax on insurance premiums, the tax on public service corporations, receipts from the United States for roads, the gasoline tax and the inheritance tax. The principal expenditures were for highways, parks and bridges $3,976,118; penal, corrective and charitable $2,263,794; education $1,296,605; and administrative $1,163,411. On June 30, 1926, there were 38 banking institutions within the State with resources of $531,992,000, and deposits of $458,282,000.

Education.—The public school system of Rhode Island was established in 1800, abolished in 1803, and re-established in 1828. At the head of it is a commissioner of education, appointed annually by the State board of education, which is composed of the governor, the lieutenant-governor and six members elected by the general assembly (two biennially) for six years. Each town has a school committee elected by the people and independent of the town or city council. School attendance is compulsory for children between the ages of seven and 16. An act to promote Americanization was passed in 1919 obliging illiterate minors (16–21) to attend evening school. Rhode Island in 1917 accepted the provisions of the Federal vocational act, and a part time trade school was opened for boys over 14 years of age at Providence. The total population between four and 21 years of age as shown by the Jan. 1926 school census was 201,955. The average number attending the public schools in 1925–26 was 101,132; the total expenditure for school purposes in 1924–25 was $9,178,575.

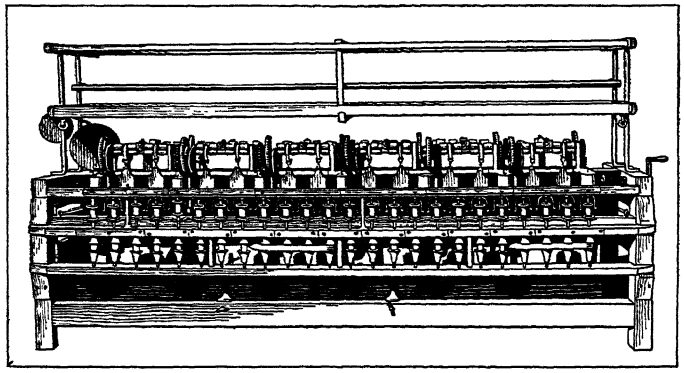
The institutions of higher education supported by the State are the Rhode Island College of Education at Providence and Rhode Island State College at Kingston, a land grant college under the Morrill Acts of 1862 and subsequent acts. There are training-schools for teachers at Providence, Cranston, Bristol, Burrillville, Central Falls, Cumberland, East Providence, Jamestown, Pawtucket, Newport, South Kingstown, Warren, Warwick, Westerly and West Warwick. The State also makes appropriations ($25,000 in 1926) to the Rhode Island school of design at Providence. Institutions for higher education other than those supported by the State, are Brown university (*q.v.*) and Providence college, both at Providence.

Charities and Corrections.—The majority of the charitable and penal institutions of the State are under control of the State Public Welfare Commission. The institutions under the control of the commission in 1928 were the Exeter school (for feeble-minded) in the town of Exeter; the State home and school for children at Providence; and a group of institutions situated upon what is known as the State farm, in the city of Cranston, including the State hospital for mental diseases, the State infirmary, the State reformatory for women, the State prison and Providence county jail, the Sockanosset school for boys, and the Oaklawn school for girls. The two latter institutions are departments of the State reform school. In addition to the institutions under the Public Welfare Commission there are four others supported wholly or in part by the State: the Rhode Island School for the Deaf at Providence, The Soldiers' Home at Bristol, Butler Hospital (for insane) at Providence and the State Sanatorium.

Agriculture.—Rhode Island, with a total crop value in 1926 estimated at $4,700,000, ranked at the bottom of the list as an agricultural State. Chief among the reasons for this low rank are the smallness of the State and the sterile nature of the soil. The boulder clay or "hard pan" of which most of the surface lands are composed, form a very indifferent support for vegetation. The farm acreage declined from 443,308 ac. in 1910 to 309,013 ac. in 1925. Of this total only 76,003 ac. were classified as crop land and only 69,368 ac. produced crops for harvest in 1924. The number of farms fell from 5,292 in 1910 to 3,911 in 1925; but the average area per farm (79 ac.) decreased but slightly. Only 472, or 12·1% of the farms were cultivated by tenants. In the total value of all farm property there was a slight increase during the period 1910–25, the values being $32,990,739 and $33,446,425 respectively. The chief crop in 1926 was cultivated hay. The 45,000 ac. devoted to hay produced 58,000 tons valued at $1,450,000. The crop next in value was potatoes, which had a yield of

450,000 bu. valued at $810,000. The only cereal crops produced on a commercial scale were Indian corn and oats. Apples were the principal orchard crop. The live stock products of Rhode Island are of greater value than the field crops. Live stock on the farms on Jan. 1, 1927, consisted of about 5,000 horses, 4,000 swine, 2,000 sheep and 27,000 cattle. Of the latter 21,000 were kept for dairy purposes.

Minerals.—Rhode Island, in mineral wealth, ranked 47th among the States of the Union. The total value of all mineral



BY COURTESY OF THE U.S. NATIONAL MUSEUM, WASHINGTON, D.C

SLATER'S SPINNING FRAME OF 1790, AFTER THE ORIGINAL IN THE U.S. NATIONAL MUSEUM IN WASHINGTON

products of the State in 1925 was $1,151,857, and of this total granite was valued at $724,428.

Fisheries.—Whaling was early an established industry in Rhode Island. As late as 1846 about 50 whaling vessels sailed annually from Rhode Island ports; but by the close of the century the industry had become practically extinct. Rhode Island, in 1924, ranked fourth among the new England States in the number of persons engaged, investment and yield of her fisheries. The total number of persons employed was 1,176, of whom 840 were in the shore and boat fisheries. The total catch amounted to 20,535,327 lb., valued at $1,818,858.

Manufactures.—Rhode Island is essentially a manufacturing State; of the 275,000 persons in the State engaged in gainful occupation in 1920, 161,920 or 58·8% were employed in manufacturing and mechanical pursuits. Boat-building was an early industry, and large vessels were built at Newport. During the Revolutionary War the State offered a premium for every pound of steel made within its boundaries. Cotton was first imported to Providence from Spain in 1785; a company to carry on cotton-spinning, formed at Providence in 1786, established there in the following year a factory containing a spinning jenny of 28 spindles (the first machine of its kind to be used in the United States), and also a carding machine and a spinning frame with which was manufactured a kind of jean. The fly shuttle was also apparently first introduced at Providence in 1788. The prohibition of the exportation from England of machinery, models or drawings, had retarded mechanical improvement in America, but in 1790 an industrial company was formed at Providence to carry on cotton spinning, and in December of that year there was established at Pawtucket a factory equipped with Arkwright machines constructed by Samuel Slater, an immigrant from England. This machine was operated by water-power, then first used in the United States for the spinning of cotton thread; and from this may be dated the beginning of the factory system in Rhode Island. The first power-loom used in the United States was invented about 1812, and was set up at Peacedale, in 1814. Textile manufacturing by improved methods, however, was hardly well established in Rhode Island before 1825. The manufacture of jewellery, which was established in Providence in 1784, was greatly promoted ten years later by Nehemiah Dodge's invention of the process of "gold-filling," and was still further improved in 1846 by Thomas H. Lowe. Rhode Island's water power has been its only natural resource which has aided its development.

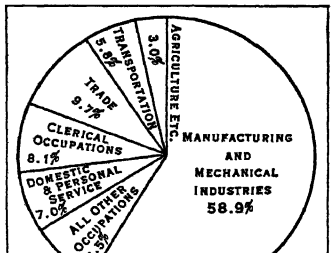
The State, in 1925, ranked 22nd in the value of its manufactured products. The manufacturing industries in 1925 show a decrease from the figures for 1923. Textiles held in 1925 the first place among the manufactures of the State, employing over one-half the persons engaged in manufacturing. In the manufacture of worsted goods, Rhode Island was surpassed by Massachusetts only. The State ranked fourth in the dyeing and finishing of textiles; fifth in the manufacture of cotton goods; and sixth in the manufacture of silk. Rhode Island has long been a leader in the manufacture of jewellery; the product of the State in 1925 was exceeded by that of New York only. The table below shows the 10 principal manufacturing industries in 1925, the number of active establishments, and wage-earners and value of products.

Industry	No. of establishments	Wage-earners	Value
Worsted goods	66	18,923	$125,503,602
Cotton goods	75	29,276	107,708,169
Dyeing and finishing textiles	63	9,860	47,163,824
Silk manufacturing	32	6,087	34,855,263
Jewellery	220	7,039	31,616,003
Woollen goods	28	3,283	21,141,962
Textile machinery	47	3,781	17,508,719
Electrical machinery and supplies	15	1,302	12,431,768
Knitted goods	23	1,821	10,605,476
Foundry and machine-shop products	49	2,154	10,200,701

The chief industrial centres were Providence ($212,117,987), Pawtucket ($108,281,019), Woonsocket ($83,357,763) and Central Falls ($25,541,848).

Transportation and Commerce.—The steam railway mileage in Rhode Island never has been great because the cities are unfavourably situated to be the termini of interstate railway systems. The total mileage within the State decreased from 211 m. in 1920 to 196 m. in 1925. At the close of the year 1925 the mileage of electric railways, chiefly interurban, in the State was 381 miles. This total shows a decrease of 73 m. since 1917. Much attention has been given to the State's highway system. The total mileage in the State system of highways on Jan. 1, 1927, was 822 m.; of this total 452 m. were surfaced. In 1925, $3,046,000 were spent by the State for the construction and maintenance of roads.

Rhode Island has water outlets at Providence (by far the largest), Newport, Pawtucket, Bristol, Tiverton and Wickford. There are also harbours of refuge at Block Island and Point Judith. The water-borne traffic of Providence in 1926 consisted of 5,294,370 tons of cargo valued at $437,480,340 and of 254,573 passengers. There was also an "in transit" traffic (to and from Pawtucket river) of 338,000 tons, valued at $55,131,000. Providence has since 1910 become the oil distributing centre of New England (106,216 tons brought in by water in 1910; 2,436,875 tons in 1926). The coal and lumber were also of great importance. The commerce at Newport in 1926 consisted of 137,486 tons, valued at $9,314,464, and of 123,452 passengers. There was an important ferry traffic between Newport and Jamestown.



DIVISION OF OCCUPATIONS OF THE 265,377 PERSONS GAINFULLY EMPLOYED (1920)

History.—Rhode Island was founded by refugees from Massachusetts, who went there in search of religious and political freedom. The first settlements were made at Providence by Roger Williams (*q.v.*) in June 1636 and at Portsmouth on the island of Aquidneck by the Antinomians, William Coddington (1601–78), John Clarke (1609–76) and Anne Hutchinson (1591–1643), in March–April, 1638. Becoming dissatisfied with conditions at Portsmouth, Coddington and Clark removed a few miles farther south in April 1639, and established a settlement at Newport. In a similar manner Warwick was founded in Jan. 1643 by seceders from Providence under the lead of Samuel Gorton. The union of Portsmouth and Newport, March 12, 1640, was followed by the

consolidation of all four settlements, May 19, 1647, under a patent of March 14, 1644, issued by the parliamentary board of commissioners for plantations. The particularistic sentiment was still very strong, however, and in 1651 the union split into two confederations, one including the mainland towns, Providence and Warwick; the other, the island towns, Portsmouth and Newport. A reunion was effected in 1654 by Roger Williams, and a charter was secured from Charles II. on July 8, 1663.

In the patent of 1644 the entire colony was called Providence Plantations. On March 13, 1644, the Portsmouth-Newport General Court changed the name of the island from Aquidneck to the Isle of Rhodes or Rhode Island. The official designation for the province as a whole in the charter of 1663, therefore, was Rhode Island and Providence Plantations. The charter was suspended at the beginning of the Andros régime in 1686, but was restored again after the Revolution of 1689. The closing years of the 17th century were characterized by a gradual transition from agricultural to commercial activities. Newport became the centre of an extensive business in piracy, privateering, smuggling and legitimate trade. Cargoes of rum, manufactured from West Indian sugar and molasses, were exported to Africa and exchanged for slaves to be sold in the southern colonies and the West Indies. The passage of the Sugar Act of April 5, 1764, and the steps taken by the British Government to enforce the Navigation acts seriously affected this trade.

The people of Rhode Island played a prominent part in the struggle for independence. On June 9, 1772, the "Gaspee," a British vessel which had been sent over to enforce the acts of trade and navigation, ran aground in Narragansett bay and was burned to the water's edge by a party of men from Providence. Nathanael Greene, a native of Rhode Island, was made commander of the Rhode Island militia in May 1775, and a major-general in the Continental army in Aug. 1776, and in the latter capacity he served with ability until the close of the war. In the year 1776, Gen. Howe sent a detachment of his army under General Henry Clinton to seize Newport as a base of operations for reducing New England, and the city was occupied by the British on Dec. 8, 1776. To capture this British garrison, later increased to 6,000 men, the co-operation of about 10,000 men (mostly New England militia) under Maj.-Gen. John Sullivan, and a French fleet carrying 4,000 French regulars under Count D'Estaing, was planned in the summer of 1778. On Aug. 9, Sullivan crossed to the north end of the island of Rhode Island, but as the French were disembarking on Conanicut Island, Lord Howe arrived with the British fleet. Count D'Estaing hastily re-embarked his troops and sailed out to meet Howe. For two days the hostile fleets manoeuvred for positions, and then they were dispersed by a severe storm. On the 20th, D'Estaing returned to the port with his fleet badly crippled, and only to announce that he should sail to Boston to refit. The American officers protested but in vain, and on the 30th the Americans, learning of the approach of Lord Howe's fleet with 5,000 troops under Clinton, decided to abandon the island. The British evacuated Newport on Oct. 25, 1779, and the French fleet was stationed here from July 1780 to 1781.

The influence of Roger Williams' ideas and the peculiar conditions under which the first settlements were established have tended to differentiate the history of Rhode Island from that of the other New England States. In 1640 the General Court of Massachusetts declared that the representatives of Aquidneck were "not to be capitulated withal either for themselves or the people of the isle where they inhabit," and in 1644 and again in 1648 the application of the Narragansett settlers for admission to the New England Confederacy was refused except on condition that they should pass under the jurisdiction of either Massachusetts or Plymouth. Rhode Island was one of the first communities to advocate and to put into practice religious freedom and political individualism.

The individualistic principle was shown in the jealousy of the towns toward the central Government, and in the establishment of legislative supremacy over the executive and the judiciary. The legislature migrated from county to county up to 1854, and there continued to be two centres of government until 1900. The dependence of the judiciary upon the legislature was maintained until 1860, and the governor is still shorn of certain powers which are customary in other States. In the main the rural towns have adhered most strongly to the old individualistic sentiment, whereas the cities have kept more in touch with the modern nationalistic trend of thought. This was shown, for example, in the struggle for the ratification of the Federal Constitution. Under the Articles of Confederation it was principally Rhode Island that defeated the proposal to authorize Congress to levy an impost duty of 5% mainly as a means of meeting the debts of the central Government. When the Constitutional Convention met in Philadelphia in 1787 to frame a Constitution for a stronger Federal Government, the agriculturists of Rhode Island were afraid that the movement would result in an interference with their local privileges, and the State refused to send delegates, and not until the Senate had passed a bill for severing commercial relations between the United States and Rhode Island, did the latter, in May 1790, ratify the Federal Constitution, and then only by a majority of two votes. Rhode Island, like the rest of New England, was opposed to the War of 1812 and the Mexican War. During the Civil War it sent 23,457 men into the service of the Union.

Providence possesses superior water-power facilities and has therefore become one of the leading manufacturing centres of New England, whereas Newport is now known only as a fashionable summer resort.

The charter of 1663 and franchise law of 1724 established substantial equality of representation among the towns, and restricted the suffrage to freeholders. In the course of time, therefore, the small towns came to be better represented proportionally than the large cities, and the growing class of artisans was entirely disfranchised. Providence issued a call for a Constitutional Convention in 1796, and similar efforts were made in 1799, 1817, 1821, 1822 and 1824, but nothing was accomplished. About 1840 Thomas W. Dorr (1805–54), a young lawyer of Providence, began a systematic campaign for an extension of the suffrage, a reapportionment of representation and the establishment of an independent judiciary. The struggle, which lasted for several years, and in fact is not yet entirely over, was one between the cities and the country, between the manufacturers and the agriculturists.

A convention summoned without any authority from the legislature, and elected on the principle of universal manhood suffrage, met at Providence, Oct. 4, to Nov. 18, 1841, and drafted a frame of Government which came to be known as the People's Constitution. A second convention met on the call of the legislature in Feb. 1842 and adopted the so-called Freeman's Constitution. On being submitted to popular vote (on Dec. 27, 28, 29, 1841) the former was ratified by a large majority, while the latter was rejected (on March 21, 22, 23, 1842), by a majority of 676. At an election held on April 18, 1842, Dorr was chosen governor. The supreme court of the State and the President of the United States (Tyler) both refused to recognize the validity of the People's Constitution, whereupon Dorr and a few of his more zealous adherents decided to organize a rebellion. They were easily repulsed in an attack upon the Providence town arsenal, and Dorr, after a brief period of exile in Connecticut, was convicted of high treason on April 26, 1844, and was sentenced to imprisonment for life. He was released by act of the Assembly in June 1845, and restored to the rights and privileges of citizenship in May 1851.

The Freeman's Constitution, modified by another convention, which held its session at Newport and East Greenwich on Sept. 12 to Nov. 5, 1842, was finally adopted by popular vote on Nov. 21–23, 1842. Only a partial concession was made to the demand for reform. The suffrage was extended to non-freeholders, but only to those of American birth. But a constitutional amendment of 1888 extended to naturalized citizens the right of suffrage in State and national elections, and an amendment of 1909 partially remedied the evils in the system of apportionment.

Inequalities still exist, however, as can best be illustrated by Providence, which, with a population in 1927 of 280,600 out of a total of 740,000, had one member in a senate of 39 and 25 members in a house of representatives of 100. The Republican machine finds it comparatively easy to maintain control over the

State Government; the majority occasionally protests by electing a Democratic governor. In 1922 the Democratic candidates for governor, lieutenant-governor, attorney-general and treasurer were elected, although the Republicans retained control of both branches of the general assembly. A long struggle in the senate culminated in the Republican members leaving for Rutland, Mass., on June 19, 1924, where they stayed until Jan. 5, 1925. The Democratic minority continued to meet daily, however, until the newly elected senate took office. The legislative business of the State was practically at a standstill for a year, and the failure of passage of the annual appropriation bill in 1924 led to the advancing of money to the State by private individuals and by 23 Rhode Island banks.

The corner stone of the marble State house at Providence was laid in Oct. 1896, and the building was opened to use on Jan. 1, 1901.

In common with other New England States Rhode Island's cotton manufacturing industries have suffered from Southern competition. The South's advantage of raw material and cheap labour has been overcome in part, however, by Rhode Island's manufacturing its own mill machinery and by training skilled workers in her textile schools, to produce a higher quality of goods. In economic and social legislation Rhode Island has kept up with the changing order of society. In 1921 a workmen's compensation act was passed; in 1923 a mother's aid law came into effect; and a State law raising the minimum working age to 15 years (with certain exceptions) came into effect in 1924. Rhode Island ratified the 19th (Woman Suffrage) amendment to the Federal Constitution; but failed to ratify the 18th (Prohibition) amendment.

In the presidential elections the State has been Federalist, 1792–1800; Democratic Republican, 1804; Federalist, 1808–12; Democratic Republican, 1816–20; Adams (Republican), 1824–28; National Republican, 1832; Democratic, 1836; Whig, 1840–48; Democratic, 1852, and Republican since 1856, except for the Democratic victory in 1912.

BIBLIOGRAPHY.—For general physical description *see:* N. S. Shaler, J. B. Woodworth and A. F. Foerste, *Geology of the Narragansett Basin* (1899) and C. T. Jackson, *Report on the Geological and Agricultural Survey of Rhode Island* (1840). For administration *see* the *Rhode Island Manual,* issued biennially by the secretary of State; C. Carroll, *Outline of Government in Rhode Island,* in Rhode Island educational circulars; and the annual reports of the various State officials, boards and commissions. For general bibliographies *see* J. R. Bartlett, *Bibliography of Rhode Island* (1864); C. S. Brigham, *List of Books upon Rhode Island History* (1908) in Rhode Island educational circulars, History Series No. 1; and H. M. Chapin, *Bibliography of Rhode Island* (1914) and *Cartography of Rhode Island* (1915). History:—For a considerable time the standard authority on the period before the ratification of the Constitution was S. G. Arnold, *History of Rhode Island, 1636–1790* (1859–60, 4th ed., 1894). His work, however, has been practically superseded by I. B. Richman, *Rhode Island: Its Making and Meaning, 1636–1683* (1902), and *Rhode Island; A Study in Separatism* (1905). *See* also, for this period, T. W. Bicknell, *The History of Rhode Island and Providence Plantations* (1920). E. Field (editor), *State of Rhode Island and Providence Plantation at the end of the century; A History* (1902) is valuable for the later history of the State. Two works of special interest for young readers are L. B. Minor, *Our State: Rhode Island* (1925) and A. C. Gleeson, *Colonial Rhode Island* (1926). *See* also A. Groton, *The Life and Times of Samuel Groton* (1908); W. B. Weeden, *Early Rhode Island: a Social History of the People* (1910); A. M. Mowry, *The Dorr War; or the Constitutional Struggle in Rhode Island* (1901); *Records of the Colony of Rhode Island and Providence Plantations, 1636–1792* (1856–65); H. M. Chapin, *Documentary History of Rhode Island* (1916–19); C. S. Brigham, "Report on the Archives of Rhode Island" in the *Annual Report* (1903, vol. i.) of the American Historical Association; *Rhode Island Historical Society, Collections* (1827–*seq.*); *Proceedings and Publications* (1872–*seq.*); *The Quarterly* (1892–1901); *Rhode Island Historical Tracts,* Series I. (1877–84), Series II. (1889–96); and the publications of the Rhode Island Soldiers and Sailors Historical Society (1878–1915).

RHODES, CECIL JOHN (1853–1902), British colonial and Imperial statesman, was born on the 5th of July 1853, at Bishop Stortford, in Hertfordshire. His father was a clergyman, but he claimed descent from yeoman stock. Cecil John Rhodes was the fifth son in a large family of sons and daughters. The boy was educated at the grammar school of Bishop Stortford, where his father held the living, with the intention of preparing for the Church; but at the age of sixteen his health broke down, and in the latter part of 1870 he joined his eldest brother Herbert, then engaged in farming in Natal. In that year diamonds were discovered in the Kimberley fields. By the end of 1871 Rhodes and his brother were among the successful diggers. The dry air of the interior restored his health, and before he was nineteen he found himself financially independent and physically strong.

Rhodes next spent eight months in a solitary journey through the then little known parts of the country lying to the north of the Orange and Vaal rivers. He went through Bechuanaland to Mafeking, thence to Pretoria, Murchison, Middelburg and back through the Transvaal to Kimberley, passing in an ox-wagon at a rate of some 15 to 20 miles a day, through vast spaces of rolling veld. He saw one of the healthiest countries in the world barely occupied. He knew the agricultural possibilities of Natal and its mineral wealth. The effect of the combined influences on his mind was profound. He was filled with desire that that fine country be secured for occupation by the British race, and that no power but Great Britain be allowed to dominate in the administration of South Africa. He had found an object to which he proposed to devote his life. It was nothing less than the governance of the world by the British race. A will exists written in Rhodes's own handwriting, when he was still only twenty-two, in which he states his reasons for accepting the aggrandizement and service of the British empire as his highest ideal of practical achievement. It ends with a single bequest of everything of which he might die possessed for the furtherance of this great purpose. Five-and-twenty years later his final will carried out, with some difference of detail, the same intention.

The share which he allotted to himself was the extension of the area of British settlement in Africa. He returned to Oxford, where he matriculated at Oriel. In 1873 his health again failed, and he was sent back under what was practically a death sentence. Years afterwards, as an older man, he saw the entry of his own case in the diary of the eminent physician whom he consulted with a note "Not six months to live." South Africa again restored him to health. Three years later he was back at Oxford, and from 1876 to 1878 he kept his terms. During this period he spent the Long Vacation each year in South Africa, where his large financial interests were daily increasing in importance. He was a member of the Cape ministry when after a further lapse of years he kept his last term and took his degree. He did not read hard at Oxford and was more than once remonstrated with in the earlier terms for non-attendance at lectures. But he passed his examinations; and though he was never a student in the university sense of the term, he was to the end of his life a keen devourer of books. He kept always a special liking for certain classic authors. Aristotle was the guide whom as a lad he followed in seeking the "highest object" on which to exercise the "highest activity of the soul." Marcus Aurelius was his constant companion. There exists at Groote Schuur a copy of the *Meditations* deeply scored with his marks.

During this Oxford time and to 1881 Rhodes was occupied with the amalgamation of the larger number of the diamond mines of Kimberley with the De Beers Company, an operation which established his position as a practical financier in the business world. To many admirers who shared his views on public questions his connection with the financial world and his practical success were a stumbling block. It was often wished for him that he "had kept himself clear of all that." But this was not the view he took of the matter. His ideals were political and practical. To him the making of money was a necessary preliminary to the realization of his political ideals, and he was proud of his practical ability in this direction. He was a man of simple tastes. His immense fortune was spent in the furtherance of his ideas, and it has been justly said of him that he taught the world a new chapter of the romance of wealth.

In 1881 Mr. Rhodes entered the Cape assembly as one of the two members for Barkly West and kept the seat for life. It was the year of the Majuba settlement. South Africa was convulsed

with questions between the British and the Dutch, and leaders of Dutch opinion at the Cape spoke openly of the formation of a United States of South Africa under its own flag. The British party needed a rallying-ground, when Cecil Rhodes offered to Dutch and British alike the ideal of a South African Federation governing itself within the empire, and extending, by its gradual absorption of native territories, the range of Imperial administration. Local self-government was, in his opinion, the only enduring basis on which the unity of the empire could be built, and throughout his life he was as keen a defender of local rights as he was of Imperial unity. There was a time when his advocacy of the elimination of direct Imperial interference in local affairs caused him to be viewed in certain quarters as a Separatist. Such suspicions were strengthened at a critical moment in the struggle for Home Rule in Ireland by his contributing £10,000 to the funds of the Nationalist party. The subsequent publication of his correspondence on the subject with Mr. Parnell demonstrated, however, that Rhodes's contribution was made strictly subject to the retention of the Irish members at Westminster. He remained of the opinion that the Home Rule movement, wisely treated, would have had a consolidating effect upon the empire.

In South Africa the influence which he acquired over the local independents and over the Dutch vote was subsequently an important factor in enabling him to carry out the scheme of northern expansion which he had fully developed in his own mind at Oxford in 1878. In 1881 the Bechuana territory was a sort of no man's land through which ran the trade routes to the north. It was evident that any power which commanded the trade routes would command the unknown northern territory beyond. The Pretoria Convention of 1881 limited the westward expansion of the Transvaal to a line east of the trade routes; but the irregular overflow into native territories made Rhodes fear that British expansion would be permanently blocked by Dutch occupation. One of his first acts as a member of the Cape assembly was to urge the appointment of a delimitation commission. He served on it in person, and obtained from Mankodoane, who claimed about half of Bechuanaland, a formal cession of his territories to the British government of the Cape. The Cape government refused to accept the offer. In February 1884 a second convention signed in London again defined the western frontier of the Transvaal, Bechuanaland being left outside the republic. With the consent of Great Britain, Germany had occupied, almost at the same time, the territory on the Atlantic coast later known as German South-West Africa. In August 1884 Rhodes was appointed resident deputy commissioner in Bechuanaland, where Boers had ousted the natives from considerable areas and set up the so-called republics of Goshen and Stellaland. An old Dutchman said privately to Rhodes, "This is the key of South Africa." The question at issue was whether Great Britain or the Transvaal was to hold the key. It was a question about which the British public knew and cared nothing. Rhodes made it his business to enlighten them. President Kruger, speaking for the government of the Transvaal, professed to regard the Dutch commandoes as freebooters, whom he was unable to control. Largely as the result of Rhodes's exertions the Warren expedition of 1884–85 was sent out. In the presence of British troops and Rhodes upon the frontier President Kruger withdrew the commandoes without any fighting, and south Bechuanaland became British territory, while a British protectorate was declared over the northern regions up to the 22nd parallel (September 1885).

It was the first round in the long duel between Cecil Rhodes, representative of British interests, and President Kruger, head of the militant Dutch. The score was to Rhodes. The entrance to the interior was secured, but the 22nd parallel was far short of the limits to which Rhodes hoped to see British influence extend, and he feared lest Germany and the Transvaal might together bar his progress. The discovery of gold on the Witwatersrand in 1886, by adding to the wealth and importance of the Transvaal, gave substance to this fear.

The territory north of the 22nd parallel was under Lobengula, chief of the Matabele, a native potentate celebrated alike for his ability and for his despotic character. There were rumours of Dutch and German emissaries at his kraal engaged in persuading him to cede portions of his territory. Portugal also was putting forward shadowy claims to the country. Rhodes conceived the idea of forming a British Chartered Company, which should occupy the territory for trading and mining purposes as far as the Zambezi, and bring the whole under the protection of Great Britain. Rhodes's first emissaries were sent to Lobengula in 1887 and the charter of the British South Africa Company was granted in October 1889. Crossing the Zambezi at the back of the Portuguese settlements, Rhodes obtained permission to extend the territories of the Chartered Company to the southern end of Lake Tanganyika and the British settlements already made in Nyasaland. He hoped to create a connected chain of British possessions which might justify the words, "Africa British from the Cape to Cairo," but the treaty between Great Britain and Germany in 1890, by extending the German sphere of influence to the frontier of the Congo Free State, defeated this hope. But Rhodes did not even then wholly renounce the idea. In 1892 when the question of the retention or abandonment of Uganda hung in the balance at home, he threw all the weight of his influence into the scale of retention, and offered at his own personal expense to connect that territory by telegraph with Salisbury. In 1893, a war with the Matabele added to the British empire about 450,000 square miles of country, of which large portions consist of healthy uplands suitable for white colonization. The pioneer party crossed the frontier at the end of 1889. In six years, though the country had passed through the trial of a war, two native rebellions, and the scourge of rinderpest, it had become Rhodesia, a well-settled province of the British empire, with a white population of some 12,000 persons.

In 1890, Rhodes became prime minister of the Cape. Maintained in power very largely by the Dutch vote, which he spared no pains to conciliate, and having won the confidence of both sections of the colony, he was practically a despot in South Africa. He did much to elevate and to enlarge the field of local politics. He frankly declared and worked for the policy of uniting British and Dutch interests in South Africa; he took a keen interest in local education. He restricted the franchise, introducing an educational test and limiting the vote to men with an income equal to a labourer's wage—thus abolishing, without making any distinction of colour, the abuses of the "blanket" vote.

His native policy was far from being one of simple restriction. He liked the natives; he employed them by thousands in the mining industry, and was successful in dealing with them. The first canon of his native policy was that liquor should be kept from them; the second, that they should be guaranteed the earnings of their labour; the third, that they should be educated in the practical arts of peace. He appreciated the full importance of raising their territorial condition from one of tribal to individual tenure; and while he protested against the uncivilized Kaffir voting on questions of highly civilized white policy, he believed in the principle of self-government in native affairs. Of these views some received practical embodiment in the much-disputed act known as the Glen Grey Act of 1894. In this connection it may also be noted that he was one of the warmest and most convinced supporters of Lovedale, the very successful missionary institution for the education of natives in South Africa.

The position of benevolent despot has obvious drawbacks. In Rhodes's case the dependence which the populations of Cape Colony were led to place on him had its reaction on the public in a demoralizing loss of self-reliance, and for himself it must be admitted that the effect on the character of a man already much disposed to habits of absolutism in thought and action was the reverse of beneficial. Rhodes felt himself to be far stronger than any man in his own surroundings; he knew himself to be actuated by disinterested motives in the aims which he most earnestly desired to reach. He was profoundly impressed by a sense of the shortness of life, and he so far abused his power as to become intolerant of any sort of control or opposition. The inevitable result followed, that though Rhodes did much of great and good work during the six years of his supreme power, he entirely failed during that period to surround himself, as he

might have done, with a circle of able men fit to comprehend and carry on the work to which his own best efforts were directed. To work with him was practically impossible for those who were not willing to accept without demur the yoke of dogmatic authority. He had a few devoted personal friends, who appreciated his aims and were inspired by his example; but he was lacking in regard for individuals, and a great part of his daily life was spent in the company of satellites and instruments, whom he used with cynical unconcern for the furtherance of his ends.

In 1896 the brilliant period of his premiership was brought to an end by the Jameson Raid. Rhodes, as a large mine-owner, was a member of the mining population, and was asked to give his countenance to the rising of the Johannesburgers, although he was also prime minister of the Cape. The subsequent finding of a Cape committee, which he accepted as accurate, was to the effect that "in his capacity as controller of the three great joint-stock companies, the British South Africa Company, the De Beers Consolidated Mines, and the Gold Fields of South Africa, he directed and controlled the combination which rendered such a proceeding as the Jameson Raid possible." He gave money, arms and influence to the movement; and he allowed Dr. Jameson, who was then administrator of the British South Africa Company in Rhodesia, to move an armed force of some 500 men upon the frontier. A cipher correspondence, seized and published by the Boers, left no doubt as to Rhodes's share in the preparation for the Raid. Subsequent inquiries held by committees of the Cape parliament and of the British House of Commons acquitted him of responsibility for Dr. Jameson's final movement, but both committees found that he had acted in a manner which was inconsistent with his duty as prime minister of the Cape and managing director of the British South Africa Company.

He made no concealment of his own share in the catastrophe; he took full responsibility for what had been done by subordinates, and accepted the consequences which ensued. He resigned his premiership of the Cape (January 1896); and turned his attention to the development of Rhodesia. His design was to live in the country, and to give all the stimulus of his own presence and encouragement to the development of its resources. The Matabele rebellion of March 1896 intervened and in June Imperial troops were sent up and drove the natives to a practically impregnable position in the Matoppo Hills. The prospect before the British was one of continued war with a renewal of a costly campaign in the following spring. Rhodes conceived the idea that he might effect single-handed the pacification which military skill had failed to compel. To succeed, it was essential that he should trust and be trusted. He moved his tent away from the troops to the base of the Matoppo Hills, and lay there quietly for six weeks, in the power of the enemy if they had chosen to attack. Word was circulated among the natives that he had come alone and undefended to hear their side of the case. A council was held by them in the very depths of the hills, where no armed force could touch them. He was invited to attend it. It was a case of staking his life on trust. He displayed no hesitation, but mounted and rode unarmed with the messenger. Three friends rode with him. They met the assembled chiefs who laid the native grievances before them. At the end of a long discussion Rhodes, having exacted such concessions as he thought fit, asked the question, "Now, for the future is it peace or is it war?" And the chiefs, laying down their sticks as a symbol of surrendered arms, declared, "It is peace." Rhodes, riding away, characterized the scene as one of those "which make life worth living."

His life was drawing towards its end. He had still a few years before him, however, and he devoted them with success to the development of the country which bore his name. The railroad was now brought to Bulawayo, and arrangements were made for carrying the line on in sections as far as the south end of Lake Tanganyika, a construction which was part of his pet scheme for connecting the Cape by a British line of communication with Cairo. He also concluded arrangements for carrying a telegraphic land line through to Egypt. The mineral development of the country also was fairly started. But the federal union of South Africa, the aim towards which he had always worked as the secure basis of the extension of British rule in the southern half of the continent, was not for him to see. The South African War broke out in 1899. Rhodes took his part at Kimberley in sustaining the hardships of a siege; but his health was broken, and though he lived to see victory practically assured to British arms, peace had not been concluded when, on March 26, 1902, he died at Muizenberg, near Cape Town.

His life's work did not end actually with his death. He left behind him a will in which he left the bulk of his vast wealth for the purpose of founding scholarships at Oxford of the value each of £300 a year, to be held by students from every important British colony, and from every State and Territory of the United States of America. The sum so bequeathed was very large; but it was not for the munificence of the legacy that the will was received with acclamation throughout the civilized world: it was for the striking manifestation of faith which it embodied in the principles that make for the enlightenment and peace and union of mankind, and for the fine constancy of Rhodes's conviction that the British Empire, which he had been proud to serve, was among the greatest of organized forces uniting for universal good. A codicil, signed during the last days of his life, gave evidence of some enlargement of his views as to the association of races necessary in order to secure the peace of the world, and added a certain number of scholarships to be held at the disposal of German students.

The publication of the will silenced Mr. Rhodes's detractors and converted many of his critics. It set a seal upon his completed life, and his name passed at once to the place which it is probably destined to take in history, as one of the makers of the British Empire.

See the *Life* by Sir Lewis Michell (2 vols., London, 1910); Sir T. E. Fuller, *Cecil John Rhodes: A Monograph and a Reminiscence* (London, 1910), "Vindex," *Cecil Rhodes: His Political Life and Speeches* (London, 1900); R. Jourdan, *Cecil Rhodes's Private Life* (1911); also: "Imperialist," *Cecil Rhodes*, with a chapter by Sir L. Starr Jameson (1897); E. T. Cook, *Rights and Wrongs of the Transvaal War* (1902); Sir Charles Dilke, *Problems of Greater Britain* (1890); Scholtz & Hornbeck, *Oxford and the Rhodes Scholarships* (1907); A. F. B. Williams, *Life of Rhodes* (1921); T. G. McDonald, *Life of Rhodes* (1927). (F. L. L.; X.)

RHODES, JAMES FORD (1848–1927), American historian, was born in Cleveland, O., on May 1, 1848. He studied at New York university, at the University of Chicago, and at the Collège de France in 1867–68, and in 1868 served as occasional Paris correspondent to the Chicago *Times*. He then took a course in metallurgy in the School of Mines, at Berlin; subsequently inspected iron and steel works in western Germany and in Great Britain; and in 1870 joined his father in the iron, steel and coal business in Cleveland, becoming a member of the firm in 1874. He retired from business with an ample fortune in 1885, and after two years devoted to general reading and travel he began his *History of the United States from the Compromise of 1850*, which was published in eight volumes in 1893–1917 (rev. ed. 1920). In 1909 he published a volume of *Historical Essays;* in 1913, *Lectures on the American Civil War;* in 1917, *History of the Civil War;* and in 1922, *The McKinley and Roosevelt Administration 1897–1909*. The merit of his work earned him numerous honorary degrees in England and America. He died in Brookline, Mass., on Jan. 22, 1927.

See C. F. Adams, *Some Phases of the Civil War* (Cambridge, Mass., 1905) an appreciation and criticism of Rhodes's history of this period; J. R. Lynch, *Some Historical Errors of James Ford Rhodes* (Boston, 1922); A. W. Lowell, "James Ford Rhodes," *Mass. Hist. Soc. Proc. 1926–27*, vol. lx., p. 122–128 (Boston, 1927), and J. T. Morse, "Memoir of James Ford Rhodes," ib., p. 178–192.

RHODES, the most easterly island of the Aegean sea, about 10 m. S. of Cape Alypo in Asia Minor (length about 45 m. from north-east to south-west, greatest breadth 22 m., area nearly 424 sq.m.). It was taken by Italy from the Turks in 1912 and is now capital of the administration of Dodecanese (*q.v.*). The population of the island is about 32,000.

The island is diversified in its surface and is traversed from north to south by an elevated mountain range, the highest point of which is called Atairo (anc. *Atabyris* or *Atabyrium*) (4,560 ft.).

It commands a view of the elevated coast of Asia Minor towards the north, and of the archipelago, studded with its numerous islands, on the north-west; while on the south-west is seen Mount Ida in Crete, often veiled in clouds, and on the south and south-east the vast expanse of waters which wash the African shore. The rest of the island is occupied in great part by ranges of moderately elevated hills, on which are found extensive woods of ancient pines, planted by the hand of nature. These forests were formerly very thick, but they were subsequently greatly thinned by the Turks, who cut them down and took no care to plant others in their place. Beneath these hills the surface of the island falls lower, and several hills in the form of amphitheatres extend their bases as far as the sea, forming a series of beautiful pictures.

Rhodes has been famed at all times for its delightful climate. The winds blow from the west, often with violence, for nine months in the year; at other times, from the north, moderating the summer heats, except during July and August, when hot winds blow from the mainland.

Rhodes, in addition to its fine climate, is blessed with a fertile soil, and produces a variety of the finest fruits and vegetables. Around the villages are extensive cultivated fields and orchards containing fig, pomegranate and orange trees. On the sloping hills carob trees, and others, both useful and agreeable, still grow abundantly; the vine also holds its place, and produces a species of wine which was highly valued by the ancients, though it seems to have degenerated greatly in modern times; a strong red wine is still exported. The valleys afford rich pastures, and the plains produce every species of grain.

Under Turkish rule Rhodes was a distributing centre for European manufactures to the neighbouring islands and mainland, receiving cattle, foodstuffs and other produce in return. Under Italian rule its commercial position has changed and is still uncertain. Italian, French and Greek steamships call frequently, and tourists are becoming more numerous.

The only town is the capital, Rhodes, at the north-east extremity, rising from the sea in the form of an amphitheatre, surrounded with walls and towers and defended by a moated castle. These are the work of the Knights of St. John, almost unimpaired. But few traces remain of the splendour of the ancient city, with its regular streets, well-ordered plan and numerous public buildings. The modern city of Rhodes is in general the work of the Knights of St. John and has altogether a mediaeval aspect. The picturesque fortifications also by which the city is surrounded remain almost unaltered as they were in the fifteenth century. Principal buildings are the church of St. John, now the principal mosque; the hospital, transformed into a museum; the palace of the grand master; and the senate-house. The picturesque Street of the Knights is perfectly straight, formed of old houses, on which remain armorial bearings of members of the order, including those of royal and noble houses of Europe.

Relics of classical antiquity, inscribed altars, bases of statues and architectural fragments are found in court-yards and gardens in the suburbs, the whole of which were within the limits of the ancient city. The foundations also of the moles between the harbours are of Hellenic work, though the superstructures were erected by the Knights.

Rhodes has two harbours. The lesser lies towards the east, and admits cargo steamers, which can also anchor outside in fair weather. The larger is silted and only admits small craft. The two harbours are separated by a mole and at the eastern entrance is the fort of St. Elmo, with a lighthouse.

History.—Archaeological remains of the Late Minoan age show that the early Aegean culture maintained itself in Rhodes comparatively unimpaired until the historic period. Legend also peopled primitive Rhodes with skilful workers in metal, the "Telchines," and with bold navigators, "Children of the Sun." In Homeric legend there was already a Heracleid settlement, and in historic times Rhodes was occupied by a Dorian population, mainly from Argos and subsequent to the "Dorian invasion" of Greece. The three Homeric cities refounded by these settlers—Lindus, Ialysus and Camirus—belonged to the "League of Six Cities," by which Dorian colonists in Asia Minor protected themselves against the neighbouring mainland. The early history of these towns records brisk commercial expansion and active colonization, illustrated by the rich tombs of Camirus. Rhodian colonies extended not only eastward along the southern coast of Asia Minor, but also to the westernmost parts of the Greek world. Examples are Phaselis in Lycia, Soli in Cilicia, Salapia on the east Italian coast, Gela in Sicily, the Lipari islands, and Rhoda in north-east Spain. In home waters the Rhodians dominated Carpathos and other islands.

The history of Rhodes during the Persian wars is quite obscure. In the 5th century B.C. the three cities were enrolled in the Delian League, and were democracies. In 412 the island revolted from Athens and became the headquarters of the Peloponnesian fleet. Four years later the inhabitants concentrated in the newly founded city of Rhodes, laid out on an exceptionally fine site according to a scientific plan by the architect Hippodamus of Miletus. This soon rose to considerable importance and attracted much Aegean and Levantine commerce which had hitherto been in Athenian hands. In the 4th century B.C. political development was arrested by constant struggles between oligarchs and democrats, who in turn brought the city under the control of Sparta (412–395, 391–378), of Athens (395–391, 378–357), and of the Carian dynasty of Mausolus (357–340). About 340 it was conquered for the Persian king by his Rhodian admiral, Mentor. In 332 it submitted to Alexander the Great, but on his death, the people expelled the Macedonian garrison, and henceforth not only maintained their independence but acquired great political influence. The expansion of Levantine trade in the Hellenistic age brought especial profit to Rhodes, whose standard of coinage and code of maritime law became widely accepted in the Mediterranean. Under modified democracy, in which the six *πρυτάνεις* found a powerful executive, the city long enjoyed a good administration. In foreign politics it prudently avoided the ambitious schemes of Hellenistic monarchs, but gained prestige by energetic interference against all who threatened the balance of power or the security of the seas. Chief incidents are a memorable siege by Demetrius Poliorcetes in 304, who sought in vain to force the city into active alliance with King Antigonus; a severe earthquake in 227, the damages of which all Hellenistic States contributed to repair, because they could not afford to see the island ruined; some vigorous campaigns against Byzantine, Pergamene and Pontic kings, who threatened the Black sea trade route (220 *sqq.*), and against the pirates of Crete. In accordance with their settled policy the Rhodians supported the Romans when these made war upon Philip V. of Macedon and Antiochus III. of Syria on behalf of the minor Greek States. During the Third Macedonian War a false step deprived them of possessions in Lycia, and partially diverted their trade to Delos (167). Nevertheless, during the two Mithridatic wars they remained loyal to Rome, and in 88 successfully stood a siege. The Rhodian navy did further good service for Pompey in his campaigns against the pirates and against Julius Caesar. But in 43 C. Cassius besieged and ruthlessly plundered the people for refusing to submit to his exactions, and though Rhodes continued a free town for another century, its commercial prosperity was crippled and extensive earthquakes after A.D. 155 completed its ruin.

In the days of its greatest power Rhodes became famous as a centre of pictorial and plastic art; it had a school of eclectic oratory whose chief representative was Apollonius Molon, the teacher of Cicero; it was the birthplace of the Stoic philosopher-Panaetius; the home of the poet Apollonius Rhodius and the historian Posidonius. Protogenes embellished the city with his paintings, and Chares of Lindus with the celebrated colossal statue of the sun-god, which was 105 ft. high. The colossus stood for 56 years, till an earthquake prostrated it in 224 B.C. Its enormous fragments continued to excite wonder in the time of Pliny, and were not removed till A.D. 656, when Rhodes was conquered by the Saracens, who sold the remains for old metal to a dealer, who employed 900 camels to carry them away. The notion that the colossus once stood astride over the entrance to the harbour is a mediaeval fiction. During the later Roman empire Rhodes was the capital of the "province of the islands." Its history under the Byzantine rule is uneventful, but for some temporary occupations by the

Saracens (653–658, 717–718), and the gradual encroachment of Venetian traders since 1082. In the 13th century the island stood as a rule under the control of Italian adventurers, who were, however, at times compelled to acknowledge the overlordship of the emperors of Nicaea, and failed to protect it against the depredations of Turkish corsairs. In 1309 it was conquered by the Knights Hospitallers of St. John of Jerusalem at the instigation of the pope and the Genoese, and converted into a great fortress for the protection of the southern seas against the Turks. Under their mild and just rule both the native Greeks and the Italian residents were able to carry on a brisk trade. But the piratical acts of these traders, in which the knights themselves sometimes joined, and the strategic position of the island between Constantinople and the Levant, necessitated its reduction by the Ottoman sultans. A siege in 1480 by Mohammed II. led to the repulse of the Turks with severe losses; after a second investment, during which Sultan Suleiman I. is said to have lost 90,000 men out of a force of 200,000, the knights evacuated Rhodes under an honourable capitulation (1522). The population henceforth dwindled in consequence of pestilence and emigration, and although the island recovered somewhat in the 18th century under a comparatively lenient rule, it was brought to a very low ebb owing to the severity of its governor during the Greek revolution. The sites of Lindus, Ialysus and Camirus, which in the most ancient times were the principal towns of the island, are clearly marked, and the first of the three is still occupied by a small town with a mediaeval castle, both of them dating from the time of the knights, though the castle occupies the site of the ancient acropolis, of which considerable remains are still visible. There are no ruins of any importance on the site of either Ialysus or Camirus, but excavations at both places have produced valuable and interesting results in the way of ancient vases and other antiquities, which are now in the British Museum and in the local collection at Rhodes. In mediaeval times its pottery, a lustre ware at first imitated from Persian, developed into an independent style of fine colouring and rich variety of design. Since the Italian occupation in 1912 a considerable modern quarter on European lines has grown up west of the city of the knights; carriage roads are being constructed and the harbours improved.

BIBLIOGRAPHY.—*See* Pindar, *7th Olympian Ode;* Diodorus, v. 55–59, xiii.–xx. *passim;* Polybius, iv. 46–52, v. 88–90, xvi. 2–9, xxvii.–xxix. *passim;* A. Berg, *Die Insel Rhodos* (1862); C. Torr, *Rhodes in Ancient Times* (Cambridge, 1885), *Rhodes in Modern Times* (Cambridge, 1887); C. Schumacher, *De republica Rhodiorum commentatio* (Heidelberg, 1886); H. van Gelder, *Geschichte der alten Rhodier* (Hague, 1900); B. V. Head, *Historia Numorum* (Oxford, 1887), pp. 539–542; Baron de Balabre, *Rhodes of the Knights* (1909); K. F. Kinch, *Fouilles de Vroulia* (1914); A. Gabriel, *La Cité de Rhodes* (1921).

RHODESIA. The name covers the territory extending from the Transvaal border northward to the boundaries of the Belgian Congo and of Tanganyika Territory. It is bounded on the east by Portuguese East Africa, Nyasaland and the Tanganyika Territory, and on the west by Belgian Congo, Portuguese West Africa and Bechuanaland. The region north of the Zambesi is Northern Rhodesia, a British territory; south of the Zambesi lies Southern Rhodesia, a British crown colony, which includes the areas of Matabeleland and Mashonaland. In this article Northern Rhodesia and Southern Rhodesia are treated separately from the geographical and administrative point of view. The historical section deals with both areas.

NORTHERN RHODESIA

Northern Rhodesia formerly consisted of two distinct provinces, North-Western Rhodesia and North-Eastern Rhodesia. The combined area is 291,000 sq. miles. The country includes much of the land lying between the Zambezi and the Congo. It is bounded on the north and north-east by the Belgian Congo, Lake Tanganyika and Tanganyika Territory, on the east and south-east by Nyasaland and Portuguese East Africa, on the south-east and south by Southern Rhodesia, on the west by Angola, and on the north-west and north by the Belgian Congo.

Topography.—Much of the country consists of high plateau, the Congo-Zambezi watershed rising, in places, to 5,000 feet. The highest land forms a ridge known as the Muchinga mountains, running north-east to south-west, to the south-east of Lake Bangweulu. Still higher land occurs in the Tanganyika District near the southern end of Lake Tanganyika. In the valleys of the Lower Zambezi, the Luangwa and the Kafue, the altitude falls below 3,000 feet. Within the territory lie Lake Bangweulu (*q.v.*) and half of Lake Mweru (*q.v.*).

Flora and Fauna.—A large part of the region is covered with tropical or sub-tropical savannah. The tall tropical forests of the West African type are poorly represented, and occur chiefly near Lake Tanganyika. The country is fairly well provided with big game. Elephants are to be found in nearly all localities; hippopotami occur in all the larger rivers; the black rhinoceros and giraffe must be included, and large herds of eland roan antelope, hartebeeste and zebra are to be seen. A list of all the animals would be a long one, but it would include sable antelope, waterbuck, lechwe, sitatunga, impala, reed buck, bush buck, oribi, duiker, etc. Lions are not uncommon. Game reserves have been established, and some of the rarer animals are protected.

Government.—Northern Rhodesia is administered by a governor, assisted by an executive council of five official members For its constitution *see* the section *Rhodesian History.*

Population.—The European population in December 1925 was 4,624, and the native population about a million. The natives belong to over 50 different tribes, among the chief of which, numerically, are the Awemba, Achewa, Angoni, Asenga, Awisa, Alala, Batoka, Barozi, Baila, Baleaye, Bakaonde, etc.

Communications.—Over much of the country, owing to the occurrence of tsetse fly, transport is done by human porters. On parts of the Zambezi and Luapula, and in the swamps about Lake Bangweulu, native canoes are used. The country is traversed by a railway, linking with Southern Rhodesia and South Africa, and running through Livingstone and Broken Hill to Elisabethville and the Belgian Congo. Roads are few, but a motor road runs from Fort James on to Blantyre.

Occupations.—The economic development by Europeans is, of course, dependent on transport facilities. Within 30m. of the railway in the Batoka and Luangwa districts, farms have been taken up, and maize is the chief crop, though tobacco, cotton, fibre, etc., are also grown. Cattle ranching appears to be successful near the Kafue and in the Kalomo area. Tobacco cultivation is being developed about Fort Jameson, and its extension will be helped by railway development in Nyasaland. A few farms have also been alienated in the Tanganyika district, where cattle thrive, but there is, as yet, no outlet for the produce of this area, until development in Tanganyika Territory provides a way from the lake to Dar-es-Salaam. Hopes are entertained for the development of the northern part of the Kasempa District, which will have a market at Elisabethville, and will receive an impetus on the completion of the Lobito Bay railway. Mining is carried on at Broken Hill, where lead and zinc deposits occur, and at the Bwana M'kuba copper mine. The total value of the mineral production in 1926 was £111,560.

Education and Health.—There are six Government schools of primary grade, three farm schools, and one aided school for Europeans. There is a Government school for natives at Mongu, and many mission schools. In the Lusaka area Afrikaans is taught. Malaria, blackwater fever and dysentery are not uncommon, and sleeping sickness occurs in the Luangwa valley.

Customs.—The country is divided into two parts. (1) The "Congo Basin" comprises that part of North-Eastern Rhodesia lying to the north-west of the Muchinga mountains. It is included in the conventional zone of the Congo, and no preference may be given to the imported products of any country. The duty on imports does not exceed 10% ad valorem. (2) The "Zambesi Basin" is a party to the South African customs agreement. South African produce, except spirits and manufactured tobacco, is admitted free of duty. Goods may be imported in bond through South Africa or Southern Rhodesia, which allows British goods to benefit by lower import duties than those entering the Union of South Africa.

See the annual reports on *Northern Rhodesia* issued by the British Colonial office. (R. U. S.)

SOUTHERN RHODESIA

Southern Rhodesia, separated from Northern Rhodesia by the Zambezi river, is bounded on the north-east and east by Portuguese East Africa, on the south by the Transvaal and on the south-west and west by the Bechuanaland Protectorate. It consists of Matabeleland and Mashonaland and covers approximately 152,000 sq. miles. The country lies between 15° 36′ and 22° 25′ S. and 25° 14′ and 33° 4′ E.

Physical Features.—Southen Rhodesia forms part of the great South African plateau. The highest part runs from south-west to north-east and forms a broad watershed between the basin of the Zambezi and the basins of the Limpopo and Sabi. It is along this central axis that the railway runs from Plumtree, through Bulawayo to Salisbury. In this central area the elevation ranges from above 4,000 to over 5,000 feet. On each side the elevation decreases, falling to below 2,000 about the Zambezi, and to below 1,000 ft. in the south-east. About 24% of the total area lies above 4,000 feet. The surface consists for the most part of gently undulating plains, diversified by steep-sided hill ranges and isolated kopjes. The highest point occurs 48 m. N. of Umtali in Inyangeni Mountain, 8,250 feet. Here a definite mountain range runs north and south and forms the eastern border of the country.

Climate.—The temperature varies of course with the latitude, altitude and distance from the sea. On the whole the considerable altitude partly compensates for the low latitude. Though the days are hot throughout the year the nights may frequently be cool, and frost is liable to occur during June, July and August. From the middle of August the temperature increases to its maximum in October, when the mean maximum is 85·2, taking the country as a whole. Rains and cloud usually appear about October and bring a little coolness. Sometimes the rains are late and the high temperatures continue to be rather trying during November and December. The thermometer may rise to over 100° even on the high veld. During the late spring heat the relative humidity of the atmosphere may fall below 20% in the middle of the day, and at 9 A.M. is often between 30 and 40%. The rainy season may be said to last from October to March.

Vegetation.—About two-thirds of the country is covered with trees and shrubs. There are comparatively few open stretches. The prevailing plant association is savannah, forming park-like territory. At favourable spots on the mountainous, eastern border, close evergreen forests occur in patches, some of the trees attaining a height of 200 feet. On the upper slopes Lussonia umbellifera and Eugenia spp. are dominant, and here they grow to heights up to 80 feet. The so-called Rhodesian teak (native Igusi: *Baikiaea plurijuga*) is about 50% harder than real teak. From the bark of the baobab the natives obtain a fine fibre which they use for making nets.

Fauna. (*See* also SOUTH AFRICA, UNION OF.)—The country is rich in antelopes, the most common species being the duiker, the stembok and the rietbok. Other herbivorous animals are the buffalo, giraffe, zebra, elephant, rhinoceros and hippopotamus. The carnivora include the lion, leopard, cheetah and various wild cats. Crocodiles occur in the rivers. Beetles, butterflies and moths abound. White ants (termites) and locusts are troublesome. Among the largest of the birds are ostriches, secretary birds, paauws, korhaans, cranes, storks, vultures and eagles. Guinea fowl, partridge, duck, geese and teal are shot. Many of the small birds have brilliant plumage, the most distinguished being what is known as the blue jay, with a brilliant iridescent light blue colour. Good shooting is to be had, but the following are royal game, and so are protected: Eland, elephant, giraffe, gemsbok, hippopotamus, inyala, ostrich, rhinoceros, springbuck and zebra.

Population.—In 1926 the population consisted of 39,174 Europeans, 834,473 natives, and about 3,500 Asiatic and coloured people. The natives include Amandabele, Amatshangana, Basuto and numerous tribes who are often grouped together as "Mashona." (*See* separate articles.) Ninety-three per cent of the white population speaks English. A certain amount of Afrikaans, however, is spoken in the country districts.

Towns and Communications.—Salisbury and Bulawayo are described in separate articles. Umtali, which is the centre of a gold mining area, has a white population of 1,964 and a racecourse. Other towns are Gwelo, Enkeldoorn, Melsetter, and Hartley.

The railways are operated by a railway commission acting for the two Rhodesias and Bechuanaland (Railway Act 1926). The colony is well served, and is connected with Beira, the nearest port, the Belgian Congo and the Union of South Africa. There is through communication by the Rhodesian system from Capetown to the Congo border and, via Bulawayo and Salisbury, to Beira on the Indian Ocean. The lines, as far as possible, follow the watersheds. The standard gauge is 3 ft. 6 inches.

Agriculture and Pastoralism.—Farming exists in several forms, from ranching to tobacco-growing. Mixed farming is becoming more common, and dairying is practised on the smaller farms near the towns and mines. Maize is the chief crop. The acreage under crops (1925) was maize, 232,947; tobacco, 8,441; winter wheat, 4,526; ground-nuts, 5,067; cotton, 62,858. Citrus fruit for export can only be grown on land that can be irrigated during the winter months. Irrigation is still in its infancy, but several large citrus orchards are already producing. and in 1923, 44,760 boxes of oranges were exported. Ranching is favoured by the climate, which allows the cattle to run out on the veld throughout the winter and to find sufficient food. There are about two million cattle in the country, more than half being owned by Europeans, generally in herds of from 600 to 1,000. They are grass fattened for market, or are sent on to agricultural farms for the final preparation.

Mining.—Gold is still the chief mineral produced in the country. Most of the mines are on the high veld, and are widely distributed. The metal occurs in the ancient schists and in lodes within the margins of the granite. In 1927 the gold output was valued at £2,458,862. In the same year other mineral production included: asbestos, 33,176 tons; coal, 1,001,724 tons; chrome ore, 218,018 tons; and silver, 113,241 oz.

Government.—For the constitution under the letters patent of 1923 *see* RHODESIAN HISTORY below.

Education.—There were 75 primary and eight secondary schools for Europeans in 1925, and in addition a large number of state-aided farm schools. There were 1,297 schools for native and six for coloured children.

RHODESIAN HISTORY

The Ancient Gold Field.—The regions of South-Central Africa, now known as Rhodesia (North and South) include what was probably the greatest gold field of the ancient world. The remains of the mines, sunk to a vertical depth of sometimes 150ft. in gold-bearing rock, are found in an area 500 miles long by 400 broad; and it is estimated by the mining engineers of to-day that, allowing for imperfect methods of extraction, gold of a value equivalent to at least £75,000,000 must have been won from these pre-historic workings. Even so, enough was left to make this very ancient gold field one of the chief resources of the youngest self-governing colony of the British Empire; and eleven-twelfths of the 129,000 claims registered in 1910 were pegged out on the site of mines of varying antiquity. In this gold-bearing area numbers of non-indigenous plants, fruits, and trees of Indian habitat are found, and there may have been a Hindu colonisation and supremacy here as there was in Java in the centuries preceding the Mohammedan conquest of that island. Another solution is that the gold area was mined by the Sabaeo-Phoenicians of Yemen with Indian labour, and that while the Ophir of King Solomon was the south-west corner of Arabia, most of the gold of this Ophir[1] (and of the Graeco-Roman world) came from South-East Africa. A glance at the map will show how easily the Sabaeans could reach by land and sea the east coast of Africa. In addition to the ancient gold workings there are two other classes of remains which reveal something of the early history of the country. As many as 426 Bushman rock paintings have been found in caves. They are generally hunting scenes and animals, but nine of them depict the Victoria Falls. Until the discovery at Broken

[1]The word "ophir," like "tharshish," is a generic term indicating any conspicuous source of natural products or merchandise.

hill in 1920 of the skull of what is thought to be an extinct species of man (Homo rhodesiensis), comparable to the Neanderthal species of Europe which perished at the close of the last glacial period, the Bushmen were taken to be the earliest inhabitants. This discovery (the actual skull is in the British Museum; a plaster cast of it is in the museum at Bulawayo) in conjunction with the prevalence of palaeolithic hand-axes and other implements similar to those of the Neanderthal men in Europe, suggests that the country was peopled by this extinct species of man thousands of years before the era of the Bushmen (?1000 B.C.). The other class of remains consists of the ruined stone buildings, at least 400 in number, of which the Great Zimbabwe is the most remarkable. Some hold that, while these ruins are of varying periods, ancient, mediaeval, and comparatively recent, the oldest must be associated with the Asiatic rock-miners. Others believe that they are exclusively mediaeval, or post-mediaeval.

Monomotapa.—The gold area of South-Central Africa emerges as the Bantu kingdom of Monomotapa with the capture of the East Coast ports from the Arabians by the Portuguese in A.D. 1500–20. At that time the fertile and temperate uplands which lay inland behind the fever-stricken coast lands were peopled by industrial Bantu, who, migrating from the north many centuries before, had perhaps mingled with, and absorbed, a decadent remnant of the Sabaean, or Indian, or Persian, gold-mining population of the Graeco-Roman era. The ancient rock-mining had been long abandoned, and the gold was won by river-sand washing and such rude methods of quartz crushing as were known to the Bantu. The paramount chief was styled grandiloquently the Monomotapa, or Lord of All; and the territory of the dynasty is shown on the 16th and 17th century maps as Monomotapae Imperium. Although the Portuguese desired from the first to obtain possession of the gold area, they made no permanent settlements in the interior except where the waterway of the Zambezi gave easy communication from the coast. The missionaries, however, whose reports on the Monomotapa, or Kafir, mission are preserved in the archives of the Propaganda and in the Vatican library at Rome, penetrated to the great chief's "court" and converted him to Christianity. As the result of the relations thus established, the Monomotapa of the day granted, by treaty in 1629, the "gold mines" to the king of Portugal. This acquisition failed to yield even a moderate revenue at the time, but 250 years later it brought the Portuguese a very substantial advantage. For it was this treaty with the cross of the Bantu chief affixed to the words, "Manuza, emperor of Monomotapa," that enabled Portugal to make good her claim to Delagoa bay in the MacMahon arbitration of 1875.

Matabele Conquest.—But possession of the country had passed from the industrial to the military Bantu. In 1837 Moselekatse, chief of the Amandabele (corrupted to Matabele), a military tribe akin to the Zulus, having failed to kill the white men north of the Orange river, was himself driven across the Limpopo by the Boers. There he almost exterminated the light-skinned, industrial Ma-Kalanga population, and established himself and his tribe in the best of their lands—thereafter Matabeleland. Three years later the Mashonas were reduced to slavery and vassalage. They also, like the Ma-Kalanga, were industrial Bantu, living in open villages with land under permanent cultivation, and practising the arts of metal-working, pottery, and weaving; and the supremacy of Moselekatse and his successor Lobengula was maintained over them by the despatch of the Matabele warriors once a year to work indiscriminate murder and robbery throughout their villages.

THE FOUNDING OF RHODESIA

Cecil Rhodes.—The first conception of Rhodesia came to Rhodes at Oxford in 1878. Sir Sidney Shippard, who afterwards succeeded him as commissioner in Bechuanaland, has recalled how, walking in Christchurch meadows, Rhodes and he "discussed and sketched out the whole plan of British advance in South and Central Africa." In 1888, with the prestige of an unexampled financial achievement, vast wealth, and an idealistic temperament that refused to recognize as permanent the hostility either of men or circumstances, Rhodes was ready to give effect in Africa to the thoughts which had first germinated in his mind ten years before at Oxford. There was no time to lose. In 1887 Portugal joined (on paper) Mozambique to Angola by claiming the whole of the interior between them—a claim to which Germany and France assented, but which the British Government at once repudiated. In the same year it was known at the Cape that the Boers were preparing to make a settlement in Mashonaland. This news spurred to action Rhodes, who was then deputy resident commissioner in Bechuanaland. On his motion, but with the sanction of the high commissioner, J. S. Moffat, the British Resident at Bulawayo, made on Feb. 11, 1888, a treaty, under which Lobengula bound himself not to enter into correspondence with any foreign power without the knowledge and consent of the high commissioner. On Oct. 30, again with the high commissioner's sanction, Rochford Maguire and two others obtained from Lobengula, in return for a monthly payment of £100 and a supply of rifles and ammunition, a concession of the right to search for, and work, minerals within his territory. This concession was then transferred to an association which Rhodes had formed, in consideration of the association's undertaking to provide the capital necessary to put it into effect, and to share the net receipts with the concessionaires. On April 30, 1889, the association's proposals for the formation of a company to develop the Bechuanaland Protectorate were submitted to the British Government. The objects of the proposed company were: (1) to extend northwards the railway and telegraph systems; (2) to encourage emigration and colonisation; (3) to promote trade and commerce; and (4) to develop and work mineral and other concessions under the management of one powerful organisation, thereby obviating conflicts and complications between the various interests that had been acquired within those regions, and securing to the native chiefs and their subjects the rights reserved to them under the several concessions.

British South Africa Company.—The Company received its charter on Oct. 29, 1889. Rhodes, as general manager in South Africa, arranged to carry the railway northward from Kimberley, and enrolled a force of 500 police to protect the settlers, who were to be established on the Mashonaland plateau: and nine months later the Company took possession of what an agent of the French Government termed not ineptly "the pick of Central Africa on both sides of the Zambesi." The pioneer expedition of 200 European settlers, 150 African labourers, and the police, broke camp on the Matcloutsie river on June 28, 1890; and, commanded by General Pennefather and guided by Selous, reached Fort Salisbury, a distance of 400 miles through virgin country, on Sept. 12. The cost of the expedition, exclusive of grants of land and mineral rights to the pioneers, was £89,285 10s.; and the occupation was effected "without the loss of a single life, and without the necessity of firing a shot." The Company's police, however, came into collision almost at once with the Portuguese authorities on the eastern border at Massikessi. Further conflict was avoided by the *modus vivendi* of Nov. 11, and the terms of this arrangement were embodied, together with the settlement of the limits of the Portuguese territories east and west, in the Anglo-Portuguese convention of June 11, 1891. Under this instrument, which governs the relations of Rhodesia to Mozambique, Portugal undertook to construct, or allow the construction of, a railway from Beira, the natural port of the interior, to the Rhodesian frontier; to limit the duties upon goods in transit to and from British territory through Mozambique to 3%; and to recognize the Zambezi and Shire rivers as international waterways. A year later, when the first administrator, A. R. Colquhoun, had been succeeded by Dr. (afterwards Sir L. S.) Jameson, the Company's possession was again challenged. In 1891 a Boer trek, 4,000 strong, was organized by Col. Ferreira to effect a settlement in Mashonaland, but was defeated by the firm action of Jameson and Lord Loch, the high commissioner.

The early years of Rhodesia[1]—the name was given to the Company's territories by proclamation of May 3, 1895—were arduous

[1] *i.e.*, Southern Rhodesia (152,000 sq.m.). Northern Rhodesia (290,000 sq.m.) is treated subsequently.

and eventful. The 1,500 settlers, Rhodes told the shareholders at their annual meeting on Nov. 29, 1892, "went to work to find their reefs, but they were removed 1,700 miles from the coast, and their food cost them £70 a ton." To provide means of transport and communication was the first duty of the Company, and Rhodes set about it at once. The work was interrupted three times; by the Matabele war in 1893, by the Jameson Raid and the subsequent native insurrection in 1896, and by the great South African war of 1899–1902. The most serious of these interruptions was the second. On Jan. 6, 1896, Rhodes resigned his premiership of the Cape Colony on account of his complicity in the raid, and went to London to see the colonial secretary (Joseph Chamberlain) and do what he could for Jameson and the other raiders, who were being sent home for trial. While there the news of the native insurrection reached him, and he hastened to Rhodesia, travelling by the Suez Canal to Beira. By the help of the railway then being made he got to Salisbury in time to join the column which set out on April 18 for the relief of Bulawayo, where the settlers had just gone into laager with 10,000 Matabele rebels on the hills around. It was then that, at the risk of his life, in the Matopo hills he won the Matabele indunas to a prompt submission, and drove the railway up from Palapye 229 miles to Bulawayo, in the amazingly short time of five months. The settlers increased in numbers, industries were established, public offices, law-courts, churches, schools and hospitals were built, the administration became more efficient, and by 1905 Rhodesia had "turned the corner." In that year with a gold export of £1,500,000, she took her place among the gold-producing countries of the empire; and in that year the first train steamed slowly across the majestic span of the Victoria Falls bridge. Bulawayo, Gwelo, Salisbury, and Umtali were all connected by rail with each other and with both Beira and Cape Town; and the main trunk line was starting from Livingstone just across the Zambezi, on its way through Northern Rhodesia to join, ten years later, the railways of the Belgian Congo.

Development of Rhodesia.—During the remaining 18 years of the Company's rule (1905–23) the resources of the colony were steadily developed, while, with the increase of European population, the elected minority in the legislative council, introduced in 1899, grew into a majority of 12 to six in 1914. There was no rapid increase of the European population. Between 1904 and 1911 it rose from 12,506 to 23,606; and at the close of the Company's rule it was returned, by the census of 1921, as 33,260. There is a reason for its relatively slow growth. In Rhodesia, as in South Africa, manual labour was provided, broadly speaking, by the 500,000 native Africans already in the country, and there was, therefore, no room for British emigrants of the wage-earning, and most numerous class, from which the North American and Australasian colonies received their great accessions of population in the 19th century. But the character of this European population is correspondingly high. Its proportion of well-educated and well-bred immigrants is unusually large. It is 90% British; and, unlike the Union of South Africa, Rhodesia is free from the bi-lingual incubus, with its double notices and mediums of instruction, and its frequent incitements to social and political dissension. Industry, on the other hand, showed a high rate of progress. Rhodes recognized from the first that the mineral production must be supplemented by the more permanent resources of agriculture and stock-raising. And after his death (1902) the Company, so soon as the economic disturbances caused by the South African war had passed, endeavoured to administer the colony in this, and other respects, on the lines he had laid down. In 1907 Jameson, then prime minister of the Cape Colony, and other directors of the company, visited Rhodesia to investigate the grievances of the settlers and devise measures for increasing production. As the result, the acquisition of agricultural land was made easier and less costly, and government advice and assistance was given to farmers, cattle-ranchers, and planters. In particular the cultivation of tobacco was promoted, and in 1911 the value of the export was £34,810. At the same time the development of the mineral wealth of the country continued, and the gold export of 1909, £2,623,708 in value, placed the colony fourth among the gold-producing countries of the empire. During the World War (1914–18), although Rhodesia contributed its full quota to the British armies, the production of copper and other base-metals, as well as that of maize and chilled meat, was actually increased.

End of the Company's Rule.—With the expiry of the 25 years' term of the Company's charter on Oct. 29, 1914, among other alternative courses, three especially claimed the attention of the settlers. When, in 1908–9, the National Convention met to frame the Union of South Africa, Rhodesian delegates followed the deliberations in the interests of the country, and provision was made in the Imperial Act of 1909 for its subsequent, and voluntary, entry into the Union. That course was open. A second was to support a renewal of the charter, and a third to press for self-government. The development of events under the predominantly Dutch ministry of Gen. Botha made Rhodesians hesitate to join the Union, and in 1913 a movement for responsible government took shape. The process of taking over the administration from the Company, however, presented so many difficulties that 11 out of the 12 members elected to the Legislative Council in March 1914 were pledged to maintain the Company's rule for the time being. A month later the council defined its policy. It affirmed the right of the settlers to self-government and instituted the proceedings necessary to ascertain what sources of revenue the Company would hand over to the administration that succeeded it. In these circumstances the British Government renewed the charter for ten years, with the proviso—in which the Company concurred—that responsible government should be granted before the term expired, if, and when, the settlers could show that they were capable of administering the colony. The directors of the Company were ready to surrender their powers, but they had to consider the interests of the shareholders. One difficult problem was the ownership of the unalienated land. The Company's expenditure on administration had exceeded greatly the revenue collected. The directors looked to the sale of these lands to make good the loss under this head, and with this purpose in view, they had declared formally in 1913 that the unalienated land, as well as its mineral rights and railway interests, was the property of the Company. The Legislative Council, on the other hand, maintained that the land, being vested in the Company merely as "an administrative and public asset," would pass, on the expiry of the Company's administrative powers, to the colony. A privy council judgment (1918) decided that while the unalienated land was the crown property, the Company was entitled to dispose of it until its administrative losses had been recovered. A royal commission—the Cave commission—assessed the amount thus due to the Company at £4,435,000 (Jan. 1921). On the recommendation of the Buxton committee, and in response to a petition from those who were in favour of entering the Union, both a draft constitution conferring responsible government and the specific terms offered by Gen. Smuts for admission to the Union were placed before the Rhodesian electors in 1922. The question was decided on Oct. 27 by a referendum, in which 5,989 electors voted for entry into the Union and 8,774 for responsible government. This majority—all the more significant in view of the generosity of the terms offered by the Union—led to the intervention of the British Government. The Company agreed to accept in satisfaction of its administrative claims in respect of both Northern and Southern Rhodesia the sum of £3,750,000 in lieu of the royal commission assessment of £4,435,000, but it retained its mineral rights and obtained an assurance that these and its interests in the railways would be respected by the governments which replaced it. The £3,750,000 was paid in cash on Oct. 31, 1923. Of this sum, £1,750,000 was the gift of Great Britain, and the remaining £2,000,000, raised by loan, was paid by Southern Rhodesia, which at the same time repaid the British Government a sum of £300,000, advanced to the Company for administrative losses incurred since March 31, 1918, the end of the period covered by the award of the royal commission. In the meantime, on Sept. 12 (1923), the 32nd anniversary of the arrival of the pioneer force at Fort Salisbury, Southern Rhodesia was formally annexed to the British Crown.

UNDER RESPONSIBLE GOVERNMENT

Southern Rhodesia.—Under the new constitution, granted by Letters Patent on Oct. 1, legislation affecting the African population, the unalienated land, the railways, and the mineral rights of the company is subject to disallowance by the Crown, but in other respects Southern Rhodesia was endowed with the institutions of a self-governing oversea British state. A legislature of two chambers was constituted, of which the Legislative Council is composed of the ministry under the presidency of the governor of the Colony, and the Legislative Assembly of 30 members elected in 11 electoral districts. The first general election was held on April 29, 1924, and the first ministry was then formed by Sir Charles Coghlan, who remained in office, as prime minister, until his death in 1927, when he was succeeded by Mr. H. U. Moffat. The franchise is most liberal. Persons possessing the necessary qualifications are admitted to the electorate without distinction of sex or race. The first concern of the colonial government was to augment the European element, and recent immigration returns indicate that their efforts have been successful. In the first nine months of 1927 the unprecedented number of 3,574 immigrants were received; and in the following year the European population, which was returned in the census of May 4, 1926, as 39,174, was estimated to be 50,000. Apart from this, two important questions occupied the ministry. As the result of negotiations with the company and the governments concerned, the administration of the railways in Southern Rhodesia, Northern Rhodesia, and the Bechuanaland protectorate were placed under a railway commission composed of a chairman and three other members. The powers and duties of this body are set out in the Railway Act, 1926. The chairman, who must have a practical experience of railway working, is appointed by the three governments jointly after consultation with the railway companies and with the approval of the Colonial Office, and the three other members respectively by the three governments. The appointment of the Hilton Young commission (*see* below) in 1927 brought into prominence again the question of the amalgamation of the two Rhodesias, which had been raised in 1914. The ministry by requesting that the colony should be included in the scope of the commission, and by public declarations (Oct. 5, 1927), showed its intention to consider favourably any proposals on this head that might come from Northern Rhodesia.

Northern Rhodesia.—The Company's territory north of the Zambezi was inhabited by a relatively sparse population of industrial Bantu, but, unlike the high plateaux south of the river, it was tropical in climate.

Up to 1911 this vast territory of 287,950sq.m., twice as large as Southern Rhodesia, was divided into North-West and North-East Rhodesia. From that year onwards the territory was administered in the form of a single government as Northern Rhodesia. At the time of the amalgamation its European population was 1,434, and the annual value of its imports and exports respectively £127,664 and £128,458. In 1924 the territory was taken over by the British Government; and under the constitution, granted by Order-in-Council of Feb. 20, the colony of Northern Rhodesia is administered by a governor, with an executive council composed of the chief officials, and a legislative council of 14 members, five of whom are non-official and elected. By the census of 1921, the colony then had a European population of 3,634, and an African population of 979,905; and in 1927 the former was estimated to have risen to between 5,000 and 6,000. The first governor, Sir Herbert (then Mr. H. J.) Stanley took office on April 1, 1924. The natives are left as much as possible to the authority of the chiefs, but there is a European magistrate in each of the nine districts into which the colony is divided. The Barotse district, which is a "native reserve," is ruled by the paramount chief, and the council of lesser chiefs, common to the Bantu peoples, has a recognized official status. As, under the terms of transfer, the company retains the mineral royalties and 50% of the land revenues, the Crown administration is placed in a disadvantageous financial position.

Although the colony is under one administration the conditions of North-West and North-East Rhodesia differ materially; 85% of the Europeans and the seat of government are in North-West Rhodesia, in proximity to the railway which, carried from Southern Rhodesia across the Zambezi by the Victoria Falls bridge in 1905, runs northward from Livingstone, the capital, to the Belgian Congo. The European population of North-East Rhodesia, on the other hand, is almost limited to the (approximately) 500 settlers engaged in the tobacco plantations. The separation of the two areas has been emphasized by an almost complete lack of communications—a factor which must continue to operate until the new east to west road from Fort Jameson to the Cape to Cairo railway has been made. As it is, the tobacco production of North-East Rhodesia, to the expansion of which the recent improvement in the finances of the colony is due, is carried 300 miles by motor lorries to railhead at Blantyre in Nyasaland, and thence by rail to be shipped at Beira. While, therefore, circumstances connect North-West Rhodesia with Southern Rhodesia, the outlook of North-East Rhodesia is to Nyasaland and the East. Although the climatic and other conditions of the territory are not unsuitable for European colonisation, the company made little effort to introduce settlers, and, broadly speaking, under its rule the development of Northern Rhodesia was subordinated to the interests of Southern Rhodesia.

Hilton Young Commission.—In these circumstances the appointment of the Hilton Young commission in 1927 was of special importance to the colony. Under the terms of reference Northern Rhodesia was classed officially as a member of the East Coast group of British Colonies. The Commission did not find themselves in complete agreement as to the disposal of the colony, but in their report (Command 3234), published in Feb. 1929, they advised that "in the present state of communications the main interests of Nyasaland and Northern Rhodesia, economic and political, lie not in association with the Eastern African territories but rather with one another and with the self-governing colony of Southern Rhodesia." It recommended, however, that the co-operation which already exists between the northern territories and Nyasaland, Northern Rhodesia and Zanzibar should be continued and through conferences links should be retained. (W. B. W.)

BIBLIOGRAPHY.—Travel and description: D. Livingstone, *Missionary Travels* (1857); K. Mauch, *Reisen im Inneren von Sud-Afrika, 1865-72* (Gotha, 1874); T. Baines, *The Gold Regions of South East Africa* (1877); F. C. Selous, *A Hunter's Wanderings in Africa* (1881); *Travel and Adventure in South East Africa* (1893), *Sunshine and Storm in Rhodesia* (1896); T. Bent, *The Ruined Cities of Mashonaland* (1892); Lord R. Churchill, *Men, Mines, and Animals in S. Africa* (1895); R. N. Hall, *The Ancient Ruins of Rhodesia* (Hall and Neal) (1902); *Prehistoric Rhodesia* (1909); D. Randall-MacIver, *Mediaeval Rhodesia* (1906). Historical Sources: G. M. Theal, *Records of South-Eastern Africa* (1896–1904); A. Wilmot, *Monomotapa* (1896); *Reports* of British South Africa Co. from 1889–92 onwards. For the British official publications *see* the annual *Dominions and Colonial Office List*. For local official publications enquire at office of High Commissioner for Southern Rhodesia. General: S. Mendelssohn, *South African Bibliography* (illus., 1910); and the "Modern bibliography" in *Guide to Rhodesia* (1924). The latter gives full and practical information for tourists and settlers.

RHODES SCHOLARSHIPS. Cecil Rhodes provided by his will for the maintenance at Oxford university of about 200 scholars for a term of three years each. The value of each scholarship is now £400 a year. Thirty-four scholars come each year from the British empire, distributed substantially as follows: One scholar is elected annually from each province or State of Canada, Australia, New Zealand and South Africa; from four specified schools in the Cape Province of South Africa and from the colonies of Newfoundland, Jamaica and Bermuda. Rhodesia elects three scholars each year, and Malta one every third year. Thirty-two scholars are elected annually from among the 48 States of the United States. Five annual scholarships were allotted to Germany, but these were annulled by Parliament in 1916.

In his will Rhodes emphasized the value of such scholarships: (1) In giving "young colonists" breadth of view, instruction in life and manners, and in instilling into their minds the advantages of a united empire; (2) in creating in American students an attachment to the country from which they originally sprang without weakening their sympathy for their own, and so fostering the cause of the union of English-speaking people.

Rhodes believed that his objects would be best attained by bringing together for education at Oxford young men selected for four groups of qualities which he defined as follows: literary and scholastic ability and attainments; qualities of manhood, truth, courage, devotion to duty, sympathy for and protection of the weak, kindliness, unselfishness and fellowship; exhibition during school days of moral force of character and of instincts to lead and to take an interest in his school-mates; fondness for sports.

Method of Selection.—Subject to ratification by the trustees, the nomination of scholars is in the hands of local committees, which are appointed by the trustees, and on which ex-Rhodes scholars sit. Candidates must be citizens of the country, dominion or colony, which they are to represent, with at least five years' domicile, and unmarried; and they must have passed their 19th and not have passed their 25th birthday by Oct. 1 of the year for which they are elected. Candidates are judged on their records and after a personal interview with the selection committee. But, except in certain exceptional cases, candidates are obliged to have attended a recognized, degree-granting college or university for two years at least. At Oxford the scholars are distributed, as Rhodes desired, among all the colleges of the university, as far as possible in accordance with their own wishes, but acceptance of any scholar is determined by the colleges themselves. No college undertakes to accept more than between two and five Rhodes scholars in any one year. The offices of the trust are at 17, Waterloo place, London, S.W.1. The Association of American Rhodes Scholars has headquarters at the Bank of Manhattan, 40 Wall st., New York. (P. K.)

RHODIUM, a metal always found in platinum ores but never in large quantities, was first discovered by Wollaston and announced by him in the memoir disclosing the discovery of palladium (*Phil. Trans.*, 1804). (Symbol Rh, atomic number 45, atomic weight 102·9.) Its name is due to the rose-red colour of its salts (ῥόδον, a rose).

If a platinum ore is treated with aqua regia, most of the osmium, iridium and ruthenium is left undissolved (some rhodium is also left if much is present). The platinum can be nearly all removed from the solution by precipitation with ammonium chloride and, if the acid solution is treated with scrap iron ("footed"), the remaining metals are deposited. If this precipitate is fused with potassium bisulphate the rhodium is all converted into potassium rhodium sulphate which on extraction with water and recrystallization gives the pure salt. Another method is to heat the above metallic precipitate with common salt in a stream of chlorine, when the double sodium rhodium chloride, Na_3RhCl_6, is formed; this is extracted with water and crystallizes with 12 molecules of water in dark red crystals appearing almost black by transmitted light. For other and more complicated methods of extraction, *see* Claus, *T. Prakt. Chem.*, (1843–45); Gibbs, *ibid.* (1861) p. 65, (1865) p. 10.

Rhodium in the massive state is a slightly bluish-white metal having a specific gravity of about 12·1. It fuses at about 1940° C and volatilizes at a somewhat higher temperature. It oxidizes superficially when heated in the air, becoming coated with a film of a blue oxide. It is practically insoluble in either hydrochloric or nitric acid or in aqua regia, but it is attacked by hot concentrated sulphuric acid or on fusion with potassium bisulphate—an unique property amongst the platinum metals; when alloyed with other metals and especially with lead, it is soluble in other strong acids. Fused with nitre and caustic potash it is oxidized to RhO_2. From the commonest commercial salt, sodium rhodium chloride, Na_3RhCl_6, $12H_2O$, other rhodium salts may be readily prepared by precipitating from its solution the yellow hydroxide $Rh(OH)_3$ with an equivalent amount of caustic potash (the hydroxide is soluble in excess), filtering and washing the precipitate, and dissolving it in the desired acid. The hydroxide being a stronger base than that of most of the other metals of this group, rhodium salts, even of organic acids, may easily be prepared by this process.

Four oxides of rhodium are known, Rh_2O, RhO, Rh_2O_3 and RhO_2; of these Rh_2O_3 is of some importance as being the oxide from which ordinary rhodium salts are derived. It is a black, sparingly soluble powder produced by heating the corresponding hydroxide.

Rhodium chloride, $RhCl_3$, can be produced either by heating finely divided rhodium in a stream of chlorine or by dissolving the corresponding hydroxide in hydrochloric acid. The latter process first gives a yellow solution, which on heating assumes a rose-red colour, and on careful evaporation gives a residue of a gummy, deliquescent hydrated chloride. This on further heating loses its water and becomes insoluble. Two new chlorides of rhodium, RhCl and $RhCl_2$, have been prepared by Wöhler and Müller (1926). The simple chloride $RhCl_3$ readily produces double chlorides with the chlorides of the alkali metals having the general formula M_3RhCl_6, xH_2O.

Rhodium sulphate. $Rh_2(SO_4)_3$, $12H_2O$, is formed from the yellow hydroxide by solution in dilute sulphuric acid. The double sulphate $K_6Rh_2(SO_4)_6$, produced by fusing rhodium with potassium bisulphate, is soluble in water and gives rose-coloured crystals on evaporation to dryness. Rhodium sulphate also combines with alkaline sulphates to form true alums isomorphous with ordinary alum. The best known example is potassium rhodium alum, K_2SO_4,$Rh_2(SO_4)_3$,$24H_2O$. (*See* ALUMS.)

Rhodium forms several series of compounds with ammonia: the best known are the roseo, purpureo and luteo compounds which are similar to the corresponding cobalt compounds (*see* COBALT). Technically, little use has been found for rhodium compounds, although it is essential in small amounts in the manufacture of "liquid gold" (*see* GOLD). A rhodium–platinum alloy is in general use as one of the elements in a thermocouple for measuring high temperatures. (F. E. M.)

RHODOCHROSITE, a mineral consisting of manganese carbonate, $MnCO_3$, crystallizing in the rhombohedral system and isomorphous with calcite. It usually occurs as cleavable, compact or botryoidal masses, distinct crystals being somewhat rare; these have the form of the primitive rhombohedron, parallel to the faces of which there are perfect cleavages. The specific gravity varies from 3·45 to 3·60; the hardness is 4. The colour is usually rose-red, but may sometimes be grey to brown. The name rhodochrosite, from the Greek ῥόδο-χρως (rose-coloured), has reference to the characteristic colour of the mineral: manganese-spar and dialogite are synonyms. It is found in mineral veins with ores of silver, lead, copper, etc., or in deposits of manganese ore. The mineral is used in making spiegeleisen and ferromanganese.

RHODODENDRON, a large genus of shrubs and trees belonging to the heath family (Ericaceae). No adequate distinction can be drawn between this genus and *Azalea* (*q.v.*). The rhododendrons are trees or shrubs, never herbs, with simple, evergreen or deciduous leaves, and flowers in terminal clusters surrounded in the bud by bud-scales but not as a rule by true leaves. The flowers are remarkable for the frequent absence or reduced condition of the calyx. The funnel- or bell-shaped corolla, on the other hand, with its five or more lobes, is usually conspicuous, and in some species so much so as to render these plants greatly prized in gardens. The free stamens are usually ten, with slender filaments and anthers opening by pores at the top. The ovary is five- or many-celled, ripening into a long woody pod which splits from top to bottom into a number of valves, liberating a large number of small bran-like seeds.

The species, which exceed 300 in number, are for the most part natives of the mountainous regions of the northern hemisphere, extending as far south as the Malay archipelago and New Guinea, but not hitherto found in South America or Australia; none are natives of Great Britain. They vary greatly in stature, some of the alpine species being mere pygmies with minute leaves and tiny blossoms, while some of the Himalayan species are moderate-sized trees with huge flowers. Some are epiphytal, growing on the branches of other trees, but not deriving their sustenance from them. Several notably handsome species are natives of North America. Among these are the great rhododendron (*R., maximum*), called also great laurel and rose bay, found from Nova Scotia and Ontario and southward to Georgia; the Catawba or Carolina rhododendron or mountain rose bay (*R. catawbiense*), of the high Appalachian mountains; the western rhododendron

(*R. californicum*), found from British Columbia to California, and adopted as the state flower of Washington; and the delicate rhodora (*q.v.*), of the north-eastern States. The great laurel and the mountain rose are widely planted; less frequently *R. minus* and *R. carolinianus*, both small evergreen shrubs with showy flowers, native to the mountains of the south-eastern States, are grown as ornamentals.

The varieties grown in gardens are mostly grafted on the Pontic species (*R. ponticum*) and the North American *R. catawbiense*. The common Pontic variety is excellent for game-covert, from its hardiness, the shelter it affords, and the fact that hares and rabbits rarely eat it. Variety of colour has been infused by crossing or hybridizing the species first named, or their derivatives, with some of the more gorgeously coloured Himalayan-American varieties.

The hardy evergreen kinds are readily propagated by seed, by layers and by grafting. Grafting is resorted to only for the propagation of the rarer and more tender kinds. Loamy soil containing a large quantity of peat or vegetable humus is essential, the roots of all the species investigated being associated with a fungus partner or mycorrhiza (*q.v.*). An excess of lime or chalk in the soil proves fatal to rhododendrons and their allies, sooner or later. The hardy deciduous kinds are valuable for forcing, and withstand cold-storage treatment well.

RHODONITE, a member of the pyroxene group of minerals, consisting of manganese metasilicate, $MnSiO_3$, and crystallizing in the anorthic system. It commonly occurs as cleavable to compact masses with a rose-red colour; hence the name, from the Greek ῥόδον (a rose). Crystals often have a thick tabular habit; there are perfect cleavages parallel to the prism faces. The hardness is 5½–6½, and the specific gravity 3·4–3·68. Rhodonite is liable to alteration, and in certain cases forms the primary source of very important deposits of ores of manganese, mainly in the form of oxides; such are a considerable part of the manganese ores of India, now exploited on a very large scale. In the iron and manganese mines at Pajsberg near Filipstadt and Långban in Vermland, Sweden, small brilliant and translucent crystals ("pajsbergite") and cleavage masses occur.

Rhodonite occurs as large, rough crystals, somewhat resembling pink felspar, with franklinite and zinc ores, in granular limestone at Franklin Furnace in New Jersey.

RHODORA (*Rhododendron canadense*), a beautiful North American flowering shrub of the heath family (Ericaceae), native to bogs and wet hillsides from Newfoundland to Quebec and southward to central New York and Pennsylvania. It grows from 1 to 3 ft. high, with pinkish-purple, two-lipped, somewhat honey-suckle-like flowers, about 1½ in. broad, in terminal clusters, appearing in May or June, with or before the small, oblong, slightly hairy, pale-green leaves are fully open. (*See* RHODODENDRON.)



BY COURTESY OF THE WILD FLOWER PRESERVATION SOCIETY

RHODORA (RHODODENDRON CANADENSE)
A delicate pink flower found in Canada and New England

RHOECUS, a Samian sculptor of the 6th century B.C. He and his son Theodorus were especially noted for their work in bronze. Herodotus says that Rhoecus built the temple of Hera at Samos. In the temple of Artemis at Ephesus was a marble figure of night by Rhoecus. His name has been found on a fragment of a vase which he dedicated to Aphrodite at Naucratis. His sons Theodorus and Telecles made a statue of the Pythian Apollo for the Samians.

RHONDDA, DAVID ALFRED THOMAS, 1ST VISCOUNT, cr. 1918 (1856–1918), British colliery owner and statesman, was born on March 26, 1856, in Aberdare. His father had enriched himself by speculations in coal. Thomas was educated at Clifton College, and Caius College, Cambridge, where he graduated in the mathematical tripos in 1880. Immediately he joined his father in the coal business, into which he threw himself with great energy and ability. His extraordinary commercial gifts, his insight, his foresight and the sympathy which he brought to bear on conditions of life in the mining industry, soon made him a prominent, and eventually the leading, figure in the industrial world of South Wales. His business combinations brought him great wealth, and culminated in the Cambrian supercombine, which produced some 6,000,000 tons of steam coal a year.

Though he had sat as a Liberal for Merthyr Tydvil for 22 years from 1888, and for Cardiff for a few months in 1910, Thomas achieved no political importance till the outbreak of the World War, when he rendered substantial help to Lloyd George, both at the Exchequer and at the Ministry of Munitions by organising British industrial resources. He went to America to complete some war contracts for the Government, and on his return was saved, with his daughter, from the sinking of the "Lusitania." He went back to America almost immediately, and spent seven months there at his own expense, expediting the output of munitions. He was created a baron, as Lord Rhondda, for his services, in Jan. 1916; and took office in Lloyd George's Ministry in the following Dec. as President of the Local Government Board, passing to the Food Controllership in June 1917. There, taking strong steps to put an end to speculation in the necessities of life, he gradually fixed prices and brought supplies under control.

But he will be mainly remembered as the author of the system of compulsory food rationing, which was carried out with absolute fairness and impartiality. In April 1918 he tendered his resignation; but pressure was put upon him to remain. He died on July 3 at Llanwern, Monmouthshire. Just previously he had been created a Viscount. He married Sybil Margaret Haig, a cousin of Lord Haig. Their only child, a daughter (who married Sir Humphrey Mackworth in 1908, and obtained a dissolution of their marriage in 1923), succeeded to the viscounty of Rhondda under a special remainder. In 1921 Lady Rhondda published a *Life* of her father.

RHONDDA, an urban district of Glamorganshire, South Wales, 12 m. long by about 4¾ m. across at its widest part, comprising two main valleys, named after their respective rivers, Rhondda Fawr and Rhondda Fach. The valleys are deeply incised in the coal measures of the South Wales geological basin and their lateral boundaries are formed by hills varying from 560 ft. near Trehafod to 1,340 ft. on the north-east of Maerdy in the Rhondda Fach and 1,742 ft. on the south-west of Treherbert in the main valley. The upper end of the latter valley culminates in Carn Moesen (1,950 feet). The two valleys are separated by the ridge of Cefn-rhondda, which ranges from 600 ft. above Porth to 1,690 ft. near the upper end of the district. There are tributary valleys of which Cwmparc, Clydach vale, and Cymmer are the chief.

The Rhondda valley is the centre of the eastern division of the South Wales coalfield. The development of the Rhondda coalfield was later than that of the northern sections of the South Wales area, where coal was worked early for iron smelting. It was the unsurpassed steam-raising properties of the Rhondda coal that made the region famous after the period 1860–65. With the great demands made for steam-coal by the ever increasing railway traffic, steam-ship service and navies of the last half of the 19th century, the Rhondda from being a purely pastoral upland region was transformed into a densely-populated industrial valley. No thought was given to the elongated straggling settlements that grew up or to the development of by-products to ensure employment in the region when the coal exporting phase would pass away. Furthermore, in the elongated settlements (the whole of the Rhondda valleys from Blaen-rhondda and Maerdy to Porth and Pontypridd is now one long winding street) the absence of central buildings, public squares, and shopping centres has counted against the development of a strong civic sense: a feature that has become more acute in an industrial region such as this, with no tradition of previous settlement and with a population almost all engaged on one kind of work for masters living usually far away.

The population was estimated at 23,950 in 1871, but it reached 55,632 in 1881, and 113,735 in 1901. In 1931 it reached 141,344. Area of Urban district 23,886 acres. In 1877, the ancient parish

of Ystradyfodwg (excepting the township of Rhigos) was formed into an urban district. In 1879, portions of the parishes of Llanwonno and Llantrisant were added to the urban area, the whole being consolidated in 1894 into one civil parish. In 1897, the name of the urban district was changed into Rhondda.

With the development of the coal exporting trade a number of small railway companies connected these valleys with Cardiff on the one hand and via the Blaengwynfi tunnel with Port Talbot and Swansea on the other hand. All these smaller lines are now amalgamated with the G.W. railway. The lack of demand for steam coal, trade depression, and changes in the world-market have seriously affected the region since 1921. Depopulation, unemployment and poverty are very marked.

RHÔNE, a department of south-eastern France, formed in 1793 from the eastern portion of the department of Rhône-et-Loire, and comprising the old districts of Beaujolais, Lyonnais, Franc-Lyonnais, Forez and a small portion of Dauphiné. Pop. (1926), 993,915. Area, 1,104 sq. miles. Rhône is bounded north by the department of Saône-et-Loire, east by Ain and Isère and south and west by Loire. The Saône and the Rhône form its natural boundary to the east. The department belongs almost entirely to the basin of the Rhône, to which it sends its waters by the Saône and its tributary the Azergues, and by the Gier. The mountains which cover the surface of the department constitute the watershed between the Rhône and the Loire, and from north to south form four successive groups—the Beaujolais mts., the highest peak of which is 3,320 ft.; the Tarare group; the Lyonnais mts. (nearly 3,000 ft.); and Mt. Pilat, the highest peak of which belongs to the department of Loire.

Good agricultural land is found in the valleys of the Saône and Rhône, but for the most part the soil is stony and only moderately fertile. Wheat, oats, rye and potatoes are widely grown, with colza on the banks of the Saône, but they are less important than the vine, the hills of the Beaujolais on the right bank of the Saône producing excellent wines. Mines of copper pyrites and coal and quarries of marble (at Bully) are worked. The production of silk fabrics, the chief branch of manufacture of artificial silk goods, of chemicals and machinery, together with most of the other industries of the department, are concentrated in Lyons (*q.v.*) and its vicinity. Tarare is a centre for the manufacture of velvet, muslin and embroidery. Oullins has large railway workshops belonging to the P.L.M railway, and there are important glass works at Lyons and at Givors. Cotton-spinning and weaving are carried on in several localities.

The department is served by the P.L.M. railway. The Rhône and the Saône and in the extreme south the canal of Givors are its navigable waterways. Lyons, the capital, is the seat of an archbishop and of a court of appeal and centre of an educational division (*académie*). The department is in the 14th military region. There are two arrondissements (Lyons and Villefranche) subdivided into 33 cantons and 269 communes. The principal places besides Lyons are Givors, Tarare and Villefranche (*qq.v.*).

RHÔNE, one of the most important rivers in Europe, and the chief of those which flow directly into the Mediterranean. It rises at the eastern extremity of the Swiss canton of the Valais, flows through Switzerland and France and enters the Mediterranean at the Gulf of Lyons. Its total length is 505 m., of which the Lake of Geneva, through which it flows, claims 45 m.; and its total fall is 5,898 feet. Its course (excluding the Lake of Geneva, *q.v.*) naturally falls into three divisions: (1) from its source to the Lake of Geneva (105½ m. and fall 4,679 ft.) (2) from Geneva to Lyons (124 m. and fall 689 ft.) and (3) from Lyons to the Mediterranean (230 m. and fall 530 ft.).

From its Source to the Lake the Rhône is a purely Alpine river, flowing through a great trench first in a synclinal structure between the Aar and St. Gothard massifs, then along the front of the Pennine nappes. (*See* ALPS.) It issues as a torrent, at the height of 5,909 ft., from the Rhône glacier at the head of the Valais. It is almost immediately joined (left) by the Mutt torrent, coming from a small glacier and then flows past the Gletsch hotel (where the roads from the Grimsel and the Furka pass unite). About half a mile from the glacier the river descends through a wild gorge to the more level valley, to reach the first village, Oberwald. It preserves a south-westerly direction till Martigny.

The uppermost valley of the Rhône is named Goms, its chief villages being Münster and Fiesch, whilst the river is swollen by mountain torrents, descending from the glaciers on either side, by the Geren (left), near Oberwald; by the Eginen (left), near Ulrichen; by the Fiesch (right), from the Fiesch glacier, at Fiesch; by the Binna (left), near Grengiols; by the Massa (right) from the Aletsch glaciers, above Brig. At Brig the Rhône has descended 3,678 ft. from its source in 28 m., and is already a considerable stream when joined (left) by the Saltine, descending from the Simplon Pass. Its course below Brig is less rapid and lies through wastes of alluvial deposits. The valley is wide and marshy, the river frequently overflowing its banks. Further mountain torrents fall into tne Rhône: these are the Visp (left) from the Zermatt valley, at Visp; at Gampel, the Lonza (right) from the Lötschen valley; at Leuk, the Dala (right) from the Gemmi Pass; at Sierre, the Navizen (left) from the Einfisch or Anniviers valley; at Sion, the capital of the Valais, the Borgne (left) from the Val d' Hérens; below Sion, by the Morge (right), from the Sansetsch pass; and at Martigny by the Dranse (left) from the Great St. Bernard and the Val de Bagnes. At Martigny, the river bends sharply to the north-west toward the Lake of Geneva. Opposite Dorénaz it receives the Salanfe (left). Immediately below St. Maurice the Rhône rushes through a narrow and striking defile which commands the entrance of the Valais.

Beyond, the river enters the wide alluvial plain, formerly occupied by the south-eastern arm of the Lake of Geneva, but now marshy. It receives at Bex the Avançon (right) flowing from the glaciers of the Diablerets range, at Monthey the Vièze (left) from Champéry and the Val d' Illiez, and at the Aigle the Grande Eau (right), from the valley of Ormonts-dessus. It passes Port Valais, once on the lake, before expanding into the Lake of Geneva, between Villeneuve (right) and St. Gingolph (left). During all this portion of its course the Rhône is not navigable, but its valley forms an artery into the Alps which is followed by the railways and roads.

The Upper Rhône, being fed by glacial streams, is overladen with sediment, much of which is deposited along the course, the remainder settling down in the Lake of Geneva, in the blue waters of which it is possible to follow the whiter course of the stream for some distance before it disappears.

From Geneva to Lyons.—About ½ m. below Geneva the blueness of the water of the Rhône is again disturbed by the Arve (left), from the glaciers of the Mont Blanc range, the two currents for some distance refusing to mix. The Rhône is here forced southward by the sweep of the Jura folds through which it breaks in a number of narrow gorges or *cluses*. It continues southward until joined near Corbelin by the Guier (left), from the Grande Chartreuse mountains and it continues the direction of this tributary thus rounding the southern spur of the Juras.

About 12 m. south of Geneva the Rhône enters France. At Bellegarde the Valserine flows in (right), and then the river resumes its southerly direction, from which a great gorge has deflected it for a while. Some way below Bellegarde, between Le Parc and Pyrimont, the Rhône becomes officially "navigable" though as far as Lyons the navigation consists almost entirely of flat-bottomed boats. Above Seyssel the Usses (left) joins the Rhône, while just below that village the Fier (left) flows in from the Lake of Annecy. Below the junction of the Fier the hills sink on either side, the channel of the river widens and it leaves the mountains for the plains. The Geneva-Paris railway follows the river as far as Culoz. The Rhône receives the waters from Lake Bourget by a canal (left). The last of the *cluses* is at the Pont du Saut or Sault, a little south of Lagnieu. The river now widens but the neighbouring country is much exposed to inundations.

It receives the Ain (right), which descends from the French slope of the Jura and is navigable for about 60 m., above its

junction with the Saône, just below Lyons. The Saône (*q.v.*) which has received (left) the Doubs, is the real continuation of the lower Rhône, both from a geographical and a commercial point of view, and it is by the means of canals branching off from the course of the Saône that the Rhône communicates with the basins of the Loire, the Seine, the Rhine and the Moselle.

Below Lyons, the Rhône becomes one of the great historical rivers of France. It was up its valley that various civilizations penetrated from the Mediterranean to Lyons. From Lyons downwards the left bank serves as a great medium of commerce by which central France sends its products to the sea. During this half of its course it flows over an alluvium-filled valley resting on Jurassic and Cretaceous rocks, and it can boast of having on its left bank (the right bank is very poor in this respect) such historical cities at Vienne, Valence, Avignon, Tarascon and Arles, while it receives (left) the Isère, the Drôme, the Aygues and the Durance rivers, all formed by the union of many streams from the Dauphiné Alps.

The Ardèche is the only considerable affluent from the right. Near Arles, about 25 m. from the sea, and by rail 175¼ m. from Lyons, the river breaks up into two main branches, the Grand Rhône running south-east and the Petit Rhône south-west; they enclose between them the delta of the Camargue, which is cultivated on the banks of the river only, but elsewhere is simply a great alluvial plain, composed of scanty pasturages and of great salt marshes. Changes in sea level have taken place in the Rhône delta in recent times. R. D. Oldham (*Nature,* vol. cxvi. [1925] pp. 16, 52, 100), shows that in Pre-Roman times the sea-level was 15 ft. higher than today. A rise was followed by a subsidence which occurred in about the 8th century when the river ended far inland in a shallow land-locked inlet which it proceeded to fill up with alluvium until in the 17th century it had regained the sea-front. Even since that time it has greatly modified its form by changes of channels, etc.

The Rhône river system is dominated by two tectonic features, the Alps and the Central Plateau of France. Below Chalon-sur-Saône, the Saône-Rhône flows along the eastern side of the central plateau and most of the course is determined by a north to south fault. The remainder of the river system is determined by the structure of the Alps (*q.v.*). The greater length of the river and of its Alpine affluents is parallel to the trend of the structures, as above Martigny, between the Lake of Geneva and Corbelin, the Arve in the Chamonix valley and parts of the Isère and of the Durance. On the other hand other portions flow radially to the trend, as between Martigny and the Lake of Geneva, parts of Isère, the Drôme, the Aygues, the Durance and numerous other tributaries.

RHOXOLANI, a Sarmatian tribe defeated in the Crimea by Diophantus, general of Mithradates, *c.* 100 B.C., and by the Romans on the lower Danube *c.* A.D. 60, and also under M. Aurelius. They seem to have finally succumbed to the Goths.

RHUBARB. This name is applied both to a drug and to a vegetable.

1. The drug has been used in medicine from very early times, being described in the Chinese herbal *Pen-king,* which is believed to date from 2700 B.C. It is still produced in the four northern provinces of China. In England the culture of rhubarb for medicinal purposes began in 1777 at Banbury in Oxfordshire and is still carried on there. Later it extended to France and other parts of Europe.

The botanical origin of Chinese rhubarb is uncertain. *Rheum palmatum, R. officinale, R. palmatum,* var. *tanguticum, R. colinianum* and *R. Franzenbachii* have been variously stated to be the source of it, but the roots produced by these species under cultivation in Europe do not present the characteristic network of white veins exhibited by the best specimens of the Chinese drug. The Banbury rhubarb appears to be a hybrid between *R. rhaponticum* and *R. undulatum*—the root, according to E. Colin, not presenting the typical microscopic structure of the former. More recently very good rhubarb has been grown at Banbury from *Rheum officinale,* but these two varieties are not equal in medicinal strength to the Chinese article, yielding less extract—Chinese rhubarb affording, according to H. Seier, 58%, English r 21% and *R. officinale* 17%.

Two varieties of the drug are known, *viz.,* kiln-dried ar dried. So-called "Turkey" rhubarb was the Chinese drug reached Europe from Aleppo and Smyrna, having trave Asia Minor by way of Persia and the Caspian.

Chemistry.—The most important constituent of thi giving it its purgative properties and its yellow colour, is ch bin, $C_{30}H_{36}O_7$, formerly known as rhein or chrysophan. The r of commerce also contains chrysophanic acid, a dioxymet thra-quinone, $C_{14}H_5(CH_3)O_2(OH)_2$, of which chrysarobin i duction product. Nearly 40% of the drug consists of c oxalate, which gives it the characteristic grittiness. There present rheotannic acid, which is of some practical impc There are numerous other constituents, such as emodin, C mucilage, resins, rheumic acid, $C_{20}H_{16}O_9$, aporrhetin, etc.

The dose of rhubarb is from ½ up to 30 grains, according action which is desired. The Pulvis Rhei Compositus British Pharmacopoeia, or Gregory's powder, is compo 2 parts of rhubarb, 6 of heavy or light magnesia and 1 of The dose is 20 to 60 gr.

Rhubarb in small doses—½ to 2gr.—is an astringent toni it stimulates all the functions of the upper part of the alin canal. Its more characteristic action, however, is purgation it causes in doses of 15gr. and upwards. The action occurs seven or eight hours, a soft, yellow motion being pr Rhubarb also increases the amount of bile formed by th The drug is apt to cause colic, and should therefore ne given alone. Purgation is succeeded by definite constipation rhubarb is obviously worse than useless in the treatm chronic constipation, which it only aggravates. On the hand, it is valuable when diarrhoea has been caused by uns food. The drug removes the indigestible residue and the the bowel rest.

Some chrysarobin is absorbed and is excreted in the which it slightly increases and colours a reddish brow colour is discharged by the addition of a little dilute hydr acid to the urine.

2. The rhubarb used as a vegetable consists of the leaf of *R. rhaponticum* and its varieties, and *R. undulatum* known in America as pie-plant. Several other species, such *palmatum, R. officinale, R. nobile* and others, are cultiva their fine foliage and handsome inflorescence, especially gardens, margins of shrubberies and similar places.

RHYL, a watering-place and urban district of Flint, Wales, 30 m. N.W. of Chester on the L.M.S.R. Pop. 13,489. It is situated on a sandy coast near the mouth Clwyd. It was originally a small fishing village with a little trade, and is now an important watering-place.

RHYME, more correctly spelt RIME, from a Provenç *rim* (its customary English spelling is due to a confusic *rhythm*), a literary ornament or device consisting of an i of sound in the terminal syllables of two or more words. art of versification it signifies the repetition of a sound at of two or more lines in a single composition. This artifi practically unknown to the ancients, and, when it occurs, o to occur, in the works of classic Greek and Latin poets, it r considered to be accidental. Conscious rhyme came late name given to lines with an intentional rhyme in the mi *Leonine verse,* the invention being attributed to a probabl ryphal monk Leoninus or Leonius, who is supposed to author of a history of the Old Testament preserved in the thèque Nationale of Paris. This "history" is composed i verses, all of which rhyme in the centre. Recent critici been inclined to look upon the African church-Latin of of Tertullian as the starting-point of modern rhyme, ar probable that the ingenuities of priests, invented to aid w pers in hearing and singing long pieces of Latin verse in th of the Catholic church produced the earliest conscious p rhyme. It is certain that by the 4th century a school of sacred poetry had come into existence, classical examples o we still possess in the "Stabat Mater" and the "Dies Ir

the course of the middle ages, alliteration, assonance and end-rhyme held the field without a rival in vernacular poetry. After the 14th century, in the north of Europe, and indeed everywhere except in Spain, where assonance held a powerful position, end-rhyme became universal and formed a distinctive indication of metrical construction. It was not until the invention of blank verse (*q.v.*) that rhyme found a modern rival. Certain forms of poetry are almost inconceivable without rhyme, though efforts have been made to compose even rhymeless sonnets. In the heyday of Elizabethan literature a serious attempt was made in England to reject rhyme altogether, and to return to the quantitative measures of the ancients. The prime mover in this heresy was a pedantic grammarian of Cambridge, Gabriel Harvey (1545?–1630). For a short time he actually seduced no less melodious a poet than Edmund Spenser to abandon rhyme and adopt a system of accented hexameters and trimeters. From 1576 to 1579 the genius of Spenser seems to have been obscured by this error of taste, but he shook it off completely when he composed *The Shepherd's Calendar*. Thomas Campion, in a tract published in 1602, advocated the omission of rhyme from lyrical poetry. By dint of a prodigious effort, he produced some unrhymed odes, which were not without charm, but the best critics of the time, such as Daniel, repudiated the innovation.

In Germany a determined attack on rhyme was made early in the 17th century, particularly by a group of aesthetic critics in the Swiss universities. Lessing recalled the German poets to a sense of the beauty and value of rhyme, but the popularity of Klopstock and his imitators continued to exercise a great influence. Goethe and Schiller, without abandoning rhyme, permitted themselves a great liberty in the employment of unrhymed measures and in imitation of classic metres. This was carried to greater lengths by Platen and Heine, the rhymeless rhythm of the last of whom was imitated in English verse by Matthew Arnold and others. In France, on the other hand, the empire of rhyme has always been triumphant, and in French literature the idea of rhymeless verse could till recently scarcely be said to exist.

In Italian literature the excessive abundance and facility of rhyme has led to a rebellion against its use. It was the influence of German aesthetics which forced upon the notice of Leopardi the possibility of introducing rhymeless lyrical measures into Italian verse, an innovation which he carried out with remarkable hardihood and success. The rhymeless odes of Carducci are also worthy of admiration. At the close of the 19th century, particularly in France, where the rules of rhyme had been most rigid, an effort was made to modify and minimize the restraints of rhyme. The laws of rhyme, like other artificial regulations, may be too severe, but there is no evidence that the natural beauty which pure rhyme introduces into poetry is losing its hold on the human ear or is in any real danger of being superseded by accent or rhythm.

See J. B. Schutze, *Versuch einer Theorie des Reimes nach Inhalt und Form* (Magdeburg, 1802); J. Minor, *Neuhochdeutsche Metrik* (Strasbourg, 1893); J. B. Mayer, *A Handbook of Modern English Metre* (1903); Egerton Smith, *The Principles of English Metre* (Oxford, 1923).

RHYMNEY, an urban district of Monmouthshire, England, on the borders of Glamorganshire, 22 m. N. by W. of Cardiff, on the G.W.R. Pop. (1931) 10,505. The Rhymney river, in the upper valley of which this town lies, forms almost throughout its course, the boundary between England and Wales (Monmouthshire and Glamorganshire). The district belongs to the South Wales iron field.

RHYNIE: *see* CHERT.

RHYOLITE, the group name of a type of volcanic rock, occurring mostly as lava flows, characterized by a highly acid composition, and so called from Gr. ῥύαξ, to flow (because of the frequency with which they exhibit fluxion structures). They are the most siliceous of all lavas, and, with the exception of the dacites, are the only lavas with free primary quartz. In chemical composition they very closely resemble the granites, the corresponding rocks of plutonic or deep-seated origin; their minerals also present many points of similarity to those of granite though they are by no means entirely the same. Quartz, orthoclase and plagioclase felspars, and biotite are the commonest ingredients of both rocks, but the quartz of rhyolites is full of glass enclosures and the potash felspar is pellucid sanidine, while the quartz of granite contains dust-like fluid cavities of very minute size and its potash felspar is of the turbid variety which is properly called orthoclase. The granites also are holocrystalline, while in the rhyolites there are usually porphyritic crystals floating in a fine ground-mass. Rhyolites have also been called liparites because many of the lavas of the Lipari Islands are excellent examples of this group. Above all rocks they have a disposition to assume vitreous forms, as when fused they crystallize with great difficulty; the vitreous forms are known as obsidian, perlite and pumice (*qq.v.*).

Mineral Constituents.—The minerals of the first generation, or phenocrysts, of rhyolite are generally orthoclase, oligoclase, quartz, biotite, augite, or hornblende. The felspars are usually glassy clear, small but of well-developed crystalline form: the potash felspar is sanidine, usually Carlsbad twinned; the soda-lime felspar is almost always oligoclase, with characteristic polysynthetic structure. Both of these may be corroded and irregular in their outlines; their cleavage and twinning then distinguish them readily from quartz. The quartz occurs as blebs or sub-rounded grains, which are corroded double hexagonal pyramids. In some rhyolites apparent crystals of quartz or felspar are found under the microscope to consist of a micrographic intergrowth of the two. Biotite is always deep brown or greenish brown, in small hexagonal tablets, generally blackened at their edges by magmatic corrosion. Muscovite is not known in rhyolites. Hornblende may be green or brown; in the quartz-pantellarites it sometimes takes the form of strongly pleochroic brown crossyrite. Like biotite it is idiomorphic but often corroded in a marked degree. Augite, which is equally common or more common than the other ferro-magnesian minerals, is always green; its crystals are small and perfectly shaped, and corrosion phenomena are very rarely seen in it. Zircon, apatite and magnetite are always present in rhyolites, their crystals being often beautifully perfect though never large. Olivine (fayalite) is never a normal ingredient, but occurs in the hollow spherulites or lithophysae of some rhyolites with garnet, tridymite, topaz and other minerals which indicate pneumatolytic action.

Types of Texture.—The ground-mass of rhyolitic rocks is of three distinct types which are stages in crystalline development, viz., the vitreous, the felsitic or cryptocrystalline, and the microcrystalline. Mixtures of the different kinds occur; thus a vitreous rhyolite has often felsitic areas in its ground-mass, and in the same lava flow some parts may be vitreous while others are felsitic. The vitreous rhyolites are identical in most respects with the obsidians, from which they can only be separated in an artificial classification; and in their glassy base the banded or eutaxitic, spherulitic and perlitic structures of pure obsidians are very frequently present (*see* OBSIDIAN: PERLITE). The felso-liparites or liparites with stony ground-mass are specially common among the pre-Tertiary igneous rocks, as liparite glass is unstable and experiences devitrification in course of time. Many of these felsites have fluxion banding, spherulites and even perlitic cracks, which are strong evidence that they were originally glassy. In other cases a hyaloliparite, obsidian or pitchstone becomes felsitic along its borders and joint planes, or even along perlitic cracks, and we may assume that the once glassy rock has changed into felsite under the action of percolating moisture or even by atmospheric decomposition. In many rhyolites the felsite is original and represents an incipient crystallization of the vitreous material which took place before the rock was cold. The felsite in turn is liable to change; it becomes a fine mosaic of quartz and alkali felspar; and in this way a matrix of the third type, the microcrystalline, may develop. This is proved by the occurrence of the remains of spherulitic and perlitic structures in rocks which are no longer felsitic or glassy. Many microcrystalline rhyolites have a ground-mass in which much felsitic matter occurs; but as this tends to recrystallize in course of time, the older rocks of this group show least of it. Whilst no quartz-bearing rhyolites are known to have been erupted in recent years, Lacroix proved that portions of the "spine" which rose as a great

tower or column out of the crater of Mont Pelée after the eruption in 1906 contained small crystals of quartz in the ground-mass. The microcrystalline ground-mass of rhyolites is never micrographic as in the porphyries (granophyres); on the other hand it is often micropoikilitic, consisting of small felspars, often subrectangular, embedded in little rounded or irregular plates of quartz.

Changes of Ground-mass.—The ground-mass of rhyolites is liable to other changes, of which the most important are silicification, kaolinization and sericitization. Among the older rocks of this group it is the exception to find that secondary quartz has not been deposited in some parts of them. Often indeed the matrix is completely replaced by silica in the form of finely crystalline quartz or chalcedony; and these rocks on analysis prove to contain over 90% of silica. In the recent rhyolites of Hungary, New Zealand, etc., the deposit of coarse opal in portions of the rock is a very common phenomenon.

Kaolinization may be due to weathering, and the stony dull look of the matrix of many microcrystalline rhyolites is due to the decomposed state of the felspar grains in them; it is even more typically developed by fumarole action, which replaces the felspars with soft, cloudy white products belonging to a mineral of the kaolin group. Sericitization, or the development of fine white mica after felspar, is usually associated with shearing, and is commonest in the older rhyolites.

Vesicular structure is very common in rhyolites; in fact the pumiceous obsidians have this character in greater perfection than any other rocks (*see* PUMICE); but even the felso-rhyolites are very often vesicular. The cavities are usually lined with opal and tridymite; in the older rocks they may be filled with agate and chalcedony. The "mill-stone porphyries," extensively used in Germany for grinding corn, are porous rhyolites; the abundance of quartz makes them hard, and their rough surfaces render them peculiarly suitable for this purpose. In some of them the cavities are partly secondary. These rocks are obtained in the Odenwald, Thuringerwald and Fichtelgebirge.

Occurrence.—In Britain a pale grey Tertiary rhyolite occurs at Tardree, Antrim, and in Skye. Felsitic rhyolites occur among the Old Red rocks of Scotland (Pentland Hills, Lorne, etc.), in Devonshire, and in large numbers in North Wales. The Carnarvonshire rhyolites are often much altered and silicified; many of them have a nodular structure which is very conspicuous on weathered surfaces. The spheroids may be two or three in. in diameter; some are built up of concentric shells. Rhyolites are also known from Fishguard, Malvern, Westmorland and Co. Waterford. One of the oldest volcanic rocks of Britain (pre-Cambrian, Uriconian) is the spherulitic rhyolite of the Lea Rock near Wellington, Shropshire. It shows bright red spherulites in great numbers and is probably an obsidian completely devitrified. Perlitic structure is also visible in it.

In other parts of Europe rhyolites have a fairly wide distribution though they are not numerous. In Hungary (Hlinik, etc.) there are many well-known examples; they extend along the margin of the Carpathians and are found also in Siebenburgen. In Italy they occur in the Euganean Hills and in the Lipari Islands; the latter being the principal source of pumice at the present day. Rhyolites of Recent age occur in Iceland (Myvatn, etc.), where they are characterized by the frequent absence of quartz, and the presence of much plagioclase and pyroxene. Some of these rocks have been called trachyte-obsidians, but they seem to be rhyolites which contain an exceptionally large amount of soda. The older rhyolites, which are generally called quartz-porphyries in Germany, are mostly of Permian or Carboniferous age and are numerous in the Vosges, Odenwald, Thuringerwald, etc. They are often accompanied by basic rocks (melaphyres). Permian rhyolites occur also at Lugano in Italy. Rhyolites are known also in Asia Minor and the Caucasus, in New Zealand, Colorado, Nevada and other parts of western North America. In the Yellowstone National Park there is a well-known cliff of obsidian which shows remarkably perfect columnar jointing. Some of the rhyolites of Nevada are exceedingly rich in porphyritic minerals, so that they appear at first sight to be holocrystalline rocks, since the ground-mass is scanty and inconspicuous. To this type name nevadite has been given, but it is rare and local i distribution.

In Pantellaria, south-west of Sicily, there are rocks of rhy affinities which present so many unusual features that they been designated pantellarites. They contain less silica and alu and more alkalis and iron than do ordinary rhyolites. Thei spars are of the anorthoclase group, being rich in soda tog with potash, and are very variable in crystalline develop Aegirine-augite and forms of soda-amphibole are also char istic of them, while dark brown aenigmatite or cossyrite occur. Quartz is not very plentiful; other ingredients are ol arfvedsonite and tridymite. The ground-mass varies much, sometimes quite vitreous, at other times a glass filled with sv of microliths, while in certain pantellarites it is a microcryst aggregate of quartz and alkali felspar. The absence of plagi and biotite are marked distinctions between these rocks ar rhyolites, together with the scarcity of quartz and the prev of soda-bearing pyroxenes and amphiboles. Comendites are tically identical rocks. They occur in Sardinia, Corsica, I East Africa, East Siberia, West Texas and the East Indies.

Among the Palaeozoic volcanic rocks of Germany ther group of lavas, the quartz-keratophyres, which are of acid position and rich in alkali felspar. Their dominant alkali is hence their felspars are albite and cryptoperthite, not sanidin rhyolites. Quartz occurs sometimes as corroded phenocryst is often scarce even in the ground-mass. Porphyritic biot augite are very rare, but occur in the matrix along with fe and quartz. Micropegmatite is not infrequent in these roc they may be silicified like the rhyolites. As quartz-kerato mostly occur in districts where there has been a good deal o ing, they are often crushed and more or less sericitized. Th best known from the Devonian rocks of Westphalia and the but are also found in New South Wales, and similar rock been described (as soda-felsites) from Ireland. The rocks they accompany are usually dolerites and spilites.

Composition.—The following analyses show the comp of some of the principal types of rhyolites:—

	SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	K_2O	Na_2O
I.	76·34	13·22	1·93		1·85	0·21	3·67	2·84
II.	72·15	13·50	3·12		0·93	0·16	4·54	4·20
III.	77·59	12·75	0·67	n.f.	0·04	0·16	3·99	2·56
IV.	67·48	9·70	7·42	2·21	1·45	0·77	2·94	7·21
V.	70·97	13·84	3·21	0·78	1·26	0·20	1·57	6·27
VI.	74·76	11·60	3·50	0·19	0·07	0·18	4·92	4·35

I. Rhyolite, Telki Banya, Hungary.
II. do. Mafahlid, Iceland.
III. do. Omahu, New Zealand.
IV. Pantellarite, Pantellaria.
V. Quartz-keratophyre, Muhlenthal, Harz.
VI. Comendite, Sardinia.

We note in the rhyolites I.–III. the very high silica, witl and alumina also in considerable amount, while lime, magn iron are very low. In the pantellarite, keratophyre and co the silica tends to be less abundant, while the alkalis, es soda, increase; they have less alumina but are richer in i magnesia. It is easy to see why the latter types contain less felspars often very rich in soda, and ferric minerals which iron and alkalis in notable amounts such as aegirine, riebec arfvedsonite. (J.

RHYTHM, a certain swing or balance in bodily mc music, verse or prose; often extended by metaphor to other spheres (*e.g.*, "rhythm of life"). The early critic ody, Aristoxenus (*c.* 320 B.C.), distinguished three eler rhythm—the speech (λέξις), the melody (μέλος) and th motion (*κίνησις σωματική*); but the later tendency h to separate these elements, and to emphasize more a the distinction between them. Precision, however, has h been reached; and there are few subjects on which opini among experts, differ more widely. In a short article i necessary to make controversial statements without c them by argument.

Rhythm in Verse.—The line between rhythm and metre is hard to draw. Aristotle is very vague on the question: Suidas says that rhythm is the father of metre, and Quintilian that rhythm is male and metre female. Such sayings merely prove the difficulty of measuring a delicate instinct by rule of three. It would appear, however, that to the Greeks metre was concerned with the measurements of poetic periods, and rhythm with their effective chanting or recitation; it cannot therefore have depended largely on *ictus* or stress, and the word is therefore often applied to prose as well as to verse. It is probable that, in a quantitative language like Greek, this stress (as it is in modern French) was far less strongly marked than (*e.g.*) in English; but it is a mistake to think it entirely absent, as, conversely, it is a mistake to think that in English, though accent is, of course, predominant, quantity is unimportant.

As Schipper says, "in English long and short syllables have no constant length, no constant relation; they depend on the context. They do not *determine* rhythm, but they help to *regulate* it." No rigid laws, therefore, can be laid down as to the proper employment of rhythmic balance. A subtle *feeling* must govern the periodic progress of sounds in harmony with the emotions it is desired to express. When the ear is satisfied, we feel that the rhythm is adequate; and a very brief study will show us that the ear demands different rhythms for an expression of different emotions. The genius of the poet is, on this side, revealed by the unforced skill with which he selects the appropriate rhythm. Ecstasy, *e.g.*, takes a quick, eager, rising movement; sadness is full, slow and emphatic; meditation deliberate; mystery and suspense are faint, languorous and throbbing; often, indeed, the rhythm is so intimately linked with human feeling that no analysis can disentangle them.

Pauses, again, are an almost essential element in modern rhythm. In Shakespeare and Milton, *e.g.*, a pause may take the place of a whole beat; and the right use of such pauses often lends a variety which increases the beauty of a passage. Still more important is what has been called the "free musical paragraph," of which Milton, in *Paradise Lost*, is so consummate a master. Here the balance, overstepping the limits of the verse-form, and felt over wide spaces, is perhaps the chief glory of the poet's style; and the skill with which one "paragraph" is set against another forms, so to speak, a larger rhythm containing and holding up the smaller rhythms of the single paragraphs and of the verse-form. In rhymed verse this larger rhythm is represented by the progression of the stanza in itself, and by the linking of the stanzas into harmonious wholes. Thus in the full meaning of the term, rhythm depends at least as much on the orderly arrangement of the thought as on the balance of the words.

Rhythm in Prose.—We perceive then that there is a rhythm in prose no less than in verse; and this appears not only in the balance of the sentence, but in the arrangement of the sentences in paragraphs and in the building up of paragraphs into chapters. Here, as in everything else, the art must be concealed. A mechanical, epigrammatic balance, like that of Johnson, is too obvious, and ere long tends to weary. The truly rhythmic prose-writer satisfies at once the ear and the mind as a skilled dancer satisfies at once the ear and the eye, without drawing attention to the means by which the effect is attained.

On the special laws of rhythm in the poetry of different nations—Greek, Hebrew, Old English, and the like—it is impossible to speak here; the works of scholars should be studied.

BIBLIOGRAPHY.—W. Christ, *Metrik der Griechen* (Leipzig, 1874); J. H. H. Schmidt, *Rhythmic and Metric of the Classical Languages* (1879), followed by R. C. Jebb in the metrical introductions to his edition of Sophocles: T. de Banville, *Petit Traité de la Poésie française* (1881); E. Guest, *History of English Rhythms* (2nd ed., 1882); F. B. Gummere, *Handbook of Poetics* (1885); J. Minor, *Neuhochdeutsche Metrik* (Strasbourg, 1893); J. Schipper, *Englische Metrik* (Leipzig, 1895); George Saintsbury, *History of English Prosody* (1906–10), *History of English Prose Rhythm* (1912); *see* also the various works by T. S. Omond. On old English metre, *see* editions of H. Sweet, *Anglo-Saxon Reader* (1897); for the metre of Chaucer *see* the various editions by W. W. Skeat; on Hebrew metre, *International Critical Commentaries*, edit. S. R. Driver, A. Plummer and C. A. Briggs (1910–20); French metre, F. Spencer, *A Primer of French Verse* (1899); L. E. Kastner, *History of French Versification* (1903); E. A. Sonnenschein, *What is Rhythm?* (1925); W. Thomson, *The Rhythm of Speech* (1923); M. Austin, *American Rhythm* (1923); J. H. Scott, *Rhythmic Verse* (1925), *Rhythmic Prose* (1925). (E. E. K.)

RHYTHM IN MUSIC

Like all artistic categories musical rhythm must be studied historically, to avoid Philistinism towards the rhythms of early periods. But the musical rhythms of the 18th and 19th centuries are so much more familiar to us than any others, and so radically different from speech-rhythms, that we shall do well to analyse them first. Their true relation to speech-rhythms will then become much clearer, and the study of older rhythms will be greatly simplified.

1. **Body-rhythm and Speech-rhythm.**—These are two prehistoric elements in musical rhythm; and in modern music they are in equipoise, though apart from music they are incompatible. Dance-rhythm is too narrow a term for the one, and speech-rhythm is a satisfactory term for the other. We may coin the term body-rhythm as giving the necessary extension to the notion of dance-rhythm. Musical body-rhythm, even in the slowest paces, is enormously stronger than anything known to prosody. It is no exaggeration to say that it is as strong as the pace of a horse. Not even Browning could have recited "How they brought the good news from Ghent to Aix" with comfort while riding a galloping horse; but Schubert's Characteristic Marches (op. 121) do not merely imitate that pace but go far to stimulate it if played to a body of cavalry. Gentler rhythms may be less immediately understood, but, once grasped, are not more easily changed. The music must brace itself up for any abrupt change of its fundamental rhythm. But that fundamental rhythm may be very slow and lie very deep.
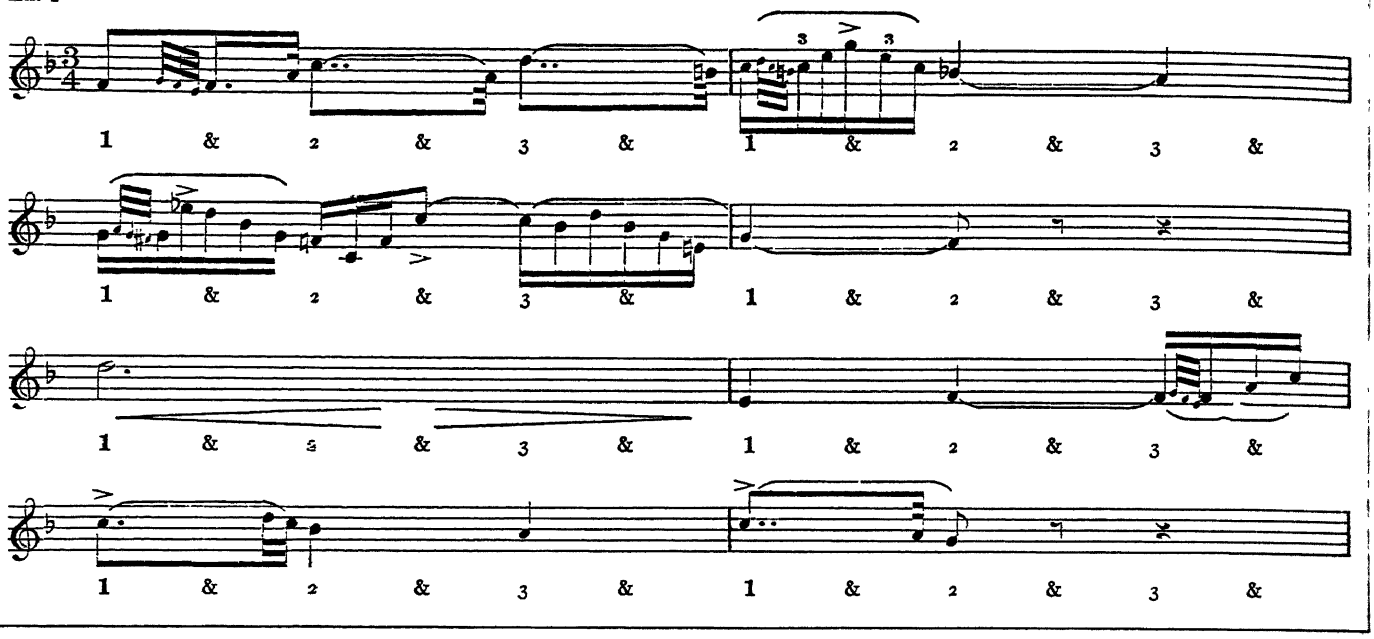
In the example on p. 274 (Ex. 1), Haydn uses an underlying rhythm of thrice two beats. The beat is a quaver, for which one second is not too slow a tempo for this particular composition. Its whole group of six beats is invariably $3 \div 2$ and never $2 \div 3$. In this kind of music change from the one division to the other would be impossible without either violence or vagueness; unless it were a permanent change of metre. So important is the notion of $3 \div 2$ that it is not counted as 6 at all, but as **1** & 2 & 3, etc. Of these beats the first bears the chief stress, the second and third bear less, and there is no rule to give either more stress than the other. We are not, at present, considering the case of three beats quick enough to mark the rhythm without subdivision. Obviously the subdivisions (counted by "&") have no accent, except in relation to their own further subdivisions. Musical rhythms are measured from accent to accent; and of pairs of accents the first is stronger than the second. In larger groups, if the rhythm is binary the third accent will be stronger than the second, but not as strong as the first or fifth. At a very quick pace the difference of strength between the first accent and the fifth may become perceptible, but the rhythm would be inartistically stiff if such distinctions were not soon obliterated.

Triple rhythm, whether slow and subdivided or quick and undivided, also falls readily into larger binary periods with the same relative strengths of accent. There is nothing to prevent it from falling into ternary periods, but the mind ceases to apprehend a high power of three rhythmically, for we cannot know that the third period of a slow group is not the first of a new pair.

On these data it is now possible to analyse the rhythm of Ex. 1. It begins on the main accent, with no anacrusis. Between the first and second quaver beats there is a group of grace-notes. In actual time these should come on the second quaver and reduce the length of the second main note instead of that of the first, but they have no accent, and the second main note has its due stress and is not noticed to have arrived late, even if the grace-notes have been taken with some deliberation. They are like the consonants in the word *three:* it is easy to pronounce the word at a given moment, and nobody thinks of dividing it as thr-ee, though the consonants really take an appreciable time.

During the second bar of six beats the accompaniment (not given here) takes its cue from the melody and divides the quaver-beats by 3 (and the crotchets by 6). This motion thereafter pervades the whole composition, sometimes in the melody, and

Ex. 1



always in the accompaniment, except when the whole orchestra pauses. These triplet semiquavers become equivalent to the average length of syllables in speech-rhythm, and the mind automatically measures all pauses by them. Besides the indeterminate grace-notes there are definite shorter values.

No rhythm in poetry or prose ever contemplated giving one syllable seven times the length of another, as we see in the double-dotted quavers with their complementary demisemiquavers. But in the fifth bar we have the whole six beats occupied by one sustained note, eighteen times the length of the average syllable. Yet so cogent is the body-rhythm of these long and complex bars that a deviation from the symmetry of an 8-bar period is permissible only when a change of key introduces new topics, as happens immediately after this quotation. But this will lead us to the separate topic of *phrasing*. Irregularities in the lengths of the bars themselves would be quite impossible, except in the case of a dramatic or final pause. Haydn has one opportunity for a dramatic pause in the course of the movement, yet he does not leave it at that, but expands it to two entire normal bars filled with organized rhythms.

Musical rhythm is not often as ornate as this, nor is this elaboration capable of much contrast or development, but the example at once carries us far away from the rhythms of poetry and includes all the musical principles so far mentioned. From it we can move a step nearer towards considering the simple relations between musical and poetic rhythm.

The technical terms of prosody are of no use here, with the solitary exception of the word anacrusis, which may be generalized to mean anything that happens before the first principal accent. When Rockstro tells us that "the theme of Weber's Rondo brillante in E flat (op. 62) is in Anapaestic Tetrameter Brachycatalectic, very rigidly maintained," this tells us less about the music than Weber's brilliant theme tells us about these solemn terms. A more scientific idea of Weber's theme, and of the prosodic technicalities, may be obtained from the following paradigm, to be recited *prestissimo*. Each dash at the end of the line represents a quarter of a beat.

Prestissimo.

Diddle | dum diddledum diddledum diddledum diddle | dum diddledum diddledum:— —
1 & 2 & 1 & 2 &

Diddle | dum diddledum diddledum diddledum diddle | dum diddledum diddledum:— —
1 & 2 & 1 & 2 &

After which Weber ceases to maintain his anapaestic-etcetera so rigidly, and proceeds for two lines with:—

Diddle | diddle diddle diddle diddle diddle diddle dum dum | dum dum dum dum Di
1 & 2 & 1 &

Such rapid rhythms at once remind us of Aristophanes or Gilbert, though they can move faster than syllables can be pronounced. If they coalesce into uniformity for a long period (e.g., *diddle-diddle* for several bars without a single *dum*) they cease to resemble speech-rhythm and subside into vibration, unless melodic interest sets up larger rhythms by illuminating a peak here and there. A common defect in second-rate music is the composer's failure to know when his quick motion has settled down into mere vibration.

2. **Time.**—The body-rhythm underlying Weber's Rondo brillante is an unchangeable binary rhythm, counted (as the paradigm shows) in a slow two or a quick four. Classical music uses only binary and ternary times, which, so long as vertebrate anatomy continues to develop with bilateral symmetry, are the only ones that yield a strong body-rhythm naturally, the elements of triple time giving just enough resistance to be overcome by a pleasant compromise.

The kinds of time, *i.e.*, of invariable rhythmic molecules underlying each continuous piece of music, are classed not only as *duple* and *triple* but also as *simple* and *compound*. Compound time is the result of dividing simple time by three. Division by two is ignored: thus the evidently highly compound time of Ex. 1 is reckoned as simple triple time. All beats are reckoned as binary divisions and subdivisions of the modern standard note, the semibreve: the time-signature given at the beginning of a composition is a fraction, with a numerator showing the number of beats in a bar, and a denominator showing the size of the beat. Thus $\frac{3}{4}$ signifies three crotchets (quarters) in a bar. Compound time does not indicate the main beats at all, but counts the smaller beats as normal fractions of the semibreve. The main beats are written as *dotted* notes, in which the dot lengthens the note by one half. Accordingly $\frac{6}{8}$ is the compound time of two dotted crotchets divided by three quavers; $\frac{9}{8}$ is that of three dotted crotchets: $\frac{12}{8}$ of four. When the division by three is only local, *triplets* are used. Triplets are groups of three equal notes crowded into the time of two.

Binary and ternary subdivision answers every ordinary purpose of musical rhythm, being capable of expressing distinctions far more subtle than have ever been regulated in speech. It is impossible to pronounce a syllable in less than a tenth of a second; but it is easy to play 16 notes in a second on the pianoforte. In such rapid notes a single break twice in a second would have an effect directly measured by the ear. If the broken series were

levelled into an even series of fourteen notes a second, the rhythmic effect would be appreciably different, though the actual difference of pace would be only $\frac{1}{56}$ of a second.

The special sign for triplets is readily adapted to other subdivisions. In most cases such adaptation is not meant to produce abstruse rhythms, but to secure an effect of free declamation. Freedom is as necessary in music as it is in speech; but fine playing, whether in obvious *tempo rubato* or in apparent strictness, bases this freedom on the superlative accuracy of good rhythmic notation.

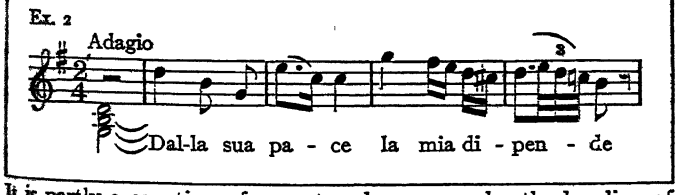
3. **Tempo.**—The time-signature tells us nothing about the pace of the music, for the choice of the denominator is determined by a tangle of historic associations, so that $\frac{3}{8}$ may mean (as in Beethoven's C minor concerto) the slowest movement ever written, and $\frac{3}{4}$ may be a scherzo-tempo in which only one beat in a bar is countable.

The sense of tempo is a larger aspect of the body-rhythm, and in classical music it is very steady. A fundamental law of all musical rhythm is that a hurrying or slackening of tempo has no power to alter the rhythmic organization. If your phrase is too short a *ritardando* will not make it aesthetically any the longer; nor will an *accelerando* get rid of a redundant bar. On the contrary, it is crowded detail that will best profit by slackening, and loose-knit passages that have most to gain by an unobtrusive mending of the pace.

The genuine *tempo rubato* is, as its name implies, a rhythmic robbing of Peter to pay Paul. Chopin said that his left hand conducted in strict time while his right declaimed freely. The truth is that sound is as full of illusions as sight. One such illusion has already been illustrated by the grace-notes of Ex. 1, and other illusions are of much the same kind. The tick of metronome measures average time-intervals; and if it is set to measure a naturally rhythmic performance it will seem to hustle the player in some passages and to drag upon him in others, however carefully we select its pace.

In the classics from Bach to Brahms a movement may give more legitimate scope for *tempo rubato* than some purists care to admit, but it will not drift from one tempo to a radically different tempo, unless towards the end, or as evidence of imminent break-up. The gradual drift from one tempo to another first becomes something better than a weakness when the whole nature of musical movement becomes capable of continuity over hours, as in Wagnerian opera. Then, and not before, can we view one and the same tempo from opposite directions. Thus, in *Tristan und Isolde* the last part of the love-duet in the second act is a quick movement in $\frac{2}{2}$ time. Isolde's *Liebestod* ends the opera with an exact recapitulation of this (differing only in the voice part and absolutely unaltered in the orchestra) in rather slow $\frac{4}{4}$ time. By metronome the two tempi should be identical, though the impulse in the duet is energetic and that of the *Liebestod* reposeful. Wagner merely feels that the broader notation better suits Isolde's dying vision; and the listener, who may know and care nothing about the notation, agrees with Wagner.

Ex. 2
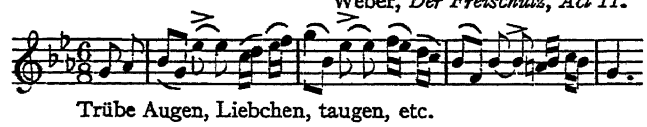


It is partly a question of accent and comes under the heading of phrasing.

4. **The Rhythm of Classical Music in Relation to Poetry.**—We can now return, furnished with new criteria, to the relation between musical and poetic rhythm. Even a simple musical setting of poetry will stretch the words in ways which speech does not normally admit. The naïve poet will unhesitatingly accept this as in the nature of singing. Only the half-baked musical *littérateur* objects, when Mozart makes Ottavio sing *Dalla sua pace la mia dipende* (Ex. 2) five times as slowly as any speaker could naturally utter the words, and then puts the top note and chief accent on the unimportant *la*. The poet would be glad to sing it that way if he could. It is quite good Italian prosody to give a nearly equal stress to *la* and *mia:* and the climax on *la* is more than counterbalanced by the fact that the important word *mia* falls on a harmonically sensitive note. The grammatical sense might have been clearer if a similar but slighter emphasis had been given to *sua*. But Ottavio is not giving instructions to a servant, but expressing his inmost feelings in solitude. Language does not base its emotional accents on logical analysis. Dr. Johnson corrected a clergyman for saying "Thou *shalt* not steal" instead of "Thou shalt *not* steal." If Johnson was right, how in the world did "shall not" ever become "shan't"?

The sensitive note on *mia* shows one of the four main degrees of freedom in musical accent. There is first the normal time-accent. Many critics of musical declamation seem to know no other forms of stress; but it can be completely eclipsed by putting the highest note of the melody elsewhere. The highest note can in its turn be eclipsed by the longest note. And in Ex. 2, both together are eclipsed by the most sensitive note. Moreover, and without recourse to anything so drastic as syncopation, the weakest note in the phrase may be given a special accent stronger than a main beat. This is beautifully shown in the third bar of Ex. 1, where the accented E♭, normally quite the weakest note in the bar, could certainly bear the chief syllable in a sentence if words for Haydn's wonderful rhythm could be found at all. Lastly, such a displaced accent may have a double meaning, the note retaining its original lightness in spite of its borrowed stress. Weber has been blamed for his bad declamation in the following famous passage:—

Ex. 3

Weber, *Der Freischütz, Act II.*



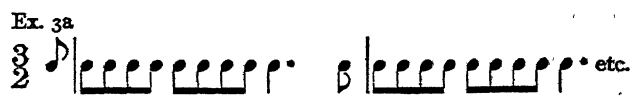
Trübe Augen, Liebchen, taugen, etc.

But, by your leave, this is a triumph of musical gesture. The lively Aennchen might even point a playful finger at the anxious Agathe with each false accent that Weber so explicitly marks. Meanwhile the orchestra corrects the declamation in waltz-rhythm.

By the interplay of these varieties of accent the strophic song, with the same tune to several stanzas, condemned as lazy and low by our prose critics of music, becomes, as Brahms always maintained, the highest achievement of a song-writer. The interplay does not annihilate right and wrong in declamation, nor does it prove that the classics are infallible; but it forms a musical technique as disciplined as prosody and as unlike prose. In such ways artistic factors reconcile their conflicts, and without such conflicts there is neither art nor life. Wagner and Wolf are perfect masters of a musical declamation that follows the rules of prose; but when we are told that there are no other rules, and that the classics from Bach to Brahms merely blundered insensitively, it is time to point out that musical rhythm cannot be learnt from a bell-metronome nor poetry from a pronouncing dictionary.

Let us now try a few experiments in setting blank verse to music. The first step will be to find a constant musical rhythm to represent the average line. This average rhythm will horrify the poetic ear if it is put forward as a specimen of blank verse, and probably if a line could be found that fitted it exactly that line would be a very ugly one. Still, the fact remains that the musician's average idea of blank verse is accurately represented by the following scheme, which represents two lines:

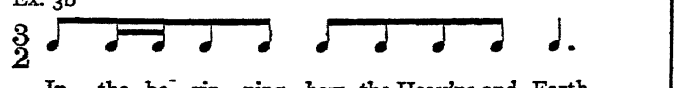
Ex. 3a



Now read the first paragraph of *Paradise Lost* rigidly to this scheme at the rate of two syllables to a metronome-beat of 80 to the minute. You will not satisfy the poet's ear; but you will find
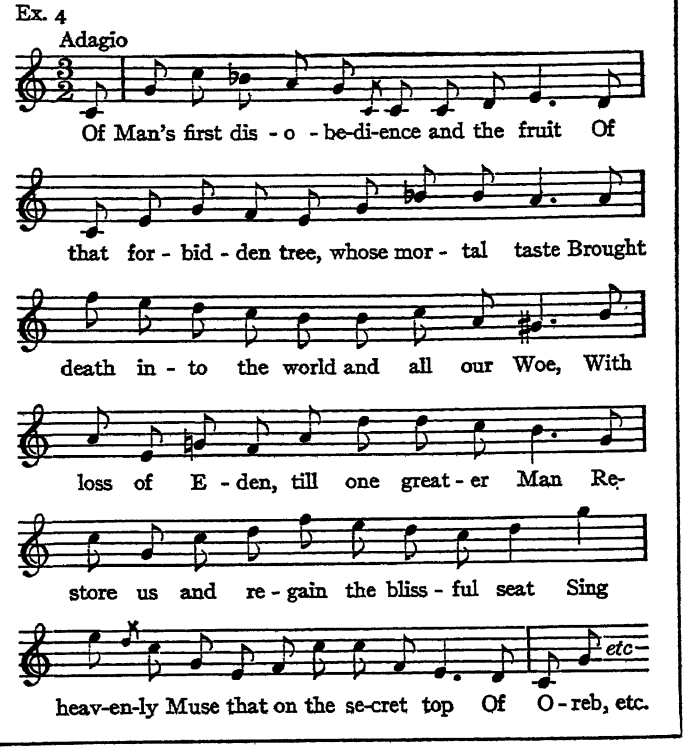
that the lines accommodate themselves better to this than to any other uniformity; that extra syllables can be managed by grace-notes, and that the interval of two quavers between each line is a natural part of the scheme. We can proceed thus for eight lines, with rheumatic pains but not complete disaster. The imperative "Sing" is a heavy word to put into anacrusis, even of double length, and our three main beats must override many accents in lines that so often have four. Also the interlinear pause of two beats is irksome when the sense runs on. In the ninth line we must alter the scheme, for no anacrusis can digest any part of "In the beginning." So we must "invert" the first foot thus:—

Ex. 3b



But before we condemn the scheme let us see how far the torture is mitigated by merely adding musical rise and fall:—

Ex. 4



Blank verse has been worse recited than this. The rigid musical timing proves unexpectedly flexible already; and the rubato of a good singer can go far to improve it without becoming vulgar.

Now let us legalize the singer's rubato, and, without altering the two-quaver intervals between the lines, help the *enjambement* by a pianoforte accompaniment that makes the ear expect the resolution of a discord. Sensitive harmonies will further aid the rhythmic sense. The $\frac{3}{2}$ notation is now becoming troublesome; so that bars are divided into three and the lengths of the notes doubled. But the original $\frac{3}{2}$ scheme is nowhere violated. (*See* Ex. 5.)

After this point any attempt to continue this literal interpretation of the metre would make the music drag hopelessly. Already the first two lines would be the better for running over the pause and doubling the pace of "that forbidden tree." But this would mean using two time-scales and would take us into free composition. The object of this illustration is not to show how these words ought to be set, nor to prove the very doubtful proposition that they are singable to any kind of music; but simply to bring out the most elementary relations between music and verse.
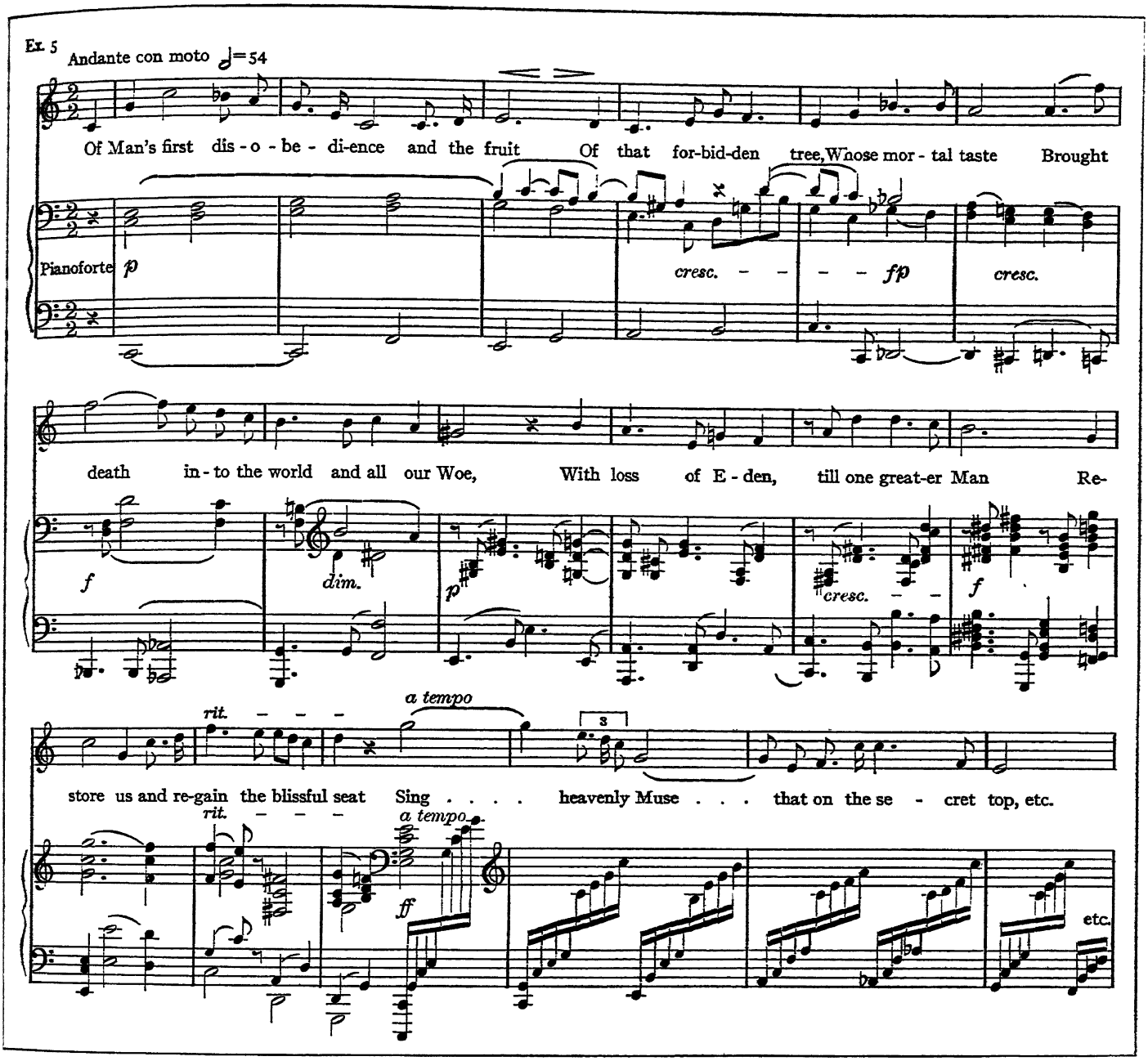
5. **Phrasing.**—The higher art of phrasing is chiefly observable in groups of very much simpler bars than those of our illustrations so far. Two facts, often ignored, must be realized before we can understand phrasing at all. First, music, being in time and not in space, is never apprehended in a *coup d'oeil*, but always in a momentary present connecting a remembered past with an imperfectly anticipated future. Consequently we miss half the aesthetic values of rhythm if we insist on knowing all about it from the first note. Rhythms have as much right to change their meaning while we listen to them as the cats of Wonderland have to grin; and "they all can and most of them do."

The second point is that the bar represents no fundamental rhythmic fact. It did not come into existence so long as music was printed only in parts. When music began to be printed with all the parts ranged legibly on one page, it was necessary to score the pile of parts with vertical strokes to range them in partitions and guide the eye. Hence the word *score*, and the French *partition* and German *Partitur*. The nascent body-rhythm grew stronger and gradually made it convenient that the bars should coincide with the groups indicated by the time-signature, and this gave rise (but only in recent times) to the delusion that the bar was the permanent unit. It is often obviously not so. When Mozart writes in moderate common time his phrasing is sure to make an odd number of half-bars somewhere so that a theme that originally lay on **1**, 2, 3, 4 now lies on 3, 4, **1**, 2. In such a case it is pedantic to say that the accent has changed and still more pedantic to blame Mozart for not either taking shorter bars throughout or changing to them according to the rhythm. If the half-bar displacement is really awkward Mozart will put it right, as when he rebarred the duet "Bei Männern welche Liebe fühlen" in *Die Zauberflöte*. But long bars imply delicate accents and these accents become no harder when the phrasing contracts.

Beethoven writes his scherzos, and some very powerful other movements, in the shortest possible bars, and it is often difficult to tell whether the first of such bars is a main accent or an anacrusis. In the first movement of the C minor sonata (op. 10, No. 1) when we reach bar 22 it becomes manifest that bar 9 must have been in anacrusis; but we cannot have noticed that at the time, for when theorists go back to bar 1 and say that that initial bump was in anacrusis we can only smile. In three late works Beethoven helps the players by the words *Ritmo di tre battute* and *Ritmo di quattro battute*. The most famous of these passages is in the scherzo of the ninth symphony. Why did Beethoven not use there $\frac{6}{4}$ or $\frac{12}{4}$ bars so that his *ritmo di tre battute* became self-evident as a change to $\frac{6}{4}$? Because if you wish to ride this Pegasus you must please to rise on your stirrups once in Beethoven's bar, and not only once in 3 or 4. The change to 3-bar rhythm is obvious enough; but the return to 4 is not, as Grove said, effected by the drums, but comes where nobody can possibly detect it. And Beethoven, having helped the conductor at this point, is quite content, as in earlier works *passim*, that the listeners should gradually become aware that the 3-bar swing is no longer in being. In the trio, Beethoven wishing to indicate that 2 of its crotchets correspond to 3 of the scherzo, first wrote in $\frac{3}{4}$ time. But this made the lilt as unrecognizable as the true proportions of Iceland at the top of a map on Mercator's projection. So he changed it to alla-breve bars $\frac{3}{2}$.

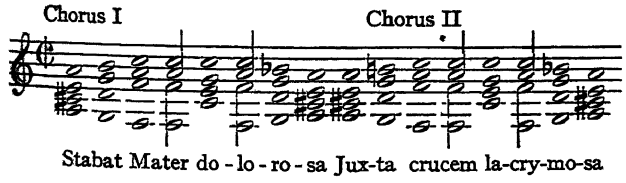
The common sense of the whole matter is that hard accents and soft accents are equally liable in the long run to obliterate the distinction between the first and the third of four beats, and may go far to weaken that between the first and the second. We shall never find that Beethoven's short bars will fit any one interpretation throughout a piece, nor shall we often be able to fix the point at which the rhythmic angle is shifted. And when we have fixed everything some overlap will upset us or some extra bar make us hold our breath. Four-bar rhythm is more important to music than limericks are to literature, but the limerick is hardly more adequate or historically qualified to be taken as the fundamental basis for rhythm. And we must not take a lofty timeless view of rhythmic inequalities and changes. Farmer Giles is mistaken in the idea that the lady he finds sketching in the woods where you can't see round the corner would find a better subject on the top of a hill where you can see six counties.

Ex. 5



6. **Older Musical Rhythms.**—In measuring the distance between the musical rhythms, the most familiar to us and those of the 16th and earlier centuries, the first thing we must dismiss is our strong body-rhythm. Only the lightest ballets and fa-las of our great madrigalists have any such element. The greater part of

Ex. 6



the 16th century polyphony is held together by a time-system which merely counts semibreves and settles whether the semibreve is to be *perfect* and equal to 3 minims or *imperfect* and equal to 2, and also whether three or only two semibreves are to go to a breve. The law of accent holds with pairs of minims about as strongly as in modern music, but it is already very much weakened with pairs of semibreves. Examine the first two lines of Palestrina's *Stabat Mater*, which is as wonderful in rhythm as it is in harmony.

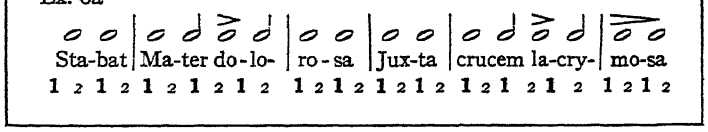
The music of the second line is identical with that of the first, and both lines are an exact quantitative rendering of the verses, with longs twice the size of shorts. The time signature tells us that the breve contains 2 semibreves and the semibreve two minims. Accordingly the modern editor draws bar-strokes at regular breve-distances throughout the score. Then comes the modern choir-master, warm from a rehearsal of *Be Not Afraid* in *Elijah*, and beats four in a bar, down, left, right, up, while the dutiful double choir sings

Sta-bat	Ma-ter do	(sniff) lo ro	Sa jux
1 2 3 4	**1** 2 3 4	**1** 2 3 4	**1** 2 3 4
Ta cru	Cem la (sniff) cry		mo sa
1 2 3 4	**1** 2 3 4		**1** 2 3 4

But now let each singer, at a starting signal from the conductor, merely move one finger regularly up and down in minims, downwards for accented beats and upwards for unaccented. It will then be found perfectly easy to override these gentle accents

whenever the sense dictates, and the choir will find itself declaiming the words beautifully.

Ex. 6a

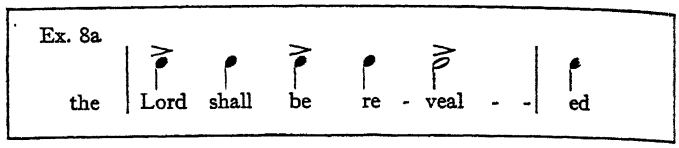


If bars must be drawn let them come only where there is a normal accent. We must not put a bar-line after *mater,* because this would come in the middle of a semibreve, or, as Morley calls it, a stroke. The examples of Victoria and Josquin given in the articles MASS, MOTET and MUSIC are barred freely by these rules, but no such single scoring is adequate for an elaborate polyphony. Ex. 7 gives a passage from Victoria's *O quam gloriosum* in full score barred so as to display what cannot be shown in the short score given with MOTET.

tinually obliterates the difference between $2 \div 3$ and $3 \div 2$, as in example 8 by Lasso.

This swing from 3 to a 3 twice as slow is called *hemiole* and survives as late as Bach and Handel. Thus, in the first chorus of *The Messiah* the hemiole which Handel always uses in triple-time closes gives the cadential accentuation:

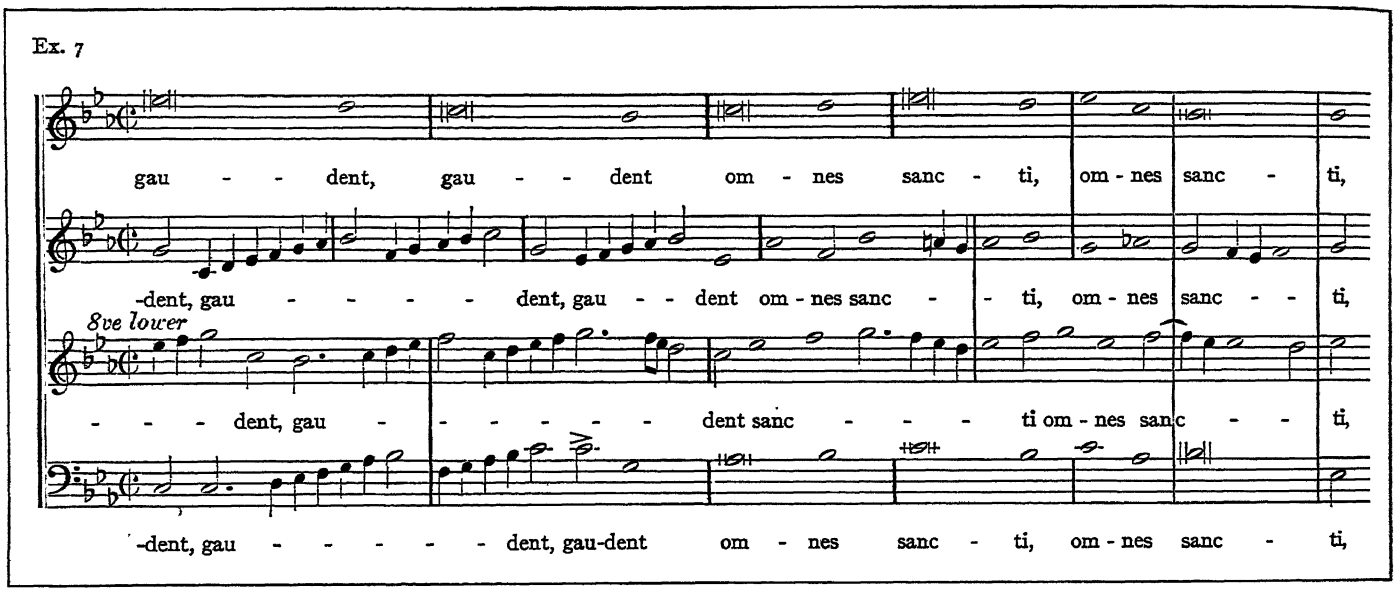
Ex. 8a



The opposite swing from $\frac{3}{2}$ to $\frac{6}{4}$ with a curious bump in the last ($\frac{6}{4}$) bar, characterizes the French courantes of Couperin and Bach.

Before Palestrina we find in England a fairly steady slow triple time (3 divided by 2 or 4) in Tallis; but a little earlier we find Obrecht writing music which abounded in amazing complexities,
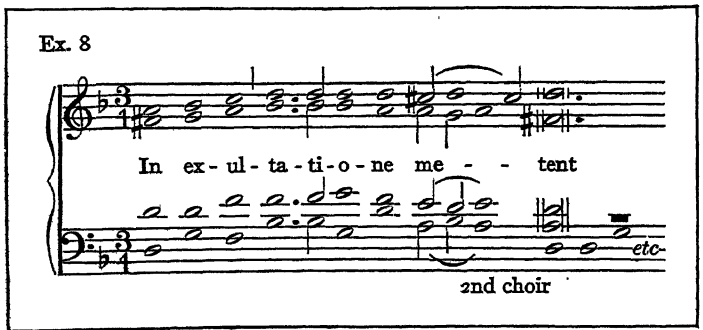
Ex. 7



From this we can see Victoria's Miltonic art of finishing a big paragraph. The lower voices enjoy their own rhythms until the slow swing of the soprano draws the bass along with it. Then the alto joins, and the tenor is compelled to regard his own rhythm as a syncopation against this majority.

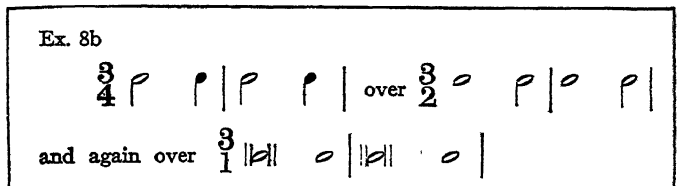
Little has been said so far about syncopation, and little now remains to be said. Its main point, even in the 16th century, as Ex. 7 shows, is that it requires a strong body-rhythm to contradict. A common fallacy of self-centred composers is to write syncopations that never encounter opposition at all. We must not confuse this with the legitimate case of a rhythm the meaning of which first appears later in the course of the music, nor with the case of an intentional vagueness. Nor, to return to the 16th century, must we put the unanimous speech-rhythm syncopations of Ex. 6 into the same category as those of the tenor at the end of Ex. 7.

Ex. 8
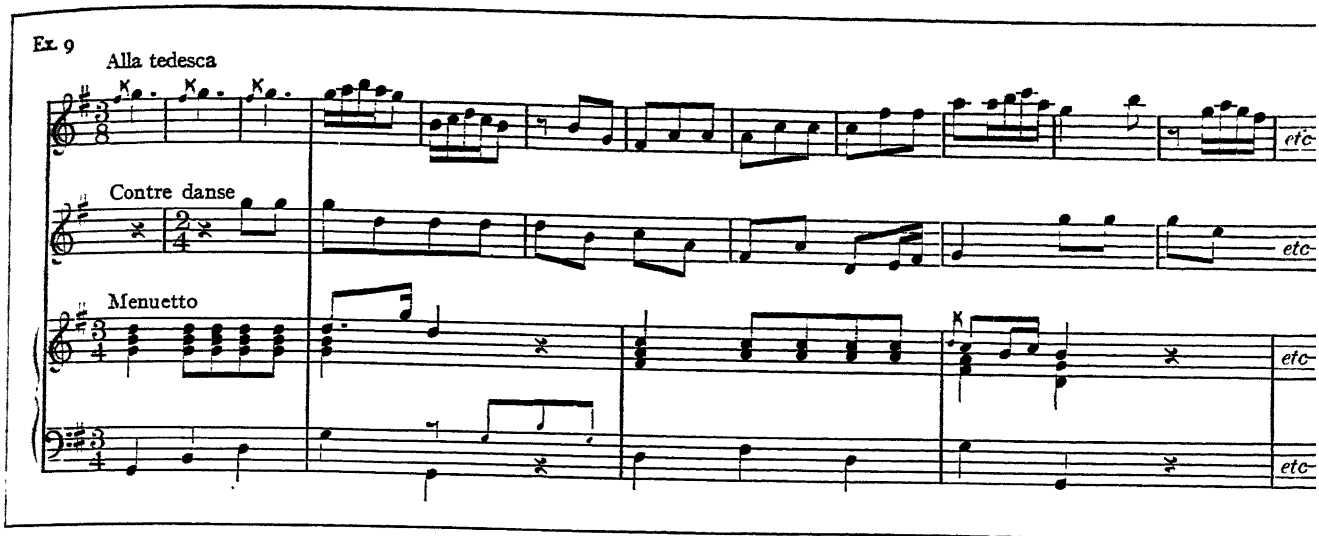


Triple time in the 16th century was very different from what it is in music with a strong body-rhythm. For one thing, it consuch as three depths of triple rhythm:—

Ex. 8b



The complexity is illusory, for the ear makes nothing of it, and the same is the case with the capacity of the ancient time-system of mode, time and prolation to multiply triple rhythms up to 27 beats. The fact that the process was by multiplication shows at once that no real rhythmic effects are concerned, and that the system is only a device by which the long-suffering tenors may count out the enormous notes of some unrecognizable *canto fermo.* If we want genuine highly compound times we must leave these multiplication tables and study the last movement of Beethoven's sonata Op. 111, where the theme and first variation are in triple time divided by 3 ($\frac{9}{16}$); the second variation divides the half-beat by 3, producing $\frac{18}{32}$ (which Beethoven misnames $\frac{6}{16}$); the third variation divides the quarter-beats, producing $\frac{36}{64}$ (misnamed $\frac{12}{32}$); and the fourth variation returns to $\frac{9}{16}$ time and divides it by a uniform triplet vibration of 27 notes to a bar, afterwards surmounted by the unmeasured vibration of a trill. All this is sublime in its cogent clearness.

Genuine complexity was achieved by Palestrina in the second Kyrie of his *Missa* "L'homme armé," a work as beautiful as it is ingenious. But Mozart achieved something unsurpassed in the ballroom scene in *Don Giovanni,* putting his vigorous body-



rhythms to the supreme test of making the characters actually dance and pass remarks in them.

7. **Recent Rhythmic Developments.**—Rhythms other than binary and ternary cannot develop a very strong ictus, though Holst manages in the ballet of *The Perfect Fool* to make some good dance-rhythms of $\frac{7}{8}$. But they tend to flow like speech-rhythms, and they are very reluctant to change their pattern. A rhythm of 5 falls into either 3+2 or 2+3. The famous 5-time movement in Tschaikowsky's *Pathetic* symphony is 2+3 and is in absolutely square 8-bar rhythm throughout. Again 7-time will be some form of 4 and 3, or will suggest 8 with a beat clipped. Ravel, in his pianoforte trio, showed that it is possible to divide 8 into 3+2+3 so inveterately that no listener can possibly hear it as 4+4. The effect is excellent, and other versions of it are used in a much quicker tempo and with more variety by Holst in his Fugal Overture. But we must call things by their right names and not say that a thing is complex when it clings like grim death to its one pattern and falls into phrases of 2+2 for pages together. The *Pantoum* of Ravel's trio blends an impish $\frac{3}{4}$ with a sanctimonious $\frac{4}{4}$ very amusingly. An early pianoforte sonata by Cyril Scott attempts to get away from all regularities. Its 13s and 3s do not always succeed in avoiding straightening out into plain $16 = 4 \times 4$; and when successful are conscientious rather than impulsive. The rhythms of Greek tragedy, interpreted syllabically, are suggestive, and so are many oriental rhythms. But they are not body-rhythms; and it may be doubted whether any great increase in variety of strong body-rhythms is imminent at present. (D. F. T.)

RHYTINA, the northern sea-cow (*Rhytina stelleri*), a gigantic relative of the manati and dugong (*qq.v.*), formerly inhabited Bering and Copper islands, in the north Pacific, where it was discovered during Bering's voyage in 1741, and described by Steller, who accompanied that expedition as a naturalist. About the year 1768 the species, which was the sole representative of its genus, became exterminated. The *Rhytina* was the largest member of the order *Sirenia,* attaining a length of nearly 20ft.; and had a thick, bark-like skin. The jaws, which were bent downwards, were unprovided with teeth but carried ridged horny plates. The tail was deeply forked; and the flippers were short and truncated, lacking the terminal joints of the digits.

When discovered, these Sirenians were numerous in the bays of Bering island, where they browsed upon the abundant sea-tangle. Their extirpation is due to the Russian sailors and traders who visited the island in pursuit of seals and sea otters.

RIAZ PASHA (*c.* 1835–1911), Egyptian statesman, born about 1835, was of a Circassian family, but said to be of Hebrew extraction. Ismail Pasha discovered him, and made him one of his ministers, to find, to his chagrin, that Riaz was possessed of a remarkable independence of character. When Ismail's financial straits compelled him to agree to a commission of inquiry Riaz was vice-president of the commission. He filled this office with distinction, but not to the liking of Ismail. The khedive, however, felt compelled to nominate Riaz minister of the interior in the first Egyptian cabinet (Sept. 1878–April 1879). When Ismail dismissed the cabinet and attempted to resume autocratic rule, Riaz fled the country. Upon the deposition of Ismail, June 1879, Riaz was sent for by the British and French controllers, and he formed the first ministry under the khedive Tewfik. His administration was overthrown by the agitation which had for figure-head Arabi Pasha (*q.v.*). On the evening of the 9th of September 1881, after the military demonstration in Abdin Square, Riaz was dismissed; broken in health he went to Europe, remaining at Geneva until the fall of Arabi. After that event Riaz accepted office as minister of the interior under Sherif Pasha. Had Riaz had his way Arabi and his associates would have been executed forthwith, and when the British insisted that clemency should be extended to the leaders of the revolt Riaz resigned (Dec. 1882). He took no further part in public affairs until 1888, when, on the dismissal of Nubar Pasha (*q.v.*), he was summoned to form a government. He worked in harmony with the British agent (Sir Evelyn Baring—afterwards Lord Cromer) until May 1891. In the February following he again became prime minister under Abbas II., being selected as comparatively acceptable both to the khedivial and British parties. In April 1894 Riaz finally resigned office on account of ill-health. Superior, probably both intellectually and morally to his great rival Nubar, he lacked the latter's broad statesmanship as well as his pliability. Riaz's standpoint was that of the benevolent autocrat; he believed that the Egyptians were not fitted for self-government and must be treated like children, protected from ill-treatment by others and prevented from injuring themselves. In 1889 he was made an honorary G.C.M.G. Riaz died on June 18, 1911.

RIBADENEIRA, PEDRO A. (1527–1611), hagiologist was born at Toledo on Nov. 1, 1527. As a lad he repaired to Rome for study, and there on Sept. 18, 1540, was admitted by Ignatius Loyola, in his thirteenth year, as one of the Society of Jesus, which had not yet received papal sanction. He pursued his studies at Paris (1542) in philosophy and theology. Loyola, in 1555, sent him on a mission to Belgium; in pursuance of it he visited England in 1558. In 1574 he settled in Madrid, where he died on Sept. 10, 1611. His most important work is the *Life of Loyola* (1572). That Ribadeneira was, though an able, a very credulous writer, is shown by his lives of the successors of Loyola in the generalship of the Society, Lainez and Borgia; and especially by his *Flos Sanctorum* (1599–1610), a collection of saints' lives, entirely superseded by the labours of the Bollandists.

See his autobiography in his *Bibliotheca Scriptorum Societatis Jesu* (1602 and 1608, supplemented by P. Alegambe and N. Sotwell in 1676); H. F. De Puy, *An Early Account of the Establishment of Jesuit Missions in America* (1921).

RIBAULT or **RIBAUT, JEAN** (*c.* 1520–1565), French navigator, was born at Dieppe, about 1520. Appointed by Admiral

Coligny to take French Protestants to America. Ribault sailed on Feb. 18, 1562, with two vessels, and on May 1 landed at Florida at St. John's river, or, as he called it, Rivière de Mai. Having settled his colonists at Port Royal harbour (now Paris Island, S.C.), and built Fort Charles for their protection, he returned to France. In 1563 he appears to have been in England and to have issued *True and Last Discoverye of Florida* (Hakluyt Soc., vol. vii.). In April 1564 Coligny despatched another expedition under René de Laudonnière, but meanwhile Ribault's colony, destitute of supplies, revolted against their governor and attempted to make their way back to Europe in a boat which was happily picked up by an English vessel. In 1565 Ribault was again sent out to satisfy Coligny as to Laudonnière's management of his new settlement, Fort Caroline, on the Rivière de Mai. While he was still there the Spaniards attacked the French ships at the mouth of the river. Ribault set out to retaliate but his vessels were wrecked near Matanzas Inlet and he had to return to Fort Caroline by land. The Spaniards by this time had slaughtered all the colonists except a few who got off with two ships under Ribault's son. Induced to surrender by false assurances, Ribault and his men were put to the sword in Oct. 1565.

BIBLIOGRAPHY.—*See* E. and E. Haag, *La France protestante* (1846–59); F. Parkman, *Pioneers of France in the New World* (new ed. 1912); J. Ribaut, *The Whole and True Discoverye of Terra Florida*, a reprint of the London ed. of 1563 with notes and biography (Deland, Florida, 1927).

RIBBON-FISHES: *see* OARFISH and DEALFISH.

RIBBONISM, the name given to an Irish secret-society movement, which began at the end of the 18th century in opposition to the Orangemen (*q.v.*), and which was represented by various associations under different names, organized in lodges, and recruited all over Ireland from the lowest classes of the people. The actual name of Ribbonism (from a green badge worn by its members) became attached to the movement later, about 1826; and after it had grown to its height, about 1855, it declined in force, and was practically at an end in its old form when in 1871 the Westmeath Act declared Ribbonism illegal. (*See* also IRELAND: *History*.)

RIBBONS. By this name are designated narrow webs, commonly of silk or velvet, used primarily for binding and tying in connection with dress, but also applied for innumerable useful, ornamental, and symbolical purposes. Along with that of tapes, fringes, and other small wares, the manufacture of ribbons forms a special department of the textile industries.

RIBEAUVILLÉ (Rappoltsweiler), a town of France, in the department of Haut-Rhin. Pop. (1926) 4,031. It lies at the entrance of the valley of the Strengbach, under the Vosges mountains, 33 m. S.W. of Strasbourg on the railway to Basle. It is in part surrounded by ancient walls, and has many mediaeval houses and two fine Gothic churches, of St. Gregory and St. Augustine. The Carolabad, a saline spring with a temperature of 64°, made Ribeauvillé a watering-place.

Rappoltsweiler, known in the 8th century as Rathaldovilare, passed from the bishops of Basel to the lords of Rappoltstein, famous nobles of Alsace. The lord of Rappoltstein was the protector of wandering minstrels. When the family became extinct in 1673 this office of king of the pipers (*Pfeiferkönig*) passed to the counts palatine of Zweibrücken-Birkenfeld. The minstrels had a pilgrimage chapel near Rappoltsweiler, dedicated to their patron saint, Maria von Dusenbach, and here they held an annual feast on Sept. 8. Near the town are the ruins of three famous castles, Ulrichsburg, Girsberg and Hohrappoltstein.

RIBEIRA, a town of north-western Spain, in the province of Corunna, on the extreme south-west of the peninsula formed between the Ria of Muros and Noya and Arosa bay. Pop. (1920) 15,834. Ribeira is in a hilly country, abounding in wheat, wine, fruit, fish and game. Its port is Santa Eugenia de Ribeira.

RIBEIRO, BERNARDIM (1482–1552), the father of bucolic prose and verse in Portugal, was a native of Torrão in the Alemtejo. He studied at the University of Lisbon, was introduced by one of his relatives to the court of King Manoel, and became secretary to King John III. in 1524. Ribeiro's early verses are to be found in the *Cancioneiro Geral* of Garcia de Resende (*q.v.*). He took part in the historic *Serões do Paço*, or palace evening entertainments, which largely consisted of poetical improvisations; there he met and earned the friendship of the poets Sá de Miranda (*q.v.*) and Christovão Falcão who soon became his literary comrades and the confidants of his romantic passion for a lady who has been variously identified by literary historians. All that is certain is that the upshot of the affair was banishment from court. Ribeiro had poured out his heart in five beautiful eclogues, the earliest in Portuguese, written in the popular octosyllabic verse. He is said to have gone to Italy, and possibly was there when he wrote his moving knightly and pastoral romance *Menina e Moça*, in which he related the story of his passion, personifying himself under the anagram of "Bimnarder," and the lady under that of "Aonia." When he returned home in 1524, the new king, John III., restored him to his former post. But his mind was already unhinged by trouble. About 1534 a long illness supervened, then melancholia. In 1549 the king gave him a pension; in 1552 he died insane in All Saints hospital in Lisbon.

The *Menina e Moça* was not printed until after Ribeiro's death (Ferrara, 1554.) It is divided into two parts, the first of which is certainly the work of Ribeiro (ed. Dr. José Pessanha, Oporto, 1891), while as to the second opinion is divided.

See Visconde Sanches de Baena, *Bernardim Ribeiro* (1895); Dr. Theophilo Braga, *Bernardim Ribeiro e o Bucolismo* (Oporto, 1897); A. F. G. Bell, *Portuguese Literature* (1922).

RIBERA, GIUSEPPE (1588–1652), called LO SPAGNOLETTO or "little Spaniard," a leading painter of the Spanish and partly Neapolitan school. He was born at Játiba near Valencia in Spain on Jan. 12, 1588. He studied painting under Francisco Ribalta (*c.* 1551–1628), the Spanish Caravaggio, whose "tenebroso technique" with marked contrast of light and shade, he acquired. He then proceeded to Italy. In Rome he studied Raphael's frescoes in the Vatican; in Parma Correggio's works; he probably also visited Padua and Venice. Eventually he settled at Naples, where he married Catarina Azzolino, the daughter of a painter, in 1616. His work attracted the attention of the Spanish viceroy, the duke of Ossuna, who favoured him, and whose patronage was continued by his successors, among whom was Count Monterey. For this nobleman he painted the wonderful "Conception" (1635) in the Augustine monastery of Salamanca. After 1637 he was employed on important work in the Carthusian church of S. Martino at Naples. Commissions flowed in upon Ribera. In 1626 he was elected a member of the Academy of St. Luke in Rome; he was decorated by the pope with the insignia of the order of "the Abito di Cristo" in 1644. Velasquez is said to have visited him at Naples. His influence was felt throughout Italy and Spain, and the popularity of the painters known as the *Tenebrosi* and naturalists depended as much on the example of Ribera as on that of Caravaggio. Luca Giordano was his most distinguished pupil. The close of Ribera's career was shadowed by his grief over the abduction of his second daughter by Don Juan of Austria.

Ribera was one of the most able naturalist painters, but he was also a poet. His drawing was precise and also powerful; his figures are true in form but also full of feeling, especially those of old men. In his earlier style, founded on Ribalta (some say on Caravaggio), he displays an excessive love of strong shadows. His later work was more luminous and of a rich golden tone. Pacheco rightly called him one of the great colourists of Spain. Ribera's religious pictures are free from sentimentality and essentially Roman Catholic in spirit. Owing to his realistic rendering of scenes of martyrdom of Christian saints it has been said that he delighted in subjects of horror. Thus to quote Byron: "Spagnoletto tainted his brush with all the blood of all the sainted" (*Don Juan*, XIV. 71). Among Ribera's principal works we may mention: "The Martyrdom of St. Bartholomew" (1630) in the Prado; "The Pietà" (1637) in S. Martino, Naples; "St. Agnes" (1641) in the Dresden gallery; "The Descent from the Cross" (1644) in the Neapolitan Certosa: "St. Januarius emerging from the Furnace" (1646) in the cathedral, Naples; and "The Adoration of the Shepherds" (1650) in the Louvre. He also painted mythological subjects such as "The Silenus" (1626) in the gallery of Naples and "Venus and Adonis" (1637) in the Galleria Nazion-

ale, Rome. He was the author of several fine male portraits such as "The Musician" from the Stroganoff collection now in the museum of Toronto, Canada. The Prado, Madrid, contains no less than 50 of his paintings.

As an etcher he belonged to the Italian school, and his plates all date from a late period (1621–48). They are masterpieces in direct drawing especially "the Drunken Silenus with Satyrs" (1628) and "Don Juan on Horseback" (1648). Bartsch enumerates 18 plates, of which three are studies of features.

See C. Bermudez, *Diccionario Historico;* Dominici, *Vite de' Pittori* (Naples 1840–46); A. L. Mayer, *Ribera* (Leipzig, 1923).

RIBOT, ALEXANDRE FÉLIX JOSEPH (1842–1923), French statesman, was born at St. Omer on Feb. 7, 1842. After a brilliant career at the University of Paris, he rapidly made his mark at the bar. He was secretary of the conference of advocates and one of the founders of the *Société de législation comparée.* After entering the Chamber of Deputies in 1878 he devoted himself especially to financial questions, and in 1882 was reporter of the budget. He became one of the most prominent republican opponents of the Radical party, distinguishing himself by his attacks on the short-lived Gambetta ministry. He refused to vote the credits demanded by the Ferry cabinet for the Tongking expedition, and shared with M. Clémenceau in the overthrow of the ministry in 1885. At the general election of that year he was defeated, but re-entered the chamber in 1887. After 1889 he sat for St. Omer. His fear of the Boulangist movement converted him to the policy of "Republican Concentration," and he entered office in 1890 as foreign minister in the Freycinet cabinet. He gave a fresh direction to French policy by the understanding with Russia, declared to the world by the visit of the French fleet to Cronstadt in 1891, and subsequently ripened into a formal treaty of alliance. He retained his post in the Loubet ministry (Feb.–Nov. 1892), and on its defeat became himself president of the council, retaining the direction of foreign affairs. The government resigned in March 1893 on the refusal of the chamber to accept the Senate's amendments to the budget. On the election of Félix Faure as president of the Republic in Jan. 1895, Ribot again became premier and minister of finance. On June 10 he made the official announcement of a definite alliance with Russia. On Oct. 30 the ministry fell. After the fall of the Méline ministry in 1898 Ribot tried in vain to form a cabinet of "conciliation." The policy of the Waldeck-Rousseau ministry on the religious teaching congregations broke up the Republican party, and Ribot was among the seceders; but at the general election of 1902, though he himself secured re-election, his policy suffered a severe check. He actively opposed the policy of the Combes ministry and denounced the alliance with Jaurès, and on Jan. 13, 1905, he was one of the leaders of the opposition which brought about the fall of the cabinet. Nevertheless, he now announced his willingness to recognize a new régime to replace the Concordat, and gave the government his support in the establishment of the *Associations cultuelles,* while he secured some mitigation of the severities attending the separation.

In June 1914 M. Poincaré summoned Ribot to form a cabinet. He succeeded in doing so but his Government did not survive the first ministerial declaration. He returned to office in Aug. 1914 as minister of finance in M. Viviani's reconstituted ministry of national defence. He held the same office in the ministry formed by M. Briand on Oct. 29, 1915, and again in the reduced cabinet of Dec. 1916. In March 1917 he succeeded M. Briand as prime minister and minister of foreign affairs. He gave way in Sept. of the same year to M. Painlevé, in whose Government he retained the ministry of foreign affairs, which he resigned in the following month. M. Ribot was a member of the Académie Française and of the Académie des Sciences Politiques et Morales. He died in Paris Jan. 13, 1923.

See M. Laurent, *Nos gouvernements de guerre* (1920).

RIBOT, THEODULE ARMAND (1839–1916), French psychologist, was born at Guingamp on Dec. 18, 1839, and died on Dec. 9, 1916. In 1888 he became professor of psychology at the Collège de France. His thesis for his doctor's degree, republished in 1882, *Hérédité: étude psychologique* (5th ed., 1889), is his most important and best known book. Following the experimental and synthetic methods, he collected instances of inherited peculiarities; he pays particular attention to the physical element of mental life, ignoring all spiritual or non-material factors in man.

Of his works the following have been translated into English:—*English Psychology* (1873); *Heredity: a Psychological Study of its Phenomena, Laws, Causes, and Consequences* (1875); *Diseases of Memory: An Essay in the Positive Psychology* (1882); *Diseases of the Will* (1884); *German Psychology of to-day,* tr. J. M. Baldwin (1886); *The Psychology of Attention* (Chicago, 1890); *Diseases of Personality* (Chicago, 1895); *The Psychology of the Emotions* (1897); *The Evolution of General Ideas,* tr. F. A. Welby (Chicago, 1899); *Essay on the Creative Imagination,* tr. A. H. N. Baron (1906).

RICARDO, DAVID (1772–1823), English economist, was born in London on April 19, 1772, of Jewish origin. His father, who was of Dutch birth, was a successful member of the Stock Exchange. In 1786 Ricardo entered his father's office, where he showed much aptitude for business, but in consequence of his adoption of the Christian faith about 1793, when he married Miss Wilkinson, he was separated from his family and thrown on his own resources. He continued a member of the Stock Exchange and by 1797 was sufficiently wealthy to be able to turn to scientific pursuits; but, having read Adam Smith's great work, he threw himself into the study of political economy.

His publication of a tract on *The High Price of Bullion, a Proof of the Depreciation of Bank Notes,* in 1809, gave a fresh stimulus to the controversy respecting the resumption of cash payments, and indirectly led to the appointment of a committee of the House of Commons, commonly known as the Bullion Committee, to consider the question. The report of the committee confirmed Ricardo's views, and recommended the repeal of the Bank Restriction Act, but the House of Commons declared that paper had undergone no depreciation. In 1811 he met James Mill, who, while influencing Ricardo politically, was under obligations to him in the economic field. Mill said, in 1823, that he himself and J. R. M'Culloch were Ricardo's only genuine disciples.

In 1815, when the Corn Laws were under discussion, Ricardo published his *Essay on the Influence of a Low Price of Corn on the Profits of Stock,* directed against a tract by Malthus entitled *Grounds of an Opinion on the Policy of Restraining the Free Importation of Foreign Corn.* His arguments were based on the theory of rent, which, as Ricardo admitted, had been clearly enunciated by Malthus in his *Inquiry into the Nature and Progress of Rent,* and which had earlier been stated by Anderson. In this essay are set forth the essential propositions of the Ricardian system, such as, that an increase of wages does not raise prices; that profits can be raised only by a fall in wages and diminished only by a rise in wages; and that profits, in the whole progress of society, are determined by the cost of the production of the food which is raised at the greatest expense. These ideas were afterwards incorporated in the *Principles of Political Economy.* In the field of the theory of banking and currency some of Ricardo's best work appears. His main ideas are expressed in three pamphlets: (1) *The High Price of Bullion* (1810), in which he discusses the available means of testing the value of paper money, and the power of the Bank of England to regulate the supply. (2) *Proposals for an Economical and Secure Currency* (1816), in which he elucidates the quantity theory, and pronounces in favour of a mono-metallic standard. (3) *A Plea for a National Bank* (1824), which was, in fact, an indictment of the methods of the existing bank, particularly in connection with its issue of paper money.

Ricardo's chief work, *Principles of Political Economy and Taxation,* appeared in 1817. The fundamental doctrine of this work is that, on the hypothesis of free competition, exchange value is determined by the labour expended in production. Ricardo's theory of distribution has been briefly enunciated as follows: "(1) The demand for food determines the margin of cultivation; (2) this margin determines rent; (3) the amount necessary to maintain the labourer determines wages; (4) the difference between the amount produced by a given quantity of labour at the margin and the wages of that labour determines profit." These theorems require much modification to adapt them to real life. His theory

of foreign trade has been embodied in the two propositions: "(1) International values are not determined in the same way as domestic values; (2) the medium of exchange is distributed so as to bring trade to the condition it would be in if it were conducted by barter." A considerable portion of the work is devoted to a study of taxation, which requires to be considered as a part of the problem of distribution. A tax is not always paid by those on whom it is imposed; it is therefore necessary to determine the ultimate, as distinguished from the immediate, incidence of every form of taxation. Smith had already dealt with this question. Ricardo, in developing and criticising his results, arrives at the conclusion that a tax on raw produce falls on the consumer, but will also diminish profits; a tax on rents falls on the landlord; taxes on houses will be divided between the occupier and the ground landlord; taxes on profits will be paid by the consumer, and taxes on wages by the capitalist.

Having retired from business and become a landed proprietor, Ricardo entered parliament as member for Portarlington in 1819. He contributed to bringing about the change of opinion on the question of free trade which led to the legislation of Sir Robert Peel on that subject, and made some valuable speeches on economic questions. In 1820 he contributed to the supplement of the *Encyclopædia Britannica* (6th ed.) an "Essay on the Funding System." In this besides giving an historical account (founded on Dr. Robert Hamilton's valuable work *On the National Debt,* 1813, 3rd ed., 1818) of the several successive forms of the sinking fund, he urges that nations should defray their expenses, whether ordinary or extraordinary, at the time when they are incurred, instead of providing for them by loans.

Ricardo died on Sept. 11, 1823, at his seat (Gatcomb Park) in Gloucestershire, from a cerebral affection. James Mill, who was intimately acquainted with him, says (in a letter to Napier of November 1818) that he knew not a better man, and on the occasion of his death published a highly eulogistic notice of him in the *Morning Chronicle.* A lectureship on political economy, to exist for ten years, was founded in commemoration of him, M'Culloch being chosen to fill it.

In forming a general judgment respecting Ricardo, we must have in view not so much the minor writings as the *Principles,* in which his economic system is expounded as a whole. By a study of this work we are led to the conclusion that he was an economist rather than a social philosopher like Adam Smith or John Mill, for there is no evidence of his having had any but the narrowest views of the great social problems. He shows no trace of that sympathy with the working classes which is apparent in the *Wealth of Nations;* and he regards the labourer as merely an instrument in the hands of the capitalist. Ricardo's main contributions to economics relate to foreign trade, money, and paper issues and rent. He was responsible for the doctrine of comparative costs, as applied to foreign trade, a clear statement of the quantity theory, and a rather involved discussion of the nature of rent. His work suffers from ambiguity of expression, which has led to erroneous interpretations by his successors.

The criticisms to which Ricardo's general economic scheme is open do not hold with respect to his treatment of the subjects of currency and banking. These form precisely that branch of economics where the operation of purely mercantile principles is most immediate and invariable. They were, besides, the departments of the study to which Ricardo's early training and practical habits led him to give special attention; and they have a lasting value independent of his systematic construction.

Ricardo's collected works were published, with a notice of his life and writings, by J. R. M'Culloch in 1846. The *Principles* were edited, with an introduction, bibliography, and notes, by G. C. K. Gonner (1891), who also edited the *Economic Notes* (1923). *See* also *Letters to T. R. Malthus* (ed. J. Bonar, 1887); *Letters to J. R. M'Culloch* (ed. J. H. Hollander, 1895); *Letters to H. Trower and Others* (ed. J. Bonar and J. H. Hollander, 1899); *Notes on Malthus' Principles of Political Economy* (ed. J. H. Hollander and T. E. Gregory, 1928). A French translation of the *Principles* by F. S. Constancio, with notes by J. B. Say, appeared in 1818; the whole works, trans. F. S. Constancio and A. Fonteyraud, form vol. xiii. (1847) of the *Collection des principaux economistes,* with important notes. *See* also E. Baumstark, *David Ricardo's Grundgesetze der Volkswirthschaft und die Besteuerung übersetzt und erläutert* (1837), also J. H. Hollander, *David Ricardo* (1910) and A. Graziani, *Ricardo e J. S. Mill* (1921).

RICASOLI, BETTINO, BARON (1809–80), (*rē-kah'sō-lī*), Italian statesman, born at Broglio March 19, 1809. In 1847 he founded the journal *La Patria,* and sent to the grand duke of Tuscany a memorial suggesting remedies for the difficulties of the state. In 1848 he was for a short time gonfaloniere of Florence. As Tuscan minister of the interior in 1859 he promoted the union of Tuscany with Piedmont. Elected Italian deputy in 1861, he succeeded Cavour in the premiership. As premier he admitted the Garibaldian volunteers to the regular army, revoked the decree of exile against Mazzini, and attempted reconciliation with the Vatican; but his efforts were rendered ineffectual by the *non possumus* of the pope. He found himself obliged in 1862 to resign office, but returned to power in 1866. On this occasion he refused Napoleon III.'s offer to cede Venetia to Italy, on condition that Italy should abandon the Prussian alliance, and also refused the Prussian decoration of the Black Eagle because Lamarmora, author of the alliance, was not to receive it. After the French troops left Rome in 1866 he attempted to conciliate the Vatican with a convention, in virtue of which Italy would have restored to the Church the property of the suppressed religious orders in return for the gradual payment of £24,000,000. He conceded the *exequatur* to 45 bishops inimical to the Italian régime. The Vatican accepted his proposal, but the Italian Chamber proved refractory, and, though dissolved by Ricasoli, returned more hostile than before. Without waiting for a vote, Ricasoli resigned office. He died at Broglio on Oct. 23, 1880. His private life and public career were marked by a rigid austerity which earned him the name of the "iron baron."

See Tabarrini and Gotti, *Lettere e documenti del barone Bettino Ricasoli,* 10 vols. (Florence, 1886–94); Passerini, *Genealogia e storia della famiglia Ricasoli* (1861); Gotti, *Vita del barone Bettino Ricasoli* (1894).

RICCATI, JACOPO FRANCESCO, COUNT (1676–1754), Italian mathematician, was born at Venice on May 28, 1676, and died at Treviso on April 15, 1754. He studied at the University of Padua, where he graduated in 1696. His authority on all questions of practical science was referred to by the senate of Venice. He corresponded with many of the European savants of his day, and contributed largely to the *Acta Eruditorum* of Leipzig. He was offered the presidency of the academy of science of St. Petersburg (Leningrad), but he declined, preferring the leisure and independence of life in Italy. Riccati's name is best known in connection with his problem called Riccati's equation, published in the *Acta Eruditorum,* Sept. 1724. A very complete account of this equation and its various transformations was given by J. W. L. Glaisher in the *Phil. Trans.* (1881).

His works were collected and published by his sons (1758, 4 vols.).

RICCI, MATTEO (1552–1610), Italian missionary to China, was born of a noble family at Macerata in the March of Ancona on Oct. 7, 1552. After some education at a Jesuit college in his native town he went to study law at Rome, where in 1571, in opposition to his father's wishes, he joined the Society of Jesus.

In 1577 Ricci and other students offered themselves for the East Indian missions. Ricci, without visiting his family to take leave, proceeded to Portugal. His comrades were Rudolfo Acquaviva, Nicolas Spinola, Francesco Pasio and Michele Ruggieri, all afterwards, like Ricci himself, famous in the Jesuit annals. They arrived at Goa in Sept. 1578. After four years spent in India, Ricci was summoned to the task of opening China to evangelization.

Several fruitless attempts had been made by Xavier, and since his death, to introduce the Church into China, but it was not till the arrival at Macao of Alessandro Valignani on a visitation in 1582 that work in China was really taken up. For this object he had obtained the services first of M. Ruggieri and then of Ricci. After various disappointments they found access to Chow-king-fu on the Si-Kiang or West River of Canton, where the viceroy of the two provinces of Kwangtung and Kwangsi then had his residence, and by his favour were able to establish themselves there for some years. Their proceedings were very

cautious and tentative; they excited the curiosity and interest of even the more intelligent Chinese by their clocks, their globes and maps, their books of European engravings, and by Ricci's knowledge of mathematics, dialling and the projection of maps. Eventually troubles at Chow-king compelled them to seek a new home; and in 1589, with the viceroy's sanction, they migrated to Chang-chow in the northern part of Kwangtung, not far from the well-known Meiling Pass.

During his stay here Ricci was convinced that a mistake had been made in adopting a dress resembling that of the bonzes, a class who were the objects either of superstition or of contempt. With the sanction of the visitor it was ordered that in future the missionaries should adopt the costumes of Chinese literates, and, in fact, they before long adopted Chinese manners altogether.

Chang-chow, as a station, did not prove a happy selection, but it was not till 1595 that an opportunity occurred of travelling northward. For some time Ricci's residence was at Nan-changfu, the capital of Kiang-si; but in 1598 he was able to proceed under favourable conditions to Nanking, and thence for the first time to Peking, which had all along been the goal of his missionary ambition. But circumstances were not then propitious, and the party had to return to Nanking. The fame of the presents which they carried had, however, reached the court, and the Jesuits were summoned north again, and on Jan. 24, 1601, they entered the capital. Wan-li, the emperor of the Ming dynasty, in those days lived in seclusion, and saw no one but his women and the eunuchs. But the missionaries were summoned to the palace; their presents were immensely admired, and the emperor had the curiosity to send for portraits of the fathers themselves.

They obtained a settlement, with an allowance for subsistence, in Peking, and from this time to the end of his life Ricci's estimation among the Chinese was constantly increasing, as was at the same time the amount of his labours. Visitors thronged the mission house incessantly; and inquiries came to him from all parts of the empire respecting the doctrines which he taught, or the numerous Chinese publications which he issued. As head of the mission, which now had four stations in China, he also devoted much time to answering the letters of the priests under him, a matter on which he spared no pains or detail. In May 1610 he broke down, and after an illness of eight days died on the 11th of that month.

Ricci's work was the foundation of the subsequent success attained by the Roman Catholic Church in China. When the missionaries of other Roman Catholic orders made their way into China, twenty years later, they found great fault with the manner in which certain Chinese practices had been dealt with by the Jesuits. The controversy burned for considerably more than a century with great fierceness. (For a list of the controversial works *see* Cordier, *Bibliographie de la Chine*.)

Probably no European name of past centuries is so well known in China as that of *Li-ma-teu*, the form in which the name of Ricci (*Ri*-cci *Mat-teo*) was adapted to Chinese usage, and by which he appears in Chinese records. The works which he composed in Chinese are numerous; a list of them (apparently by no means complete, however) will be found in Kircher's *China Illustrata*, and also in Abel Rémusat's *Nouveaux Mélanges Asiatiques* (ii. 213–15).

The chief facts of Ricci's career are derived from the account brought home by P. Nicolas Trigault, *De Expeditione Christiana apud Sinas Suscepta ab Soc. Jesu*, extracted from Ricci's commentaries and published at Augsburg and at Lyons. (H. Y.; X.)

RICCOBONI, MARIE JEANNE (1714–1792), *née* Laboras de Mézières, was born at Paris in 1714. She married in 1735 Antoine François Riccoboni, a comedian and dramatist, from whom she soon separated. She herself was an actress, but did not succeed on the stage. Her works are examples of the novel of "Sensibility," and the nearest English parallel to her work is to be found in the work of Henry Mackenzie (*q.v.*). *Lettres de mistress Fanny Butler* (1757); the remarkable *Histoire du marquis de Cressy* (1758); *Milady Juliette Catesby* (1759–1760), like her other books, in letter form; *Ernestine* (1798), which La Harpe thought her masterpiece; and three series of *Lettres* in the names of *Adelaide de Dammartin* (*comtesse de Sancerre*) (2 vols., 1766), *Elizabeth Sophie de Vallière* (2 vols., 1772), and *Milord Rivers* (2 vols., 1776) were among her works. Deprived by the Revolution of her small pension from the crown, she died on Dec. 6, 1792, in great indigence.

See Julia Kavanagh, *French Women of Letters* (2 vols., 1862), where an account of her novels is given; J. Fleury, *Marivaux et le marivaudage* (1881); J. M. Quérard, *La France littéraire* (vol. vii., 1835); and notices by La Harpe, Grimm and Diderot prefixed to her *Oeuvres* (9 vols., 1826); E. A. Crosby, *Une Romancière oubliée, Mme. Riccoboni* (1926).

RICE, EDMUND IGNATIUS (1762–1844), Irish philanthropist, founder of the "Irish Christian Brothers," was born at Westcourt, near Callan, Kilkenny, on June 1, 1762. He abandoned his provision merchant business to devote himself to education and in 1808 he and nine others, meeting at Waterford, took religious vows from their bishop, assumed a "habit" and adopted an additional Christian name, by which, as by the collective title "Christian Brothers," they were thenceforth known. Schools were established in Cork (1811), Dublin (1812), and Thurles and Limerick (1817). In 1820 Pope Pius VII. issued a brief sanctioning the order of "Religious Brothers of the Christian Schools (Ireland)," the members of which were to be bound by vows of obedience, chastity, poverty and perseverance, and to give themselves to the free instruction, religious and literary, of male children, especially the poor. Rice held the office of superior general of the order from 1822 to 1838. He died on Aug. 29, 1844.

RICE, JAMES (1843–1882), English novelist, was born at Northampton on Sept. 26, 1843. Educated at Queens' college, Cambridge, where he graduated in law in 1867, he was called to the bar at Lincoln's Inn in 1871. In the meantime (1868) he had bought *Once a Week*, which proved a losing venture for him, but which brought him into touch with Walter Besant, a contributor. (*See* Besant's preface to the Library Edition [1887] of *Ready-money Mortiboy*.) There ensued a close friendship and a literary partnership between the two men which lasted ten years until Rice's death. The first of their joint works was *Ready-money Mortiboy* (1872), dramatized by them later and unsuccessfully produced at the Court theatre in 1874. In rapid succession followed *My Little Girl* (1873); *With Harp and Crown* (1874); *This Son of Vulcan* (1876); *The Golden Butterfly* (1876); *The Monks of Thelema* (1878) and others. (*See* BESANT, SIR WALTER.) James Rice died at Redhill on April 26, 1882.

RICE, a well-known cereal, botanical name *Oryza sativa*. According to Roxburgh, the Indian botanist, the cultivated rice with all its numerous varieties has originated from a wild plant, called in India Newaree or Nivara, which is indigenous on the borders of lakes in the Circars and elswhere in India, and is also native in tropical Australia. The rice plant is an annual grass with long linear glabrous leaves, each provided with a long sharply pointed ligule. The spikelets are borne on a compound or branched spike, erect at first but afterwards bent downwards. Each spikelet contains a solitary flower with two outer small barren glumes, above which is a large, tough, compressed, often awned, flowering glume, which partly encloses the somewhat similar pale. Within these are six stamens, a hairy ovary surmounted by two feathery styles which ripens into the fruit (grain), and which is invested by the husk formed by the persistent glume and pale. The cultivated varieties are extremely numerous, some kinds being adapted for marshy land, others for growth on the hillsides. Carleton gives the following provisional arrangement of wild and cultivated rices:—(1) *Oryza granulata* (wild rice), (2) *Oryza officinalis* (wild rice), (3) *Oryza sativa* (cultivated rice), (*a*) *utilissima*, (i.) *communes* (large kernelled rice), (ii.) *minuta* (small kernelled rice), (*b*) *glutinosa* (glutinous rice).

See G. Watt, *Dictionary of the Economic Products of India* (1908); C. B. Carleton, *The Small Grains* (1916); W. W. Robbins, *The Botany of Crop Plants* (1924). (V. H. B.)

World Trade in Rice.—The rice plant is grown in many lands, but most successfully in hot countries with plenty of water obtainable. By far the greater part of the enormous crop is grown in the plains, with the roots standing in water; there is, however, so-called hill rice, which is sown broadcast on ordinary arable land

and never irrigated.

World Crops
(Tons of clean rice)

	1926	Average 1909 to 1913
British India	34,000,000	27,500,000
Japan	6,200,000	5,600,000
Korea	2,700,000	1,100,000
Formosa	700,000	500,000
Indo-China	3,700,000	3,300,000
Dutch East Indies	3,200,000	2,500,000
Siam	2,800,000	1,700,000
Philippine Islands	1,200,000	500,000
Other Countries	2,900,000	2,200,000
*World Total	57,400,000	44,900,000

*China not included, crop estimated at about 30,000,000 tons.

Exports in the year 1926 were 6,300,000 tons, of which 2,360,000 were furnished by British India, 1,200,000 by Indo-China and 1,100,000 by Korea and Formosa. China imported 1,050,000, Dutch East Indies 600,000, Japan 340,000 and Ceylon 470,000 tons, the rest being shared round amongst many countries. The United Kingdom imported 72,000 tons of cleaned and 46,000 tons of broken rice. British India supplied 43,000, Spain 25,000 and the United States 7,000 tons, the remainder coming in smaller lots from many countries.



BY COURTESY OF THE BRITISH MUSEUM (NATURAL HISTORY)

RICE (ORYZA SATIVA), SHOWING GENERAL HABIT OF GROWTH
A. Single flower with part removed to show branched stigma and 6 stamens
B. Single stamen (Both A and B are enlarged)

Preparation of Rice.—All parts of the rice plant are useful; even the husk is valuable as fuel for the mills. Rice is good food, but it cannot be said to be very popular with Western people and there is no record of any civilized community discarding other cereals and making rice its main food. A diet limited to polished rice renders Eastern people very liable to a disease known as beri-beri. But this disease can be avoided by mixing some pulse with the ration and, strange to say, parboiled rice is innoxious. The rice is parboiled before the skin is removed, then it is dried in the sun. It appears that the process fixes the vitamin of the cuticle in the rice berry.

Rice milling is almost a lost industry in Great Britain, only three mills now being at work. Continental and Eastern millers have captured the trade, by reason of their lower working costs. Special machines are used for husking, for milling or whitening (removing the cuticle by attrition), grading, polishing and facing. Such terms as husking, whitening and grading are almost self-explanatory, but it may be useful to mention that grading is necessary to remove the rough broken rice, which is then further graded as to size and finally put on the market as "broken rice," of which there are several classes. Facing and glazing give the rice an attractive appearance and have no other value, except that the facing may protect the surface and save the rice from deterioration. Oiled rice is obtained by running the white rice through a special mixing machine with the bran containing the oily germ. The rice bran, which contains small broken grains, is used as cattle food and is in much request for the manufacture of special feeding cakes. The broken rice is used for brewing and distilling, for the manufacture of starch and to a small extent for the manufacture of rice flour. (G. J. S. B.)

RICE BIRD: *see* BOBOLINK.

RICE PAPER. The substance which has received this name in Europe, through the mistaken notion that it is made from rice, consists of the pith of a small tree, *Aralia papyrifera*, which grows in the swampy forests of Formosa. The cylindrical core of pith is rolled on a hard flat surface against a knife, by which it is cut into thin sheets of a fine ivory-like texture. Dyed in various colours, rice paper is extensively used for the preparation of artificial flowers, while the white sheets are employed by native artists for water-colour drawings.

RICH, BARNABE (*c.* 1540–1617), English author and soldier, was a distant relative of Lord Chancellor Rich. He fought in the Low Countries, rising to the rank of captain, and afterwards served in Ireland. He shared in the colonization of Ulster, and spent the latter part of his life near Dublin. In the intervals of his campaigns he produced many pamphlets on political questions and romances. He died on Nov. 10, 1617. His best-known work is *Riche his Farewell to Militarie Profession conteining verie Pleasaunt discourses fit for a peaceable tyme* (1581). Of the eight stories contained in it, five, he says, "are forged only for delight, neither credible to be believed, nor hurtful to be perused." The rest are translations from the Italian. Among his euphuistic tales are *The Strange and Wonderful Adventures of Don Simonides* (1581), with its sequel (1584); and *The Adventures of Brusanus, prince of Hungaria* (1592). His authenticated works number 24, and includes works on Ireland.

See "Introduction" to the Shakespeare Society's reprint of *Riche his Farewell* (1846); P. Cunningham's "Introduction" to Rich's *Honesty of this Age* (reprinted for the Percy Society, 1844); and the life by S. Lee in the *Dict. Nat. Biog.*

RICH, JOHN (1692–1761), English actor, the "father of English pantomime," was the son of Christopher Rich (d. 1714), the manager of Drury Lane, with whose quarrels and tyrannies Colley Cibber's *Apology* is much occupied. John Rich opened the new theatre in Lincoln's Inn Fields left unfinished by his father, and here, in 1716, under the stage name of Lun, he first appeared as Harlequin in a piece which developed into an annual pantomime. Rich was less happy in his management of Covent Garden, which he opened in 1733, until Garrick's arrival (1746), when a most prosperous season ensued, followed by a bad one when Garrick went to Drury Lane. During Rich's management occurred the rival performances of *Romeo and Juliet*—Barry and Mrs. Cibber at Covent Garden, and Garrick and Miss Bellamy at Drury Lane—and the competition between the two rival actors in *King Lear*. Rich died on Nov. 25, 1761. Garrick has described his acting in pantomime:

> When Lun appeared, with matchless art and whim,
> He gave the power of speech to every limb:
> Tho' masked and mute, conveyed his quick intent,
> And told in frolic gesture what he meant.

RICH, PENELOPE, LADY (*c.* 1562–1607), the Stella of Sir Philip Sidney's *Astrophel and Stella,* was the daughter of Walter Devereux, 1st Earl of Essex. She was a child of fourteen when Sir Philip Sidney accompanied the queen on a visit to Lady Essex in 1576, on her way from Kenilworth, and must have been frequently thrown into the society of Sidney, in consequence of the many ties between the two families. Essex died at Dublin in Sept. 1576. He had sent a message to Philip Sidney from his death-bed expressing his desire that he should marry his daughter, and later his secretary wrote to the young man's father, Sir Henry Sidney, in words which seem to point to the existence of a definite understanding. But her relative and guardian, Henry Hastings, earl of Huntingdon, secured Burghley's assent in March 1581 for her marriage with Robert Rich, 3rd Baron Rich. Penelope is said to have protested in vain against the alliance with Rich, who is represented as a rough and overbearing husband. The evidence against him is, however, chiefly derived from sources as interested as Sir Philip Sidney's violent denunciation in the twenty-fourth sonnet of *Astrophel and Stella,* "Rich fooles there be whose base and filthy hart." Sidney's serious love for Penelope appears to date from her marriage with Rich. The eighth song of *Astrophel and Stella* narrates her refusal to accept him as a lover.

Lady Rich was the mother of six children by her husband when she contracted in 1595 an open liaison with Charles Blount, 8th Lord Mountjoy, to whom she had long been attached. Rich obtained a legal separation in 1601, and Mountjoy acknowledged her five children born after 1595. Mountjoy was created earl of Devonshire on the accession of James I., and Lady Rich was in high favour at court. In 1605 they legitimized their connection by a marriage celebrated by William Laud, the earl's chaplain. This proceeding, carried out in defiance of canon law, was followed by their banishment from court. Devonshire died on April 3, 1606, and his wife within a year of that date.

See the editions of *Astrophel and Stella* by Dr. A. B. Grosart, E. Arber and A. W. Pollard; also the various lives of Sir Philip Sidney, and Mrs. Aubrey Richardson's *Famous Ladies of the English Court* (London, 1899). *See* also references under SIDNEY.

RICH, RICHARD, 1ST BARON RICH (*c.* 1490–1567), English lord chancellor, was born about 1490, in St. Laurence Jewry, London. After holding various preferments, he was knighted in 1533, and became solicitor-general, acting under Thomas Cromwell in the demolition of the monasteries. He played a malicious part in the trials of Sir Thomas More and Bishop Fisher. Rich became first chancellor (1536) of the court of Augmentations, and benefited vastly by its disposal of the monastic revenues. In the same year, he was speaker in the House of Commons. He was a Roman Catholic by conviction, and was a willing agent in the Catholic reaction after the fall of Thomas Cromwell.

Rich was one of the executors of Henry VIII.'s will. In 1548 he became Baron Rich of Leez. As chancellor in succession to Wriothesley he supported Protector Somerset until Oct. 1549, when he deserted to Warwick, and presided over the trial of his former chief. At the close of 1551 he retired from the chancellorship on the ground of ill-health at the time of the final breach between Warwick (now Northumberland) and Somerset.

Lord Rich was an active persecutor during the restoration of the old religion in Essex under Mary's reign. He died at Rochford, Essex, on June 12, 1567, and was buried in Felsted church.

The chief authorities are the official records of the period covered by his official life, calendared in the Rolls Series. *See* also A. F. Pollard, *England under Protector Somerset* (1900); P. Morant, *History of Essex* (2 vols., 1768); R. W. Dixon, *History of the Church of England* (6 vols., 1878–1902); and lives in J. Sargeaunt's *History of Felsted School* (1889); Lord Campbell's *Lives of the Lord Chancellors* (1845–69); and C. H. and T. Cooper's *Athenae Cantabrigienses* (2 vols., 1858–61).

RICH, RICHARD (*fl.* 1610), English soldier and adventurer, the author of *Newes from Virginia,* sailed from England on June 2, 1609, for Virginia, with Captain Christopher Newport and the three commissioners entrusted with the foundation of the new colony. In his verse pamphlet he relates the adventures undergone by the expedition, and describes the resources of the new country, with the advantages offered to colonists. The only known copy of this tract, dated 1610, is in the Huth Library. A reprint edited by J. O. Halliwell-Phillips appeared in 1865.

RICHARD, ST., of Wyche (*c.* 1197–1253), English saint and bishop, was named after his birthplace, Droitwich in Worcestershire. Educated at Oxford, he soon began to teach in the university, of which he became chancellor, probably after he had studied in Paris and in Bologna. About 1235 he became chancellor of the diocese of Canterbury under Archbishop Edmund Rich, and he was with the archbishop during his exile in France. Having returned to England some time after Edmund's death in 1240 he became vicar of Deal and chancellor of Canterbury for the second time. In 1244 he was elected bishop of Chichester, being consecrated at Lyons by Pope Innocent IV. in March 1245, although Henry III. refused to give him the temporalities of the see, the king favouring the candidature of Robert Passelewe (d. 1252). In 1246, however, Richard obtained the temporalities. He died at Dover in April 1253. It was generally believed that miracles were wrought at his tomb in Chichester cathedral, which was long a popular place of pilgrimage, and in 1262 he was canonized at Viterbo by Pope Urban IV.

His life by his confessor, Ralph Bocking, is published in the *Acta Sanctorum* of the Bollandists, with a later life by John Capgrave.

RICHARD (d. 1184), archbishop of Canterbury, was a Norman, who became a monk at Canterbury, where he acted as chaplain to Archbishop Theobald and was a colleague of Thomas Becket. In 1173, more than two years after the murder of Becket, it was decided to fill the vacant archbishopric of Canterbury; there were two candidates, Richard, at that time prior of St. Martin's, Dover, and Odo, prior of Canterbury, and in June Richard was chosen, although Odo was the nominee of the monks. Objections were raised against this election both in England and in Rome, but in April 1174 the new archbishop was consecrated at Anagui by Pope Alexander III., and he returned to England towards the close of the year. The ten years during which Richard was archbishop were disturbed by disputes over the respective rights of the sees of Canterbury and York. Richard died at Rochester on Feb. 16, 1184, and was buried in his cathedral.

See the article by W. Hunt in the *Dict. Nat. Biog.* vol. xlviii. (1896); and W. F. Hook, *Lives of the Archbishops of Canterbury.*

RICHARD I. (1157–1199), king of England, nicknamed "Coeur de Lion" and "Yea and Nay," was the third son of Henry II. by Eleanor of Aquitaine. Born in Sept. 1157, he received at the age of 11 the duchy of Aquitaine, and was formally installed in 1172. In his new position he was allowed, probably from regard to Aquitanian susceptibilities, to govern with an independence which was studiously denied to his brothers in their shares of the Angevin inheritance. Yet in 1173 Richard joined with the young Henry and Geoffrey of Brittany in their rebellion; Aquitaine was twice invaded by the old king before the unruly youth would make submission. Richard was soon pardoned and reinstated in his duchy, where he distinguished himself by crushing a formidable revolt (1175) and exacting homage from the count of Toulouse. In a short time he was so powerful that his elder brother Henry became alarmed and demanded, as heir-apparent, that Richard should do him homage for Aquitaine. Richard having scornfully rejected the demand, a fratricidal war ensued; the young Henry invaded Aquitaine and attracted to his standard many of Richard's vassals, who were exasperated by the iron rule of the duke. Henry II. marched to Richard's aid; but the war ended abruptly with the death of the elder prince (1183).

Richard, being now the heir to England and Normandy, was invited to renounce Aquitaine in favour of Prince John. The proposal led to a new civil war; and, although a temporary compromise was arranged, Richard soon sought the help of Philip Augustus, to whom he did homage for all the continental possessions in the actual presence of his father (Conference of Bonmoulins, Nov. 18, 1188). In the struggle which ensued the old king was overpowered, chased ignominiously from Le Mans to Angers, and forced to buy peace by conceding all that was demanded of him; in particular the immediate recognition of Richard as his successor.

But the death of Henry II. (1189) at once dissolved the friendship between Richard and Philip. Not only did Richard continue the continental policy of his father, but he also refused to fulfil his contract with Philip's sister, Alais, to whom he had been betrothed at the age of three. An open breach was only delayed by the desire of both kings to fulfil the crusading vows which they had recently taken. Richard, in particular, sacrificed all other interests to this scheme, and raised the necessary funds by the most reckless methods. He put up for auction the highest offices and honours; even remitting to William the Lion of Scotland, for a sum of 15,000 marks, the humiliating obligations which Henry II. had imposed at the Treaty of Falaise. By such expedients he raised and equipped a force which may be estimated at 4,000 men-at-arms and as many foot-soldiers, with a fleet of 100 transports (1191).

Richard did not return to his dominions until 1194. But his stay in Palestine was limited to 16 months. On the outward journey he wintered in Sicily, where he employed himself in quarrelling with Philip and in exacting satisfaction from the usurper Tancred for the dower of his widowed sister, Queen Joanna, and for his own share in the inheritance of William the Good. Leaving Messina in March 1191, he interrupted his voyage to conquer Cyprus, and only joined the Christian besiegers of Acre in June. The reduction of that stronghold was largely due to his energy and skill. But his arrogance gave much offence. After the fall of Acre he inflicted a gross insult upon Leopold of Austria; and his relations with Philip were so strained that the latter seized the first pretext for returning to France, and entered into negotiations with Prince John (*see* JOHN, king of England) for the partition of Richard's realm.

Richard also threw himself into the disputes respecting the crown of Jerusalem, and supported Guy of Lusignan against Conrad of Montferrat with so much heat that he incurred grave, though unfounded, suspicions of complicity when Conrad was assassinated by emissaries of the Old Man of the Mountain. None the less Richard, whom even the French crusaders accepted as their leader, upheld the failing cause of the Frankish Christians with valour and tenacity. He won a brilliant victory over the forces of Saladin at Arsuf (1191), and twice led the Christian host within a few miles of Jerusalem. But the dissensions of the native Franks and the crusaders made it hopeless to continue the struggle; and Richard was alarmed by the news which reached him of John's intrigues in England and Normandy. Hastily patching up a truce with Saladin, under which the Christians kept the coast-towns and received free access to the Holy Sepulchre, Richard started on his return (Oct. 9, 1192).

His voyage was delayed by storms, and he appears to have been perplexed as to the safest route. The natural route overland through Marseilles and Toulouse was held by his enemies; that through the empire from the head of the Adriatic was little safer, since Leopold of Austria was on the watch for him. Having adopted the second of these alternatives, he was captured at Vienna in a mean disguise (Dec. 20, 1192) and strictly confined in the duke's castle of Dürenstein on the Danube. His mishap was soon known to England, but the regents were for some weeks uncertain of his whereabouts. This is the foundation for the tale of his discovery by the faithful minstrel Blondel, which first occurs in a French romantic chronicle of the next century. Early in 1193 Leopold surrendered his prize, under compulsion, to the emperor Henry VI., who was aggrieved both by the support which the Plantagenets had given to the family of Henry the Lion and also by Richard's recognition of Tancred in Sicily. Although the detention of a crusader was contrary to public law, Richard was compelled to purchase his release by the payment of a heavy ransom and by doing homage to the emperor for England. The ransom demanded was 150,000 marks; though it was never discharged in full, the resources of England were taxed to the utmost for the first instalments; and to this occasion we may trace the beginning of secular taxation levied on movable property.

Richard reappeared in England in March 1194; but his stay lasted only a few weeks, and the remainder of his reign was entirely devoted to his continental interests. He left England to be governed by Hubert Walter (*q.v.*), and his personal authority was seldom asserted except by demands for new subsidies. The rule of the Plantagenets was still popular in Normandy and Aquitaine; but these provinces were unable or unwilling to pay for their own defence. Though Richard proved himself consistently the superior of Philip in the field, the difficulty of raising and paying forces to resist the French increased year by year. Richard could only stand on the defensive; the keynote of his later policy is given by the building of the famous Château Gaillard at Les Andelys (1196) to protect the lower courses of the Seine against invasion from the side of France. He did not live to see the futility of such bulwarks. In 1199 a claim to treasure-trove embroiled him with the viscount of Limoges. He harried the Limousin and laid siege to the castle of Châlus; while directing an assault he was wounded in the shoulder by a crossbow bolt, and, the wound mortifying from unskilful treatment or his own want of care, he died on April 6, 1199. He was buried by his own desire at his father's feet in the church of Fontevrault. Here his effigy may still be seen[1]. Though contemporary, it does not altogether agree with the portraits on his Great Seal, which give the impression of greater strength and even of cruelty. The Fontevrault bust is no doubt idealized.

The most accomplished and versatile representative of his gifted family, Richard was, in his lifetime and long afterwards, a favourite hero with troubadours and romancers. This was natural, as he belonged to their brotherhood and himself wrote lyrics of no mean quality. But his history shows that he by no means embodied the current ideal of chivalrous excellence. His memory is stained by one act of needless cruelty, the massacre of over two thousand Saracen prisoners at Acre; and his fury, when thwarted or humbled, was ungovernable. A brave soldier, an experienced and astute general, he was never happier than when engaged in war. As a ruler he was equally profuse and rapacious. Not one useful measure can be placed to his credit; and it was by a fortunate accident that he found, in Hubert Walter, an administrator who had the skill to mitigate the consequences of a reckless fiscal policy. Richard's wife was Berengaria, daughter of Sancho VI., king of Navarre, whom he married in Cyprus in May 1191. She was with the king at Acre later in the same year, and during his imprisonment passed her time in Sicily, in Rome and in France. Husband and wife met again in 1195, and the queen long survived the king, residing chiefly at Le Mans. She died soon after 1230. Berengaria founded a Cistercian monastery at Espau.

BIBLIOGRAPHY.—The more important of the general chronicles are: the *Gesta Henrici Secundi,* ascribed to Benedict of Peterborough (Rolls Series, 2 vols., 1867); the *Chronica* of Roger of Hoveden (Rolls Series, 4 vols., 1868–71); the *Chronica* of Gervase of Canterbury (Rolls Series, 1879); the *Imagines Historiarum* of Ralph of Diceto (Rolls Series, 2 vols., 1876); the *Historia Rerum Anglicarum* of William of Newburgh (in *Chronicles of the Reigns of Stephen,* etc., Rolls Series, 2 vols., 1884–85); the *De rebus gestis Ricardi Primi* of Richard of Devizes (in *Chronicles of the Reigns of Stephen,* etc., vol. iii., Rolls Series, 1886); the *Chronicon Anglicanum* of Ralph of Coggeshall (Rolls Series, 1875); the *Flores Historiarum* of Roger of Wendover (Rolls Series, 3 vols., 1886–89); the *Gesta Philippi Augusti* of Rigord (*Société de l'histoire de France,* Paris, 1882) and of Guillaume le Breton (*op. cit.*). A detailed narrative of Richard's crusade is given in *L'Estoire de la guerre sainte,* a rhyming French chronicle by the minstrel Ambroise (ed. Gaston Paris, Paris, 1897), and in the Latin prose version known as the *Itinerarium O. Peregrinorum et gesta Regis Ricardi;* this last, with some valuable historical letters, is printed in W. Stubbs's *Chronicles and Memorials of the Reign of Richard I.* (Rolls Series, 2 vols., 1864–65). Of modern works the following are useful: W. Stubbs's preface to vols. iii. and iv. of Hoveden; the same author's *Constitutional History of England,* vol. i. (Oxford, 1897); Miss K. Norgate's *England under the Angevin Kings,* vol. ii. (1887) and *Richard the Lion Heart* (1924); Sir J. H. Ramsay's *Angevin Empire* (1903); R. Röhricht's *Geschichte des Königreichs Jerusalem* (1898); W. B. Stevenson's *Crusaders in the East* (Cambridge, 1907); A. Cartellieri's *Philipp II. August* (Leipzig, 1899, etc.). (H. W. C. D.)

RICHARD II. (1367–1400), king of England, younger son of Edward the Black Prince by Joan "the Fair Maid of Kent," was born at Bordeaux on Jan. 6, 1367. He was brought to Eng-

[1]The remains of Richard, together with those of Henry II. and his queen Eleanor, were removed in the 17th century from their tombs to another part of the church. They were rediscovered in 1910 during the restoration of the abbey undertaken by the French Government.

land in 1371, and after his father's death was, on the petition of the Commons in parliament, created prince of Wales on Nov. 20, 1376. When Edward III. died, on June 21, 1377, Richard became king. Popular opinion had credited John of Gaunt with designs on the throne. This was not justified; nevertheless, the rivalry of the boy-king's uncles added another to the troubles due to the war, the Black Death and the prospect of a long minority. At first the government was conducted by a council appointed by parliament. The council was honest, but the difficulties of the situation were too great. The ill-considered poll-tax of 1381 was the occasion, though not the real cause, of the Peasants' Revolt in that year. The ministers were quite unequal to the crisis, and when Wat Tyler and his followers got possession of London, Richard showed a precocious tact and confidence in handling it. He met and temporized with the rebels on June 13 at Mile End, and again next day at Smithfield; and with courageous presence of mind, he saved the situation when Tyler was killed, by calling on them to take him for their leader.

From this time Richard began to assert himself. His chief ministers, appointed by parliament in 1382, were the earl of Arundel and Michael de la Pole. Arundel Richard disliked, and dismissed next year, when he began his personal government. Pole, whom he retained as chancellor and made earl of Suffolk, was a well-chosen adviser. But others, and especially his youthful favourite Robert de Vere, promoted to be marquess of Dublin and duke of Ireland, were less worthy. Further, Richard made his own position difficult by lavish extravagance and by outbursts of temper. He chafed under the restraint of his relatives, and therefore encouraged John of Gaunt in his Spanish enterprise.

Thereupon, Thomas of Gloucester, supported by Arundel, attacked his nephew's ministers in the parliament of 1386, and by open hints at deposition forced Richard to submit to a council of control. When Richard, with the aid of his friends and by the advice of subservient judges, planned a reversal of the parliament, Gloucester, at the head of the so-called lords appellant, anticipated him. Richard had been premature and ill-advised. Gloucester had the advantage of posing as the head of the constitutional party. The king's friends were driven into exile or executed, and he himself forced to submit to the loss of all real power (May 1388). Richard changed his methods, and when the lords appellant had lost credit, asserted himself constitutionally by dismissing Gloucester's supporters from office, and appointing in their place well-approved men like William of Wykeham. In the next parliament of 1390 the king showed himself ready to meet and conciliate his subjects. The simultaneous return of John of Gaunt from Spain put a check on Gloucester's ambition. For seven years Richard ruled constitutionally and on the whole well.

In Jan. 1383 Richard had married Anne of Bohemia (1366–1394), daughter of the emperor Charles IV. Her death on June 7, 1394 was a great shock to Richard, and incidentally had important consequences. Richard sought distraction by an expedition to Ireland, the first visit of an English king for more than two centuries. In his policy there he showed a wise statesmanship. At the same time he was negotiating for a permanent peace with France, which was finally arranged in Oct. 1396 to include his own marriage with Isabella, daughter of Charles VI., a child of seven. Gloucester criticized the peace openly, and there was some show of opposition in the parliament of Feb. 1397.

Period of Absolute Monarchy.—But there was nothing to foreshadow the sudden stroke by which in July Richard arrested Gloucester and his chief supporters, the earls of Arundel and Warwick. The others of the five lords appellant, Henry of Bolingbroke, afterwards King Henry IV., and the earl of Nottingham, now supported the king. Richard's action was apparently in deliberate revenge for the events of 1387–88. Gloucester, after a forced confession, died in prison at Calais, smothered by his nephew's orders. Arundel, in a packed parliament, was condemned and executed; his brother Thomas archbishop of Canterbury was exiled. The king's friends, including Nottingham and Bolingbroke, made dukes of Norfolk and Hereford, were all promoted in title and estate. Richard himself was rewarded for ten years' patience by the possession of absolute power. He might perhaps have established it if he could have exercised it with moderation. But he declared that the laws of England were in his mouth, and supported his court in wanton luxury by arbitrary methods of taxation. By the exile of Norfolk and Hereford in Sept. 1398 he seemed to have removed the last persons he need fear. He was so confident that in May 1399 he paid a second visit to Ireland, taking with him all his most trusted adherents.

Rebellion and Deposition.—Thus when Henry landed at Ravenspur in July he found only half-hearted opposition, and when Richard himself returned it was too late. Ultimately Richard surrendered to Henry at Flint on Aug. 19, promising to abdicate if his life was spared. He was taken to London riding behind his rival with indignity. On Sept. 30, he signed in the Tower a deed of abdication, wherein he owned himself insufficient and useless, reading it first aloud with a cheerful mien and ending with a request that his cousin would be good lord to him. The parliament ordered that Richard should be kept close prisoner, and he was sent secretly to Pontefract. There in Feb. 1400 he died: no doubt of the rigour of his winter imprisonment, rather than by actual murder as alleged in the story adopted by Shakespeare. The mystery of Richard's death led to rumours that he had escaped, and an impostor pretending to be Richard lived during many years under the protection of the Scottish government. But no doubt it was the real Richard who was buried without state in 1400 at King's Langley, and honourably reinterred by Henry V. at Westminster in 1413.

Richard II. is a character of strange contradictions. It is difficult to reconcile the precocious boy of 1381 with the wayward and passionate youth of the next few years. Even if it be supposed that he dissembled his real opinions during the period of his constitutional rule, it is impossible to believe that the apparent indifference which he showed in his fall was the mere acting of a part. His violent outbursts of passion perhaps give the best clue to a mercurial and impulsive nature, easily elated and depressed. He had real ability, and in his Irish policy, and in the preference which he gave to it over continental adventure, showed a statesmanship in advance of his time. But this, in spite of his lofty theory of kingship, makes it all the more difficult to explain his extravagant bearing in his prosperity. In appearance Richard was tall and handsome, if effeminate. He had some literary tastes, which were shown in fitful patronage of Chaucer, Gower and Froissart. Richard's second queen, Isabella (1389–1409), was born in Paris on Nov. 9, 1389, and was married to the English king at Calais in October, or November, 1396, but on account of the bride's youth the marriage was never consummated.

When Richard lost his crown in 1399 Isabella was captured by Henry IV.'s partisans and sent to Sonning, near Reading, while her father, Charles VI., asked in vain for the restoration of his daughter and of her dowry. In 1401 she was allowed to return to France; in 1406 she became the wife of the poet, Charles, duke of Orleans, and she died on Sept. 13, 1409.

BIBLIOGRAPHY.—The best contemporary authorities are the *Chronicon Angliae* down to 1388, Walsingham's *Historia Anglicana*, the *Annales Ricardi II.*, Knighton's *Chronicle* (all these in the Rolls Series), the *Vita Ricardi II.* by a Monk of Evesham (ed. T. Hearne), and the *Chronique de la traison et mort* (English Hist. Soc.). Froissart wrote from some personal knowledge. A metrical account of Richard's fall, probably written by a French knight called Creton, is printed in *Archaeologia*, xx. The chief collections of documents are the *Rolls of Parliament* and the *Calendar of Patent Rolls*. H. A. Wallon's *Richard II.* (Paris, 1864) is the fullest life, though now somewhat out of date. For other modern accounts *see* W. Stubbs, *Constitutional History*, and C. W. C. Oman, *The Political History of England*, vol. iv., and *The Great Revolt of 1381*. (C. L. K.)

RICHARD III. (1452–1485), king of England, youngest son of Richard, duke of York, by Cicely Neville, was born at Fotheringhay on Oct. 2, 1452. After the second battle of St. Albans in Feb. 1461, his mother sent him with his brother George for safety to Utrecht. They returned in April, and at the coronation of Edward IV. Richard was created duke of Gloucester. As a mere child he had no importance till 1469–70, when he supported his brother against Warwick, shared his exile and took part in his triumphant return. He distinguished himself at Barnet and Tewkesbury; according to the Lancastrian story, after the latter battle

he murdered the young Edward of Wales in cold blood; this is discredited by the authority of Warkworth (*Chronicle,* p. 18); but Richard may have had a share in Edward's death during the fighting. He cannot be so fully cleared of complicity in the murder of Henry VI., which probably took place at the Tower on the night of May 22, when Richard was certainly present there.

Richard shared to the full in his brother's prosperity. He had large grants of lands and office, and by marrying Anne (1456–1485), the younger daughter of Warwick, secured a share in the Neville inheritance. This was distasteful to George, duke of Clarence, who was already married to the elder sister, Isabel. The rivalry of the two brothers caused a quarrel which was never appeased. Richard does not, however, seem to have been directly responsible for the death of Clarence in 1478; Sir Thomas More, who is a hostile witness, says that he resisted it openly "howbeit somewhat (as men deemed) more faintly than he that were heartily minded to his wealth." Richard's share of the Neville inheritance was chiefly in the north, and he resided usually at Middleham in Yorkshire. In May 1480 he was made the king's lieutenant-general in the north, and in 1482 commanded a successful invasion of Scotland. His administration was good, and brought him well-deserved popularity.

Protectorate.—On Edward's death he was kept informed of events in London by William, Lord Hastings, who shared his dislike of the Woodville influence. On April 29, 1483, supported by the duke of Buckingham, he intercepted his nephew at Stony Stratford and arrested Lord Rivers and Richard Grey, the little king's half-brother. It was in Richard's charge that Edward was brought to London on May 4. Richard was recognized as protector, the Woodville faction was overthrown, and the queen with her younger children took sanctuary at Westminster. For the time the government was carried on in Edward's name, and June 22 was appointed for his coronation. Richard was nevertheless gathering forces and concerting with his friends. In the council there was a party, of whom Hastings and Bishop Morton were the chief, which was loyal to the boy-king. On June 13 came the famous scene when Richard appeared suddenly in the council baring his withered arm and accusing Jane Shore and the queen of sorcery; Hastings, Morton and Stanley were arrested and the first-named at once beheaded. A few days later, probably on June 25, Rivers and Grey were executed at Pontefract. On June 22 Dr. Shaw was put up to preach at Paul's Cross against the legitimacy of the children of Edward IV. On the 25th a sort of parliament was convened at which Edward's marriage was declared invalid on the ground of his precontract with Eleanor Talbot, and Richard rightful king. Richard, who was not present, accepted the crown with feigned reluctance, and from the following day began his formal reign.

Usurpation of the Throne.—On July 6, Richard was crowned at Westminster, and immediately afterwards made a royal progress through the Midlands, on which he was well received. But in spite of its apparent success the usurpation was not popular. Richard's position could not be secure whilst his nephews lived. There seems to be no reasonable doubt that early in August Edward V. and his brother Richard (whom Elizabeth Woodville had been forced to surrender) were murdered by their uncle's orders in the Tower. Attempts have been made to clear Richard's memory. But the report of the princes' death was believed in England at the time, "for which cause king Richard lost the hearts of the people" (*Chronicles of London,* 191), and it was referred to as a definite fact before the French states-general in January 1484. The general, if vague, dissatisfaction found its expression in Buckingham's rebellion.

Richard, however, was fortunate, and the movement collapsed. He met his only parliament in Jan. 1484 with some show of triumph, and deserves credit for the wise intent of its legislation. He could not, however, stay the undercurrent of disaffection, and his ministers, Lovell and Catesby, were unpopular. His position was weakened by the death of his only legitimate son in April 1484. His queen died also a year later (March 16, 1485), and public opinion was scandalized by the rumour that Richard intended to marry his own niece, Elizabeth of York. Thus the feeling in favour of his rival Henry Tudor strengthened. Henry landed at Milford Haven on Aug. 7, 1485, and it was with dark forebodings that Richard met him at Bosworth on the 22nd. The defection of the Stanleys decided the day. Richard was killed fighting, courageous at all events. After the battle his body was carried to Leicester, trussed across a horse's back, and buried without honour in the church of the Greyfriars.

Richard was not the villain that his enemies depicted. He had good qualities, both as a man and a ruler, and showed a sound judgment of political needs. Still it is impossible to acquit him of the crime, the popular belief in which was the chief cause of his ruin. He was a typical man in an age of strange contradictions of character, of culture combined with cruelty, and of an emotional temper that was capable of high ends, though unscrupulous of means. Tradition represents Richard as deformed. It seems clear that he had some physical defect, though not so great as has been alleged. Extant portraits show an intellectual face characteristic of the early Renaissance, but do not indicate any deformity.

BIBLIOGRAPHY.—The chief original authorities are Sir Thomas More's *History of Richard III.,* based on information supplied by Archbishop Morton, and therefore to be accepted with caution; the more trustworthy *Continuation of the Croyland Chronicle* in Fulman's *Scriptores,* the *History* of Polydore Vergil, written in a Tudor spirit; the *Chronicle of London* (ed. C. L. Kingsford, 1905), and its biased expansion in Fabyan's *Chronicle. See* also *Letters and Papers Illustrative of the Reigns of Richard III. and Henry VII.,* ed. J. Gairdner, in Rolls Series. Of later accounts those in Stow's *Annales* (preserving some oral tradition) and George Buck's *Richard III.* ap. Kennet *History of England* deserve mention. Horace Walpole attempted a vindication in his *Historic Doubts* (1768). The best modern account is James Gairdner's *Life of Richard III.* (2nd ed., 1898). The latest and fullest defence is given in Sir Clements Markham's *Richard III., His Life and Character* (1906); G. B. Churchill's *Richard the Third up to Shakespeare* (*Palaestra* x., 1900) is a valuable digest of material. (C. L. K.)

RICHARD, earl of Cornwall and king of the Romans (1209–1272), was the second son of the English king John by Isabella of Angoulême. Born in 1209, Richard was the junior of his brother, Henry III., by fifteen months; he was educated in England and received the earldom of Cornwall in 1225. From this date to his death he was a prominent figure on the political stage. In the years 1225–27 he acted as governor of Gascony; between 1227 and 1238, owing to quarrels with his brother and dislike of the foreign favourites, he attached himself to the baronial opposition and bade fair to become a popular hero. But in 1240 he took the command of a crusade in order to escape from the troubled atmosphere of English politics. He was formally reconciled with Henry before his departure; and their amity was cemented on his return by his marriage with Sancha of Provence, the sister of Henry's queen (1243). In 1257 a bare majority of the German electors nominated Richard as king of the Romans, and he accepted their offer at Henry's desire.

In the years 1257–68 Richard paid four visits to Germany. He obtained recognition in the Rhineland, which was closely connected with England by trade relations. Otherwise, however, he was unsuccessful in securing German support. In the English troubles of the same period he endeavoured to act as a mediator. On the outbreak of civil war in 1264 he took his brother's side, and his capture in a windmill outside Lewes, after the defeat of the royalist army, is commemorated in the earliest of English vernacular satires; he remained a prisoner till the fall of Montfort. But after Evesham he exerted himself, not without success, to obtain reasonable terms for those who had suffered from the vengeance of the royalist party. He died on April 2, 1272. His end is said to have been hastened by grief for his eldest son, Henry of Almain, who had been murdered in the previous year by the sons of Simon de Montfort at Viterbo.

Authorities.—The original sources and general works of reference are the same as for the reign of Henry III. G. C. Gebauer's *Leben und Thaten Herrn Richards von Cornwall* (Leipzig, 1744), H. Koch's *Richard von Cornwall, 1209–1257* (Strassburg, 1888), and A. Busson's *Doppelwahl des Jahres, 1257* (Münster, 1866) are useful monographs. (H. W. C. D.)

RICHARD OF CIRENCESTER (*c.* 1335–*c.* 1401), historical writer, was a member of the Benedictine abbey at West-

minster, and his name ("Circestre") first appears on the chamberlain's list of the monks of that foundation drawn up in the year 1355. In the year 1391 he obtained a licence from the abbot to go to Rome, and in this the abbot gives his testimony to Richard's perfect and sincere observance of religion for some 30 years. In 1400 Richard was in the infirmary of the abbey, where he died in the following year. His only known extant work is *Speculum Historiale de Gestis Regum Angliae, 447–1066.* The ms. of this is in the university library at Cambridge, and has been edited for the Rolls Series (No. 30) by Professor J. E. B. Mayor (2 vols., 1863–69).

RICHARD OF DEVIZES (*fl.* 1191), English chronicler, was a monk of St. Swithin's house at Winchester. The *Chronicon de rebus gestis Ricardi Primi,* by which Richard of Devizes is chiefly known, is an account of events in England and the Holy Land during the third crusade.

See the editions of the *Chronicon de rebus gestis Ricardi Primi* by J. Stevenson (Eng. His. Soc., 1838) and by R. Howlett in *Chronicles of the Reigns of Stephen, Henry II. and Richard I.,* vol. iii. (Rolls Series, 1886); the *Annales de Wintonia* in H. R. Luard's *Annales Monastici,* vol. ii. (Rolls Series, 1864–69).

RICHARD OF HEXHAM (*fl.* 1141), English chronicler, became prior of Hexham about 1141, and died between 1163 and 1178. He wrote *Brevis Annotatio,* a short history of the church of Hexham from 674 to 1138, for which he borrowed from Bede, Eddius and Simeon of Durham. This is published by J. Raine in *The Priory of Hexham, its Chroniclers, Endowments and Annals* (Durham, 1864–65). More important is his *Historia de gestis regis Stephani et de bello Standardii,* valuable for the history of the north of England during the earlier part of the reign of Stephen, and for the battle of the Standard. It has been edited for the Rolls Series by R. Howlett in the *Chronicles of the Reigns of Stephen, Henry II. and Richard I.,* vol. iii. (1886); and has been translated by J. Stevenson in the *Church Historians of England,* vol. iv. (1856).

RICHARD OF ILCHESTER or OF TOCLYVE (d. 1188), English statesman and prelate, was born in the diocese of Bath, where he obtained preferment. Early in the reign of Henry II., however, he is found acting as a clerk in the king's court, probably under Thomas Becket, and he was one of the officials who assisted Henry in carrying out his great judicial and financial reforms. In 1162, or 1163, he was appointed archdeacon of Poitiers, but he passed most of his time in England, although in the next two or three years he visited Pope Alexander III. and the Emperor Frederick I. in the interests of the English king, who was then engaged in his struggle with Becket. For promising to support Frederick he was excommunicated by Becket in 1166. In May 1173 he was elected bishop of Winchester, being consecrated at Canterbury in October 1174. In 1176 he was appointed justiciar and seneschal of Normandy, and was given full control of all the royal business in the duchy. He died on Dec. 21 or 22, 1188, and was buried in Winchester cathedral.

See the article by Miss K. Norgate in the *Dict. Nat. Biog.,* vol. xlviii. (1896); and W. R. W. Stephens and W. W. Capes, *The Bishops of Winchester* (1907).

RICHARD OF ST. VICTOR (d. 1173), theologian and mystic of the 12th century. Very little is known of his life; he was born in Scotland or in England, and went to Paris, where he entered the abbey of St. Victor and was a pupil of the great mystic, Hugh of St. Victor. He succeeded as prior of this house in 1162. The best known of Richard's writings are the mystical treatises: *De statu hominis interioris, De praeparatione animi ad contemplationem, De gratia contemplationis, De gradibus caritatis, De arca nuptica,* and his two works on the Trinity: *De trinitate libri sex, De tribus appropriatis personis in Trinitate.* According to him, six steps lead the soul to contemplation: (1) contemplation of visible and tangible objects; (2) study of the productions of nature and of art; (3) study of character; (4) study of souls and of spirits; (5) entrance to the mystical region which ends in (6) ecstasy.

His theory of the Trinity is chiefly based on the arguments of Anselm of Canterbury. The influence of neo-Platonic terminology, as well as of the works of the pseudo-Dionysius, can be clearly detected in his works. In the *Paradiso* Dante has placed Richard among the greatest teachers of the Church. His writings came into favour again in the 16th and 17th centuries, six editions of his works having been printed between 1506 and 1650.

BIBLIOGRAPHY.—*Oeuvres,* edited in the *Patrologia latina* by Migne, vol. cxcvi.; W. Kaulich, "Die Lehren des Hugo und Richard von St. Victor" (*Abhandlungen der K. böhmischen Gesellschaft der Wissenschaften*). V. Folge, vol. xiii. (2nd ed. Paris, 1905), p. 231 (Prague, 1864); P. C. F. Daunou, article in *Histoire littéraire de la France,* tome xiii. (Paris, 1869); G. Buonamici, *Riccardo da S. Vittore* (Alatri, 1899); J. Ebner, *Die Erkenntnislehre Richards von St. Viktor* (Beiträge z. Gesch. d. Phil. vol. 19, Münster, 1917); full bibliography in Überweg, *Gesch. d. Phil.,* Bd. 2 (1928).

RICHARDS, HENRY BRINLEY (1819–1865), English pianist and composer, born at Carmarthen. He is principally remembered for writing the song "God bless the Prince of Wales" (1862).

RICHARDS, THEODORE WILLIAM (1868–1928), American chemist, was born in Germantown (Pa.), on Jan. 31, 1868. He graduated from Haverford college (S.B., 1885) and Harvard University (A.B., 1886; Ph.D., 1888); Göttingen, Leipzig, and the Dresden technical school. He was appointed assistant professor of chemistry at Harvard in 1894 and professor in 1901, and was made director of the Wolcott Gibbs memorial laboratory in 1912. He was best known for his researches on atomic weights. The results were generally accepted, and for his contributions he received the Nobel Prize in chemistry in 1914. He also gave much time to physico-chemical investigation, especially concerning electro-chemistry and chemical thermo-dynamics, thermometry (especially calorimetry), piezo-chemistry, and surface tension. Of these, his contributions to atomic compressibility, to the relation between the change of heat capacity and the change of free and total energy and to the thermo-dynamics of amalgams are noteworthy. In 1907 he was Harvard exchange professor at Berlin, in 1908 Lowell lecturer. He was president of the American Chemical Society (1914), the American Association for the Advancement of Science (1917), and the American Academy of Arts and Sciences (1919). (*See* ATOMIC WEIGHTS.) He died at Cambridge, Mass., on April 2, 1928.

RICHARDSON, HENRY HOBSON (1838–1886), American architect, was born in the parish of St. James, La., on Sept. 29, 1838, of a rich family, his mother being a grand-daughter of the famous Dr. Priestley, the English dissenting refugee and man of science. He was graduated from Harvard university in 1859, and went immediately to Paris to study architecture, entering the École des Beaux-Arts. The Civil War, which broke out in the United States while he was in the school, prevented his return to Louisiana, and stripped his family of their possessions. Richardson provided for his own support by working in the offices of practising architects in Paris, till the fall of 1865. He then established himself in New York, where he soon made his way into practice as an architect. In 1878 he moved to Boston, designing there most of the work that made his reputation. He married in 1867 Miss Julia Gorham Hayden of Boston; he died there on April 27, 1886.

Richardson's career was short, and the number of his works was small indeed compared with the attention they attracted and the influence he left behind him. The most important and characteristic are: Trinity church and the so-called Brattle Square church, in Boston; the alterations in the State Capitol at Albany; the county buildings at Pittsburgh; town halls at Albany, Springfield and North Easton; town libraries at Woburn, North Easton, Quincy, Burlington and Malden; Sever hall and Austin hall at Harvard university; the Chamber of Commerce at Cincinnati. Trinity church, the Pittsburgh buildings and the Capitol at Albany were works of great importance, which have had a strong influence on men who followed him.

The best known book about Richardson is Mrs. Schuyler van Rensselaer's *H. H. Richardson and his Works* (Boston, 1888).

RICHARDSON, OWEN WILLANS (1879–), English physicist, was born on April 26, 1879, at Dewsbury, Yorkshire. He was educated at Batley Grammar school and at Trinity college, Cambridge, where he became a fellow. He held the post

of professor of physics at the University of Princeton from 1906 to 1913, and was Wheatstone professor of physics at King's college, London, from 1914 to 1924. He was then appointed a Yarrow research professor by the Royal Society and director of research in physics at King's college.

Richardson's best known work is on the emission of electricity from hot bodies. He has made this subject peculiarly his own and has given it the name "thermionics." Richardson was elected F.R.S. in 1913.

He is the author of two standard works: *The Electron Theory of Matter* (1914) and *The Emission of Electricity from Hot Bodies* (1916).

RICHARDSON, SAMUEL (1689–1761), English novelist, was the son of a London joiner, who, for obscure reasons, probably connected with Monmouth's rebellion, had retired to Derbyshire, where, in 1689, Samuel was born. He was apprenticed at seventeen to an Aldersgate printer named John Wilde. Here he became successively compositor, corrector of the press, and printer on his own account; married his master's daughter according to programme; set up newspapers and books; dabbled a little in literature by compiling indexes and "honest dedications," and ultimately became Printer of the Journals of the House of Commons, Master of the Stationers' Company, and Law-Printer to the King. Like all well-to-do citizens, he had his city house of business and his "country box" in the suburbs; and, after a thoroughly "respectable" life, died on July 4, 1761, being buried in St. Bride's Church, Fleet Street, close to his shop (now demolished), No. 11 Salisbury Court.

The origin of *Pamela* dates back to a request from Rivington of St. Paul's Churchyard and Osborn of Paternoster Row, two book-selling friends who were aware of Richardson's epistolary gifts, to suggest that he should prepare a little model letter-writer for such "country readers" as "were unable to indite for themselves." The result was *Pamela;* or *Virtue Rewarded.* He completed it in a couple of months (Nov. 10, 1739 to Jan. 16, 1740). In Nov. 1740 it was issued by Messrs. Rivington and Osborn, who, a few weeks afterward (Jan. 1741), also published the model letter-writer under the title of *Letters written to and for Particular Friends, on the most Important Occasions.* Both books were anonymous. The letter-writer was noticed in the *Gentleman's Magazine* for January, which also contains a brief announcement as to *Pamela,* already rapidly making its way without waiting for the reviewers. A second edition, it was stated, was expected; and such was its popularity, that not to have read it was judged "as great a sign of want of curiosity as not to have seen the French and Italian dancers"—*i.e.,* Mme. Chateauneuf and the Fausans, who were then delighting the town. In February a second edition duly appeared, followed by a third in March and a fourth in May. At public gardens ladies held up the book to show they had got it; Dr. Benjamin Slocock of Southwark openly commended it from the pulpit; Pope praised it; and at Slough, when the heroine triumphed, the enraptured villagers rang the church bells for joy. The other volume of "familiar letters" consequently fell into the background in the estimation of its author, who, though it went into several editions during his lifetime, never acknowledged it.

Such a popularity, of course, was not without its drawbacks. That it would lead to *Anti-Pamelas,* censures of *Pamela* and all the spawn of pamphlets which spring round the track of a sudden success, was to be anticipated. One of the results to which its rather sickly morality gave rise was the *Joseph Andrews* (1742) of Fielding (*q.v.*). But there are two other works prompted by *Pamela* which need brief notice here. One is the *Apology for the Life of Mrs. Shamela Andrews,* a clever and very gross piece of raillery which appeared in April 1741, and by which Fielding is supposed to have alluded to *Joseph Andrews.* The second noteworthy result of *Pamela* was *Pamela's Conduct in High Life* (Sept. 1741), a spurious sequel by John Kelly of the *Universal Spectator.* Richardson tried to prevent its appearance, and, having failed, set about two volumes of his own, which followed in December, and professed to depict his heroine "in her exalted condition." It attracted no permanent attention.

About 1744 we begin to hear something of the proj Richardson's second and greatest novel, *Clarissa; or the of a Young Lady,* usually miscalled *Clarissa Harlowe.* T edition was in seven volumes, two of which came out i 1747, two more in April 1748 and the last three in De Upon the title-page of this, of which the mission was as as that of *Pamela,* its object was defined as showing the di that may attend the misconduct both of parents and chil relation to marriage. Virtue, in *Clarissa,* is not "rewarde hunted down and outraged. The chief drawbacks of *Clar* its merciless prolixity (seven volumes, which cover c months); the fact that (like *Pamela*) it is told by lette a certain haunting and uneasy feeling that many of the h obstacles are only molehills which should have been read mounted.

Between *Clarissa* and Richardson's next work appea *Tom Jones* of Fielding—a rival by no means welcome elder writer, although a rival who generously (and perhaj tently) acknowledged *Clarissa's* rare merits.

> Pectus inaniter angit,
> irritat, mulcet, falsis terroribus implet,
> ut Magus

Fielding had written in the *Jacobite's Journal.* But ev could not console Richardson for the popularity of the "s brat" whom Fielding had made his hero, and his next eff the depicting of a genuine fine gentleman—a task to wl was incited by a chorus of feminine worshippers. In tl *tory of Sir Charles Grandison,* "by the Editor of *Pam Clarissa*" (for he still preserved the fiction of anonymi essayed to draw a perfect model of manly character and c In the pattern presented there is, however, too much bu too much ceremonial—in plain words, too much priggisl to make him the desired exemplar of propriety *in excels* he is not entirely a failure, still less is he to be regarde more than "the condescending suit of clothes" by which unfairly defines Miss Burney's Lord Orville. When Richard lineated Sir Charles Grandison he was at his best, and his ences and opportunities for inventing such a character w finitely greater than they had ever been before. And nothing of his gift for portraying the other sex. Harriet Clementina della Porretta and even Charlotte Grandison, whit behind Clarissa and her friend Miss Howe. *Sir Grandison,* in fine, is a far better book than *Pamela.*

Grandison was published in 1753, and by this time Rich was sixty-four. Although the book was welcomed as war it predecessors, he wrote no other novel, contenting him stead with indexing his works, and compiling an anthology "maxims," "cautions" and "instructive sentiments" the tained. To these things, as a professed moralist, he had attached the greatest importance. He continued to corr relentlessly with a large circle of worshippers, mostly w whose counsels and fertilizing sympathy had not a litt tributed to the success of his last two books. He was a n highly strung little man, intensely preoccupied with his and his feelings, hungry for praise when he had once ta and afterwards unable to exist without it; but apart from things, well meaning, benevolent, honest, industrious and re Seven vast folio volumes of his correspondence with h friends, and with a few men of the Young and Aaron Hi are preserved in the Forster library at South Kensington. of it only have been printed. There are several good portr him by Joseph Highmore, two of which are in the N Portrait Gallery.

Richardson is the father of the novel of sentimental a As Sir Walter Scott has said, no one before had di deeply into the human heart. No one, moreover, had l to the study of feminine character so much prolong search, so much patience of observation, so much interest indulgent apprehension, as this twittering little printer of bury Court. That he did not more materially control the of fiction in his own country was probably owing to the new tion which was given to that fiction by Fielding and Sr

whose method, roughly speaking, was synthetic rather than analytic. Still, his influence is to be traced in Sterne and Henry Mackenzie, as well as in Miss Burney and Miss Austen, both of whom, it may be noted, at first adopted the epistolary form. But it was in France, where the sentimental soil was ready for the dressing, that the analytic process was most warmly welcomed. Extravagantly eulogized by the great critic, Diderot, modified with splendid variation by Rousseau, copied (unwillingly) by Voltaire, the vogue of Richardson was so great as to tempt French critics to seek his original in the *Marianne* of a contemporary analyst, Marivaux. As a matter of fact, though there is some unconscious consonance of manner, there is nothing whatever to show that the little-letter author of *Pamela,* who was also ignorant of French, had the slightest knowledge of Marivaux or *Marianne.* In Germany Richardson was even more popular than in France. Gellert, the fabulist, translated him; Wieland, Lessing, Hermes, all imitated him, and Coleridge detects him even in the *Robbers* of Schiller. What was stranger still, he returned to England again under another form. The French *comédie larmoyante,* to which he had given a fillip, crossed the channel as the sentimental comedy of Cumberland and Kelly, which, after a brief career of prosperity, received its death-blow at the hands of Goldsmith and Sheridan.

Richardson's novels were edited by Mangin (19 vols., 1811), and an edition in 12 vols. was published by Sotheran in 1883 with preface by Sir Leslie Stephen. A *Collection of the Moral and Instructive Sentiments,* etc., was published in 1755. A selection from Richardson's *Correspondence* was published by Mrs. A. L. Barbauld in 1804, in six volumes, with a valuable Memoir. Recent lives are by Miss Clara L. Thomson, 1900, and by Austin Dobson ("Men of Letters"), 1902. A convenient reprint of the novels, with copies of the old illustrations by Stothard, Edward Burney and the rest, and an introduction by Mrs. E. M. M. McKenna, was issued in 1901 in 20 volumes.

(A. Do.; X.)

RICHBOROUGH, England, a port on the Stour, in Kent, 1¼ m. from Sandwich. Richborough castle is one of the most remarkable monuments of the Roman occupation of Great Britain. It marked the beginning of Watling street, and guarded the channel of the Wantsum, then separating the Isle of Thanet from the mainland. Richborough was a landing place and base for Roman legionaries. The extant remains of the castle include the north wall of the castellum, 460 ft. long and 22 ft. high. There is a cruciform platform of concrete, 144 ft. long and 104 ft. wide. It is believed to have borne a lighthouse. A subterranean passage runs round the foundations of the platform. During the War of 1914–18, to relieve the traffic in military stores through Dover, the old port was re-established. Work began in 1916 with the widening and deepening of the Stour, and the cutting of a canal across a large bend; 250 ac. of sea marsh were reclaimed, and nearly a mile of wharfage built and equipped. In six months regular cross-channel services of barges to Calais and Dunkirk were begun. In 1925 the port of Richborough with 1,500 ac. of land, the remaining equipment, and the fleet of ferries and barges, was sold for development in connection with the undertakings in the Kent coalfields.

RICHELIEU, ARMAND EMMANUEL SOPHIE SEPTEMANIE DU PLESSIS, Duc de (1766–1822), French statesman, was born in Paris on Sept. 25, 1766, the son of Louis Antoine du Plessis, duc de Fronsac and grandson of the marshal de Richelieu (1696–1788). The comte de Chinon, as the heir to the Richelieu honours was called, was married at fifteen to Rosalie de Rochechouart, a deformed child of twelve, with whom his relations were never more than formal. After two years of foreign travel he entered the Queen's dragoons and next year received a place at court, where he had a reputation for Puritan austerity. He left Paris in 1790 for Vienna, and in company with his friend Prince Charles de Ligne joined the Russian army as a volunteer, reaching the Russian headquarters at Bender on the 21st of November. By the death of his father in February 1791, he succeeded to the title of duc de Richelieu. He returned to Paris shortly afterwards on the summons of Louis XVI., but he was not sufficiently in the confidence of the court to be informed of the projected flight to Varennes. In July he obtained a passport from the National Assembly for service in Russia. In 1803 he became governor of Odessa. Two years later he became governor general of the Chersonese, of Ekaterinoslav and the Crimea, then called New Russia. In the eleven years of his administration, Odessa rose from a village to an important city. The central square is adorned with a statue of Richelieu (1826). A magnificent flight of nearly 200 granite steps leads from the Richelieu monument down to the harbours.

Richelieu returned to France in 1814; on the triumphant return of Napoleon from Elba he accompanied Louis XVIII. in his flight as far as Lille, whence he went to Vienna to join the Russian army, believing that he could best serve the interests of the monarchy and of France by attaching himself to the headquarters of the emperor Alexander. As the personal friend of the Russian emperor his influence in the councils of the Allies was likely to be of great service. He refused, indeed, Talleyrand's offer of a place in his ministry, pleading his long absence from France and ignorance of its conditions; but after Talleyrand's retirement he succeeded him as prime minister.

The events of Richelieu's tenure of office are noticed elsewhere. (*See* France: *History.*) It was mainly due to his efforts that France was so early relieved of the burden of the allied army of occupation. It was for this purpose mainly that he attended the congress of Aix-la-Chapelle in 1818. There he had been informed in confidence of the renewal by the Allies of their treaty binding them to interfere in case of a renewal of revolutionary trouble in France; and it was partly owing to this knowledge that he resigned office in December of the same year, on the refusal of his colleagues to support a reactionary modification of the electoral law. After the murder of the duc de Berry and the enforced retirement of Decazes, he again became president of the council (Feb. 21, 1821); but his position was untenable owing to the attacks of the "Ultras" on the one side and the Liberals on the other, and on Dec. 12 he resigned. He died of apoplexy on May 17, 1822.

Part of Richelieu's correspondence, his journal of his travels in Germany and the Turkish campaign, and a notice by the duchesse de Richelieu, are published by the Imperial Historical Society of Russia, vol. 54. *See* also L. de Crousaz-Crêtêt, *Le Duc de Richelieu en Russie et en France* (1897); L. Rioult de Neuville in the *Revue des questions historiques* (Oct. 1897); R. de Cisternes, *Le Duc de Richelieu, son action aux conférences d'Aix-la-Chapelle* (1898).

RICHELIEU, ARMAND JEAN DU PLESSIS DE, Cardinal (1585–1642), French statesman, was born of an ancient family of the lesser nobility of Poitou. The cardinal's father, François du Plessis, seigneur de Richelieu (d. 1590), fought through the wars of religion, first as a favourite of Henry III., and after his death under Henry IV. His mother, Susanne de La Porte, belonged to a legal family. Armand was the third son and was born in Paris, Sept. 9, 1585. In 1606, at the age of twenty-one, he was nominated bishop of Luçon by Henry IV. As he was under the canonical age, he went to Rome to obtain a dispensation and was consecrated there in April 1607. In the winter of 1608 Richelieu went to his poverty-stricken little bishopric, and for the next six years devoted himself seriously to his episcopal duties. In 1614 he was elected by the clergy of Poitou to the last States-general which met before the Revolution. There he attracted the attention of Marie de' Medici, the queen-mother, and was chosen at its close to present the address of the clergy embodying its petitions and resolutions. After the States-general was dissolved he remained in Paris, and the next year he became almoner to Anne of Austria, the child-queen of Louis XIII. He was appointed in 1616 a secretary of state to the king. But he owed all to Concini, and his taste of power ended with the murder of his patron on Aug. 24, 1617.

The reign which Richelieu was to dominate so absolutely began with his exile from the court. He resigned himself to the post of chief adviser to Marie de' Medici in her exile at Blois. Here he sought to ingratiate himself with Luynes and the king by reporting minutely the actions of Marie and by protestations of loyalty. As this ungrateful work brought no reward, Richelieu retired once more to his bishopric. But he was exiled to Avignon, with his brother and brother-in-law, on April 7, 1618. There he wrote "A Defence of the Main Principles of the Catholic Faith," but

the escape of Marie de' Medici from Blois, on Feb. 22, 1619, again opened paths for his political ambition. Luynes and the king recalled him to the post at Angoulême with the queen-mother, who allowed him to sign the treaty of Angoulême with the Cardinal de la Rochefoucauld, acting for the king. By this treaty Marie was given liberty to live wherever she wished, and the government of Anjou and of Normandy with several castles was entrusted to her. Richelieu was made a cardinal by Pope Gregory XV., on Sept. 5, 1622.

Luynes's death on Dec. 15, 1621, made possible a reconciliation a month later between the king and his mother. Richelieu seized his opportunity. He furnished Marie de' Medici with political ideas and acute criticisms of the king's ministry, especially of the Brularts. Marie zealously pushed her favourite towards office, and eventually, in 1624, the king named him a member of his council. In August he became chief minister of Louis XIII.

Home Policy.—For the next eighteen years, he worked to make the royal power—his power—absolute and supreme at home, and to crush the rival European power of the Habsburgs. At home there were two opponents to be dealt with: the Huguenots and the feudal nobility. The former were crushed by the siege of La Rochelle and the vigorous campaign against the duc de Rohan. But the religious toleration of the edict of Nantes was reaffirmed while its political privileges were destroyed, and Huguenot officers fought loyally in the foreign enterprises of the cardinal. The suppression of the independence of the feudal aristocracy was inaugurated in 1626 by an edict calling for the destruction of castles not needed for defence against invasion. There was no serious opposition to the new minister. The first serious conspiracy took place in 1626, the king's brother, Gaston of Orleans, being the centre of it. His governor, Marshal D'Ornano, was arrested by Richelieu's orders, and then his confidant, Henri de Talleyrand, marquis de Chalais and Vendôme, the natural son of Henry IV. Chalais was executed and the marshal died in prison. The overthrow of the Huguenots in 1629 made Richelieu's position seemingly unassailable, but the next year it received its severest test. Marie de' Medici had turned against her "ungrateful" minister with a hatred intensified, it is said, by unrequited passion. In September 1630, while Louis XIII. was very ill at Lyons, the two queens, Marie and Anne of Austria, reconciled for the time, won the king's promise to dismiss Richelieu. He postponed the date until peace should be made with Spain. When the news came of the truce of Regensburg Marie claimed the fulfilment of the promise. On Nov. 10, 1630, the king went to his mother's apartments at the Luxembourg palace. Orders were given that no one should be allowed to disturb their interview, but Richelieu entered by the unguarded chapel door. When Marie had recovered breath from such audacity she proceeded to attack him in the strongest terms, declaring that the king must choose between him or her. Richelieu left the presence feeling that all was lost. The king gave a sign of yielding, appointing the brother of Marillac, Marie's counsellor, to the command of the army in Italy. But before taking further steps he retired to Versailles, then a hunting lodge, and there, listening to two of Richelieu's friends, Claude de Saint-Simon, father of the memoir writer, and Cardinal La Valette, sent for Richelieu in the evening, and while the salons of the Luxembourg were full of expectant courtiers the king was reassuring the cardinal of his continued favour and support. The "Day of Dupes," as this famous day was called, was the only time that Louis took so much as a step toward the dismissal of a minister who was personally distasteful to him but who was indispensable. The queen-mother followed the king and cardinal to Compiègne, but as she refused to be reconciled with Richelieu she was left there alone and forbidden to return to Paris. The next summer she fled across the frontiers into the Netherlands, and Richelieu was made a duke. Then Gaston of Orleans, who had fled to Lorraine, came back with a small troop to head a rebellion to free the king and country from "the tyrant." The only great noble who rose was Henri, duc de Montmorenci, governor of Languedoc, and his defeat at Castelnaudary on the 1st of September 1632, was followed by his speedy trial by the parlement of Toulouse, and by his execution. Richelieu had sent to the block the first noble of France, the last of a family illustrious for seven centuries, the head of the nobility of Languedoc. He knew no mercy. The only other conspiracy against him which amounted to more than intrigue was that of Cinq Mars in 1642, at the close of his life. This vain young favourite of the king was treated as though he were really a formidable traitor, and his friend. De Thou, son of the historian, whose sole guilt was not to have revealed the plot, was placed in a boat behind the stately barge of the cardinal and thus conveyed up the Rhone to his trial and death at Lyons.

Foreign Policy.—Richelieu's foreign policy was as inflexible as his home policy. To humble the Habsburgs he aided the Protestant princes of Germany against the emperor, in spite of the strong opposition of the disappointed Catholic party in France, which had looked to the cardinal as a champion of the faith. The year of Richelieu's triumph over the Huguenots (1629) was also that of the Emperor Ferdinand's triumph in Germany, marked by the Edict of Restitution, and France was threatened by a united Germany. Richelieu, however, turned against the Habsburgs young Gustavus Adolphus of Sweden, paying him a subsidy of a million livres a year by the treaty of Barwald of Jan. 23, 1631. The dismissal of Wallenstein was of double value to Richelieu when his Swedish ally marched south. After the treaty of Prague, in May 1635, by which the emperor was reconciled with most of the German princes, Richelieu was finally obliged to declare war, and, concluding a treaty of offensive alliance at Compiègne with Oxenstierna, and in October one at St. Germain-en-Laye with Bernard of Saxe-Weimar, he proceeded himself against Spain, both in Italy and in the Netherlands. The war opened disastrously for the French, but by 1642, when Richelieu died, his armies,—risen from 12,000 men in 1621 to 150,000 in 1638—had conquered Roussillon from Spain; they held Catalonia, which had revolted from Philip IV. of Spain, and had taken Turin and forced Savoy to allow French troops on the borders of the Milanese. In Germany Torstensson was sweeping the imperialist forces before him through Silesia and Moravia. The lines of the treaty of Westphalia, six years later, were already laid down by Richelieu; and its epochal importance in European history is a measure of the genius who threw the balance of power from Habsburg to Bourbon.

Personality.—His own personality was his strongest ally. The king himself quailed before that stern, august presence. His pale, drawn face was set with his iron will. His frame was sickly and wasted with disease, yet when clad in his red cardinal's robes, his stately carriage and confident bearing gave him the air of a prince. His courage was mingled with a mean sort of cunning, and his ambition loved the outward trappings of power as well as its reality; yet he never swerved from his policy in order to win approbation, and the king knew that his one motive in public affairs was the welfare of the realm—that his religion, in short, was "reason of state."

No courtier was ever more assertive of his prerogatives. He claimed precedence over even princes of the blood, and one like Condé was content to draw aside the curtains for him to pass, and to sue for the hand of Richelieu's niece for his son, the "Great Condé." His pride and ambition were gratified by the foundation of a sort of dynasty of his nephews and nieces, whose hands were sought by the noblest in the realm. Like all statesmen of his time, Richelieu made money out of politics. He came to court in 1617 with an income of 25,000 livres from his ecclesiastical benefices. In the later years of his life it exceeded 3,000,000 livres. He lived in imperial state, building himself the great Palais Cardinal, now the Palais Royal, in Paris, another at Rueil near Paris, and rebuilding his ancestral château in Poitou. In January 1641 the tragedy of *Mirame*, which was said to have been his own, was produced with great magnificence. Richelieu was anxious for literary fame, and his writings are not unworthy of him. But more important than his own efforts as an author were his protection and patronage of literary men, especially of Corneille, and his creation of the French Academy

in 1635. When he died, on Dec. 4, 1642, he was buried in the chapel of the Sorbonne, which still stands as he built it. His tomb, erected in 1694, though rifled at the Revolution, still exists.

Many writings are attributed to Richelieu, although owing to his habit of working with substitutes and assistants it is difficult to settle how much of what passes under his name is authentic. *Les Tuileries, La Grande Pastorale, Mirame,* and the other plays, have long been forgotten; but a permanent interest attaches to his *Mémoires* and correspondence: *Mémoire d'Armand du Plessis de Richelieu, l'année 1607 à 1610,* ed. by A. Baschet (1880); *Histoire de la mère et du fils* (Marie de Medici and Louis XIII.), sometimes attributed to Mézeray (Amsterdam, 1730) and, under title *Histoire de la régence de reine Marie de Médici, femme de Henry IV.* (The Hague, 1743); *Mémoires sur le règne de Louis XIII.,* 1610 to 1638, and of which the earlier portion is a reprint of the *Histoire de la mère et du fils,* Petitot's collection (1823, *seq.*); *Testament politique d'Armand du Plessis, cardinal de R.* (Amsterdam, 1687, *seq.*); *Journal de 1630–31* (1645); "Lettres, instructions diplomatiques, et papiers d'état," publ. by d'Avenel in the *Coll. de doc. ined.* (1853–77); these, with the *Mémoires* in J. F. Michaud and J. Poujalat's collections, are the most important sources for Richelieu's statesmanship.

BIBLIOGRAPHY.—M. Topin, *Louis XIII. et R.* (1876); B. Zeller, *R. et les Ministres de Louis XIII.* (1880); A. Desprez, *R. et Mazarin; leur deux politiques* (1883); G. d'Avenel, *R. et la monarchie absolue* (1884); L. E. Dussieux, *Le Cardinal de R.; étude biographique* (1886); G. Hanotaux, *Hist. du Cardinal de R.* (2 tom. 1893–1903), and "Maximes d'état et fragments politiques," in the *Coll. de doc. ined;* J. H. Mariejol, *Henri IV. et Louis XIII.* (1905), in Lavisse, *Hist. de la Fr.,* tom. IV.; S. Leathes in *Camb. Mod. Hist.,* vol. iv. (1906); E. C. Price, *Cardinal de R.* (1912); P. Denis, *Le Cardinal de R. et la réforme des monastères benedictines* (1913); M. Deloche, *Autour de la Plume du Cardinal de R.* (1920); W. Mommsen, *Kardinal R., seine Politik im Elsass und Lothringen;* bibl. (1922); F. C. Palmer, *The Economic Policies of R.;* bibl. (1922) in Univ. of Illinois Studies in the Social Sciences; Hilaire Belloc, *Richelieu* (1929).

RICHELIEU, LOUIS FRANÇOIS ARMAND DU PLESSIS, DUC DE (1696–1788), marshal of France, was a grandnephew of Cardinal Richelieu, and was born in Paris on March 13, 1696. As ambassador to Vienna (1725–29) he settled in 1727 the preliminaries of peace; in 1733–34 he served in the Rhine campaign. He fought with distinction at Dettingen and Fontenoy; three years afterwards he made a brilliant defence of Genoa; in 1756 he expelled the English from Minorca by the capture of the San Felipe fortress; and in 1757–58 he closed his military career by those pillaging campaigns in Hanover which procured him the sobriquet of *Petit Père de la Maraude.* In his early days he was thrice imprisoned in the Bastille: in 1711 at the instance of his stepfather, in 1716 in consequence of a duel, and in 1719 for his share in Alberoni's conspiracy against the regent Orleans. He died in Paris on Aug. 8, 1788.

See H. Noel Williams, *The Fascinating Duc de Richelieu* (1910); L. A. F. Du Plessis, *Mémoires authentiques du Maréchal de Richelieu, 1725–1757* (1918); P. d'Estrée, *Le Maréchal de Richelieu 1696–1788* (1917).

RICHEPIN, JEAN (1849–1926), French poet, novelist and dramatist, the son of an army doctor, was born at Medea (Algeria) on Feb. 4, 1849. He served as a *franc-tireur* in the Franco-German War, and was afterwards actor, sailor and stevedore. Richepin became famous with the publication, in 1876, of a volume of verse entitled *Chanson des gueux;* the outspokenness and the revolutionary defiance in these verses resulted in imprisonment and a fine for *outrage aux moeurs.* Later volumes were: *Les Caresses* (1877), *Les Blasphèmes* (1884), *La Mer* (1886), *La Bombarde* (1899). His novels developed in style from the morbidity and brutality of *Les Morts bizarres* (1876), *La Glu* (1881) and *Le Pave* (1883) to the more thoughtful psychology of *Grandes amoureuses* (1896) and *Lagibasse* (1899), and the more simple portrayal of life in *Miarka* (1883), *Truandailles* (1890) and *Flamboche* (1895). His best work is to be found in *Nana Sahib* (1883), in which he himself played with Sarah Bernhardt, *Monsieur Scapin* (1886), *Par le glaive* (1892), *Le Chemineau* (1897), *Le Chien de garde* (1898), *Les Truands* (1899), *Don Quichotte* (1905), most of which were produced at the Comédie française, of which he was for some time director. He also wrote *Miarka* (1905), adapted from his novel, for the music of Alexandre Georges, and *Le Mage* (1897) for the music of Jules Massenet. He was director of the Académie française at the time of his death. He died on Dec. 11, 1926.

His son, Jacques Richepin (b. 1880), the author of *La Reine de Tyr* (1899), *La Cavalière* (1901), *Cadet-Roussel* (1903) and *Falstaff* (1904), also made his mark on the stage.

RICHERUS (*fl.* 10th cent.), monk of St. Remi at Reims, and a chronicler of the 10th century, studied at Reims under Gerbert, afterwards Pope Silvester II. He was still living in 998, but there is no mention of him after that date. His *Historiae* has a unique value as giving us the only tolerably full account by a contemporary of the revolution of 987, which placed the Capets on the throne of France. From 969 onwards Richerus had no earlier history before him, and his work is the chief source for the period.

There are French translations by Guadet (1845, *Soc. de l'hist. de France*); Poinsignon (Reims, 1855, pub. de l'Académie de Rheims).

RICHFIELD SPRINGS, a village of Otsego county, New York, U.S.A., 22 m. S.S.E. of Utica, on Federal highway 20, near the north end of Canadargo lake; served by the Lackawanna and electric railways. Pop. 1930, 1,333 Federal census. It is a health and summer resort, at an elevation of 1,500 ft. above sea-level, in the midst of beautiful scenery, and supplied with sulphur springs, of value in cases of gout, rheumatism and skin diseases.

RICHMOND, EARLS AND DUKES OF. The title earl of Richmond appears to have been in existence in England a considerable time before it was held in accordance with any strict legal principle. Alan, surnamed "Le Roux," and his brother Alan (*c.* 1040–1089), surnamed "Le Noir," relatives of Geoffrey, count of Brittany, and kinsman of William the Conqueror, took part in the latter's invasion of England; and Le Roux obtained grants of land in various parts of England, including manors formerly held by Earl Edwin in Yorkshire, on one of which he built the castle of Richmond, his possessions there being formed into the honour of Richmond, to which his brother Alan Le Noir, or Alan Niger (*c.* 1045–1093), succeeded in 1089. The latter was in turn succeeded as lord of the honour of Richmond by Stephen (d. 1137), count of Penthievre, who was either his son or another brother. These Breton counts are often reckoned as earls of Richmond, though they were not so in the strict and later sense. The same should perhaps be said of Stephen's son Alan Niger II. (*c.* 1116–1146).

This Alan married Bertha, daughter and heiress of Conan, reigning count of Brittany; and his son Conan (*c.* 1138–1171), who married Margaret, sister of Malcolm IV. of Scotland, asserted his right to Brittany, and transferred it in his lifetime to his daughter Constance (*c.* 1162–1201). As he left no sons the honour of Richmond and his other English possessions passed to the king in 1171, though Constance is also loosely spoken of as countess of Richmond in her own right. Constance was three times married, and each of her husbands in turn assumed the title of earl of Richmond, in conjunction with that of count, or duke of Brittany. They were: Geoffrey Plantagenet (1158–1186), son of Henry II., king of England; Randolph de Blundevill, earl of Chester (*c.* 1172–1232), the marriage with whom Constance treated as null on the ground of consanguinity; and Guy de Thouars (d. 1213), who survived his wife for 12 years. The only son of the first marriage, Arthur of Brittany (1187–1203), was styled earl of Richmond in his mother's lifetime, and on his murder at the hands of his uncle, King John, the earldom was resumed by the crown.

By her third husband Constance had two daughters, the elder of whom, Alice, was given in marriage by Philip Augustus, king of France, to Peter de Braine in 1213, after which date Peter was styled duke of Brittany and earl of Richmond till about 1235, when he renounced his allegiance to the king of England and thereupon suffered forfeiture of his English earldom.

In 1241 Henry III. granted the honour of Richmond to Peter of Savoy (1203–1268), uncle of Queen Eleanor, who was thereafter described as earl of Richmond by contemporary chroniclers, though how far he was strictly entitled to the designation has been disputed. By his will he left the honour of Richmond to his niece, the queen consort, who transferred it to the crown. In the same year (1268) Henry III. granted the earldom specifically to

John, duke of Brittany (1217–86), son of Peter de Braine, in whose family the title continued—though it frequently was forfeited or reverted to the crown and was re-granted to the next heir—till 1342, when it was apparently resumed by Edward III. and granted by that sovereign to his son John of Gaunt, who surrendered it in 1372. It was then given to John de Montfort, duke of Brittany, but on his death without heirs in 1399, or possibly at an earlier date through forfeiture, it reverted to the crown.

The earldom now became finally separated from the duchy of Brittany, with which it had been loosely conjoined since the Conquest, although the dukes of Brittany continued to assume the title till a much later date. From 1414 to 1435 the earldom of Richmond was held by John Plantagenet, duke of Bedford, and in 1453 it was conferred on Edmund Tudor, uterine brother to King Henry VI., whose wife, Margaret Beaufort, was the foundress of St. John's college, Cambridge, and of the "Lady Margaret" professorships of divinity at Oxford and Cambridge. (*See* RICHMOND AND DERBY, MARGARET, COUNTESS OF.) When Edmund Tudor's son Henry ascended the throne as Henry VII. in 1485, the earldom of Richmond merged in the crown, but in 1525 Henry Fitzroy, natural son of Henry VIII. by Elizabeth Blound, was created duke of Richmond and Somerset and earl of Nottingham, all these titles becoming extinct at his death without children in 1536.

Ludovic Stuart, 2nd duke of Lennox (1574–1624), who also held other titles in the peerage of Scotland, was created earl of Richmond in 1613 and duke of Richmond in 1623. These became extinct at his death in 1624, but his Scottish honours devolved on his brother Esmé, who was already earl of March in the peerage of England. (*See* MARCH, EARLS OF; and LENNOX.) Esmé's son, James, 4th duke of Lennox (1612–1655), was created duke of Richmond in 1641, the two dukedoms as well as the lesser English and Scottish titles thus becoming again united. In 1672, on the death of his nephew Charles, 3rd duke of Richmond and 6th duke of Lennox, whose wife was the celebrated beauty called "La Belle Stuart" at the court of Charles II. (*see* RICHMOND AND LENNOX, FRANCES TERESA, DUCHESS OF), his titles became extinct.

In 1675 Charles II. created his illegitimate son Charles duke of Richmond, earl of March and baron Settrington. This Charles (1672–1723), on whom his father the king bestowed the surname of Lennox, was the son of the celebrated Louise de Keroualle, duchess of Portsmouth. His son Charles, 2nd duke (1701–1750), added to the titles he inherited from his father that of duke of Aubigny in France, to which he succeeded in 1734 on the death of his grandmother the duchess of Portsmouth; these honours are still held by his descendant the present duke of Richmond.

The seven dukes of Richmond of the Lennox line have all borne the Christian name of Charles. The 2nd duke, by his marriage with Sarah, daughter of the 1st Earl Cadogan, was father of Lady Caroline Lennox, who eloped with Henry Fox, and was the mother of Charles James Fox, and of the beautiful Lady Sarah Lennox (1745–1826) with whom George III. fell in love and contemplated marriage, and who afterwards married, first, Sir Thomas Bunbury, from whom she was divorced, and secondly George Napier, by whom she was the mother of Generals Sir Charles and Sir William Napier.

Charles, 3rd duke of Richmond (1734–1806), was famous for his advanced views on the question of parliamentary reform. Having succeeded to the peerage in 1750, he was appointed British ambassador extraordinary in Paris in 1765, and in the following year he became a secretary of State in the Rockingham administration, resigning office on the accession to power of the earl of Chatham. In the debates on the policy that led to the War of American Independence Richmond was a firm supporter of the colonists. Richmond also advocated a policy of concession in Ireland, with reference to which he originated the famous phrase "a union of hearts." In 1779 the duke brought forward a motion for retrenchment of the civil list; and in 1780 he embodied in a bill his proposals for parliamentary reform, which included manhood suffrage, annual parliaments and equal electoral areas. Richmond sat in Rockingham's second cabinet as master-general of ordnance; and in 1784 he joined the ministry of William Pitt. He now developed strongly Tory opinions, and his alleged desertion of the cause of reform led to a violent attack on him by Lauderdale in 1792. Richmond died in Dec. 1806, and, leaving no legitimate children, he was succeeded in the peerage by his nephew Charles.

The 5th duke (1791–1860), while still known by the courtesy title of earl of March, served on Wellington's staff in the Peninsula, being at the same time member of parliament for Chichester. He was afterwards a vehement opponent in the House of Lords of Roman Catholic emancipation, and at a later date a leader of the opposition to Peel's free trade policy. In 1836, on inheriting the estates of his maternal uncle, the 5th and last duke of Gordon, he assumed the name of Gordon before that of Lennox. On his death in 1860 he was succeeded in his titles by his son Charles Henry, 6th duke of Richmond (1818–1903), a statesman who held various cabinet offices in the Conservative administrations of Lord Derby, Disraeli and the marquess of Salisbury; and who in 1876 was created earl of Kinrara and duke of Gordon. These honours in addition to the numerous family titles of more ancient creation passed on his death in 1903 to his son Charles Henry Gordon-Lennox (1845–1928), 7th duke of Richmond and Lennox and 2nd duke of Gordon. The 7th duke was succeeded by his son Charles Henry Gordon-Lennox (b. 1870).

See Sir Robert Douglas, *The Peerage of Scotland,* edited by Sir J. B. Paul; G. E. C., *Complete Peerage,* vol. vi. (London, 1895); Lady Elizabeth Cust, *Some Account of the Stuarts of Aubigny in France* (1891). For the dukes of the creation of 1675 *see* also, Anthony Hamilton, *Memoirs of Grammont,* edited by Sir W. Scott, new edition (2 vols., 1885); Horace Walpole, *Letters,* edited by P. Cunningham (9 vols., 1891), and *Memoirs of the Reign of George III.,* edited by G. F. R. Barker (4 vols., London, 1894); the earl of Albemarle, *Memoirs of Rockingham and his Contemporaries* (2 vols., 1852); *The Grenville Papers,* edited by W. J. Smith (4 vols., 1852); Earl Stanhope, *Life of William Pitt* (4 vols., 1861); Lord Edmond Fitzmaurice, *Life of William Earl of Shelburne* (3 vols., 1875); the duke of Richmond, *The Right of the People to Universal Suffrage and Annual Parliaments* (1817), being an edition of the 3rd duke's famous "Letter to Lieut.-Colonel Sharman," originally published in 1783; Lord William Pitt Lennox, *Memoir of Charles Gordon-Lennox, 5th Duke of Richmond* (1862).

RICHMOND, LEGH (1772–1827), English divine, was born on Jan. 29, 1772, at Liverpool, and was educated at Cambridge. He wrote *The Dairyman's Daughter,* of which as many as four millions in nineteen languages were circulated before 1849. A collected edition of his stories was first published in 1814 under the title of *Annals of the Poor.* He died May 8, 1827.

See T. S. Grimshawe, *A Memoire* (1828); T. Fry, *Domestic Portraiture* (1833).

RICHMOND, SIR WILLIAM BLAKE, K.B. 1897 (1842–1921), English painter and decorator, was born in London on Nov. 29, 1842. At the age of 14 William Richmond entered the Royal Academy schools, where he worked for about three years. A visit to Italy in 1859 had an important effect upon his development. His first Academy picture was a portrait group (1861), and several other pictures of the same class followed. In 1865 he returned to Italy, and spent four years there, living chiefly at Rome. On his return in 1869 he exhibited "A Procession in Honour of Bacchus" at the Academy. He became Slade professor at Oxford, succeeding Ruskin, in 1878, but resigned three years later. He was elected A.R.A. in 1888 and R.A. in 1895; he received the degree of D.C.L. in 1896, and became professor of painting to the Royal Academy. Apart from his pictures, he is notable for his work in decorative art, his most conspicuous of St. Paul's cathedral. He died at Hammersmith on Feb. 11. 1921. His portrait by George Phoenix is in the National Portrait Gallery.

See *The Richmond Papers,* ed. A. M. W. Stirling (1926).

RICHMOND: *see* MELBOURNE.

RICHMOND, a municipal borough in Surrey, England, 9 m. W.S.W. of Charing Cross, London. Pop. (1931) 37,791. It lies on the right bank of the Thames, which is here crossed by a bridge carrying the main road to Twickenham. Richmond was anciently called *Syenes* and afterwards *Schene* and *Sheen* (a name preserved in the village of East Sheen, adjacent on the London side)

until the name was in 1500 changed to Richmond by command of Henry VII., who was earl of Richmond in Yorkshire. It grew up round the royal manor house, of which nothing but a gateway remains. Edward I. received the Scotch commissioners at his manor of Sheen in 1300. The palace was rebuilt by Edward III., who died here in 1377. It was frequently used by Richard II., who afterwards caused it to be demolished. By Henry V., however, it was rebuilt, and a great tournament was held here in 1492 by Henry VII., who after its destruction by fire in 1498 restored it. Henry VIII. gave it to Wolsey to reside in, after the latter presented him with the new palace of Hampton Court. James I. settled it on his son Henry, prince of Wales, who restored it. Charles I. added to it the new deer park, Richmond park, 2,253 acres in extent surrounded by a wall. After the execution of the king, the parliament presented the park to the citizens of London, who again presented it to Charles II. at the Restoration. Though partly dismantled, the palace was the residence of the queen dowager till 1665, but it was parcelled into tenements about 1720. In the old deer park extending northwards from the site of the palace, Kew Observatory was erected in 1769, occupying the site of a Carthusian convent founded by Henry V. The White Lodge was built by George I. To the south-east of the town is Richmond hill with its famous view of the Thames. A theatre, first established in 1719, was during his later years leased by Edmund Kean. Richmond was incorporated in 1890.

RICHMOND, a municipal borough in the North Riding of Yorkshire, England, 15 m. S.W. of Darlington by a branch of the L.N.E. railway, of which it is the terminus. Pop. (1931) 4,769. It is situated on the left bank of the Swale, where the valley is still narrow and steep-sided before it emerges from the Pennines into the Vale of York.

The town is chiefly interesting because of the castle, which occupies the summit of a high cliff. The castle was founded about 1071 by Alan Rufus of Penthièvre in Brittany, who is said to have rebuilt the town on obtaining from William the Conqueror the estates of the Saxon earl Edwin, which embraced some two hundred manors of Richmond and extended over nearly a third of the North Riding. This tract was called Richmondshire at this time, but the date of the creation of the shire is uncertain. William the Lion of Scotland was imprisoned in the castle in the reign of Henry II.; otherwise the town owes its importance chiefly to its lords. It was a valuable possession in the middle ages, and was usually in royal or semi-royal hands. The whole shire reverted to the crown on the accession of Henry VII. Henry VIII. gave it to his son Henry, afterwards Duke of Richmond, and the title was also bestowed upon a son of Charles II. The original castle covered an area of 5 acres, but the only portions remaining are the Norman keep, with pinnacled tower and walls 100 ft. high by 11 ft. thick, and some smaller towers.

The name of Richmond (Richemont, Richemund) has not been traced further back than 1145, but it is probable that there was an earlier settlement on the site. As far as is known, the earliest charter was granted in 1145 giving the burgesses the borough of Richmond to hold for ever in fee farm at an annual rent of £29, but a charter dated 1146 shows that the burgesses had enjoyed some municipal liberties at an earlier period. Other charters were granted in 1150, and in 1268, the latter pointing to the existence of a market at Richmond, but there is no grant of it extant. In 1278, a yearly fair was granted and in 1328, Edward III. gave the first Royal Charter to the town.

A charter of incorporation, under the title of aldermen and burgesses was granted in 1576 by Queen Elizabeth, who also allowed a market each Saturday, an animal market every fortnight, and a fair each year on the vigil of Palm Sunday. In 1668, Charles II. granted a charter under the title of mayor and aldermen. This charter, though superseded later, was restored in the reign of James II., and, until the passing of the Municipal Reform Act of 1835, was regarded as the governing charter of the borough. Although Richmond received a summons as early as 1328, it was not represented in parliament until 1584, from which time it usually sent two members. In 1867, the number was reduced to one, and since 1885, the representation has been merged in the Richmond division of the North Riding. In 1889, Richmond became the seat of a suffragan bishop in the diocese of Ripon.

The church of St. Mary is transitional Norman, Decorated and Perpendicular, and is largely restored. The church of the Holy Trinity is ancient and was restored to use from ruins; only the nave and a detached tower remain. The tower of a Franciscan abbey, founded in 1258, still exists. Close to the town are the ruins of Easby Abbey, a Premonstratensian foundation of 1152, beautifully situated by the river. The remains include a Decorated gateway, an Early English chapel and fragments of the transepts and choir of the church, with sufficient portions of the domestic buildings to enable the complete plan to be traced. The free Grammar School was founded by Elizabeth, but the present Gothic building was not erected until 1850.

The principal trade is in agricultural produce, and as Richmond possesses the only railway station in Swaledale, the market is still important.

See R. Eale, *Registrum Honoris de Richemond* (1722); C. Clarkson, *History and Antiquities of Richmond* (Richmond 1821); T. D. Whitaker, *A History of Richmondshire* (1823); *Victoria County History: Yorkshire.*

RICHMOND, a city of Contra Costa county, California, U.S.A., on the eastern shore of San Francisco bay, adjoining Berkeley on the north, 8 m. N.E. of San Francisco, with which it is connected by passenger and automobile ferries. It is served by the Santa Fe and the Southern Pacific railways, and is a port of call for vessels operating in coastwise, inter-coastal and foreign trade. Pop. 16,843 in 1920, 21% foreign-born white; and in 1930, 20,093 by the Federal census. Richmond is a rapidly growing industrial centre of the "Eastbay district," with a factory output in 1927 valued at $55,312,976. The major industries include the largest refinery of the Standard Oil Company, terminal repair shops of the Santa Fe railroad and of the Pullman Company, a Ford assembly plant and large establishments making vitreous china, enamelled iron, roofing, linoleum, high explosives, steel barrels and containers, pressed brick, tile and various other commodities. There are 16 miles of harbour frontage. Richmond was settled about 1900 and incorporated in 1905. By 1928 it had an assessed valuation of $30,508,267. It is under a council-manager form of government.

RICHMOND, a city of Indiana, U.S.A., 68 m. E. of Indianapolis, near the Ohio state line, on the east branch of the Whitewater river; the county-seat of Wayne county. It is on Federal highways 27 and 40, and is served by the Chesapeake and Ohio and the Pennsylvania railways. The population was 26,765 in 1920; in 1930, 32,493. The city has broad, well shaded streets, several parks and substantial public buildings. It is the seat of a state hospital for the insane (1890) and of several charitable institutions under religious auspices. Adjoining its western boundary is the beautiful campus (120 ac.) of Earlham college, established in 1847 by the Society of Friends. Richmond has a large wholesale trade and important manufacturing industries. Richmond was founded by Quakers from North Carolina and Pennsylvania, and for many years was the principal centre of the Society of Friends west of Philadelphia. Settlement began in the vicinity in 1806. Richmond was incorporated as a village in 1818 and chartered as a city in 1840.

RICHMOND, a city of eastern Kentucky, U.S.A., the county seat of Madison county; 125 m. S.E. of Louisville, on Federal highway 25 and the Louisville and Nashville railroad. Pop. 5,622 in 1920, 30% negroes; 6,495 in 1930 by the Federal census. It is in the blue-grass region, near the foot-hills of the Cumberland mountains, about 1,000 ft. above sea-level. There is a sulphur spring in the heart of the city. Natural gas is available, and hydro-electric power from the development on the Dix river. Richmond is an important market for thorough-bred live stock and burley tobacco, of which 10,000,000 lb. are handled in a normal season. It is the seat of the U.S. Trachoma hospital (1926) and of the Eastern Kentucky State Teachers' college (1906) which has an enrolment of 4,500 students (1928), and a beautiful 50-ac. campus, formerly occupied by Central university (founded 1874,

consolidated in 1901 with Centre college at Danville). The marked in 1770 by Squire Boone, who preceded his brother el, passed through Richmond, over what is now the Dixie ray, and one of the huge sandstone slabs on which he cut an ption is now in the Court House yard. Along this trail was it the battle of Richmond (Aug. 30, 1862) when the Confed- General Edmund Kirby Smith won a decisive victory. Ft. esborough (erected 1775) and the town founded by Daniel e were about 12 m. south of Richmond. There are many ld mansions in the city and its environs.

CHMOND, the capital and largest city of Virginia, U.S.A., t of entry, the county seat of Henrico county (but admin- ively independent of it), and from 1861 to 1865 the capital e Confederate States of America; at the head of navigation ie James river, 100 m. S. by W. of Washington. It is on ral highways 1 and 60; has a municipal airport; and is d by the Atlantic Coast Line, the Chesapeake and Ohio, Richmond, Fredericksburg and Potomac, the Seaboard Air and the Southern railways, and steamship lines. Pop. 67 in 1920; 66% native white and 31% negroes; 89 males o females; in 1930, 182,929 by Federal census, with an addi- l 30,000 in the immediate suburbs.

e city is very attractively built around a bend in the James. original site, embracing seven hills on the north side of the , has been extended by annexations in all directions (includ- he city of Manchester on the south side in 1910) until the is 26 square miles. Two highway and four railroad bridges the James within the city limits. There are numerous ls, including Belle isle, the site of a Confederate prison g the Civil War, and Mayo's island, now a public park. ects are under way for straightening the bends in the river deepening the channel (now 18 ft.) to 30 ft. between Rich- l and Hampton Roads. The State capitol, standing in a . square, was built (1785–92) after designs prepared from del and plans of the Maison Carrée at Nîmes, which Jeffer- secured while he was minister to France. It contains the lon statue of Washington (1796) and a replica of the bust afayette by Houdon which was presented by Virginia to the of Paris. In this building Aaron Burr was tried (1807); the nia Secession Convention met (1861); and the sessions of Confederate Congress were held. The oldest building in the is a stone dwelling erected in 1737. St. John's Episcopal ch (1740) was the meeting-place of the Virginia Convention 775, before which Patrick Henry made his famous speech ng, "Give me liberty or give me death!" Jefferson Davis attending services in St. Paul's church when word reached (April 2, 1865) from Lee that Richmond must be evacuated. executive mansion of the Confederacy, occupied by Jefferson s 1862–65, a house built in 1819, is now a Confederate eum. The home of Chief Justice Marshall (built in 1795) the war-time residence of Gen. Lee's family, also house rical collections. The Valentine museum, devised by Mann alentine in 1892 as a public trust, includes many books of 15th and 16th centuries. The State library has a valuable ction of old manuscripts. The Edgar Allan Poe shrine and Father Tabb library commemorate those two poets.

ichmond is an important educational centre. The public ols have an annual budget of $1,700,000, and include the inia Mechanics' institute, founded in 1856. The University ichmond (1832) including Richmond college for men, West- pton college for women, and the T. C. Williams School of , has an extensive campus of 293 ac. in the western suburbs he city. The Union Theological seminary (Presbyterian; .) has been in Richmond since 1898. The Medical college of inia (1838) is the oldest medical school in the South. Vir- a Union university for negroes (created in 1899) combines land seminary (1865), Richmond Theological seminary 5) and Hartshorn Memorial college. Both the University Virginia and the College of William and Mary maintain exten- centres in Richmond. The daily papers (both Democratic) the *Times-Dispatch,* formed in 1903 by the consolidation of *Dispatch* (1850) and the *Times* (1886), and the *News-Leader* (1896).

The city has 23 public parks, covering 652 ac., and 12 play- grounds for small children. There are many fine monuments and statues, among them the Washington monument in Capitol square, designed and largely executed by Thomas Crawford, and the noble equestrian statue of Robert E. Lee, by Mercié. In Hollywood cemetery are the graves of Jefferson Davis, James Monroe, John Tyler, John Randolph of Roanoke, Commodore Matthew F. Maury, several Confederate generals, and 16,000 Confederate soldiers. Oakwood cemetery contains the graves of 18,000 Confederate soldiers. Two miles north-east of the city is a national cemetery with 6,600 graves of Union men, most of whom were killed in the actions around Richmond.

Richmond has a mayor-council form of government, with an advisory board consisting of the directors of the five depart- ments, together with the mayor. It owns and operates its water, gas and electric plants, and has an annual budget of $8,500,000. A city plan has been adopted and zoning ordinances are in effect. The assessed valuation of property subject to taxation was $259,- 101,845 in 1927. Richmond is the financial and commercial metropolis of a large area of the South and the leading manufac- turing city of Virginia. It is the seat of the Federal Reserve Bank of the fifth district. Bank debits in 1927 amounted to $1,711,- 049,000, and postal receipts totalled $2,197,000. Five insurance companies have their home offices here. The wholesale and jobbing houses do an annual business of over $150,000,000. Richmond is one of the oldest and largest tobacco markets, and one of the largest hog markets, in the United States. Its principal manu- factures are cigars and cigarettes (500,000,000 and 40,000,000,000 annually) and other tobacco products. In 1927 the total value of the city's manufactures was $220,742,721.

History.—Richmond was founded in 1733 by Col. William Byrd, owner of much land along the James, who held important offices in the Colony and was the author of some of the best accounts of contemporary scenes and events, and whose family has been conspicuous in the history of Virginia since 1637. He was an ancestor of Harry F. Byrd, governor 1926–30, and of Richard E. Byrd, explorer (*q.v.*) An exploring party from James- town had sailed up the river in 1607 and erected a cross on one of the small islands here; a short-lived settlement had been made within the present city limits in 1609, and a second had been attempted 3 m. below by Capt. John Smith on land he bought from the Indians; and in 1645 Ft. Charles had been built as a frontier defence at the falls. Col. Byrd (who had been educated in England) called the town Richmond, probably be- cause of the similarity of its site to that of Richmond on the Thames. It was laid out in 1737 by Maj. William Mayo and was incorporated as a town in 1742. In 1777 the public records were brought here from Williamsburg, and in May 1779, Rich- mond was made the capital of the State. The town was partly burned on Jan. 5, 1781, by British troops under Benedict Arnold. It was chartered as a city in 1782. At the opening of the Civil War it was an important port and commercial centre, with a population of about 38,000. On May 8, 1861, it was made the capital of the Confederacy, and for the next four years was the objective of military operations to which the greatest lead- ers and the finest armies were devoted. (*See* AMERICAN CIVIL WAR.) The city was defended by three encircling lines of fortifi- cations. On March 1, 1862, President Davis placed it under mar- tial law, together with the environs within a radius of 10 miles. The opening of McClellan's peninsular campaign (*see* YORK- TOWN) in 1862 caused great apprehension in Richmond, and preparations were made to ship the government records to a safer place. On the approach of the "Monitor" and the Union gunboats many persons fled from the city and President Davis appointed a day of prayer. Confidence was restored by the checking of the fleet at Drewry's Bluff on May 15, 1862, the battle of Fair Oaks, and the Seven Days (*qq.v.*). In May 1864 Grant began the final campaign against Richmond. (*See* WILDER- NESS and PETERSBURG.)

On the fall of Petersburg (April 2, 1865) Richmond was evacu- ated, after the ironclads, the bridges and many of the tobacco

and military warehouses had been set on fire. When the Federal troops made their entrance the next morning a serious conflagration was under way, which was not extinguished until a third of the city was in ruins. The Tredegar iron works, still a leading industry of Richmond, was the principal iron foundry of the Confederacy, where most of the cannon were cast. A tobacco warehouse and ship-chandlery (built in 1845 by Luther Libby) was used as a prison, chiefly for Federal officers, throughout the war. Frequently it was terribly overcrowded, housing at times as many as 1,200, and the sufferings and the death-rate were extreme. In 1888–89 Libby prison was moved to Chicago to be a war museum. Within 25 years after the close of the war the population of Richmond had doubled (reaching 81,388 in 1890). $14,000,000 was invested in manufacturing plants, annual jobbing sales amounted to $31,500,000 and bank clearings to $93,500,000. In the next 30 years (1890–1920) the population doubled again.

RICHMOND AND DERBY, MARGARET, COUNTESS OF (1443–1509), mother of the English king, Henry VII., and foundress of St. John's and Christ's colleges at Cambridge, was the daughter and heiress of John Beaufort, duke of Somerset, and was born on May 31, 1443. In 1455 she married Edmund Tudor, earl of Richmond, who died in the following year; she then married Henry (d. 1482), son of Humphrey Stafford, duke of Buckingham, and later Thomas Stanley, afterwards earl of Derby. She was in constant communication with her son, the future Henry VII., during his exile in Brittany, and with her husband, Lord Stanley, aided him to gain the crown in 1485. Under the influence of her confessor, John Fisher, afterwards bishop of Rochester, the countess founded the Lady Margaret professorships of divinity at the universities of Oxford and Cambridge. She completed the foundation of Christ's College, Cambridge, and much of her wealth was left for building and endowing St. John's College in the same university. She died on the 29th of June 1509.

See C. H. Cooper, *Memoir of Margaret, Countess of Richmond and Derby* (1874).

RICHMOND AND LENNOX, FRANCES TERESA STEWART, DUCHESS OF (1648–1702), daughter of a physician in the household of Queen Henrietta Maria when she was in exile after 1649, was born in 1648 and was brought up in France. Henrietta Maria sent her to England, where she was appointed maid of honour to Catherine of Braganza, queen of Charles II. Charles II. became infatuated with her, and it is stated that in 1667 he was considering the possibility of obtaining a divorce in order to make her his wife. This was at a time when he feared to lose her as his mistress, since her hand was sought in marriage by Charles Stuart, duke of Richmond and Lennox. In March 1667 she eloped with Richmond and married him secretly; but on her return to court she retained her hold on the king's affections.

RICHMOND RIVER AND BASIN, together with the basins of the Tweed (*q.v.*) and Clarence Rivers, forms the largest area of coastal lowland in New South Wales, Australia (*c.* 125 miles N.-S.; 20–40 miles east-west). The area contains most of the productive portions of the North Coast Division which has 65% of its total area (6,900,000 ac.) occupied, contains nearly half of the dairying holdings and makes nearly 60% of the butter (1925–26: 63,000,000 lb.) made in the State (*e.g.*, the butter factory at Byron Bay is said to be the largest in Australia). The whole of the sugar produced in New South Wales is grown in this area (1925–26: 8,700 acres [cut], yielding 297,000 tons cane or 123,500 tons raw sugar and molasses). The district is linked by rail with Sydney (North Coast Railway) and a through connection with Brisbane is being constructed from Kyogle.

RICHTER, EUGEN (1839–1906), German politician, was born on July 30, 1839 at Düsseldorf. After attending the universities of Bonn, Heidelberg and Berlin, he entered the Government service. In 1864 he was chosen burgomaster of Neuwied; but he was already known for his Liberal opinions, and the Government refused to confirm the appointment and transferred him to Bromberg, in East Prussia. In consequence, he resigned from the public service, went to Berlin and entered journalism. A consistent advocate of the economic doctrines of the Manchester School, he was also keenly interested in the working-class co-operative movement, on which he wrote a book. In 1867 he was tried for revolutionary tendencies but acquitted. In 1867 he was elected a member of the Reichstag, and in 1869 of the Prussian parliament. A member of the Progressive party, in 1880 one of the founders, and eventually the leader, of the Freisinnige, he was always in opposition. Next to Windthorst he was Bismarck's most dangerous opponent, and leader of the opposition to the introduction of protection, to the new colonial policy introduced after 1878, and to State Socialism. He also strongly opposed all increases in the army and navy; and it was his opposition to the army measures of 1893 which finally split his party, leaving him with only a small following. In 1885 he founded the *Freisinnige Zeitung,* which he edited himself; he also wrote many political brochures and works on Prussian finances. He died at Jena, on Jan. 26, 1906.

See his reminiscences *Jugenderinnerungen* (1892) and *Im alten Reichstag* (2 vols., 1894–96).

RICHTER, HANS (1843–1916), Hungarian musical conductor, born at Raab on April 4, 1843, was the son of the kapellmeister at the cathedral, whose wife, *née* Josephine Csazinsky, was an operatic singer. He studied (1860–65) at the Vienna Conservatoire.

In 1871 Richter was appointed conductor of the Hungarian National Opera at Budapest, and in May 1875 began his long connection with the Vienna Opera, which terminated only with the century. In 1876 he directed the rehearsals and performances of *Der Ring* at Bayreuth, and in 1877 paid his first visit to England to conduct the Wagner Festival at the Albert Hall. There in 1879 he founded the Richter Concerts and quickly established himself as a prime favourite with the London musical public. Later, in 1892, he conducted a famous series of performances of Wagner's works (including the first in England of *Die Meistersinger* and *Tristan*) at Drury Lane; while special performances of German opera were also conducted by him at Covent Garden from 1904 onwards. In 1900 he became conductor of the Hallé Orchestra in Manchester doing splendid service in this capacity, while previously in 1885 he had established an equally happy connection with Birmingham as conductor of the Birmingham Triennial Festival. His last performance of *Die Meistersinger* was given at Bayreuth in 1911, and his last years were spent in retirement there. He died on Dec. 5, 1916. As a conductor Richter was supreme in the interpretation of Wagner, though hardly less great in that of Mozart, Beethoven, Brahms and all the other great classical masters.

RICHTER, JOHANN PAUL FRIEDRICH (1763–1825), usually called JEAN PAUL, famous German author, was born at Wunsiedel, in Bavaria, on March 21, 1763. His father was a school master and organist at Wunsiedel, but in 1765 he became a pastor at Joditz near Hof, and in 1776 at Schwarzenbach, where he died in 1779. After attending the gymnasium at Hof, Richter went in 1781 to the university of Leipzig. Unable to maintain himself at Leipzig he returned in 1784 to Hof, where he lived with his mother. From 1787 to 1789 he served as a tutor at Töpen, a village near Hof; and afterwards he taught the children of several families at Schwarzenbach.

Richter's first work was *Grönländische Prozesse* and *Auswahl aus des Teufels Papieren,* the former of which was issued in 1783–84, the latter in 1789. In later life Richter had little sympathy with their satirical tone. His next book, *Die unsichtbare Loge,* a romance, published in 1793, had all the qualities which were soon to make him famous, and its power was immediately recognized. He then produced in rapid succession *Hesperus* (1795), *Biographische Belustigungen unter der Gehirnschale einer Riesin* (1796), *Leben des Quintus Fixlein* (1796), *Blumen- Frucht- und Dornenstücke, oder Ehestand, Tod und Hochzeit des Armenadvokaten Siebenkäs* (1796–97), *Der Jubelsenior* (1797), and *Das Kampaner Tal* (1797). This series of writings won for Richter an assured place in German literature.

In 1797 he went to Leipzig, and in the following year to Weimar, where he had much pleasant intercourse with Herder, by whom he

was warmly appreciated. He did not become intimate with Goethe and Schiller, to both of whom his literary methods were repugnant; but in Weimar, as elsewhere, his good talk and genial manners made him a favourite in general society. In 1801 he married Caroline Meyer, whom he met in Berlin in 1800. They lived first at Meiningen, then at Coburg; and finally, in 1804, they settled at Bayreuth. Here Richter spent a quiet, simple and happy life, constantly occupied with his work as a writer. In 1808 he was delivered from anxiety as to outward necessities by the prince-primate, K. T. von Dalberg, who gave him a pension of a thousand florins. Before settling at Bayreuth, Richter had published his most ambitious novel, *Titan* (1800–3); and this was followed by *Flegeljahre* (1804–5), two works which he himself regarded as his masterpieces. His later imaginative works were *Dr. Katzenbergers Badereise* (1809), *Des Feldpredigers Schmelzle Reise nach Flätz* (1809), *Leben Fibels* (1812), and *Der Komet, oder Nikolaus Marggraf* (1820–22). In *Vorschule der Aesthetik* (1804) he expounded his ideas on art; he discussed the principles of education in *Levana, oder Erziehungslehre* (1807); and the opinions suggested by current events in *Friedenspredigt* (1808), *Dämmerungen für Deutschland* (1809), *Mars und Phöbus Thronwechsel im Jahre 1814* (1814), and *Politische Fastenpredigten* (1817). In his last years he began *Wahrheit aus Jean Pauls Leben,* to which additions from his papers and other sources were made after his death by C. Otto and E. Förster. In 1821 Richter lost his only son, and never quite recovered from the shock. He died of dropsy, at Bayreuth, on Nov. 14, 1825.

Schiller said of Richter that he would have been worthy of admiration "if he had made as good use of his riches as other men made of their poverty." And it is true that in the form of his writings he never did full justice to his great powers. In working out his conceptions he found it impossible to restrain the expression of any powerful feeling by which he might happen to be moved. He was equally unable to resist the temptation to bring in strange facts or notions which occurred to him. Hence every one of his works is irregular in structure, and his style lacks directness, precision and grace. But he had an amazingly fertile imagination and a surprising power of suggesting great thoughts by means of the simplest incidents and relations. Richter was a great nature-lover and deeply religious in spirit; to him visible things were but the symbols of the invisible, and in the unseen realities alone he found elements which seemed to him to give significance and dignity to human life. His humour, the most distinctive of his qualities, cannot be dissociated from the other characteristics of his writings. It determined to some extent the form in which he embodied even his most serious reflections. It is sometimes extravagant and grotesque but never harsh or vulgar, and generally it springs naturally from the perception of the incongruity between ordinary facts and ideal laws. With all his wilfulness and eccentricity Richter was a man of a pure and sensitive spirit, with a passionate scorn for pretence and an ardent enthusiasm for truth and goodness.

Richter's *Sämtliche Werke* appeared in 1826–28 in 60 vols., to which were added 5 vols. of *Literarischer Nachlass* in 1836–38. Editions of selected works appeared in 16 vols. (1865), in Kürschner's Deutsche Nationalliteratur (edited by P. Nerrlich, 6 vols., 1884–87). The chief collections of Richter's correspondence are: *Jean Pauls Briefe an F. H. Jacobi* (1828); *Briefwechsel Jean Pauls mit seinem Freunde C. Otto* (1829–33); *Briefwechsel zwischen H. Voss und Jean Paul* (1833); *Briefe an eine Jugendfreundin* (1858); P. Nerrlich, *Jean Pauls Briefwechsel mit seiner Frau und seinem Freunde Otto* (1902). *See* further the continuation of Richter's autobiography by C. Otto and E. Förster (1826–33); R. O. Spazier, *J. P. F. Richter: ein biographischer Kommentar zu dessen Werken* (5 vols., 1833); F. J. Schneider, *Jean Pauls Altersdichtung* (1901), and *Jean Pauls Jugend und erstes Auftreten in der Literatur* (1906). All Richter's more important works have been translated into English, *Quintus Fixlein* and *Schmelzles Reise,* by Carlyle; *see* also Carlyle's two admirable essays on Richter.

RICHTHOFEN, FERDINAND, Baron von (1833–1905), German geographer and traveller, was born near Karlsruhe, Silesia, on May 5, 1833. He was educated at Breslau and Berlin, and in 1856 carried out geological investigations in the Tirol, subsequently extending them to Transylvania. In 1859 he accompanied as geologist the Prussian diplomatic mission to the Far East under Count von Eulenburg, and visited Ceylon, Japan, Formosa, the Philippines and Java, subsequently making an overland from Bangkok to Moulmein and reaching Calcutta in 18 important work resulted from these travels, for much of hofen's records and collections was lost. China was at t inaccessible owing to the Taiping rebellion, but Richtho impressed with the desirability of exploring it, and after to California, where he remained till 1868, he returned to t In a remarkable series of seven journeys he penetrat almost every part of the Chinese Empire. He returned h 1872, and a work comprising three large volumes and a which, however, did not cover the entire field or compl author's plan, appeared at Berlin in 1877–85 under the *China; Ergebnisse eigner Reisen und darauf gegründeter S* In this standard work the author deals not only with geol with every subject necessary to a general geographical t Notably he paid close attention to the economic resources country he traversed; he wrote a valuable series of letters Shanghai Chamber of Commerce, and first drew attention importance of the coalfields of Shantung, and of Kiaocho port. In 1875 Richthofen was elected professor of geo Bonn, but being fully occupied with his work in China he take up professorial duties till 1879; in 1883 he became pr of geography at Leipzig, and in 1886 was chosen to the sam at Berlin, and held it till his death. He died Oct. 16, 1905

Among his other works are: *Natural System of Volcanic* (San Francisco, 1867); *Aufgaben und Methoden der heutige graphie* (an address delivered at Leipzig, 1883); *Führer für ungsreisende* (Berlin, 1886); *Triebkräfte und Richtungen der E in neunzehnten Jahrhundert* (address on his election as rector, 1903).

RICHWOOD, a city of Nicholas county, West V U.S.A., 60 m. E. of Charleston, on the Baltimore and Oh road. Pop. 4,331 in 1920, 92% native white; 5,720 in 1930 Federal census. It is in a farming and timber region foot-hills of the Alleghenies, and has lumber and paper a tannery, coal mines and several wood-working factorie town was founded and incorporated in 1901, and in 19 chartered as a city.

RICIMER (d. 472), master of the Roman Empire in th during part of the 5th century, was the son of a prince Suebi and the daughter of Wallia, king of the Visigoth youth was spent at the court of Valentinian III., and h distinction under Aetius. In 456 he defeated the Vanda sea-fight near Corsica, and on land near Agrigentum in He then gained the consent of the Roman senate to an exp against the emperor Avitus, whom he defeated at Piace Oct. 16, 456. Ricimer then obtained from Leo I., emperor a stantinople, the title patrician, but in 457 set up Majoria his own emperor in the West. When, however, Majorianu to rule by himself, Ricimer forced him to abdicate and cau assassination on Aug. 7, 461. The successor whom Ricimer upon the throne was Libius Severus, who proved to be docile than Majorianus. Upon his death in 465—said to to the poison of Ricimer—this emperor-maker ruled the W eighteen months without an emperor, and then accepted candidate Anthemius. Before long, however, Ricimer mo Milan, ready to declare war upon Anthemius. St. Epip bishop of Milan, patched up a truce, but in 472 Ricime claimed as emperor Olybrius, whom Leo had sent to paci two enemies, and after three months' siege captured Ro July 1, 472. Anthemius was massacred and Rome was a p Ricimer's soldiers. He himself, however, died on Aug. 18, malignant fever.

The main authorities for this period are collected in Mon *Chron. Minora* (3 vols., 1892–98). *See* also Gibbon ed. Bury (I 1907) p. 15–49. L. M. Hartmann, *Geschichte Italiens im Mit* vol. i. (1897).

RICINA, an ancient town of Picenum, Italy, 3 m. N the modern Macerata, on the banks of the river Potenza fertile valley. After it was refounded by Pertinax and Sep Severus, it bore the name Colonia Helvia Ricina Pe Considerable ruins of an amphitheatre and remains of bat other buildings (all of the imperial period) still exist; al

fragments of an ancient bridge over the Potenza.

RICKETS, a disease of children and young animals characterized by deficient calcification of the bones and teeth and by other evidences of perverted nutrition (*see* METABOLIC DISEASES). Rickets most commonly attracts attention about the end of the first year of life but the bony changes are preceded by digestive disorder. The child's appetite is poor, and there is frequent vomiting, with diarrhoea and wasting. A common early symptom is profuse sweating of the head, particularly during sleep, with a tendency in the child to kick off all coverings and expose the limbs. There is great tenderness of the bones, as shown by the pain produced on moving or handling the child. Gradually changes in the shape of the bones become obvious about the epiphyseal lines at the ends of the long bones. Thus in the arm there is enlargement at the wrists, and in the ribs a knobbed appearance at the junction of their ends with the costal cartilages. The bones from their lack of calcium salts become misshapen, by the action of the muscles and the superincumbent weight of the body. Those of the limbs are bent outwards and forwards, and the child becomes "bow-legged" or "in-kneed." The trunk shows alterations and deformities owing to curvature of the spine, flattening of the lateral curves of the ribs, and projection forwards of the sternum ("pigeon breast"). The pelvis undergoes distortion, which may reduce its diameters to a degree that in the female may afterwards lead to difficulties in parturition. The head of the rickety child is large-looking in its upper part, the individual bones of the cranium sometimes remaining long ununited, while the face is small and ill-developed, and the teeth appear late and fall out or decay early. The spleen often is enlarged.

Commonly, the disease terminates in recovery, with more or less deformity and dwarfing, the bones although altered in shape becoming firmly ossified. But during the progress of the disease, various intercurrent ailments may cause death, such as the infectious fevers, bronchitis and other pulmonary affections, chronic hydrocephalus, convulsions, laryngismus stridulus, etc.

Rickets is now recognized to be largely if not entirely due to deficiency of vitamin D in the food (*see* VITAMINS). The treatment is directed towards the supply of this deficiency, *e.g.*, by cod liver oil, exposure to sunlight or in its absence to ultra-violet light. Recently ergosterol which has been exposed to ultra-violet radiation, has been introduced to replace cod-liver oil. In addition general hygienic and nutritive measures must be adopted. Unduly prolonged suckling and artificial—especially starchy-foods given before the infant is able to digest them, are often noted in the histories of rickety children.

An acute form of rickets of rare occurrence (really a form of scurvy, *q.v.*) has been described, in which all the symptoms develop rapidly, the result in many instances being fatal.

The condition formerly known as foetal rickets (achondroplasia or chondrodystrophia foetalis) is now classed as a separate disease. Its chief characteristics are dwarfism with shortening of the limbs and enormous enlargement of the articulations.

RICKETTS, CHARLES (1866–), English artist, was born at Geneva on Oct. 2, 1866, and educated in France. In 1889 he became joint editor with Charles Shannon of the *Dial*. In 1896 he founded the Vale press, the output of which was a series of beautifully designed and printed books. Of his pictures, "The Plague" (1911) is in the Luxembourg at Paris, and "Don Juan" (1916) in the National Gallery. He published *The Prado and its Masterpieces* (1903); *A Bibliography of the Books issued by Hacon and Ricketts* (1904); *Titian* (1906); and *Pages on Art* (1913).

RICKMAN, THOMAS (1776–1841), English architect, was born on June 8, 1776, at Maidenhead, Berkshire, and died at Birmingham on Jan. 4, 1841. He designed many churches, the new court of St. John's College, Cambridge and a palace for the bishop of Carlisle. These are all in the Gothic style, but show more knowledge of its outward form than real acquaintance with its spirit. Rickman nevertheless played a part in the revival of mediaevalism perhaps second only to Pugin. His *Attempt to discriminate the Styles of Architecture in England* ran through many editions.

RICKMANSWORTH, an urban district in Hertfordshire, England; 17½ m. W.N.W. of London by the Met. and G.C. Jt. railway; served also by a branch of the L.M.S. railway from Watford. Pop. (1931) 10,810.

RICOCHET, a military term expressing the rebound of a projectile that strikes on a hard surface. The origin of the French word *ricochet* is unknown. Its earliest known use (14th and 15th centuries) was in the sense of "repetition," e.g. *chanson du ricochet,* "an oft-told tale." Hence it came to be applied to the rebound of a flat stone skimmed along the surface of water, known familiarly in English as "ducks and drakes," and so finally in the military sense defined above, which found its way into the English language.

The use of the now obsolete "ricochet fire" in war is well illustrated by "ducks and drakes." The shot, striking the ground at a small angle, described for the remainder of its course a succession of leaps and falls. The discovery of this species of fire, usually attributed to Vauban (siege of Ath in 1697), had the greatest influence both on sieges and on operations in the field. In siege warfare, ricochet, especially when combined with enfilade, *i.e.* when directed along the enemy's line of defence, soon became the principal weapon of the besieger, and with the system of parallels (*q.v.*) gave the attack a superiority so complete that a siege came to be considered as the most certain operation of war. Enfilade fire by itself was neutralized by traverses in the defences, but by the new method a shot could be so aimed as to skip over each successive traverse and thus to search ground that was immune from direct fire. The application of ricochet fire to operations in the field came somewhat later. In the 18th century field artillery, which was not, before Napoleon's time, sufficiently mobile to close with the enemy, relied principally upon the ricochet of round shot, which, sweeping a considerable depth of ground, took effect upon several successive lines of hostile troops. But once artillery was able to gallop up to the enemy and to use its far more terrible close-range projectile, case-shot, ricochet fire came to be used less and less, until finally, with the general adoption of shell (which, of course, burst at the first contact with the ground), the round shot disappeared altogether from the battlefield. Similarly in siege warfare, as soon as high-angle fire with shells became sufficiently accurate, there was no further need of round shot and ricochet.

The term "ricochet" is now only applied, in modern rifle shooting, to the graze of a bullet that has struck short. A modern bullet that has ricochetted inflicts a very severe wound, as its nickel or other hard envelope is torn and jagged by its contact with the ground. With its high remaining velocity it is dangerous even after more than one ricochet, except at extreme ranges.

RICOLD OF MONTE CROCE (1242–1320), Italian Dominican missionary, was born at Monte Croce, near Florence. In 1267 he entered the Dominican house of Santa Maria Novella in Florence, and in 1272 that of St. Catherine in Pisa. He started for Acre with a papal commission to preach in 1286 or 1287: in 1288 or 1289 he began to keep a record of his experiences in the Levant; this record he probably reduced to final book form in Baghdad. He travelled extensively in Syria, Asia Minor and Persia. In Baghdad he stayed several years, studying the Koran and other works of Moslem theology, for controversial purposes, arguing with Nestorian Christians, and writing. In 1301 Ricold again appeared in Florence: some time after this he proposed to submit his *Confutatio Alcorani* to the pope, but did not. He died on Oct. 31, 1320.

The best edition of the *Itinerary* is by J. C. M. Laurent, in *Peregrinatores Medii Aevi Quatuor,* pp. 105 (101)–41 (Leipzig, 1864 and 1873). The *Epistles* have been edited by R. Röhricht in *Archives de l'orient latin,* vol. ii. part ii. (Documents) pp. 258–96 (Paris, 1884). The *Confutatio Alcorani,* printed at Seville in 1500, at Venice in 1607, adds hardly anything to the sections of the *Itinerary* devoted to Moslem belief, etc. Ricold's *Libellus contra Nationes Orientales* and *Contra errores Judaeorum* have never been printed. *See* also C. Raymond Beazley, *Dawn of Modern Geography,* iii. 190–202, 218, 390–391, 547, 554, 564.

RICOTTI-MAGNANI, CESARE (1822–1905), Italian general and knight of the Annunziata, was born at Borgo Lavezzaro on June 30, 1822. After serving from 1856 to 1859 as

director of the artillery school, he became general of division in 1864, commanding the 5th division at the battle of San Martino. In the war of 1866 he stormed Borgoforte, to open a passage for Cialdini's army. Upon the death of General Govone in 1872 he was appointed minister of war, and after the occupation of Rome bent all his efforts to army reform, in accordance with the lessons of the Franco-German War. He shortened the period of military service; extended conscription to all able-bodied men; created a permanent army, a mobile militia and a reserve; commenced the renewal of armaments; and placed Italy in a position to put 1,800,000 men on a war footing. Ricotti fell from power with the Right in 1876, but returned to office with Depretis in 1884, and amended his previous scheme of reform. Resigning in April 1887, he became a member of the senate in 1890, but took little part in public life until 1896, when, after the battle of Adowa, he formed a ministry; he made over the premiership to the marquis di Rudini, retaining for himself the portfolio of war, and sought to consolidate the tactical structure of the army without weakening its fighting power. Ricotti's ideas were not acceptable at court, and he had to resign. Nevertheless, his prestige as creator of the modern Italian army remained unimpaired.

RIDDELL, GEORGE ALLARDICE RIDDELL, 1ST BARON (1865–), British newspaper proprietor, was born in London on May 25, 1865, and educated privately. He became a solicitor in 1888 and settled in practice at Cardiff. There he acquired an interest in *The Western Mail,* and he eventually turned his energies mainly to newspaper management. He went to London and obtained control over the Sunday paper *The News of the World,* which he developed on popular lines, so that it obtained a huge circulation during the first decade of the 20th century and made its proprietor a wealthy man. He gradually extended his newspaper connections, becoming a director also of George Newnes Ltd., Country Life Ltd. and C. Arthur Pearson Ltd., etc. In 1909 he received a knighthood. He was a prominent member of the Newspaper Proprietors' Association at the outbreak of the World War, and, owing to his intimate relations with Mr. Lloyd George, he gradually became the principal liaison between the Press and the Government so far as all matters of publicity were concerned. In this capacity he represented the British Press at the Peace Conference in 1919 and at all the important Allied conferences subsequently. He was created a baronet in 1918 and raised to the peerage as Baron Riddell of Walton Heath in 1920. His publications include *Some Things That Matter* (1922) and *More Things That Matter* (1925). (*See* CENSORSHIP.)

RIDGEFIELD PARK, a village of Bergen county, New Jersey, U.S.A., on the Hudson river, opposite New York city (about 125th street). It is served by the New York, Susquehanna and Western and the West Shore railways and motor-bus lines. Pop. (1930) 10,764. It is a residential suburb.

RIDGEWOOD, a village of Bergen county, New Jersey, U.S.A., 22 m. N.W. of New York city and 5 m. N.E. of Paterson on the Erie railroad. Pop. (1920) 7,580 (86% native white); 1930 Federal census 12,188. It is a park-like residential suburb, in the foot-hills of the Watchung and the Ramapo mountains. The village, originally called Godwinville, was incorporated in 1894 and in 1911 a commission form of government was established.

RIDGWAY, a borough of northern Pennsylvania, U.S.A., the county seat of Elk county; midway between Buffalo and Pittsburgh, on the Clarion river at the mouth of Elk creek. It is on Federal highways 120 and 219, and is served by the Buffalo, Rochester and Pittsburgh and the Pennsylvania railways. Pop. (1920) 6,037; 1930 it was 6,313. The borough has an altitude of 1,380 ft. and covers nearly 3 square miles. It is in a natural gas field which has supplied many cities and towns within a radius of 150 m. since 1914, and is headquarters of the electric power company serving a large territory. Ridgway was founded in 1824 by Jacob Ridgway of Philadelphia and incorporated in 1880.

RIDING, THRITHING or **THRIDING,** a Scandinavian term for the third part of a shire or county, *e.g.*, the ridings of Yorkshire and of Lindsey in Lincolnshire. In Iceland the third part of a *thing* which corresponds roughly to an English county was called *thrithjungr;* in Norway, however, the *thrithjungr* seems to have been an ecclesiastical division. To the riding causes were brought which could not be determined in the wapentake, and a matter which could not be determined in the riding was brought into the court of the shire. There is abundant evidence that riding courts were held after the Norman Conquest.

Each of the ridings of Yorkshire has its own lord lieutenant and commission of the peace, and under the Local Government Act of 1888 forms a separate administrative county. They are distinguished as the north, east and west ridings, but the ancient divisions of Lindsey were known as the north, south and west ridings respectively.

See Dugdale, *Monasticon Anglicanum,* vol. vi. ed. by John Caley and others (1846); F. Liebermann, *Die Gesetze der Angelsachsen* (Halle, 1888–89); Stubbs, *Constitutional History of England.*

RIDING: *see* HORSEMANSHIP.

RIDLEY, NICHOLAS (*c.* 1500–1555), English bishop and martyr, was the second son of Christopher Ridley of Unthank Hall, near Willemoteswick, Northumberland. He was sent about 1518 to Pembroke Hall, Cambridge. Having graduated M.A. in 1526 he went to study at the Sorbonne in Paris and at Louvain, and on his return to Cambridge was appointed junior treasurer of his college. In 1534 he was one of the university proctors, and signed the decree of the university against the jurisdiction of the pope in England. Ridley was now chaplain to the university and began to show leanings to the reformed faith. In 1537 he became chaplain to Thomas Cranmer, archbishop of Canterbury, and in April 1538 vicar of Herne, Kent. In 1540 he was chosen master of Pembroke Hall; in 1541 he became chaplain to Henry VIII. and canon of Canterbury. In 1543 he was accused of heretical teaching and practices but acquitted, although just after his exculpation he finally abandoned the doctrine of transubstantiation.

In September 1547 Ridley was nominated bishop of Rochester. He was one of the visitors who were appointed to establish protestantism in the University of Cambridge; in 1548 helped to compile the English prayer book, and in 1549 was one of the commissioners who examined Bishops Gardiner and Bonner. He concurred in their deprivation, and succeeded Bonner in the see of London. Having signed the letters patent settling the English crown on Lady Jane Grey, Ridley, in a sermon preached at St. Paul's cross on July 9th, 1553, affirmed that the princesses Mary and Elizabeth were illegitimate, and that the succession of the former would be disastrous to the religious interests of England. When Lady Jane's cause was lost, however, he went to Framlingham to ask Queen Mary's pardon, but was at once arrested and sent to the Tower of London. From his prison he wrote in defence of his religious opinions, and early in 1554 he, with Cranmer and Latimer, was sent to Oxford to be examined. He defended himself against a number of divines, but was declared a heretic, and excommunicated. He refused to recant, and in Oct. 1555 he was tried for heresy under the new penal laws, being degraded and sentenced to death. With Cranmer and Latimer he met his end at the stake in Oxford on Oct. 16, 1555.

See *Works of Nicholas Ridley D.D.* (ed. H. Christmas, Parker Soc., 1841). His *Life* was written by Dr. Gloucester Ridley in 1763, and there is a memoir of him in Moule's edition of the bishops' *Declaration of the Lord's Supper* (1895).

RIDOLFI or RIDOLFO, **ROBERTO DI** (1531–1612), Italian conspirator, born at Florence on Nov. 18, 1531, settled in London about 1555. In 1570 he set to work on the plot against Elizabeth which is usually associated with his name. His intention was to marry Mary, queen of Scots, to the duke of Norfolk and to place her on the English throne. In 1571 he visited the duke of Alva at Brussels, Pius V. at Rome, and Philip II. at Madrid to explain to them his scheme and to gain their active assistance thereto. His messenger, by name Charles Baillie (1542–1625), was, however, seized at Dover; Norfolk and Lesley were arrested, the former being condemned to death in January 1572. Ridolfi, who was then in Paris, died at Florence on Feb. 18, 1612.

RIEGER, PHILIPP FRIEDRICH VON (1818–1903), Bohemian politician and publicist, was born on Dec. 18, 1818, at

Semil, Bohemia. He first came into prominence as one of the Czech leaders in the revolution of 1848. In 1853 he married a daughter of the historian Palacky. In 1858 he started the *Slovnik naučny*, the Czech national encyclopaedia and also helped to found the first Czech political daily newspaper published in Prague (1861), of which he was for a while the editor. After the issue of the "October diploma" of 1860, Rieger, with Palacky, undertook the leadership of the reconstituted Czech party. In 1871 he conducted the negotiations with the Hohenenwarth ministry for a federal constitution of the empire, which broke down owing to his extreme attitude in the matter of Bohemian independence. On the reappearance of the Czechs in the Bohemian diet (1878) and the Austrian *Reichsrath* (1879) Rieger, as chief of the so-called "Old Czechs," supported Count Taaffe's government. In 1891, together with the other "Old Czechs," he was defeated at the poll. In March 1897 he was created a baron (*Freiherr*) and given a seat in the Upper House, but his influence was now at an end. He died on March 3, 1903.

RIEL, LOUIS (1844–1885), Canadian agitator, son of Louis Riel and Julie de Lagemaundière, was born at St. Boniface, on Oct. 23, 1844, according to his own account, though others place his birth in 1847. Though known as a half-breed, or Métis, and though with both Indian and Irish ancestors, his blood was mainly French. From July 1866 he worked for two years at various occupations in Minnesota, returning in July 1868 to St. Vital, near St. Boniface. In 1869 the transfer of the territorial rights of the Hudson's Bay Company to the dominion of Canada gave great uneasiness to the Métis, and in October 1869 a party led by Riel turned back at the American frontier the newly appointed Canadian governor; in November they captured Fort Garry (Winnipeg), the headquarters of the Company, and called a convention which passed a bill of rights.

In December a provisional government was set up, of which on Dec. 29, Riel was made president, and which defeated two attacks made on it by the English-speaking settlers of the vicinity. So far the Métis had been within their rights, but Riel was flighty, vain and mystical, and his judicial murder on March 4, 1870, of Thomas Scott, an Orangeman from Ontario, roused against him the whole of English-speaking Canada. An expedition was equipped and sent out under Colonel Garnet, later Lord Wolseley, which captured Fort Garry on Aug. 24, 1870, Riel decamping. (*See* STRATHCONA, LORD.) He was not arrested, and on Aug. 4, 1871, urged his countrymen to combine with the Canadians against a threatened attack from American Fenians, for which he was publicly thanked by the lieutenant-governor. In 1872 for religious reasons he changed his name to Louis David Riel. In October 1873 he became member of the Dominion parliament for Provencher, came to Ottawa and took the oath, but did not sit. On April 16, 1874, he was expelled from the House, but in September was again elected for Provencher; on Feb. 10, 1875, he was outlawed, and the seat thereby again vacated. In 1877–78 he was for over a year a patient in the Beauport asylum for the insane, but from 1879 to 1884 he lived quietly in Montana.

In 1884 in response to a deputation from the Métis, who had moved west to the forks of the Saskatchewan river, he returned to Canada to win redress for their wrongs. His own rashness and the ineptitude of Canadian politicians and officials brought on a rising, which was crushed after some hard fighting, and on May 15, 1885, Riel surrendered. He was imprisoned at Regina, was tried and on Aug. 1 found guilty of treason, and on Nov. 16 was hanged at Regina, meeting his fate with courage. His death was the signal for a fierce outburst of racialism in Quebec and Ontario, which nearly overthrew the Conservative government.

See J. S. Willison, *Sir Wilfrid Laurier*, vol. i.; George Bryce, *History of the Hudson's Bay Company* (1900); and the Canadian daily press for 1885.

RIEMANN, GEORG FRIEDRICH BERNHARD (1826–1866), German mathematician, was born on Sept. 17, 1826, at Breselenz, near Dannenberg in Hanover.

In 1840 he went to Hanover, where he attended the lyceum and two years later he entered the Johanneum at Lüneburg. The director, Schmalfuss, encouraged him in his mathematical studies by lending him books (among them Euler's works and Legendre's *Theory of Numbers*). In 1846 Riemann entered the university of Göttingen, where, although supposed to be studying theology, he attended lectures on the numerical solution of equations and on definite integrals by M. A. Stern, on terrestrial magnetism by Goldschmidt, and on the method of least squares by K. F. Gauss. In 1847 he went to Berlin, where P. G. L. Dirichlet, C. G. J. Jacobi, J. Steiner and F. G. M. Eisenstein were professors. During this period he formed those ideas on the theory of functions of a complex variable which led to his great discoveries.

In 1850 he returned to Göttingen and in 1851 obtained his doctorate with his celebrated thesis "Grundlagen für eine allgemeine Theorie der Functionen einer veränderlichen complexen Grösse."

In his Habilitationsschrift on the "Representation of a Function by Means of a Trigonometrical Series," Riemann shows his usual originality and refined style. The subject of his trial lecture, chosen by Gauss, was "On the Hypotheses which form the Foundation of Geometry." (*See* GEOMETRY: *Non-Euclidian.*) This wonderful work was published in the *Göttinger Abhandlungen* (1868) and a translation by Clifford in *Nature* (vol. 8).

Riemann's health had never been strong and now under the strain of work he broke down, and retired to the Harz with his friends Ritter and R. Dedekind, where he gave himself up to excursions and "Naturphilosophie." After his return to Göttingen (Nov. 1857) he was made extraordinary professor, and his salary raised to 300 thalers. Before this he had been in very straitened circumstances, and in 1855 was granted a government stipend of 200 thalers. On Dirichlet's death in 1859, Riemann was appointed his successor in Göttingen. He died at Selasca, on Lake Maggiore, on July 20, 1866. Most of his memoirs are masterpieces—full of original methods, profound ideas and far-reaching imagination. *See* RIEMANNIAN GEOMETRY below.

The collected works of Riemann were published by H. Weber, assisted by R. Dedekind (8vo, Leipzig, 1876; 2nd ed., 1892).

RIEMANNIAN GEOMETRY. Any n independent variables x_i where i takes the values 1 to n, may be thought of as the coordinates of an n-dimensional space, or variety V_n, in the sense that each set of values of the x's defines a point of V_n. In a space as thus defined there is not an *a priori* basis for the determination of magnitude nor for the comparison of directions at two different points. Riemann proposed the study of the metric properties of a general V_n by introducing as the basis for measurement a quadratic differential form

$$\sum_{i,j}^{1,\ldots,n} g_{ij}dx_i dx_j,$$

where the g's are functions of the x's, subject to the restrictions that the determinant of the g's is not zero and that for all values of the differentials the above sum is positive. By definition the distance ds between the points of coordinates x_i and x_i+dx_i is given by

$$ds^2 = \sum_{i,j}^{1,\ldots,n} g_{ij}dx_i dx_j. \qquad (1)$$

This is a generalization of the first fundamental form of a surface in ordinary space when the surface is defined in terms of two parameters, as proposed by Gauss (*see* DIFFERENTIAL GEOMETRY). In this case the metric on the surface is induced by the Euclidean metric of the enveloping space, whereas in a general Riemannian space the metric is assigned.

From the hypotheses concerning (1) it can be shown that at any point

$$\sum_{i,j}^{1,\ldots,n} g_{ij}\frac{dx_i}{ds}\frac{\delta x_j}{\delta s}$$

is less than unity for two different sets of differentials dx_i and δx_i. Consequently a real angle θ is determined by the equation

$$\cos\theta = \sum_{i,j}^{1,\ldots,n} g_{ij}\frac{dx_i}{ds}\frac{\delta x_j}{\delta s}; \qquad (2)$$

by definition it is the *angle* between the directions at the point determined by the two sets of differentials. This is in keeping with the fact that the cosine of the angle between two tangents, at a point, to a surface in ordinary space when expressed in terms of the induced metric, is given by an equation of the form (2).

When we have n independent functions ϕ_i of the x's the equations

$$x'_i=\phi_i(x_1, \cdots, x_n) \qquad (i=1, \cdots, n)$$

define a transformation of coordinates of the space. If the g's in (1) are such, which is rarely the case, that by a suitable transformation the form (1) is reducible to

$$ds^2=\sum_i^{1,\ldots,n}(dx'_i)^2, \tag{3}$$

which is a generalization of the metric of ordinary space in cartesian coordinates, we say that the space is flat, or *plane;* otherwise it is *curved.* The locus of points defined by

$$x_1=f_1(t), \cdots, x_n=f_n(t)$$

for all values of the parameter t is called a *curve.* When these expressions are substituted in (1), we obtain an expression of the form $ds=F(t)dt$, and then the length of arc of the curve is given by integration. If the result of the integration is $s=\phi(t)$, by means of this equation the coordinates at points of the curve are expressible as functions of the arc s as parameter. The theory of curves involves $n-1$ principal curvatures, which are generalizations of the curvature and torsion of a curve in ordinary space.

Using the terminology of the calculus of variations, we say that the extremals of the integral

$$\int\Big(\sum_{i,j}^{1,\ldots,n} g_{ij}\frac{dx_i}{ds}\frac{dx_j}{ds}\Big)^{\frac{1}{2}}ds$$

are the shortest lines, or *geodesics,* of the space. The geodesics are found to be the integral curves of a system of differential equations

$$\frac{d^2x_i}{ds^2}+\sum_{j,k}^{1,\ldots,n}\Gamma^i_{jk}\frac{dx_j}{ds}\frac{dx_k}{ds}=0 \qquad (i=1, \cdots, n), \tag{4}$$

where the Γ's are certain functions of the g's and their first derivatives. When the space is flat and the coordinates are those for which the fundamental form is (3), all the functions Γ vanish identically. Consequently in the coordinate system the equations of the geodesics of the flat space are

$$x_i=a_is+b_i, \qquad (i=1, \cdots, n), \tag{5}$$

where the a's and b's are constants. Thus the geodesics of a Riemannian space are the analogues of straight lines of a Euclidean space. Riemann showed that in a general space a coordinate system exists such that all the geodesics through a given point are defined by a_is $(i=1,\ldots n)=1$, but those through other points are not given by (5). In such a coordinate system the Γ's vanish at the given point, but not their derivatives.

Two sets of differentials dx_i and δx_i determine two directions at a point, and $adx_i+b\delta x_i$, where a and b are parameters, a linear pencil of directions at the point. The geodesics issuing from a point P in a linear pencil of directions constitute a surface; the Gaussian curvature (*see* DIFFERENTIAL GEOMETRY) of this surface at P was taken by Riemann as the measure of curvature of the space for the given pencil. It is expressed in terms of the directions, and the components of a tensor of the fourth order, which involves the functions Γ^i_{jk} and their first derivatives; it is now known as the *Riemannian curvature tensor* (*see* TENSOR). Ordinarily the curvature varies with the choice of the pencil. Schur showed that, if it is the same for all pencils at each point of the space, then it has the same value at every point; these are the spaces of constant Riemannian curvature; when, and only when, the constant is zero, the space is flat.

From time to time important contributions to Riemannian geometry were made by Bianchi, Beltrami, Christoffel, Voss and others, and Ricci co-ordinated and extended the theory simultaneously with the development of tensor calculus. These contributions include the study of a sub-space of a Riemannian space analogous to that of a surface in ordinary space. Such a sub-space of order r is the locus of points defined by the equations

$$x_i=\psi_i(u_1, \cdots, u_r) \qquad (i=1, \cdots, n), \tag{6}$$

where the u's are independent parameters. When these expressions are substituted in (1), we obtain an induced metric for the sub-space—a generalization of the first fundamental differential form of a surface (*see* DIFFERENTIAL GEOMETRY). There is also a generalized second fundamental form, whose coefficients enter in the relations between the curvatures of a curve in the sub-space relative to the latter and the curvatures of the curve as of the enveloping space. Among the curves of the sub-space there are geodesics, lines of curvature, asymptotic lines and conjugate systems of curves, which are generalizations of these types of curves on a surface in ordinary space. Einstein based his theory of gravitation upon the assumptions that physical space and time constitute a four-dimensional continuum whose metrical character is determined by the presence of matter, and that these spaces are of a particular kind defined in invariantive form by means of the curvature tensor; in this theory the fundamental form (1) is not positive for every choice of the differentials. This and other physical interpretations of differential geometry of spaces have stimulated the development of the theory.

Notable among the recent contributions is the concept of parallelism of vectors in a general Riemannian space as introduced by Levi-Civita. In such a space parallelism is not absolute, as it is in Euclidean space, but is relative to the curve joining the points of application of the vectors. Thus for a curve $x_i=f_i(s)$ each set of solutions of the equations

$$\frac{d\xi^e}{ds}+\sum_{j,k}^{1,\ldots,n}\Gamma^e_{jk}\xi\frac{jdx_k}{ds} \qquad (i=1, \cdots, n) \tag{7}$$

are the components of a family of vectors at the points of the curve which are parallel to one another with respect to the curves. Certain Riemannian spaces admit one or more fields of vectors, such that any two of them are parallel with respect to any curve joining their points of application. When there are n independent fields of this kind, the space is flat. In particular, the tangents to a geodesic are parallel with respect to the geodesic, as follows from (7) and (4), when we put $\xi^i=\frac{dx_i}{ds}$, geodesics are the straight lines of the space. This concept of parallelism is involved in many of the recent developments of Riemannian geometry and its generalizations have opened up new fields (*see* AFFINE GEOMETRY).

BIBLIOGRAPHY.—G. Ricci, *Lezioni sulla teoria delle superficie* (Padua, 1898); J. Struik, *Grundzüge, Mehrdimensialen Differentialgeometrie* (1922); J. A. Schouten, *Der Ricci-Kalkül* (1924); E. Cartan, *La géométrie des espaces de Riemann* (1925); L. P. Eisenhart, *Riemannian geometry* (1926); T. Levi-Civita, *The Absolute Differential Calculus* (Eng. trans. 1927). (L. P. E.)

RIENZI, COLA DI (*c.* 1313–1354), tribune of the Roman people, was born in Rome, the son of a tavern-keeper named Lorenzo Gabrini. His father's Christian name was shortened to Rienzo, and his own, Nicholas, to Cola; hence the Cola di Rienzi, or Rienzo, by which he is generally known. His early years were passed at Anagni. The study of the Latin writers, historians, orators and poets filled his mind with stories of the glories and the power of ancient Rome, and he dreamed of restoring his native city to its pristine greatness. His zeal was quickened by the desire to avenge his brother, who had been killed by a noble. Rienzi became a notary and a person of some importance in the city, and was sent in 1343 on a public errand to Pope Clement VI. at Avignon. He won the favour and esteem of the pope, who gave him an official position at his court. Returning to Rome about April 1344 he gathered a band of supporters, plans were drawn up, and at length all was ready for the rising. On May 19, 1347, heralds invited the people to a parliament on the Capitol, and on the 20th, Whit-Sunday, the meeting took place. Dressed in full armour and attended by the papal vicar, Cola headed a procession to the Capitol; here he addressed the assembled crowd on

"the servitude and redemption of Rome." A new series of laws were adopted by acclamation, and unlimited authority was given to the author of the revolution. The nobles left the city or went into hiding, and a few days later Rienzi took the title of tribune (*Nicholaus, severus et clemens, libertatis, pacis justiciaeque tribunus, et sacre Romane Reipublice liberator*).

The new ruler governed the city with a stern justice, in marked contrast to the recent reign of licence. The tribune moved through the streets of Rome in state, being received at St. Peter's with the hymn *Veni Creator spiritus*. Petrarch wrote to him, urging him to continue his great and noble work, and called him the new Camillus, Brutus and Romulus. In July in a sonorous decree he proclaimed the sovereignty of the Roman people over the empire, but before this he had set to work to restore the authority of Rome over the cities and provinces of Italy, to make the city again *caput mundi*. He invited the cities of Italy to send representatives to an assembly to meet on Aug. 1, when the formation of a great federation under the headship of Rome would be considered. On the appointed day representatives appeared, and after elaborate and fantastic ceremonial Rienzi, as dictator, issued an edict citing the emperor Charles IV., and also the imperial electors and all others concerned in the dispute, to appear before him in order that he might pronounce judgment in the case. On the following day the festival of the unity of Italy was celebrated.

Rienzi's power was recognized in Naples, whence both Queen Joanna and her bitter foe, King Louis of Hungary, appealed to him for protection. On Aug. 15 he was installed tribune with great pomp, wreaths of flowers being placed on his head. Gregorovius says this ceremony "was the fantastic caricature in which ended the imperium of Charles the Great. A world where political action was represented in such guise was ripe for overthrow, or could only be saved by a great mental reformation." Rienzi then seized, but soon released, Stephen Colonna and other barons who had spoken disparagingly of him. But his power was waning. His extravagant pretensions excited ridicule. His government was costly, and he was obliged to lay heavy taxes upon the people. He offended both pope and emperor by his proposal to set up a new Roman empire, resting directly upon the will of the people. In October Clement gave power to a legate to depose him and bring him to trial. The exiled barons gathered some troops, and war began. Rienzi obtained aid from Louis of Hungary and others, and on Nov. 20 his forces defeated the nobles in a battle outside the gates of Rome, where Rienzi's most distinguished foe, Stephen Colonna, was killed. But this victory did not save him. He passed his time in feasts and pageants, while in a bull the pope denounced him as a criminal, a pagan and a heretic, until, terrified by a slight disturbance on Dec. 15, he abdicated and fled from Rome. He sought refuge in Naples, but soon left that city and spent over two years in a mountain monastery.

Emerging from his solitude Rienzi journeyed to Prague, which he reached in July 1350, and threw himself upon the protection of the emperor Charles IV. Denouncing the temporal power of the pope he implored the emperor to deliver Italy, and especially Rome, from their oppressors; but Charles kept him in prison for more than a year in the fortress of Raudnitz, and then handed him over to Clement. At Avignon, where he appeared in August 1352, Rienzi was tried by three cardinals, and was sentenced to death, but this judgment was not carried out, and he remained in prison. In December 1352 Clement died, and his successor, Innocent VI., anxious to strike a blow at the baronial rulers of Rome, pardoned and released his prisoner. Giving him the title of senator, he sent him to Italy with the legate, Cardinal Albornoz, and Rienzi, with a few mercenaries, entered Rome in August 1354. He was received with great rejoicing, and regained his former position. A tumult broke out on Oct. 8. Rienzi attempted to address the mob, but the building in which he stood was fired, and while trying to escape in disguise he was murdered. In 1887 a statue of the tribune was erected at the foot of the Capitoline hill in Rome.

Rienzi's life and fate have formed the subject of a famous novel by Bulwer Lytton, of an opera by Wagner and of a tragedy by Julius Mosen. His letters, edited by A. Gabrielli, are published in vol. vi. of the *Fonti per la storia d'Italia* (Rome, 1890). *See* also Papencordt, *Cola di Rienzo und seine Zeit* (Hamburg, 1841); Auriac, *Étude historique sur N. Rienzi* (Amiens, 1885); E. Rodocanachi, *Cola di Rienzi* (Paris, 1888); Kühn, *Die Entwickelung der Bündnispläne Cola di Rienzos im Jahre 1347* (Berlin, 1905); A. von Reumont, *Geschichte der Stadt Rom* (1867–70); and F. Gregorovius, *Geschichte der Stadt Rom im Mittelalter*, vol. vi. (Eng. trans., by A. Hamilton, 1898)

RIESA, a town in the republic of Saxony, on the Elbe, 30 m. N.W. of Dresden, on the main line of railway to Leipzig, and at the junction of lines to Chemnitz, Elsterwerda and Nossen. Pop. (1925) 24,218. Riesa received municipal rights in 1632, and after a period of decay was again raised to the rank of a town in 1859. The town contains a castle, which is now used as a town hall. There are rolling-mills and saw-mills and ironworks. Other industries are the manufacture of furniture, beer, soap, carriages, marble wares, and bricks. The most important shipping station on the Elbe in Saxony, Riesa is the lading-place for goods to and from Bavaria, and a mart for herrings, petroleum, wood and grain. A passenger steamboat service is maintained with Meissen and Dresden.

RIESENER, JEAN HENRI (1734–1806), French cabinet-maker of the Louis XVI. period, was born at Gladbach near Cologne on July 4, 1734, and died in Paris on Jan. 6, 1806. At an early age he went to Paris, where he entered the workshop in the Arsenal of Jean François Oeben (*q.v.*). When his master died, Riesener became foreman of the works; two years later he married Mme. Oeben. By 1782 he had accumulated a fortune of about £40,000 and had received the title, formerly Oebens's, of "Ébéniste du Roi." Riesener was unquestionably the greatest of the Louis Seize cabinet-makers. His work is generally bold and graceful. His marquetry presents an extraordinary finish; his chiselled bronzes are of the first excellence. He was especially distinguished for his cabinets, in which he employed many European as well as exotic woods. Wreaths and bunches of flowers form the centres of the panels; on the sides are often diaper patterns in quiet colours. His high-water mark was reached in the Bureau du Roi, conceived by Oeben, finished in 1769 and consequently belonging rather to the Louis Quinze than the Louis Seize period, and a similar cylinder bureau believed to have been made for Stanislas Leszczynski, king of Poland, now in the Wallace Collection. At Buckingham Palace there is a third bureau on the same lines. These pieces are triumphs of marquetry. For long Riesener followed Oeben, but there was a gradual transition to a style more individual, more delicately conceived, with finer but hardly less vigorous lines. By the time he had been working alone for ten years he had completely embraced the Louis Seize manner —he had, perhaps, some responsibility for it. One of the most distinguished of his achievements for the court was the famous flat writing-table now at the Petit Trianon. Some of his creations are vitiated by being mounted with panels of Sèvres, Wedgwood and other china. Such is the beautiful little secretaire in the Jones collection in the Victoria and Albert Museum.

See F. de Salverte, *Les Ébénistes du XVIII. Siècle* (Paris, 1927).

RIESENGEBIRGE or **GIANT MOUNTAINS,** a lofty and rugged group on the boundary between Prussian Silesia and Bohemia, between the upper courses of the Elbe and the Oder. They are continued towards the north-west in the Erzgebirge, the Thuringian Forest and the Harz Mountains. Adjoining the Isergebirge and the Lausitzergebirge on the west, and the Eulengebirge and the Adlergebirge on the east and south-east, the Riesengebirge proper trend south-east and north-west between the sources of the Zacken and the Bober, for a distance of 23 m., with a breadth of 14 miles. They cover an area of about 425 sq.m., three-quarters of which is in Czecho-Slovakia, the rest in Germany. The boundary line follows the crest of the principal ridge (Riesenkamm, average height 4,000 ft.), which stretches along the northern side of the group. The principal peaks are the Reifträger (4,430 ft.), the Hohes Rad (4,950 ft.), the Great Sturmhaube (4,862 ft.), the Little Sturmhaube (4,646 ft.), and, near the east extremity, the Schneekoppe (5,258 ft.), the loftiest mountain in northern or central Germany. Roughly parallel to this northern ridge, and separated from it by a long narrow valley of the Siebengründe, there extends on the south a lower chain, of broad massive "saddles," with comparatively few peaks. The **chief**

heights here are Kesselkoppe (4,708 ft.), the Krkonose (4,849 ft.), the Ziegenrücken and the Brunnenberg (5,072 ft.). From both ridges spurs are sent off, whence a magnificent view is obtained from Breslau to Prague; the lowlands of Silesia, watered by the Oder, and those of Bohemia, intersected by the Elbe and the Moldau, appear to lie mapped in relief (*see* SCHNEEKOPPE). A group of isolated columnar rocks known as the *Adersbacher Felsen* occur in a valley on the Bohemian side of the Riesengebirge, 9 m. from Braunau.

On its northern side this mountain group has a rugged and precipitous slope from the Hirschberg valley; but on its southern slope, towards Bohemia, a more gradual one. The Bohemian ridge is cleft about the middle by a deep gorge through which pour the headwaters of the river Elbe, which finds its source in the Siebengründe. A great number of small streams also rise among these mountains and small lakes and tarns are not unfrequent. The Great and Little Schneegruben—two deep rocky gorge-like valleys in which snow remains all the year round—lie to the north of the Hohes Rad.

A wide range of rock formations occurs in the Riesengebirge. Archaean gneisses and schists form an important part, but Palaeozoic and Mesozoic rocks (especially Jurassic and Cretaceous) are also important. Variscan and Tertiary folding affected the region and north-easterly faults run along the foot of the Isergebirge and Riesengebirge. Extensive peat moors occupy many of the mountain slopes and valleys. The lower parts of the mountains are clad with forests of oak, beech, pine and fir; above 1,600 ft. only the last two kinds of trees are found, and beyond about 3,950 ft. only the dwarf pine (*Pinus Pumilio*). Various alpine plants are found, some of them having been artificially introduced on the Schneekoppe. Wheat is grown to an elevation of 1,800 ft. above the sea and oats as high as 2,700 feet.

The Riesengebirge is easily accessible by railway, several branches from the main lines on both sides, penetrating the valleys, and thus many spots are a good deal frequented in the summer. The Schneekoppe and other summits are annually visited by numbers of travellers, notably the spas of Warmbrunn (near Hirschberg) and Flinsberg on the Gneis, and Görbersdorf, with its sanatorium. The Riesengebirge is the legendary home of Number Nip (Rübezahl), a goblin of German folklore.

RIETI (anc. *Reate*), a city and episcopal see of Italy, the capital of the province of Rieti, 25½ m. by rail and 15 m. direct S.S.E. of Terni, which is 70 m. by rail from Rome. Pop. (1921) 11,810 (town), 18,975 (commune). It occupies a fine position 1,318 ft. above sea-level on the right bank of the Velino (a torrent subtributary to the Tiber), which at this point issues from the limestone plateau; the old town occupies the declivity and the new town spreads out on the level. While with its quaint red-roofed houses, its old town walls (some Roman fragments, restored about 1250), its cathedral (13th and 15th centuries), its episcopal palace (1283), and its various churches and convents Rieti has much mediaeval picturesqueness; it also displays a good deal of modern activity in corn, vine and olive growing and cattle-breeding. The fertility of the neighbourhood is celebrated both by Virgil and by Cicero.

For the disputes of Reate with the people of Interamna *see* TERNI. In 1149 the town was besieged and captured by Roger I. of Sicily. In the struggle between church and empire, it always held with the former; and it defied the forces of Frederick II. and Otho IV. Pope Nicholas IV. long resided at Rieti, and it was there he crowned Charles II. of Anjou king of the Two Sicilies. In the 14th century Robert, and afterwards Joanna of Naples managed to keep possession of Rieti for many years, but it returned to the States of the Church under Gregory IX. About the year 1500, the liberties of the town, long defended against the encroachments of the popes, were entirely abolished. An earthquake in 1785 was in 1799 followed by the pillage of Rieti by the Neapolitans.

See G. Colasanti, *Rieti* (Perugia, 1911).

RIEVAULX (rē-ę-vō), a village, North Riding, Yorkshire, England, three miles west by north of Helmsley, which is served by the L.N.E. railway. Pop. (1921) 191. It is situated on the River Rye before it emerges from the York moors into the Vale of Pickering. The name is probably a corruption of Rye Vale. Rievaulx abbey, one of the most beautiful ruins in Yorkshire, was founded by the Cistercians in 1131. The principal remains are those of a cruciform church which is mainly Early English in style and is of very fine workmanship. Considerable fragments of the refectory remain and the domestic buildings may be traced.

RIF CAMPAIGNS: *see* MOROCCO, FRANCO-SPANISH CAMPAIGNS IN.

RIFIS, the name given to the Berbers of the Rîf district of Morocco, the mountain region bordering the north coast from Ceuta eastward nearly to the borders of Algeria and forming part of the Atlas range. The Rîf dialect changes the Arabic "l" to "r," and this supports the derivation of "Rifi" from "Libi," "b" and "f" being interchangeable. *See* MOROCCO.

RIFLE: *see* SMALL ARMS.

RIFLE-BIRD or **RIFLEMAN-BIRD,** the name applied to birds of paradise (*q.v.*) of the genera *Ptilorrhis* and *Craspidornis*, probably because their plumage bears some resemblances to the full-dress uniform (green and black) of the British rifle regiments. There are five species, of which one inhabits New Guinea and the others the Australian continent. The best known is *P. paradisea. See* R. B. Sharpe, *Monograph of the Paradiseidae.*

RIGA, a seaport of Latvia, of which it is the capital, in 57° 3′ N., 24° 1′ E. Pop. (1923) 285,000. It is situated at the southern extremity of the Gulf of Riga, 8 m. above the mouth of the western Dwina, which is connected by means of inland canals with the basins of the Dnieper and Volga. The Gulf of Riga is 100 m. long and 60 m. wide, with shallow waters of slight salinity and a greatest depth of 22 fathoms. It is frozen for an average of 127 days in the year. The sea entrance has a depth of 24½ ft. which is being dredged to 26 ft. The channel up to the town is 24 ft. deep and the depth at the quays varies from 18 to 26 ft. There are vast warehouses and a large grain elevator. The port has two electric cranes (10 tons and 25 tons), a 25 ton floating crane and there are on order (1928) for the town 8 electrical portable cranes and one 130 ton crane as there is a growing transit trade with Soviet Russia. The Riga Exchange Committee's slip dock at Bolderaja is capable of taking ships up to 1,000 tons. Large ships unload at Ust-Dvinsk (formerly Dunamünde). The imports are herrings, foodstuffs, clothing, sugar, tobacco, industrial and agricultural machinery, mechanical tools, railway equipment, coal, coke and fertilisers, and the exports flax, timber, wooden goods, dairy produce, meat, pork and ham. The town manufactures paper, wood-pulp, cellulose, matches, veneered goods, paints and varnish, textiles, especially cotton and linen goods, boots and shoes, rubber goods, cement, vegetable oils, tobacco and alcoholic drinks. Manufactures were seriously hampered by the destruction of factories and plant during the World War, when Riga was occupied by German troops from 1917 to 1919. Trade in 1926 was about 10% of that in 1913.

Riga consists of four parts—the old town and suburbs on the right bank of the Dwina (Latvian, *Daugava*), and the Mitau suburb on the left bank, the two sides being connected by a floating bridge, which is removed in winter, and by a viaduct, 820 ft. long. The old town still preserves its Hanseatic features—high storehouses, with spacious granaries and cellars, flanking the narrow, winding streets. The only open spaces are the market-place and two other squares. The suburbs, with their broad and quiet boulevards on the site of the fortifications, are steadily growing.

Few antiquities of the mediaeval town remain. The oldest church, the Dom (St. Mary's), founded in 1215, was burned in 1547, and the present building dates from the second half of the 16th century, but has been thoroughly restored since 1883. Its organ, dating from 1883, is one of the largest in the world. St. Peter's church, with a beautiful tower 412 ft. high, was erected in 1406–9. The castle was built in 1494–1515 by the master of the Knights of the Sword, Walter von Plettenberg, a spacious building often rebuilt. The "House of the Black Heads," a corporation or club, of foreign merchants, was founded in 1330, and subsequently became the meeting-place of the wealthier youth.

The Livlandische Ritterhaus, the former place of meeting of the Livonian nobility, still stands. Near the city are extensive

summer bathing beaches, with mile after mile of little wooden chalets nestling among pine trees. The Riga Polytechnic Institute became a university in 1919, Dorpat (Tartu) university, which previously served all the Russian Baltic provinces, having become Estonian property.

History.—Riga was founded in 1158, as a storehouse at the mouth of the river, by a few Bremen merchants. About 1190 the Augustinian monk Meinhard erected a monastery there, and in 1199–1201 Bishop Albert I. of Livonia obtained from Pope Innocent III. permission for German merchants to land at the new settlement, and chose it for his seat, exercising his power over the neighbouring district in connexion with the Teutonic Knights. As early as the first half of the 13th century the young city obtained the right of electing its own magistracy, and enlarged the walls erected during Albert I.'s time. It joined the Hanseatic League, and from 1253 refused to recognize the rights of the bishop and the knights. In 1420 it fell once more under the rule of the bishop, who maintained his authority until 1566, when it was abolished in consequence of the Reformation. Sigismund II., king of Poland, took Riga in 1547, and in 1558 the Russians burned its suburbs and many ships in the river. In 1561 Gotthard Ketteler publicly abdicated his mastership of the order of the Teutonic Knights, and Riga, together with southern Livonia, became a Polish possession. After some unsuccessful attempts to reintroduce Roman Catholicism, Stephen Bathory, king of Poland, recognized the religious freedom of the Protestant population. Throughout the 17th century Riga was a bone of contention between Sweden, Poland and Russia. In 1621 Gustavus Adolphus, king of Sweden, took it from Poland, and held it against the Poles and the Russians, who besieged it in 1656. During the Northern War between Sweden and Russia, it was courageously defended (1700), but after the battle of Poltava it succumbed, and was finally taken in July 1710 by the Russians.

RIGAUD, HYACINTHE (1659–1743), French painter, born at Perpignan on July 20, 1659, was the descendant of a line of artists. He was sent to Montpellier to study under Pezet, and afterwards went to Lyons, and in 1681 to Paris. There he obtained the grand prix de Rome, but on the advice of Le Brun he allowed it to lapse and devoted himself to painting portraits. For sixty-two years he did as many as thirty to forty portraits a year. But Rigaud, although purely a portrait painter, set his heart on gaining admission to the Academy as a historical painter, and succeeded in Jan. 1700. He died on Dec. 27, 1743.

His principal portraits at the Louvre are those of himself and his mother (Marie Serre), of the sculptor Desjardins, of Mignard and Le Brun, of Bossuet and of Louis XIV.

RIGBY, RICHARD (1722–1788), English politician, was the only son of Richard Rigby (d. 1730) of Mistley Hall, Essex, a merchant who made a fortune through his connection with the South Sea Company. Young Rigby became an associate of Frederick, prince of Wales, and entered parliament in 1745. He is chiefly known to fame through his connection with John Russell, 4th duke of Bedford, and the "Bloomsbury gang," his audacity earning for him the title of the "brazen boatswain" of the "crew." In 1758 he became secretary to Bedford, who was lord lieutenant of Ireland, and in the following year he was given the sinecure office of master of the rolls for Ireland. Following the political fortunes of the duke he became vice-treasurer of Ireland in 1765, and in 1768 he obtained the lucrative position of paymaster-general of the forces. Rigby often spoke in parliament, and in 1769 he shared in the opposition to Wilkes. In 1784 he was obliged to resign his position as paymaster-general, and he was somewhat surprised and embarrassed when he was requested to pay over the large sum of public money which was in his possession. He left a great fortune when he died at Bath on April 8, 1788. Wraxall says that Rigby "possessed talents for addressing a popular assembly which were sustained by a confidence that nothing could abash."

RIGEL, the bright star at the heel of the constellation (*q.v.*) Orion (*q.v.*). It is of magnitude 0·34, being one of the brightest stars in the sky. Its equivalent in the alphabetical series is β Orionis. (*See* STAR.)

RIGG, JAMES HARRISON (1821–1909), English Nonconformist divine, was born at Newcastle-on-Tyne on Jan. 16, 1821. In 1845 he entered the Wesleyan ministry, and during the agitation of 1849–52 wrote successfully in exposition and defence of the polity of Methodism. In 1857 he published *Modern Anglican Theology,* an acute criticism of the writings of Coleridge, Hare, Maurice, Kingsley and Jowett. In 1868 Rigg was appointed Principal of the Westminster Wesleyan Training College for day-school teachers, a post which he held for 35 years. In 1870 he was elected on the first School Board for London. In 1886 he sat on the Royal Commission of Education. In 1878 he was elected president of conference—and again in 1892. He resigned his principalship in 1903 and died at Brixton on April 17, 1909.

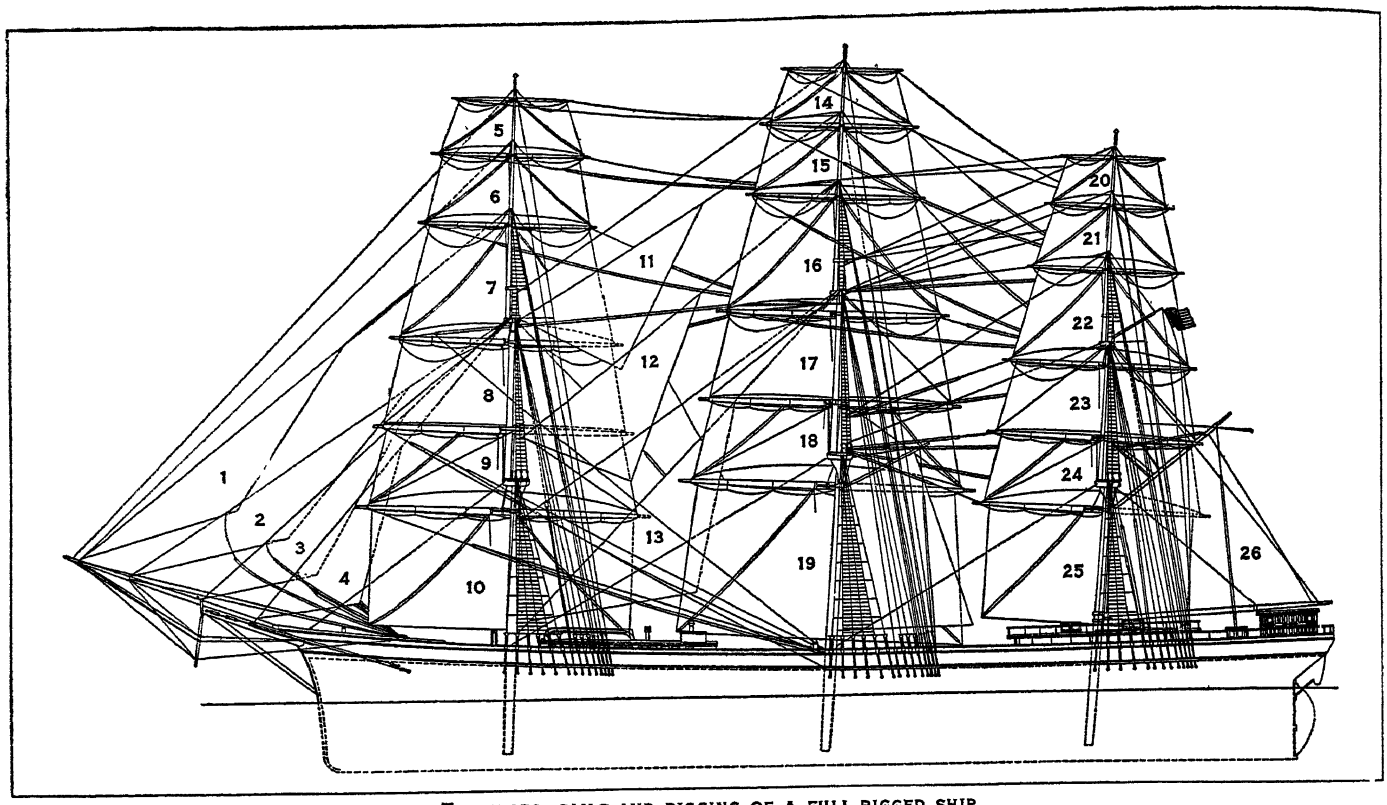
See *Life* by John Telford (1909). His other works include: *National Education in its Social Conditions and Aspects* (1873); *The Living Wesley* (1875, reissued as *The Centennial Life of Wesley* in 1891); *Character and Life-work of Dr. Pusey* (1893); *Oxford High Anglicanism and its chief Leaders* (1895).

RIGGING (A.S. *wrigan* or *wrihan,* to clothe), the general term, in connection with ships, for the whole apparatus of masts, yards, sails and cordage. (*See* also SHIP, YACHT and NAUTICAL TERMS.) The word is also used as meaning the cordage only.

SAILING SHIPS

Sailing vessels of all classes are classed according to their "rig," *i.e.,* the particular combination of spars, sails and cordage. "Cutter," "brig," or "ship," are really convenient abbreviations for "cutter-rigged," "brig-rigged," or "ship-rigged."

The basis of all rigging is the mast whether it be composed of one or of many pieces of wood or of steel. The mast is supported against fore and aft or athwartship strains by fore and back stays and by shrouds, known as the "standing rigging," because they are made fast, and not hauled upon. In the case of a mast composed of several parts, including topmast and topgallant mast, the stays, and other ropes which keep the top and topgallant masts in place, are however only comparative fixtures as they may be cast off when these masts are lowered down. The bowsprit, though it does not rise from the deck but projects from the bow, is in the nature of a mast. The masts and bowsprit support all the sails, whether they hang from yards, slung across the mast, or from gaffs, projecting from the mast, or, as in the case of the jibs, or other triangular sails, travelling on the ropes called "stays," which go from the mast to the bowsprit or deck. The bowsprit is subdivided like the masts. The bowsprit proper corresponds to the lower fore-, main- or mizzen-mast. The jib-boom, which is movable and projects beyond the bowsprit, corresponds to a topmast; the flying jib-boom, which also is movable and projects beyond the jib-boom, answers to a topgallant mast. The ropes by which the yards, booms and sails are manipulated for trimming to the wind or for making or shortening sail, are known as the "running rigging." The rigging also provides the crew with the means of going aloft, and for laying out on the yards to let fall or to furl the sail. Therefore the shrouds (*see* below) are utilized to form ladders, the steps of which are called ratlines. Near the heads of the lower masts are the tops—platforms on which men can stand —and in the same place on the topmasts are the "cross-trees," of which the main function is to extend the topgallant shrouds. The yards are provided with ropes, extending from the middle to the extremities or yard-arms, called foot-ropes, which hang down about 2 or 3 ft., and on which men can stand. The material of which the cordage is made differs greatly. Leather has been used but the prevailing materials have been hemp or grass rope, and, in recent days, chain and wire. As the whole of the rigging is divided into standing and running, so a rope forming part of the rigging is divided into the "standing part" and the "fall." The standing part is that which is made fast to the mast, deck or block. The fall is the loose end or part on which the crew haul. The block is the pulley through which the rope runs. A "tackle" (pronounced "taikel") is a combination of ropes and blocks which gives increased power at the lifting or moving end, as distinct from the end which is being "manned." If fig. 1 is followed from the bow to the mizzenmast, it will be seen that a succession



THE SPARS, SAILS AND RIGGING OF A FULL-RIGGED SHIP

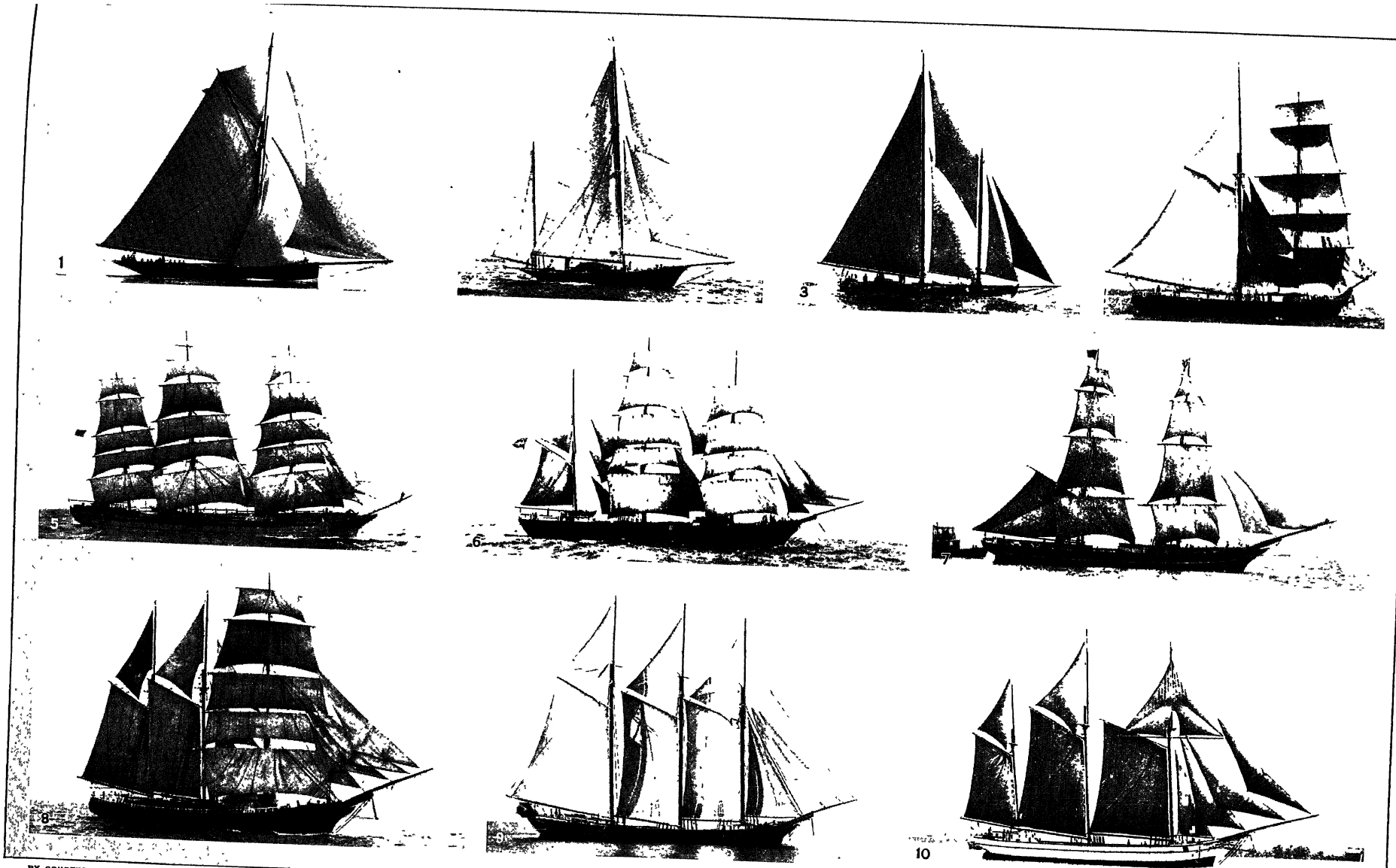
1. Flying jib; 2. Outer jib; 3. Inner jib; 4. Jib; 5. Fore skysail; 6. Fore royal; 7. Fore topgallant sail; 8. Fore upper topsail; 9. Fore lower topsail; 10. Foresail; 11. Main royal staysail; 12. Main topgallant staysail; 13. Main topmast staysail; 14. Main skysail; 15. Main royal; 16. Main topgallant sail; 17. Main upper topsail; 18. Main lower topsail; 19. Mainsail; 20. Mizzen skysail; 21. Mizzen royal; 22. Mizzen topgallant sail; 23. Mizzen upper topsail; 24. Mizzen lower topsail; 25. Crossjack; 26. Spanker

of stays connect the masts with the hull of the ship or with one another. All pull together to resist pressure from in front. Pressure from behind is met by the backstays, which connect the topmasts and topgallant masts with the sides of the vessel. Lateral pressure is met by the shrouds and breast-backstays. A temporary or "preventer" backstay is used when great pressure is to be met. The bobstays hold down the bowsprit, which is liable to be lifted by the tug of the jibs and of the stays connecting it with the fore-topmast. If the bowsprit is lifted the fore-topmast loses part of its support.

The running rigging by which all spars are hoisted or lowered and sails spread or taken in may be divided into those which lift and lower—the lifts, jeers, halliards (haulyards)—and those which hold down the lower corners of the sails—the tacks and sheets. A long technical treatise would be required to name the many parts of standing and running rigging and their uses. All that is attempted here is to give the main lines and general principles or divisions.

The vessel dealt with here is the fully rigged ship with three masts. But the principles of others are the same. The simplest of all forms of rigging is the dipping lug, a quadrangular sail hanging from a yard and always hoisted on the side of the mast opposite to that on which the wind is blowing (the lee side). When the boat is to be tacked so as to bring the wind on the other side, the sail is lowered and rehoisted. One rope can serve as halliard to hoist the sail and as a stay when it is made fast on the weather side on which the wind is blowing. The difference between such a craft and the fully rigged ship is that between a simple organism and a very complex one; but it is one of degree, not of kind. The steps in the scale are innumerable. Every sea has its own type. (*See* Pl. I., figs. 1, 2, 3, 4, 5, 6, 7.) Some in eastern waters are of extreme antiquity, and even in Europe vessels are still to be met with which differ very little if at all from ships of the Norsemen of the 9th and 10th centuries. For a full account of these varieties of rigging the reader may be referred to *Mast and Sail in Europe and Asia* (London, 1906), by H. Warington Smyth.

When the finer degrees of variation are neglected the types of rigging may be reduced to comparatively few, which can be classed by the shape of their sail and the number of their masts. At the bottom of the scale is such a craft as the Norse herring boat. This boat has one quadrangular sail suspended from a yard which is hung (or slung) by the middle to a single mast which is placed (or stepped) in the middle of the boat. She is the direct representative of the ships of the Norsemen. Her one sail is a "course" such as is still used on the fore and mainmasts of a fully developed ship; a topsail may be added (above the course) and then we have the beginning of a fully clothed mast. A very similar craft called a Humber keel is used in the north of England. The lug sail is an advance on the course, since it is better adapted for sailing on the wind, with the wind on the side. When the lug is not meant to be lowered, and rehoisted on the lee side, as in the dipping lug mentioned above, it is slung at a third from the end of the yard, and is called a standing lug. A good example of the lug is the junk (Pl. I., figs. 4, 6). The lug is a "lifting sail," and does not tend to press the vessel down as the fore and aft sail does. Therefore it is much used by fishing vessels in the North Sea. The type of the fore and aft rig is the schooner (Pl. II., fig. 9). The sails on the masts have a gaff above and a boom below. These spars have a prong called "the jaws," which fit to the mast, and are held in place by a "jaw rope" on which are threaded beads called trucks. Sails of this shape are carried by fully rigged ships on the mizzenmast, and can be spread on the fore and main. They are then called trysails and are used only in bad weather when little sail can be carried, and are hoisted on the trysail mast, a small mast above the great one. The lateen sail (Pl. I., fig. 2) is a triangular sail akin to the lug, and is the prevailing type of the Mediterranean. These original types, even when unmodified by mixture with any other, permit of large variations. The number of masts of a lugger may vary from one to five, and of a schooner from two to five or even seven. A small lug may be carried above the large one, and a gaff topsail added to the sails of a schooner. A one-masted fore-and-aft-rigged vessel may be a cutter (Pl. II., fig. 11) or sloop. But the pure types may be combined, in topsail schooners, brigantines, barquentines and barques, when the topsail, a



BY COURTESY OF (6) THE AMERICAN MUSEUM OF NATURAL HISTORY, (8, 10) THE DETROIT PUBLISHING COMPANY, PHOTOGRAPHS, (2, 5) EDWIN LEVICK, (3) MORRIS ROSENFELD

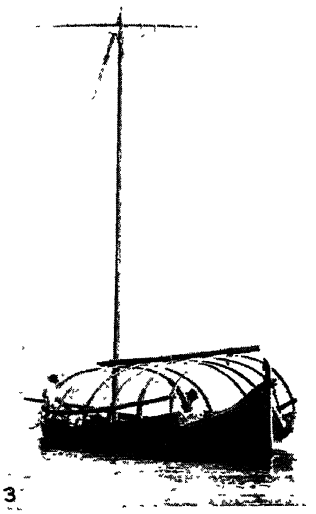
VARIOUS TYPES OF SAILING VESSELS AND THEIR RIGGING

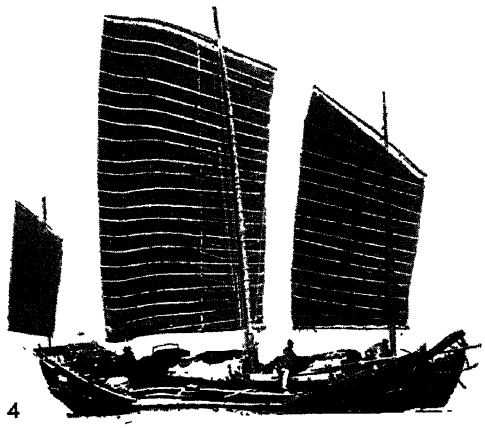
1. A cutter, with gaff-mainsail and topsail
2. A yawl, with Bermuda or jib-headed rig
3. A staysail schooner, so-called because of the staysails between the masts instead of the regular foresail
4. A brigantine, or hermaphrodite brig
5. A full-rigged ship, square-rigged on all three masts
6. A barque, square-rigged on fore and main masts and fore and aft rigged on the mizen
7. A brig; two-masted ship, square-rigged on both masts
8. A barquentine; three-masted ship, square-rigged on foremast only
9. A three-masted schooner, fore-and-aft-rigged on all three masts
10. A Great Lakes schooner, with a raffee or triangular sail on the foremast

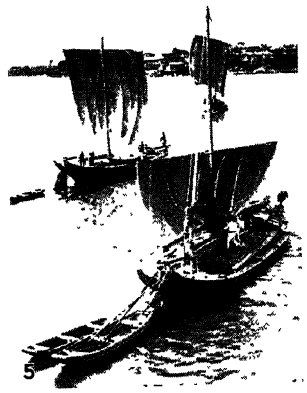
RIGGING

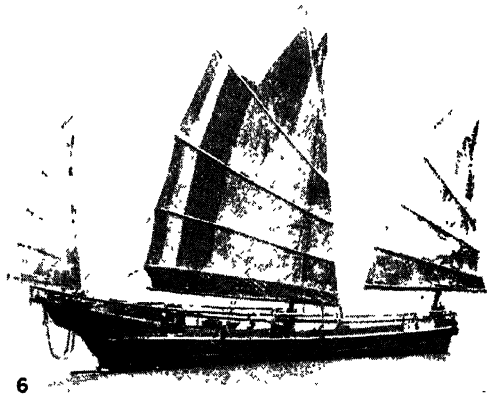

1

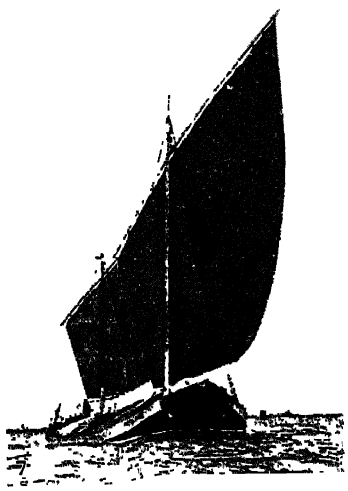

2

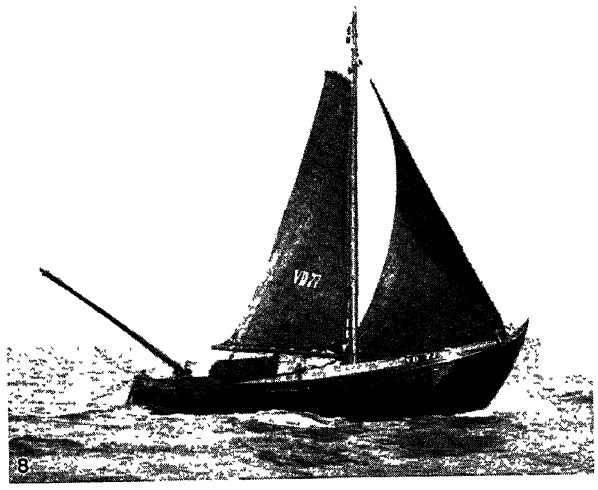

3

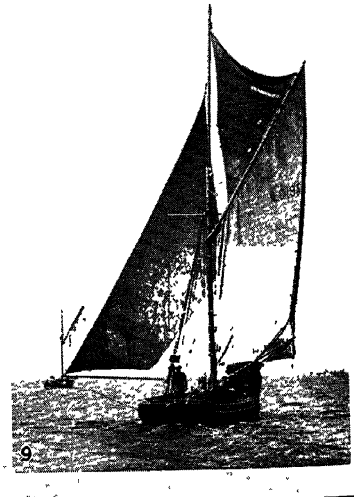

4


5


6


7


8


9

PHOTOGRAPHS, (1, 2, 3, 7, 8) DONALD MCLEISH, (4, 9) SPORT AND GENERAL PRESS AGENCY, (5) EWING GALLOWAY, (6) THE NAUTICAL PHOTO AGENCY

SAILING BOATS OF DIFFERENT NATIONS

1. Arab dhow with long overhanging forepart, an open waist and high poop
2. Native trading boat of the type frequently found on the River Nile
3. Small fishing boat on an Italian lake
4. Chinese junk
5. Japanese sampans
6. Chinese junk
7. Broad beamed Venetian trading boat
8. Dutch fishing boat as used on the Zuider Zee
9. English fishing smacks

quadrangular sail hanging from and fastened to a yard, slung by the middle, is combined with fore and aft sails. The lateen rig has been combined with the square rig to make such a rigging as the xebec—a three-masted vessel square rigged on the main, and lateen on the fore and mizzen. Triangular sails of the same type as the jibs can be set on the stays between the masts of a fully rigged ship, and are then known as staysails. But it can only be repeated that the variations are innumerable. Studding-sails (pronounced "stun-sails") are lateral extensions to the courses, topsails, etc., of a square-rigged ship to increase the spread of sails, that require the support of special yards, booms and tackle.

The development of the rigging of ships is a very obscure subject. It was the work of centuries, and of practical men who wrote no treatises. It has never been universal. A comparison of the four-masted junk given above with the figures of ships on mediaeval seals shows at least much similarity. Yet by selecting a few leading types of successive periods it is possible to follow the growth of the fully rigged ship, at least in its main lines, in modern times.

For a time, and after the use of spritsails had been given up, the spritsail yard continued to be used to discharge the function now given to the gaffs. (*See* Smyth, *Sailor's Word-Book.*) The changes in the mizzen have an obscure history. About the middle of the 18th century it ceased to be a pure lateen. The yard was retained, but no sail was set on the fore part of the yard. Then the yard was given up and replaced by a gaff. The resulting new sail was called the spanker. It was, however, comparatively narrow, and when a greater spread of sail was required, a studding-sail (at first called a "driver") was added, with a boom at its foot. At a later date "spanker" and "driver" were used as synonymous terms, and the studding-sail was called a "ringtail." The studding-sails are the representatives of a class of sail once more generally used. In modern times a sail is cut of the extreme size which is capable of being carried in fine weather, and when the wind increases in strength it is reefed—*i.e.*, part is gathered up and fastened by reef points, small cords attached to the sail. Till the 17th century at least the method was often to cut the courses small, so that they could be carried in rough weather. When a greater spread of sail was required, a piece called a bonnet was added to the foot of the sail, and a further piece called a drabbler could be added to that. It is an example of the tenacious conservatism of the sea that this practice is still retained by the Swedish small craft called "lodjor" in the Baltic and White Sea. It will be easily understood that no innovation was universally accepted at once. Jib and sprit topsail, lateen-mizzen and spanker, and so forth, would be found for long on the sea together.

The history of the development of rigging is one of adjustment. The size of the masts had to be adapted to the ship, and it was necessary to find the due proportion between yards and masts. As the size of the mediaeval ship increased, the natural course was to increase the height of the mast and of the sail it carried. Even when the mast was subdivided into lower, top and topgallant, the lower mast was too long, and the strain of the sail racked the hull. Hence the constant tendency of the ships to leak. Sir Henry Manwayring, when giving the proper proportions of the masts, says that the Flemings (*i.e.*, the Dutch) made them taller than the English, which again forced them to make the sails less wide.

A few words may be added concerning the tops. In the earlier form of ships the top was a species of crow's nest placed at the head of the mast to hold a look-out, or in military operations to give a place of advantage to archers and slingers. They appear occasionally as mere bags attached to one side of the mast. As a general rule they are round. In the 16th century there were frequently two tops on the fore- and main-masts, one at the head of the lower, another at the head of the topmast, where in later times there have only been the two traverse beams which make the crosstrees. The upper top dropped out by the 17th century. The form was round, and so continued to be till the 18th century when the quadrangular form was introduced.

Rigging in Power Ships.—The steam and motor ship still carries one or more masts for supporting derricks, for lifting heavy weights in and out of the ship, for carrying wireless aerials, for providing a platform for look out aloft, for mounting the steaming lights and for visual signalling. In the bigger ships the masts are usually hollow steel structures, occasionally with an internal ladderway, while in some merchant ships they also act as uptake ventilators. Stays are usually provided on the same principle as in sailing days, but dead eyes have given way to bottle screws as rope has to wire. Where masts are provided with ladderways, either internally or externally on the iron structure itself, ratlines on the rigging are dispensed with. Modern battleships, battle cruisers and light cruisers in the British navy usually have a tripod foremast in which the lower mast is supported by two inclined steel struts instead of rigging. This is to give the necessary rigidity for mounting the gun director, (*see* GUNNERY, NAVAL) control top and rangefinder.

The main mast usually carries the main derrick and is stayed on the old lines. Wooden topmasts and sometimes topgallant masts are fitted for wireless and signalling, while one or more signal yards are always carried on the foremast. In light cruisers the main mast is usually a small wooden pole. Destroyers and other light craft are fitted with a light wooden foremast and usually a short main or mizzen mast.

The upper end of the standing rigging is shackled to steel bands round the lower masthead and their lower ends are secured to the deck by bottle screws and slips, the screw being locked by a check piece which prevents it easing back, and together with its slip it is covered with painted canvas.

The topmast rigging, consisting of the usual shrouds, stays and back stays is fitted with insulators so as to avoid interference with wireless and danger from lightning. In the case of ships with a tripod foremast it is set up to projections on a level with the base of the control top instead of being brought right down to deck level. A Jacob's ladder gives access to the masthead, whilst above all is a lightning conductor connected by a copper strap running down the mast to the hull of the ship. Where a masthead flashing lamp is fitted, a gallows is provided for its reception. In flagships a pole 16 feet long is clamped to the fore topmast or fore topgallant mast head to carry the Admiral's flag.

Modern Running Rigging.—The only semblance to running rigging in a modern power ship is as follows:

Gantlines, which can be rove through a sheave in the topmast for tricing weights aloft and general purposes.

Clothes lines and hammock gantlines, used for drying clothes or hammocks, which in warships are of thin flexible steel rope which lead through blocks on a shroud near the fore or main lower mast heads and are set up well forward or well aft.

Dressing lines, leading from the foremast awning stantion over both topmasts and down to the after awning stantion. To these are attached flags for "dressing ship."

Signal halyards, made of light white line led through blocks on the yards and trucks for hoisting signal flags.

BIBLIOGRAPHY.—*A Treatise on Rigging* (about 1625), London, Society for Nautical Research, 1921; Sir Henry Manwayring, *The Seaman's Dictionary* (1644); Darcy Lever, *The Young Sea Officer's Sheet Anchor* (1808); Sir George Nares, *Seamanship* (Portsmouth); Vice-Adm. Edmond Paris, *La Musée de marine du Louvre* (1883); Anderson, *The Rigging of Ships—1600–1720* (Salem, Mass., 1927); *Der geöfnete See-Hafen* (Hamburg, 1700 and 1702); Lescalier, *Traité pratique du Gréement des vaisseaux* (Paris, 1791); *The Elements and Practice of Rigging and Seamanship* (London, 1794); Commander Walker, R.N., *Alston's Seamanship; Manual of Seamanship,* Vol. I, 1926, H.M. Stationery Office.

RIGHI, AUGUSTO (1850–1920), Italian physicist, was born at Bologna on Aug. 27, 1850. He studied at Bologna, where he afterwards held several posts for the teaching of physics. In 1880 he was appointed professor of physics at Palermo university, and in 1889 to a similar post at Bologna, which he retained until he died, on June 8, 1920.

Righi's researches were on electricity, magnetism and light. He discovered the variation in the resistance of bismuth in a magnetic field, and applied this to the measurement of magnetic fields. Righi extended Kerr's observations on the Kerr effect, and found the variation in the rotation of the plane of polarization with the wave length of the light. He examined the phenomena in

a discharge tube and investigated the potential in the neighbourhood of the cathode. Righi observed the discharge of negative electricity from a zinc plate when illuminated by ultra violet light, and this led him to work on photo-electricity. He worked with electromagnetic waves and designed a Hertzian oscillator known by his name. Righi also wrote papers on the changes of length due to magnetization, change of size of insulators under electric stress, and on the phenomena of radioactivity.

Righi received many academic and other honours, and in 1905 was elected a senator.

His principal works are: *Ricerche di elettro-statica* (1873), *La telegrafia senza filo* (with B. Dessau, 1902, etc.), *L'Ottica della oscillazioni eletriche* (1897), *La moderna teoria dei fenomeni fisici* (1907), *Le nuove vedute sulla struttura della materia* (1907), *I fenomeni elettro-atomici sotto l'azione del magnetismo* (1918).

RIGHT ASCENSION, in astronomy, that co-ordinate of a heavenly body defined by the angle which the meridian passing through it makes with the prime meridian through the vernal equinox (*see* ASTRONOMY).

RIGHT-HANDEDNESS: *see* HANDEDNESS.

RIGHTS OF MAN AND OF THE CITIZEN, DECLARATION OF, a sort of manifesto issued in 1789, by the Constituent Assembly in the French Revolution, to be inscribed at the head of the constitution when it should be completed. It stated the fundamental principles which inspired the revolution. The Declaration was first drafted and proposed by the marquis de Lafayette, who had returned from America full of enthusiasm for the principles proclaimed in the Declaration of Independence. The final text voted by the Assembly and accepted by the king on Oct. 5, 1789, is much fuller than the American prototype. It contains a preamble and 17 articles. They proclaim and define political equality and liberty in its various manifestations, determine the character of the law and the conditions of its application, and state at the same time the restrictions upon the individual will which are necessary for the benefit of society. Similar declarations were attached to the constitution of 1793 and to that of the year III.

See E. Blum, *La Déclaration des droits de l'homme et du citoyen,* text with commentary (1902); G. Jellinck, *Die Erklärung der Menschen und Bürgerrechte* (Leipzig, 1895). This study has been translated into English by Rudolf Tombo (New York), and aroused considerable controversy; *see* E. Boutmy, "La Déclaration des droits de l'homme et du citoyen et M. Jellinck," in *Annales des sciences politiques,* July 15, 1902; also E. Walsh, *La Déclaration des droits de l'homme et du citoyen et l'assemblée constituant, Travaux préparatoires* (Paris, 1903).

RIGHT WHALE (*Balaena mysticetus*), also called the Greenland whale, attaining a length of 60 ft. to 70 ft., the largest and most valuable of the whalebone whales, a single specimen sometimes furnishing 3,500 lb. of whalebone. It was formerly the mainstay of the whaling trade, but now almost extinct. An allied species exists in the southern hemisphere, but is also very rare. (*See* CETACEA; WHALE FISHERIES.)

RIGORD (*c.* 1150–*c.* 1209), French chronicler, was probably born near Alais in Languedoc, and became a physician. He entered the monastery of Argenteuil, and then that of St. Denis, and described himself as *regis Francorum chronographus.* Rigord wrote the *Gesta Philippi Augusti,* covering the period 1179–1206. It was abridged and continued by William the Breton (*q.v.*).

See Dom Bouquet's *Recueil des historiens des Gaules et de la France* (Paris, 1738–1876); another ed. by H. F. Delaborde (Paris, 1882–85); French trans. in tome xi. of Guizot's *Collection des mémoires relatifs à l'histoire de France* (Paris, 1825).

RIGORISM, a philosophical term applied by Kant specially to those moralists who take up an anti-hedonist or ascetic standpoint (Lat. *Rigor,* stiffness, firmness). In general the term is opposed to "latitudinarianism" or "indifferentism,"—respectively a morality of compromise and a morality of pure indifference,—and signifies insistence upon the strictest interpretation of a principle, rule or criterion. Thus, in Roman Catholic theology, a rigorist holds that in cases of conscience the proper course is to adhere to the strict wording of the law in question.

RILA (Bulg. RILSKOE SELO), a village of Bulgaria, 51 m. S.S.W. of Sofia, which can be reached by rail to Radomir and Decauville. Ten miles further, up a gorge of the magnificent Rila mountains, stands the monastery of Rila, the largest and richest in Bulgaria. It was founded in the 10th century, but the present church and most of the courtyard date from the 19th.

RILEY, JAMES WHITCOMB (1853–1916), American poet, was born, of pioneer stock, in Greenfield (Ind.), Oct. 7, 1853. "The poet of the common people," Riley was elected to the American Academy of Arts and Letters, received the gold medal of the National Institute of Arts and Letters, was given several honorary degrees and in 1915 had his birthday declared an official holiday throughout his home State in honour of "Indiana's most beloved citizen." After a happy boyhood, which he records in his poems, he found his father's profession of lawyer distasteful and spent several years as an itinerant sign-painter, entertainer, and assistant to patent-medicine venders, all valuable experience, for it gave him the opportunity to compose songs and dramatic skits, to gain skill as an actor and to come into intimate touch with the rural folk of Indiana. His first reputation came through his poems contributed to newspapers—*Leonainie,* which purported to be a poem written by Poe, and the series in Hoosier dialect ostensibly written by a farmer, "Benjamin F. Johnson of Boone," which he contributed to the Indianapolis *Daily Journal* and later published in book form as *The Old Swimmin' Hole and 'Leven More Poems* (1883). Riley was for a short time local editor of the Anderson (Ind.) *Democrat,* but his later life was spent in Indianapolis, where he died, July 22, 1916. His verse is sentimental and although he used, sometimes to excess, the conventional devices of the humorist, the best of his verse has a singing quality and a simple charm which make it live.

Of Riley's numerous volumes, among the most outstanding are: *The Boss Girl* (1886; republished 1891 as *Sketches in Prose*), *Pipes o' Pan at Zekesbury* (1889), *Old Fashioned Roses* (1888), *The Flying Islands of the Night* (1892), *A Child-World* (1896), *Home Folks* (1900). Because of reprints under varying titles, it is most satisfactory to read him in one of the collected editions: *Poems and Prose Sketches* (Homestead ed., 16 vol., 1897–1914); the biographical edition prepared by his nephew and secretary E. H. Eitel (6 vol., 1913); and the Memorial edition of his *Complete Works* (10 vol., 1916). Hewitt Howland collected Riley's conventional English verse in *The Lockerbie Book* (1911) and his dialect poems in *The Hoosier Book* (1916).

See Clara E. Laughlin, *Reminiscences of James Whitcomb Riley* (1916); also *The Youth of James Whitcomb Riley* (1919) and *The Maturity of James Whitcomb Riley* (1922), both by Marcus Dickey, and "James Whitcomb Riley" by Edgar Lee Masters in the *Century Mag.* (Oct., 1927).

RILKE, RAINER MARIA (1875–1926), German author, was born at Prague, Dec. 4, 1875. Originally intended for an officer, he studied in Prague, Munich and Berlin, travelled in Russia, Italy and France, and frequented chiefly artistic circles, acting at one time as Rodin's secretary. He afterwards lived in Vienna, Munich and Switzerland, where he died in Dec. 1926. Rilke's work includes both prose and verse; but the latter is the better known, and from 1900–10 he, with Stefan George (*q.v.*), was Germany's foremost lyric poet. His writing is deeply artistic and deeply musical at once; a religious mysticism colours an extraordinarily rich and melodious style, which absorbed the best influences of most of the important European literatures. Its unique delicacy fully compensates for a certain lack of breadth and grandeur.

Rilke's works include: *Traumgekrönt* (1897); *Zwei Prager Geschichten* (1899); *Vom lieben Gott* (1900); *Das Buch der Bilder* (1902); *Stundenbuch* (1908); *Neue Gedichte* (1907); *Sonette an Orpheus* (1923); *Vergers* (poems in French, 1925).

RIMBAUD, JEAN ARTHUR (1854–1891), French poet and adventurer, born at Charleville, in the Ardennes, on Oct. 20, 1854. He was the second son of a captain in the French army, who in 1860 abandoned his wife and family. From early childhood Arthur Rimbaud, who was severely brought up by his mother, displayed rich intellectual gifts and a sullen, violent temperament. He began to write when he was ten, and some of

the poems which now appear in his works belong to his fifteenth year. Before he was sixteen, in consequence of a violent quarrel with his mother, the boy escaped from Charleville with a packet of his verse, was arrested as a vagabond, and for a fortnight was locked up in the Mazas prison, Paris. A few days after being taken home Rimbaud escaped again, into Belgium, where he lived for some time as a tramp, almost starved, but writing verses with feverish assiduity. In February 1871 he left his mother for a third time, and made his way to Paris, where he knew no one, and whence, after very nearly dying of hunger and exposure, he begged his way back to Charleville. There he wrote in the same year the extraordinary poem of *Le Bateau ivre,* which is now hailed as the pioneer of the entire "symbolist" or "decadent" movement in French literature in all its forms. He sent it to Verlaine, who encouraged the boy of seventeen (whom he supposed to be a man of thirty) to return to Paris. Rimbaud spent from October 1871 to July 1872 in the capital, partly with Verlaine, partly as the guest of Théodore de Banville, and served in the army of the Commune. With Verlaine he travelled for thirteen months, after the fall of the Commune, through England and Belgium, where in 1873 he published the only work which he ever printed, *Une Saison en Enfer,* in prose; in this he gives an allegorical account of his extravagant relations with Verlaine, which ended at Brussels by a double attempt of the latter to murder his young companion. On the second occasion Rimbaud was dangerously wounded by Verlaine's revolver, and the elder poet was imprisoned at Mons for two years.

Meanwhile Rimbaud, deeply disillusioned, determined to abandon Europe and literature, and he ceased at the age of nineteen to write poetry. He settled for a while at Stuttgart, studying German, and in 1875 he disappeared. He set out on foot for Italy, and after extraordinary adventures found employment as a day-labourer in the docks at Leghorn. Returning to Paris, he obtained a little money from his mother, and then definitely vanished. For sixteen years nothing whatever was heard of him, but it is now known that he embarked as a Dutch soldier for the Sunda Isles, and, presently deserting, fled to Sumatra and then to Java, where he lived for some time in the forest. Returning to Europe, after a vagabond life in every capital, he obtained in 1880 some menial employment in the quarries of Cyprus, and then worked his way to Aden and up into Abyssinia, where he was one of the pioneers of European commercial adventure. Here he settled, at Harrar, as a trader in coffee and perfumes, to which he afterwards added gold and ivory; for the next eleven years, during which he led many commercial expeditions into unknown parts of northern Africa, Shoa and Harrar were his headquarters, and he lived almost entirely with the natives, and as one of themselves. From 1888 to 1891, having prospered greatly as a merchant, he became a sort of semi-independent chieftain, intriguing for France, just outside the borders of civilization. From documents which were first produced in 1902 it appears that from 1883 to 1889 Rimbaud was in close relations with the Ras Makonnen and with Menelek, then only king of Shoa. At the death of the Negus John, in 1888, he was concerned in the formation of the empire of Ethiopia. From this time Rimbaud had a palace in the town of Harrar, and intrigued with the French government in favour of Menelek and against Italy.

Meanwhile, in 1886, believing Rimbaud to be dead, Verlaine had published his poems, under the title of *Les Illuminations,* and they had created a great sensation in Paris. In this collection appeared the sonnet on the vowels, attributing a different colour to each: "A noir, E blanc, I rouge, U vert, O bleu voyelles." But the author, in his Abyssinian hut of palm-leaves, was, and remained, quite unconscious of the fact. In March 1891 a tumour in his knee obliged Rimbaud to leave Harrar and go to Europe for surgical advice. He reached Marseilles, but the case was hopeless; the leg had to be amputated, and Rimbaud died there in hospital on Nov. 10, 1891. The poems of Rimbaud all belong to his earliest youth. Their violent originality, the influence which they have exercised upon younger writers, the tumultuous existence of their author, and the strange veil of mystery which still hangs over his character and adventures, have given to Rimbaud a remarkable fascination. His life has been written by M. Paterne Ber (1897), and valuable reminiscences by his sister, Mlle. I Rimbaud. His *Oeuvres* were collected in 1898 by MM. Ber and Delahaye, and in 1901 his statue was unveiled at Charl (E.

See *Lettres de Jean Arthur Rimbaud* (*Égypte, Arabie, Éth* 1899, edited by P. Berrichon; Paul Verlaine, *Les Poètes m* (1884); George Moore, *Impressions and Opinions: Two Un Poets* (1891); A. Symons, *The Symbolist Movement in Lite* (1900); M. Coulon, *Le Problème de Rimbaud, Poète maudit* (1 1923); E. Delahaye, *Rimbaud: l'artiste et l'être moral* (1923 Rickword, *Rimbaud: the boy and the poet* (1924). His *O complètes* were published by the *Mercure de France.* For the significance of Rimbaud and his influence on post-war French v *see* P. Claudel.

RIME ROYAL, the name given to a strophe or stanza-, which is of Italian extraction, but is almost exclusively iden with English poetry from the 14th to the early 17th centur appears to be formed out of the stanza called ottava rima (by the omission of the fifth line, which reduces it to seven of three rhymes, arranged ababbcc. It was earliest employed skill, if not invented, by Chaucer, who composed his long rom poem of *Troilus and Cressida* in rime royal, of which the fol ing is an example:—

"And as the new-abashéd nightingale,
Thet stinteth first when she beginneth sing,
When that she heareth any herdë tale,
Or in the hedges any wight stirring,
And, after, siker doth her voice out-ring,—
Right so Cresseyda, when her dredë stint,
Opened her heart, and told all her intent."

In the 15th century this stanza was habitually used, in prefer to heroic verse, by Hoccleve and Lydgate, and, with more mel and grace, by the unknown writer of *The Flower and the L* In the 16th century, it was regarded as the almost exclu classical form for heroic poetry in England, and it had long bee accepted in Scotland, where *The King's Quair* of King James the *Fables* of Henryson and *The Thistle and the Rose* of Dun had closely followed the pattern of Chaucer. After the f decade of the 17th century rime royal went out of fashion. Si then it has been occasionally revived, but not in poems of gr length or particular importance. Rime royal should always written in iambic metre, and be formed of seven lines of eq length, each containing ten syllables.

RIMINI, a town and bishop's see of Italy (anc. *Arimin q.v.*), in the province of Forlì, Emilia, on the Adriatic coast, 69 S.E. of Bologna by rail. Pop. (1921): town, 19,996; commu 57,672. The city is bounded on three sides by water. It fa the Adriatic to the north, has the torrent Aprusa, now call Ausa, on the east, and the river Marecchia, which has been nalized to serve as a harbour for small boats, on the west. stands in a fertile plain, which on the southern side soon swe into pleasant slopes backed by the jagged peaks of the Umbri Apennines. The foremost foothill of the range is the steep cr of Monte Titano, crowned by the towers of the republic of S Marino. Rimini attracts numerous visitors for the sea-bathin and has now extended as far as the coast, from which the old tow is nearly a mile distant. Apart from its ancient buildings, Rimi has some interesting churches, notably S. Agostino in the R manesque style (1247) with a lofty campanile; the Palazzi d Podestà (1304) and dell'Aréngo (1204) are good mediaeval buil ings; there is a municipal picture gallery and an archaeologic museum. The ancient castle of Sigismondo Malatesta is no dilapidated. For the church of S. Francis *see* p. 310.

HISTORY.

Rimini is the ancient Ariminum (*q.v.* for its early history an remains). Alternately captured by Byzantines and Goths, it wa rigorously besieged by the latter in A.D. 538. They were, however compelled to retreat before the reinforcements sent by Belisariu and Narses; thus the Byzantines, after various vicissitudes, be came masters of the town, appointed a duke as its governor, an included it in the exarchate of Ravenna. It afterwards fell int the power of the Longobards, and then of the Franks, who yielde

it to the pope, for whom it was governed by counts to the end of the 10th century. Soon after this period the imperial power became dominant in Rimini. In 1157 Frederick I. gave it, by imperial patent, the privilege of coining money and the right of self-government; and in the 13th century we find Rimini an independent commune waging war on the neighbouring cities.

Rise of the Malatesta.—In the year 1216 Rimini, being worsted by Cesena, granted citizenship to two members of the powerful Malatesta family, Giovanni and Malatesta, for the sake of their aid and that of their vassals in the defence of the state and the conduct of the war. This family quickly struck root in the town; and in 1237 Giovanni was named podestà.

Giovanni Malatesta died in 1247 and was succeeded by his son Malatesta, born in 1212 and surnamed Malatesta da Verrucchio. This chieftain, who lived to be 100 years old, was the real founder of his house. Being repeatedly elected podestà for lengthy terms of office, he at last became the virtual master of Rimini. Pope Boniface VIII. not only left Malatesta, as a Guelph champion, unmolested but in 1299 conferred on him fresh honours and estates, so that his power went on increasing to the day of his death in 1312. He had four sons, Malatestino, Giovanni (called the Lame), Paolo, and Pandolfo. Giovanni served under Giovanni da Polenta of Ravenna and won the hand of that potentate's beautiful daughter, known to history as Francesca da Rimini. But her heart had been won by the handsome Paolo, her brother-in-law; and the two lovers, being surprised by Giovanni, were murdered by him (1285). This episode has been immortalized in Dante's *Inferno*. Giovanni died in 1304. Thus in 1312 Malatestino became lord of Rimini, and on his decease in 1317 bequeathed the power to his brother Pandolfo.

Pandolfo died in 1326, leaving two heirs, Malatesta and Galeotto. In 1355 the Malatesta were reduced to submission by Pope Innocent VI. The two brothers divided their lands. Galeotto retained the lordship of Rimini, ruling tranquilly and on good terms with the popes, who allowed him to add Cervia, Cesena, and Bertinoro to his states. Dying in 1385 at the age of 80, he left two sons—Carlo (1364–1429) and Pandolfo (1370–1427). Carlo left no sons. Of those of Pandolfo, the eldest, Galeotto (1411–32), was an ascetic, gave little or no attention to public business, and, dying early, bequeathed the state to his brother Sigismondo Pandolfo. The third son, Novello (1418–65) ruled over Cesena.

Sigismondo Pandolfo.—Sigismondo (1417–68) is the personage to whom Rimini owes its renown during the Renaissance, of which indeed he was one of the strangest and most original representatives. He was born in Brescia, and when called to the succession, at the age of 15, had already given proofs of valour in the field. His knowledge of antiquity was so profound as to excite the admiration of all the learned men with whom he discoursed, even when, as in the case of Pius II., they chanced to be his personal enemies. To him is due the erection of the church of St. Francis, or temple of the Malatesta, the greatest of Rimini's treasures. On assuming power in 1432, Sigismondo was already affianced to the daughter of Count Carmagnola; but when that famous leader was arraigned as a traitor by the Venetians, and ignominiously put to death, he promptly withdrew from his engagement and espoused Ginevra d'Este, daughter of the duke of Ferrara in 1434. In 1440 his wife died. Two years afterwards he married Polissena, daughter of the famous condottiere, Francesco Sforza, who in 1443 bore him a son named Galeotto Roberto. But by this time he was already madly in love with Isotta degli Atti, and this was the passion which endured to his death. The lady succeeded in gaining an absolute ascendancy over him, which increased with time. She bore him several children, but this did not prevent his having others by different concubines. Such being the nature of the man, it is not astonishing that, as his ardour for Isotta increased, he should have little scruple in ridding himself of his second wife. On June 1, 1450, Polissena died by strangling, and on the 30th of the same month Isotta's offspring were legitimated by Nicholas V.

The Church of St. Francis.—Her marriage with Malatesta did not take place until 1456; but of the ardent affection that had long bound them together there are stronger proofs than the lover's juvenile verses, or than even the children Isotta had borne to him. For, more than all else, the temple of St. Francis has served to transmit to posterity the history of their loves. Malatesta decided to build this remarkable church as a thank-offering for his safety during a dangerous campaign undertaken for Pope Eugene IV. about the year 1445. The first stone was laid in 1446, and the work was carried on with such alacrity that mass was performed in it by the close of 1450. Sigismondo entrusted the execution of his plans to Leon Battista Alberti. The vault was never finished, and still shows its rough beams and rafters. The eight side chapels alone are complete, and their pointed arches spring from Renaissance pilasters planted on black marble elephants, the Malatesta emblem, or on baskets of fruit held by children. Everywhere—on the balustrades closing the chapels, round the base of the pilasters, along the walls, beneath the cornice of both the exterior and the interior of the church—there is one ornament that is perpetually repeated, the interwoven initials of Sigismondo and Isotta. This monogram is alternated with the portrait and arms of Malatesta; and these designs are enwreathed by festoons linked together by the tyrant's second emblem, the rose. The most singular and characteristic feature of this edifice is the almost total absence of every sacred emblem. Rather than to St. Francis and the God of the Christians it was dedicated to the glorification of an unhallowed attachment. Nature, science, and antiquity were summoned to celebrate the tyrant's love for Isotta.

Sigismondo understood the science of fortification. He was also the first to discard the use of wooden bomb-shells and substitute others cast in bronze. As a soldier his numerous campaigns had shown him to be possessed of all the best qualities and worst defects of the free captains of his time. He took part in many hazardous campaigns against adversaries such as the duke of Urbino, Sforza of Milan, Piccinino, and, worst of all, the Sienese pope, Pius II., his declared and mortal foe. This time Sigismondo had blundered, and he was driven to make his submission to the pope, but, again rebelling, was summoned to trial in Rome (1460) before a tribunal of hostile cardinals. All the old charges against him were now revived and eagerly confirmed. He was pronounced guilty of rapine, incendiarism, incest, assassination, and heresy. Consequently he was sentenced to the deprivation of his state (which was probably the main object of the trial), and to be burnt alive as a heretic. This sentence, however, could not easily be executed, and Sigismondo was only burnt in effigy. He could afford to laugh at this farce; nevertheless he prepared in great haste for a desperate defence (1462). He knew that the bishop Vitelleschi, together with the duke of Urbino, and his own brother, Novello Malatesta, lord of Cesena, were advancing against him in force; and, being defeated at Pian di Marotta, he was forced to go to Rome in 1463, again to make submission to the pope. This time he was stripped of all his possessions excepting the city of Rimini and a neighbouring castle, but the sentence of excommunication was withdrawn. In 1464 he took service with the Venetians, and had the command of an expedition to the Morea. In 1466 he was able to return to Rimini, for Pius II. was dead, and the new pope, Paul II., was less hostile to him. Indeed, the latter offered to give him Spoleto and Foligno, taking Rimini in exchange; but Malatesta was so enraged by the proposal that he went to Rome with a dagger concealed on his person, to kill the pope. But, being forewarned, Paul received him with great ceremony and surrounded by cardinals prepared for defence; whereupon Sigismondo changed his mind, fell on his knees, and implored forgiveness. His star had now set forever. For sheer subsistence he had to hire his sword to the pope and quell petty rebellions with a handful of men. At last, his health failing, he returned to his family, and died in Rimini on Oct. 7, 1468, aged 51 years.

Roberto Malatesta.—He was succeeded, according to his desire, by Isotta and his son Sallustio (who were ousted by an illegitimate elder son by another mother, named Roberto Malatesta), and died in 1470 in suspicious circumstances. Roberto died in 1482; his son Pandolfo fled before Cesare Borgia in 1500. Rimini was captured by Pope Julius II. after his victory at Ravenna over the Venetians in 1512. Malatesta made more than one attempt to

win back his city, but always in vain, for his subjects preferred papal rule; and in 1528 Pope Clement VII. became definite master of the town. The history of Rimini practically ends with its independence.

BIBLIOGRAPHY.—Battaglini, *Memorie Storiche di Rimini e de' suoi signori, publicati con note di G. A. Zanetti* (Bologna, 1789); Fossati, *Le tempi di Malatesta di Rimini* (Foligno, 1794); Moroni, *Dizionario di erudizione storico-ecclesiastica* (vol. lvii., *s.v.* "Rimini"); Ch. Yriarte, *Rimini: Un Condottiere au XV. Siècle: Études sur les lettres et les arts à la cour des Malatesta* (1882); Tonini, *Storia di Rimini* (Rimini, 1848–62); E. Hutton, *Sigismondo Malatesta* (1906).

(P. V.; L. V.)

RIMSKY-KORSAKOV, NICOLAS ANDREIEVICH (1844–1908), Russian composer, was born at Tikhvin, Novgorod, on March 18, 1844. He spent six years (1856–62) in the Naval college at St. Petersburg, and at the end of that time received a commission and spent three years afloat. But as a cadet he had been one of the musical amateurs who, with Borodin, Cui and Moussorgsky, gathered round Balakirev in St. Petersburg in the days when Wagner was still unknown. During his cruise he had written a symphony (in E minor) which in that year was performed—the first by a Russian composer—under Balakirev's direction, and in 1873 he definitely retired from the navy, having been appointed a professor in the St. Petersburg Conservatoire. The same year witnessed his marriage to a talented pianist, Nadejda Pourgold, and the production of his first opera, *Pskovitianka.* This was followed by *May Night* (1878), *The Snow Maiden* (1880), *Mlada* (1892), *Christmas Eve* (1894), *Sadko* (1895), *Mozart and Salieri* (1898), *The Tsar's Bride* (1899), *Tsar Saltana* (1900), *Servilia* (1902), *Kostchei the Immortal* (1902), *The Tale of the Invisible City of Kitezh* (1905), and *Le Coq d'Or* (1910). For all of these, with the exception of *Mozart and Salieri,* he chose Russian national subjects. But his operas attracted less attention abroad than his symphonic compositions, which show a mastery of orchestral effect combined with a fine utilization of Russian folk-melody. Notable among these works are his first symphony, his second (op. 9) *Antar,* his third (op. 32), and his orchestral suites including the well known *Scheherazade* and overtures. He also wrote a number of beautiful songs, pianoforte pieces, etc., and he eventually took Balakirev's place as the leading conductor in St. Petersburg, where he died on June 20, 1908.

The influence of Rimsky-Korsakov on the Russian composers of his day was very great. His instrumentation was fresh and original; he was direct and clear, with something of a painter's vision, and he brought a wealth of learning and study to bear on his subject. Many came directly under his influence as his pupils at the Conservatoire, while many more studied his great treatise of *The Foundations of Instrumentation.* He did much also to promote the better appreciation of Moussorgsky and others of his fellow Russians, although during recent years he has been severely criticized for his alleged tampering with Moussorgsky's original text in his edition of *Boris Godounov.*

See his own *History of My Musical Life* (which has been translated into English); Stassov, *Rimsky-Korsakov* (1890); Rosa Newmarch, *The Russian Opera* (1914) and Montagu Nathan, *History of Russian Music* (1915).

RINCEAU, in architecture and the decorative arts, an ornament consisting of a continuous wavy line, from the sides of which there branch at intervals lines or forms that twist into spirals; sometimes known as a branching scroll.

RINDERPEST (German for "cattle-plague," which is the English synonym), one of the most contagious, infectious and fatal diseases of oxen; transmissible to sheep, goats, and other ruminants, both domesticated and wild; swine are doubtfully affected; horses, etc., carnivora and man are immune. Rinderpest is a virulent eruptive fever which runs its course so rapidly and attacks such a large percentage of ruminants, when it is introduced into a country, that from the earliest times it has excited terror and dismay. Endemic throughout Asia it has prevailed extensively in south-eastern Russia and neighbouring countries. It appeared in Egypt in 1844 and 1865, Abyssinia in 1890, Japan in 1892, and the Philippines in 1898, and towards the end of the nineteenth century it was carried along the course of the Nile into South Africa involving many parts of the country. Outbreaks occurred in Belgium in 1920 and in Western Australia in 1923.

It has been noted that its irruptions into Europe in the earlier centuries of our era always coincided with invasions of barbarous tribes in eastern Europe. One of the earliest recorded irruptions of cattle-plague into western Europe occurred in the 5th century after the invasion of the Huns. Later invasions are recorded, and in several of these Britain was visited—as in 809–10, 986–87, 1223–25, 1513–14, and notably in 1713, 1745, 1774, 1799. In 1865 it was imported from Finland into the cattle markets of London and other large provincial towns; it raged for 1½ years, destroying 500,000 cattle. The last outbreak occurred in 1877.

The infective agent belongs to the group of filter passing viruses (*q.v.*). Under favourable conditions, as in bone marrow, the virus may long remain infective, but generally its virulence is lost after a few days on exposure to sunlight, putrefaction or disinfectants. It is known to exist in all the various secretions and excretions, in the flesh, blood and various organs of the body. Contagion may be direct or indirect, and the disease may be conveyed to healthy cattle by contaminated fodder, litter, water, clothing, pasture, sheds, railway wagons, hides, horns and hoofs. Attendants, cats, dogs, birds, vermin and flies may spread the infection. Definite symptoms of the disease may not be recognised until the expiration of three to nine days after exposure.

Symptoms.—An exact knowledge of the symptoms and microscopical appearances of the disease is of the utmost importance, as its extension and consequent ravages can only be arrested through its timely recognition and the immediate adoption of the necessary sanitary measures. Intense fever, diarrhoea or dysentery, croupous inflammation of the mucous membranes in general, sometimes a cutaneous papular eruption, and great prostration, mark the course of the disease. Its introduction and mode of propagation can, in many instances, be ascertained only at a late period, and when great loss may already have been sustained. In the majority of cases the examination of the carcass of an animal which has died or been purposely killed is the best way to arrive at a correct diagnosis. Indeed, this is practically the only certain means of definitely deciding upon the presence of the malady.

Among cattle indigenous to the regions in which this malady may be said to be enzoötic the symptoms are often comparatively slight, and the mortality not great. So much is this the case that veterinary surgeons who can readily distinguish the disease when it affects the cattle of Western Europe, can only with difficulty diagnose it in animals from Hungary, Bessarabia, Moldavia, or other countries where it is always more or less prevalent. In these, fever is usually brief, and lassitude and debility are, in some instances, the only marks of the presence of this disorder in animals which may, nevertheless, communicate the disease in its most deadly form to the cattle of other countries.

In the more malignant form the fever runs high, 106° to 107° Fahr., and all the characteristic symptoms are well marked: dullness, sunken eyes, eruption on the skin, discharges from eyes, nose and mouth, shivering fits, difficult breathing, dry harsh cough, miliary eruptions on the gums, accumulation of bran-like exudate within the lips, fetid breath, with certain nervous phenomena, and dysenteric dejections. Death generally occurs in four or five days, the course of the disorder being more rapid with animals kept in sheds than with those living in the open, and in summer than in winter. The post-mortem appearances are most marked in the digestive canal, and comprise red spots and erosions on the palate, lips, tongue and pharynx; intense congestion of the lining of the fourth stomach, which in places is covered with a grey or reddish pultaceous deposit, under which the membrane is deeply ulcerated. Similar lesions are seen in the small intestine, caecum and rectum. The membrane lining the air passages is congested throughout, and the lungs are emphysematous.

Remedial Measures.—Various methods of preventive inoculation have been elaborated in countries where the disease is endemic. In South Africa the bile method (or the injection of bile obtained from cattle dead of rinderpest), discovered by

Koch. in 1896; bile with admixture of glycerine, recommended by Edington; the simultaneous injection of serum and rinderpest blood, introduced by Turner and Kolle in 1897, and repeated injection of fortified serum alone, have been employed, more or less successfully, in conferring immunity. The simultaneous method has been extensively used in many countries, such as in S. Africa, Egypt, India, Turkey, with a large measure of success. It consists in the injection of one c.c. of blood of an animal affected with rinderpest, but free from protozoan and other infection, into one side of the body and an appropriate amount of hyperimmune serum into the other side. Elsewhere, precautionary measures consist in legislation regarding importation of animals from infected countries. In Great Britain the disease is scheduled under the Diseases of Animals Act. (A. R. S.)

RING, a band of circular shape, made of any material and for various purposes, but, particularly, a circular band of gold, silver or other precious or decorative material used as an ornament, not only for the finger, but also for the ear (*see* EAR-RING), or even for the nose, as worn by certain races in India and Africa.

Egyptian Rings.—The earliest existing rings are those found in the tombs of ancient Egypt. The finest examples date from about the XVIII. to the XX. Dynasty; they are of pure gold, simple in design, very heavy and massive, and have usually the name and titles of the owner deeply sunk in hieroglyphic characters on an oblong gold bezel. Rings worn in Egypt by the poorer classes were made of less costly materials, such as silver, bronze, glass or pottery covered with a siliceous glaze and coloured brilliant blue or green with various copper oxides. Some of these had hieroglyphic inscriptions impressed while the clay was moist. Other examples have been found made of ivory, amber and hard stones, such as carnelian. Another form of ring used in the XII. and subsequent dynasties of Egypt had a scarab in place of the bezel, and was mounted on a gold hoop which passed through the hole in the scarab and allowed it to revolve.

Cylinders.—In ancient Babylonia and Assyria the signet took the form of a cone seal or of a cylinder cut in crystal or other hard stone and perforated from end to end. A cord was passed through the cylinder, and it was worn on the wrist like a bracelet.

Within the limits necessarily imposed by its purpose the finger ring assumed a considerable variety of form, according to its date and place of origin.

In the Cretan and Mycenaean periods a characteristic form of ring had a broad flat bezel, not organically connected with the hoop, and having an incised design in the gold. The use of inset stones hardly occurs, but rings from Enkomi and Aegina of the late Mycenaean period have inset paste decorations.

The Phoenician type of ring was primarily intended to carry a scarab or scarabaeoid, usually in a box setting on a swivel, called for by the fact that the flat base of the scarab would be wanted for sealing purposes, but in wear would be most conveniently turned inwards. Strength being necessary, the hoop became massive. A similar arrangement of the signet-scarab is found attached to a twisted ring, which, from its shape, must have been meant to be suspended, and which is shown thus worn on some of the Cypriote terra-cottas.

The Greek ring of an early period has a characteristic flattened bezel, for an intaglio design in the gold. An alternative form was a swivel ring for a scarab or scarabaeoid.

Etruscan Rings.—The Etruscans used very largely the gold swivel ring mounted with a scarab, a form of signet probably introduced from Egypt. Some found in Etruscan tombs have real Egyptian scarabs with legible hieroglyphs; others, probably the work of Phoenician or native engravers, have rude copies of hieroglyphs, either quite or partially illegible. A third and more numerous class of Etruscan signet rings have scarabs, cut usually in sard or carnelian. One from Etruria, now in the British Museum, is formed by two minutely modelled lions whose bodies form the hoop, while their paws hold the bezel, a scarab engraved with a lion of heraldic character. An alternative type of Etruscan ring has an incised design on the gold bezel, or a flat stone set in the rigid bezel.

Roman Rings.—The Romans appear to have imitated the simplicity of Lacedaemonia. Throughout the republic none but iron rings were worn by the bulk of the citizens, and even these were forbidden to slaves. Ambassadors were the first who were privileged to wear gold rings, and then only while performing some public duty. Next senators, consuls, equites and all the chief officers of state received the *ius annuli aurei*. In the Augustan age many valuable collections of antique rings were made, and were frequently offered as gifts in the temples of Rome. One of the largest and most valuable of the *dactyliothecae* was dedicated in the temple of Apollo Palatinus by Augustus's nephew Marcellus (Pliny, *H.N.* xxxvii. 5).

Different laws as to the wearing of rings existed during the empire: Tiberius made a large property qualification necessary for the wearing of gold rings in the case of those who were not of free descent; Severus conceded the right to all Roman soldiers; and later still all free citizens possessed the *ius annuli aurei*, silver rings being worn by freedmen and iron by slaves. Under Justinian even these restrictions passed away.

Early Christian Rings.—Most early Christian rings date from the 4th century onwards. Generally of bronze or gold they are often engraved with acclamations and invocations and occasionally with the owner's bust or with Christian symbols.

Celtic Rings.—Large numbers of gold rings have been found in many parts of Europe in the tombs of early Celtic races. They are usually of very pure gold, often penannular in form—with a slight break, that is, in the hoop so as to form a spring. They are often of gold wire formed into a sort of rope, or else a simple bar twisted in an ornamental way. Some of the quite plain penannular rings were used in the place of coined money.

Throughout the Middle Ages the signet ring was a thing of great importance in religious, legal, commercial and private matters.

Episcopal Rings.—The episcopal ring was solemnly conferred upon the newly made bishop together with his crozier, a special formula for this being inserted in the Pontifical. In the earliest references to rings worn by bishops, there is nothing to distinguish them from other signet rings. In A.D. 610 the first mention has been found of the episcopal ring as a well-understood symbol of dignity. It is clear that it was derived from the signet. It was only in the 12th century and onwards that it was brought into mystical connection with the marriage ring. In the time of Innocent III. (1194) the ring was ordered to be of pure gold mounted with a stone that was not engraved; but this rule appears not to have been strictly kept. It was the custom upon the death of a bishop for his ring to be handed over to the royal treasurer but many rings with all the appearance of consecration rings have been discovered in the coffins of bishops. Among the collection of rings formed by the naturalist Edmund Waterton, and now in the South Kensington museum, is a fine gold episcopal ring decorated with niello, and inscribed with the name of Alhstan, bishop of Sherborne from 824 to 867. In many cases an antique gem was mounted in the bishop's ring, and often an inscription was added in the gold setting of the gem to give a Christian name to the pagan figure. The monks of Durham, for example, made an intaglio of Jupiter Serapis into a portrait of St. Oswald by adding the legend CAPVT S. OSWALDI. In other cases the engraved gem appears to have been merely regarded as an ornament without meaning—as, for example, a magnificent gold ring found in the coffin of Seffrid, bishop of Chichester (1125–1151), in which is mounted a Gnostic intaglio.

Papal Rings.—The papal "Ring of the Fisherman" (*annulus piscatoris*) bears the device of St. Peter in a boat, drawing a net from the water. The first mention of it, as the well-understood personal signet ring of the pope, that has been found, occurs in a letter of Clement IV. in 1265. After the middle of the 15th century it was no longer used as the private seal of the popes, but was always attached to briefs. After the death of a pope the ring is broken. A new ring with the space for the name left blank is taken into the conclave, and placed on the finger of the newly elected pontiff, who thereupon declares what name he will assume, and gives back the ring to be engraved. (*See* Waterton, *Archaeologia*, 40, p. 138.)

The so-called papal rings, of which many exist dating from the

15th to the 17th centuries, are very large thumb rings, usually of gilt bronze coarsely worked, and set with a foiled piece of glass or crystal. On the hoop is usually engraved the name and arms of the reigning pope, the bezel being without a device. They are sometimes described as rings of investiture and according to another hypothesis they were carried as credentials by envoys. Such cumbrous ornaments cannot have been worn by the popes and cardinals themselves.

Other Varieties.—The giving of a ring to mark a betrothal was an old Roman custom. The ring was probably a mere pledge, *pignus*, that the contract would be fulfilled. In Pliny's time conservative custom still required a plain ring of iron, but the gold ring was introduced in the course of the 2nd century. This use of the ring, which was thus of purely secular origin, received ecclesiastical sanction, and formulae of benediction of the ring exist from the 11th century. The exact stages by which the wedding ring developed from the betrothal ring can no longer be traced. Gold marriage rings enriched with niello date from the 5th century though they may not have been used in the actual ceremony of marriage.

Posy rings, so called from the "poesy" or rhyme engraved on them, were specially common in the same centuries. The name "posy ring" does not occur earlier than the 16th century. A posy ring inscribed with "Love me and leave me not" is mentioned by Shakespeare (*Mer. of Ven.*, act v. sc. 1). The custom of inscribing rings with mottoes or words of good omen dates from a very early time. Greek and Roman rings exist with words such as ZHCAIC, XAIPE, KAAH, or *votis meis Claudia vivas*. In the middle ages many rings were inscribed with words of cabalistic power, such as *anam zapta*, or Caspar, Melchior and Balthasar, the supposed names of the Magi.

In the 17th century memorial rings with a name and date of death were frequently made of very elaborate form, enamelled in black and white; a not unusual design was two skeletons bent along the hoop, and holding a coffin which formed the bezel.

Cramp rings were much worn during the middle ages as a preservative against cramp. They derived their virtue from being blessed by the king; a special form of service was used for this, and a large number of rings were consecrated at one time, usually when the sovereign touched patients for the king's evil.

Decade rings were not uncommon, especially in the 15th century; these were so called from their having ten knobs along the hoop of the ring, and were used, after the manner of rosaries, to say nine aves and a paternoster.

In the 15th and 16th centuries signet rings engraved with a badge or trademark were much used by merchants and others; these were not only used to form seals, but the ring itself was often sent by a trusty bearer as the proof of the genuineness of a bill of demand. At the same time private gentlemen used massive rings wholly of gold with their initials cut on the bezel, and a graceful knot of flowers twining round the letters. Other fine gold rings of this period have coats of arms or crests with graceful lambrequins.

Poison rings with a hollow bezel were used in classical times; as, for example, that by which Hannibal killed himself, and the poison ring of Demosthenes. Pliny records that, after Crassus had stolen the gold treasure from under the throne of Capitoline Jupiter, the guardian of the shrine, to escape torture, "broke the gem of his ring in his mouth and died immediately." The mediaeval *anello della morte*, supposed to be a Venetian invention, was actually used as an easy method of murder. Among the elaborate ornaments of the bezel a hollow point made to work with a spring was concealed; it communicated with a receptacle for poison in a cavity behind, in such a way that the murderer could give the fatal scratch while shaking hands with his enemy. This device was probably suggested by the poison fang of a snake. (*See* also SEALS; JEWELLERY; GEMS.)

BIBLIOGRAPHY.—Licetus, *De Annulis antiquis* (Udine, 1645); Kirchmann, *De Annulis* (Schleswig, 1657); King, *Antique Gems and Rings* (1872); F. H. Marshall, *Catalogue of Finger Rings, Greek, Roman and Etruscan in the British Museum* (1907); O. M. Dalton, *Catalogue of Finger Rings, Early Christian, Byzantine, Teutonic, Mediaeval and later in the British Museum* (1912); G. F. Kunz, *Rings* (Philadelphia, 1917); Cabrol, *Dictionnaire d'archéologie chrétienne, s.v.* "Anneaux"; articles of Waterton in *Archaeologia* and *Archaeological Journal*.

(J. H. MI.; A. H. SM.; X.)

RING-DOVE, a name applied to the European wood-pigeon, and also to the Barbary or collared dove. (*See* DOVE.)

RINGWOOD, a market town in Hampshire, England, 103½ m. S.W. by W. from London by the Southern railway. Pop. (1921) 5,131. It lies on the river Avon, which here divides into numerous branches, flowing through flat meadow land. The church of SS. Peter and Paul was almost entirely reconstructed in 1854. An agricultural trade and some manufactures are carried on.

RINGWORM or **TINEA TONSURANS,** a disease mainly affecting the scalp; it consists of bald patches, usually round, and half an inch up to several inches across, the surface showing the broken stumps of hairs and a fine whitish powdering of desquamated epidermic scales. The disease is due to a group of fungi distinguished, among other features, by the size of the spores they form. In London and Paris *Microsporon audovini* causes about three-quarters of all cases of ringworm. If one of the broken hairs be plucked out with forceps and pressed flat under a cover-glass in a drop of dilute caustic potash, the microscope will show it to be occupied by long rows of minute oval spores, very uniform in size.

Forms of ringworm are also met with in lower animals (*e.g.*, cat and dog) but according to J. G. Hare and P. Tate there is little evidence that these infect children. (*Journ. Hygiene*, 1927, xxvii., 32). Modern treatment is by X-rays (*see* X-RAY TREATMENT) and is very effective. Thallium acetate has also been recommended.

See also FAVUS.

RIOBAMBA or **ROYABAMBA,** a town of Ecuador, capital of the province of Chimborazo, on the railway between Guayaquil and Quito, about 85m. E.N.E. of the former. Pop. (1900, estimate) 12,000. It stands in a barren, sandy basin of the great central plateau, drained by the Chambo, a tributary of the Pastaza, on the old road running southward from Quito into Peru, 9,039ft. above sea-level, and in full view of the imposing heights of Chimborazo, Carahuairazo (Carguairazo), Tunguragua and Altar. Though 300ft. lower than Quito, its climate is considerably colder, owing, perhaps, to its more exposed situation and the vicinity of snow-clad peaks. The present town dates from 1797, when the great earthquake of that year destroyed the old town then situated 12m. W., near Cajabamba.

RÍO CUARTO, a town of Argentina in the province of Córdoba, 119 m. S. of the city of that name, and about 500 m. N.W. of Buenos Aires. Pop. (1926) 18,400. It stands 1,440 ft. above sea-level and about half-way across the great Argentine pampas, on the banks of a river of the same name which finds an outlet through the Carcarañal into the Paraná near Rosario. The town is built on the open plain and is surrounded with attractive suburbs. It is the commercial centre of a large district and has a large and lucrative trade. Its geographical position gives it great strategical importance, and the Government maintains here a large arsenal and a garrison of the regular army. Previous to the activities of General Ivanovski in 1872 this region was overrun by the Ranqueles, a warlike tribe of Indians. The surrounding country belongs to the partially arid pampa region and is devoted to stockraising. Irrigation is employed in its immediate vicinity. There are some manufacturing industries in the town. The Andine National railway passes through Rio Cuarto, and branch lines connect with the Buenos Aires and Pacific line—all of which give railway communication with Buenos Aires, Rosario, Tucumán, Córdoba, San Luis and Mendoza.

RIO DE CONTAS or **VILLA DE CONTAS,** a town of Brazil, in the State of Bahia, 230 m. S.W. from the city of Bahia, on the Brumado (Contas-Pequeño), a head stream of the Rio de Contas (Jussiape), which rises on the eastern slope of the neighbouring Serra das Almas, and flows south-east and east to the Atlantic coast at Barra do Rio de Contas. Pop. (1920), including rural districts, 24,350. Stock-raising was formerly an important industry here. The town was founded in 1715 by some "Paulistas" who discovered gold there in the sands of the river. It became a

"villa" in 1724, but was soon afterwards moved down the river 5 m. to a site on the high road between Bahia and Goyaz.

RIO DE JANEIRO, a maritime state of Brazil, bounded on the north by Minas Geraes, on the east by Espirito Santo and the Atlantic, on the south by the Atlantic, and on the west by São Paulo. It is one of the smaller states of the republic and has an area of 26,635sq.m.; pop. (1920) 1,505,601. The state is traversed longitudinally by the Serra do Mar, which divides it into a low, narrow, irregular coastal zone, and a broad elevated river valley through which the Parahyba flows eastward to the Atlantic. The eastern part of this valley widens out into a great alluvial plain on which are to be found some of the richest sugar estates of Brazil. The well watered Parahyba valley has long been celebrated for its fertility, and is the centre of the coffee-producing industry. Stock-raising has been slowly developing since the abolition of slavery (1888).

The state is watered by the Parahyba (*q.v.*) and its tributaries and by numerous short streams flowing from the Serra do Mar to the coast. Manufacturing has been developed largely because of the fine water power supplied by the mountain streams, and among the manufactures are cotton, woollen, silk and jute fabrics, brick, tile and rough pottery, sugar, rum, vehicles, furniture, beer and fruit conserves. The state is well provided with railways, which include the Central do Brazil, Leopoldina, Melhoramentos and Rio do Ouro. The Central line runs from the city of Rio de Janeiro north-north-westward across the Serra do Mar to the Parahyba valley, where it divides into two branches at the station of Barra do Pirahy, one running westward to São Paulo, and the other eastward and northward into Minas Geraes. Besides these there are a number of short railways called the Theresopolis, União Valenciana, Rio das Flores, Bananal, and Vassourense lines. The total extension of these railways in the state in 1925 was 2,100m. Other than Nictheroy, the ports of the state are São João da Barra, Macahé or Imbetiba, Cabo Frio and Paraty, visited only by the smaller coasting vessels.

The capital of the state is Nictheroy (Pop. 1920, 86,238) on the east side of the Bay of Rio de Janeiro, and other cities and towns, with their populations in 1920, are: Campos (48,108), on the lower Parahyba in the midst of a rich sugar-producing region; Rio Bonito (17,763); Itaborahy (22,228); Barra Mansa (13,585), on the upper Parahyba; Rezende (7,876), in a fertile district of the upper Parahyba; Petropolis (38,025); Cantagallo (6,963), in a rich coffee district of the Serra do Mar; Paraty (7,885), a small port on the west side of the bay of Angra dos Reis; Valença (13,020); Vassouras (12,510); São Fidelis (13,829), a river port on the lower Parahyba having steamboat communication with Campos; Macahé (8,635), an old port on the eastern coast of the state at the mouth of the Macahé river whose original anchorage has been filled with silt, and that of Imbetiba, in the vicinity, with which it is connected by tramway, is now used by vessels both for the town and the Macahé and Campos railway; Barra do Pirahy (13,086), an important station and junction of the Central do Brazil railway on the north side of the Serra do Mar, with large manufacturing and commercial interests; Parahyba do Sul (9,332), in a fertile, long-settled district in the north-east part of the state; Maricá (8,467); Cabo Frio (14,508); Pirahy (7,264); Saquarema (7,301); Nova Friburgo (23,261); and Araruama (10,374).

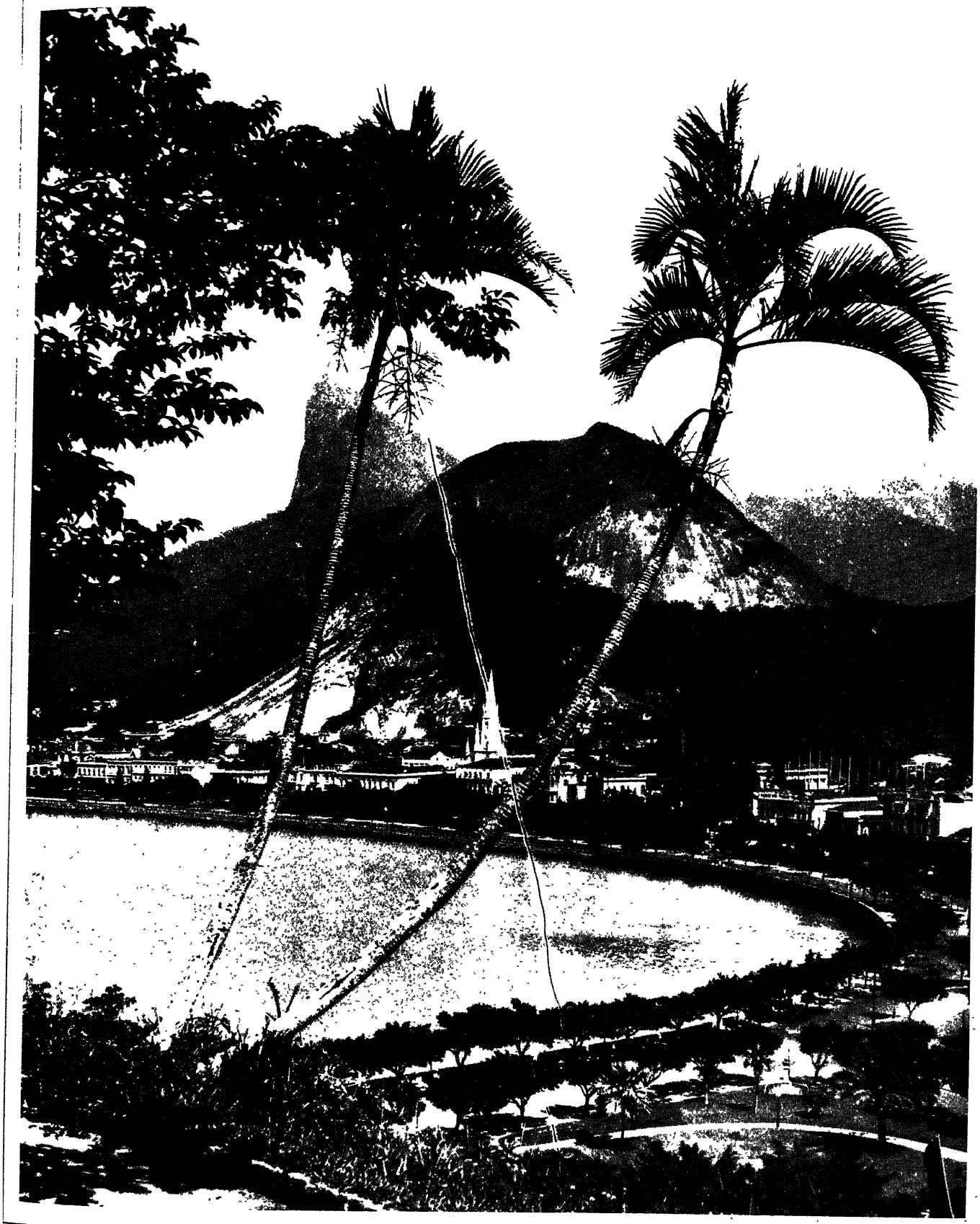
RIO DE JANEIRO (in full, São Sebastião do Rio de Janeiro, colloquially shortened to Rio), a city and port of Brazil, capital of the republic, and seat of an archbishopric, on the western side of the Bay of Rio de Janeiro, or Guanabara, in lat. 22° 53′ 42″ S., long. 43° 13′ 22″ W. (the position of the observatory). The city is situated in the south-east angle of the Federal District, an independent district or commune with an area of 538 sq.m., which was detached from the province of Rio de Janeiro in 1834. The city stands in great part on an alluvial plain formed by the filling in of the western shore of the bay, which extends inland from the shore-line in a north-westerly direction between a detached group of mountains on the south known as the Serra da Carioca, and the imposing wooded heights of the Serra do Mar on the north. The spurs of the Carioca range project into this plain, in some places close up to the margin of the bay, fo picturesque valleys within the limits of the city. Some o residential quarters follow these valleys up into the mountair extend up their slopes and over the lower spurs, which, wit hills covered with buildings rising in the midst of the city, g picturesque appearance. At the entrance to the bay is the Loaf (*Pão de Assucar*), a conical rock rising 1,212 ft. abov water-level and forming the terminal point of a short rang tween the city and the Atlantic coast. The culminating po that part of the Carioca range which projects into and part vides the city is the Corcovado (Hunchback), a sharp peak, 2,329 ft. high overlooking the Botafogo suburb an proachable only on the wooded north-west slope. Considerab yond the limits of the city on its south-west side, but withi municipality, is the huge isolated flat-topped rock known a Gavea, 2,575 ft. high, which received its name from its r blance to the square sail used on certain Portuguese craft. sky-line of this range of mountains, as seen by the approa traveller some miles outside the entrance to the bay, form rough outline of a reclining figure called "the sleeping gian

The entrance to the bay, between the Sugar Loaf on the and the Pico on the east, with fortress of Santa Cruz on on and the fort of São João on the other, is about a mile wid free from obstructions. Almost midway in the channel i little island and fort of Lage, so near the level of the sea th spray is sometimes carried completely over it. On the west semicircular bay of Botafogo, round which are grouped the dences of one of the richest suburbs; on the east, the almost locked bay of Jurujuba. (*See* Nictheroy.) The bay extends r ward nearly 16½ nautical miles, with a maximum breadth of The irregular shore-line has been modified by the constru of sea-walls and the filling in of shallow bays. Close to the are the islands of Villegaignon (occupied by a fort), C (occupied by fortifications, naval storehouses, hospital an docks), Santa Barbara and Enxadas, the site of the naval s

The oldest part of the city, which includes the comm section, lies between Castle and Santo Antonio hills on the and São Bento, Conceicão and Livramento hills on the nortl extends inland to the Praça da Republica, though the defe works in colonial times followed a line much nearer the bay. section during the 19th century extended southward along th shore in a string of suburbs known as the Cattete and Bot with that of Larangeiras behind the Cattete in a pretty vall the same name, and thence on or near the Atlantic coast as l dos Leoes, Copacabana and Gavea, the last including the bot garden. The greatest development has been northward and ward, where are to be found the suburbs of Cidade Nova Christovão, Engenho Novo, Praia Formoso, Pedregulho, Isabel, Tijuca, and a number of smaller places extending fa on the line of the Central railway. The extreme length of th along lines of communication is little less than 20 m. The pc tion (1920 census) was 1,157,873.

Climate.—The climate of Rio de Janeiro is warm and h the average temperature for the year being about 74° F, with variation from month to month, and the rainfall (well tributed throughout the year) averages about 44 inches. greater part of the city is only 2 or 3 ft. above sea-level, is rounded by mountains, and has large areas of water, swamj wet soil in its vicinity. But the unhealthiness of Rio de Ja in past years may be charged to insanitary conditions and n the climate. Yellow fever, whose first recorded appearance v Dec. 1849, was for many years almost a regular yearly vis and the mortality from it was terrible. This and other dang diseases disappeared as epidemics due to improved sanitary ditions following the notable work begun by Dr. Oswaldo under whose direction Rio de Janeiro was made one of the healthy of tropical cities. The death rate has been reduced about 50 to 20 per thousand.

Streets and Parks.—Some of the most modern streets been laid out with Spanish-American regularity, but mucl greater part seems to have sprung into existence without any Most of the streets of the old city are parallel and cross at



PHOTOGRAPH, EWING GALLOWAY

BOTAFOGO BAY

1. View of the harbour of Botafogo Bay and the Avenida Beira-Mar, the beautiful boulevard of Rio de Janiero which stretches for twenty miles around the harbour. The high pointed peak called Corcovado (Hunchback) may be seen in the background

angles, but they are narrow and enclose blocks of unequal size. Each suburb is laid out independently, with straight streets where the ground permits, and crooked ones where the shore-line or mountain contour compels. Since the beginning of the 20th century large sums have been borrowed and expended on new avenues, the widening and straightening of old streets, and the improvement of the water front between the Passeio Publico and the southern extremity of the Praia de Botafogo by the construction of a grand boulevard, partly on reclaimed land. One of these improvements consists of a central avenue (Avenida Rio Branco) cut across the old city from a point on the water front near the Passeio Publico northward to the Saúde water front. This is one of the handsomest thoroughfares in the Western Hemisphere. Over a mile long from north to south, it is lined with fine private and public buildings. The military, naval and jockey clubs are situated there, and also the offices of some of the principal newspapers, such as the *Jornal do Commercio* and *O Paiz*, besides fashionable shops, cafés and business places. The shore-line boulevard, called the Avenida Beira-Mar, is about 4½ m. long, the wider parts being filled in with gardens.

Another improvement was the completion and embellishment of the Mangue canal, originally designed as an entrance to a central market for the boats plying on the bay, but now destined for drainage purposes and as a public pleasure ground. This canal, as completed, is nearly 2 m. long, enclosed with stone walls, crossed by a number of iron bridges and bordered by lines of royal palms. The most famous street of the old city is the Rua do Ouvidor, running westward from the market-place to the Largo de São Francisco de Paula, and lined with retail shops, cafés and newspaper offices. It has long been a favourite promenade, and fills an important part in the social and political life of the city. The principal business street is the Rua Primeiro de Março, formerly called Rua Direita, which extends from the Praça 15 de Novembro northward to São Bento Hill. The streets and suburbs are served by tramway lines using electric traction. The streets are lighted with electricity and gas.

The public parks and gardens are numerous and include the botanical garden with its famous avenue of royal palms (*Oreodoxa regia*); the Passeio Publico (dating from 1783), a small garden on the water front facing the harbour entrance; the Jardim d'Aclamação, forming part of the Praça da Republica with its artistic walks and masses of shrubbery; the Praça Tiradentes with its magnificent equestrian statue of Dom Pedro I., executed by the French sculptor, Luiz Rochet; the Praça 15 de Novembro on the water front, facing the old city palace; and smaller squares.

Water Supply and Sewerage Drainage.—The water supply is derived from three sources: the small streams flowing down the mountain sides which serve small localities; the old Carioca aqueduct, dating from colonial times, which collects a considerable supply from the small streams of the Serra da Carioca and brings it into the city through a covered conduit which once crossed the gap between Santa Thereza and Santo Antonio hills on two ranges of stone arches (now used as a viaduct); and the modern Rio do Ouro waterworks, which brings in an abundant supply from the Serra do Tinquá, some 30 m. north-west of the city. An extensive system of sewers has been constructed and a separate system of rain-water drains.

Buildings.—There remain many public edifices and dwellings of the colonial period, severely plain in appearance, with heavy stone walls and tile roofs. The old city palace facing upon Praça 15 de Novembro, once the residence of the fugitive Portuguese sovereign Dom João VI., is a good example. The 19th century brought no important modifications until near its close, when French and Italian styles began to appear, both in exterior decoration and in architectural design. The Praça do Commercio (Merchants' Exchange) and post office on Rua 1° de Março, and the national printing office near the Largo da Carioca, are notable examples. Since then exterior ornamentation and architectural eccentricities have run riot, and the city is now a mixture of the plain one-storey and two-storey buildings of the Portuguese type and fanciful modern creations, embellished with stucco and overtopping the others by many storeys. At the southern end of the Avenida Rio Branco is a group of elegant State edifices: the Municipal theatre, the Monroe palace and the National library and Academy of Fine Arts. The Municipal theatre, designed in 1904, cost over £2,000,000, although it seats but 1,700 people. The building which houses the National library, opened in 1910 in commemoration of the centenary of its founding (1808), is also a notable addition to the city.

Rio has no cathedral, the old imperial chapel facing the Praça 15 de Novembro being used for that purpose. The most noteworthy church is the Candelaria church, in the commercial district, with twin towers and graceful dome.

Education.—Although much money is given to hospitals and asylums, Rio de Janeiro has no great educational institutions either public or private. The Medical school, the school of law and the Polytechnic school were consolidated (1920) into the University of Rio de Janeiro, a federal institution. The Gymnasio Nacional, formerly the Collegio D. Pedro II., is a boys' college of a high school grade, located on Rua Floriano Peixoto, with an *internato* or boarding-school in Rua de S. Francisco Xavier. One of the most noteworthy schools of the city is the Lyceo de Artes e Officios, located on Rua 13 de Maio, opposite the opera-house (1858). Another important school is the Instituto Benjamin Constant, a school for the blind, located in a fine new edifice on the Praia da Saudade, Botafogo. Primary instruction is provided by the municipality, which in 1920 maintained 320 day schools and 68 night schools, with a matriculation of 74,111 pupils in the former and 8,662 in the latter. The seminary on Castle Hill, called the Seminario Episcopal de São José, founded in 1739 and devoted exclusively to the education of priests, is the best classical school in the city.

There are a number of charitable institutions which are devoted to the education of orphans, the blind and the deaf and dumb. Among other educational institutions are a conservatory of music, school of fine arts, normal school, a military college, a naval academy, a rich national library, the Cabinete Portuguez da Leitura, the national observatory on Castle Hill, the national museum now domiciled in the São Christovão palace in the midst of a pretty park, a zoological garden in the suburb of Villa Isabel, and the famous botanical garden founded by Dom João VI. in 1808 and now a horticultural experiment station.

Hospitals, etc.—Rio de Janeiro is well provided with hospitals, asylums and benevolent institutions. Chief of these is the Misericordia hospital, popularly known as the "Santa Casa," belonging to a religious brotherhood dating from 1591. In addition to a large income from rentals, the Santa Casa receives the product of certain port taxes in return for opening its wards to the crews of all vessels in port. Other public hospitals are a lepers' hospital in São Christovão, the military and naval hospitals, the São Sebastião hospital and the isolation and contagious diseases hospitals in Jurujuba. There are also a number of private hospitals maintained by church brotherhoods and charitable associations; among them are the Portuguese hospital in Rua de Santo Amaro and the Strangers' hospital (American and British) in Botafogo. Most prominent among the asylums is the Hospicio Nacional for the insane, on the Praia da Saudade, Botafogo, which was erected in 1842–52.

Harbour, Communications and Commerce.—The port and harbour of Rio de Janeiro are the largest and most important in the republic. The entrance is open to vessels of the largest draught, and there is sufficient deep-water anchorage inside for the navies of the world. The lower anchorage, where the health officers visit vessels, is below Ilha Fiscal, and the upper, or commercial anchorage, is in the broad part of the bay above Ilha das Cobras, the national coasting vessels occupying the shallower waters near the Saúde and Gambôa districts. The custom-house occupies a considerable part of the shore-line before the old city.

The new port works consist of a new water front for the Saúde, Gambôa and Sacco de Alferes districts, in which the shipping interests are centred, and a continuation of the sea-wall across the shallow São Christovão bay to the Ponta do Cajú, the large reclaimed area being filled in by the removal of some small hills. The commercial quays are built in deep water and

permit the mooring alongside of the largest vessels. The total length of the commercial quays is about 3,800 yards. Railway and tramway connections are provided and both electric and hydraulic power are available. Special surtaxes are levied on imports to meet the interest and redemption charges on the loans raised for the execution of these important works.

Railway communication with the interior is maintained by the Central do Brazil (formerly the Dom Pedro II.), Leopoldina and Melhoramentos lines, besides which there is a short passenger line up to the Corcovado about 2¾ m. long, an electric line to Tijuca, and a narrow-gauge line running out to the Rio do Ouro water-works. There is communication with Petropolis by a branch line of the Leopoldina system, and also by a steamer to the head of the bay and thence by rail up the serra.

Rio de Janeiro is the seaport for a large area of the richest, most productive and most thickly settled parts of Brazil, including the States of Rio de Janeiro and Minas Geraes and a small part of eastern São Paulo. Its exports include coffee, sugar, hides, cabinet woods, tobacco and cigars, tapioca, gold, diamonds, manganese and sundry small products. Rio is also a distributing centre in the coasting trade, and many imported products, such as jerked beef (*carne secca*), hay, flour, wines, etc., appear among the coastwise exports, as well as domestic manufactures. The total exports for 1925 amounted to one-fifth the exportation of the whole country. Formerly Rio led all other ports in the export of coffee, but the enormous increase in production in the State of São Paulo has given Santos the lead. Rio handles about two-fifths the importation of the whole republic.

Manufactures.—The industrial activities of Rio de Janeiro have been largely increased since the organization of the republic through increased import duties on foreign products. There were a number of protected industries before this, but they made slight impression on imports. In 1920 there were 1,265 factories, with 46,953 operatives, representing a capital of nearly 270,000,000 paper milreis and an annual production valued at 5,000,000,000 milreis. Rio de Janeiro has manufactures of flour from imported wheat, cotton, woollen and silk textiles, boots and shoes, ready-made clothing, furniture, vehicles, cigars and cigarettes, chocolate, fruit conserves, refined sugar, biscuits, macaroni, ice, beer, artificial liquors, mineral waters, soap, stearine candles, perfumery, feather flowers, printing type, etc. There are numerous machine and repair shops, the most important of which are the shops of the Central railway. One of the most important industrial enterprises in the city is the electric plant belonging to the Rio de Janeiro Light and Power Company.

Government.—The Federal District including Rio de Janeiro is governed by a prefect, who represents the national Government, and a municipal council which represents the people. The prefect is appointed by the president of the republic for a term of four years, and the appointment must be confirmed by the Senate. There are seven *directorias*, or boards, under the prefect, each one assigned to a special field of work, chief among which are education, health and public assistance, public works and transportation, and finance. The municipal council is elected by direct suffrage for a term of two years, and is composed of 24 members. The consolidated debt of the municipality in 1920 was computed at 227,089,200 paper milreis, of which 129,225,450 milreis was an external debt, and 97,863,750 milreis internal. The revenue had grown from 29,070,883 paper milreis in 1910 to 51,182,357 paper milreis in 1919. There is some confusion in administration and accounts, however, and it is sometimes difficult to determine the exact situation. The Federal District is represented in Congress by three senators and ten deputies, and is credited with the rights and privileges of citizenship. On the other hand, the city is a garrison town and under the direct administration of the national executive, who controls its police force, and exercises part control over its streets, squares and water front. In the work of improving the city, the national Government assumed the expense of the commercial quays, the filling of the São Christovão bay, the opening of the Mangue canal and its embellishment, the opening of the Avenida Central, the extension of the sewage system and the addition of new sources to the water supply, while the city was responsible Avenida Beira-Mar, the opening of a new avenue from th da Lapa westward to Rua Frei Caneca, the removal of th do Senado, the widening of some streets crossing the . Central and the opening and straightening of other street

History.—The discovery of the Bay of Rio de Ja attributed by many Portuguese writers to André Gonçalv entered its waters on Jan. 1, 1502, and believed that it mouth of a great river, hence the name Rio de Janeiro of January). Another Portuguese navigator, Martim Aff Souza, visited it in 1531, but passed on to São Vicen Santos, where he established a colony. The first settle the bay was made by an expedition of French Huguenot the command of Nicholas Durand Villegaignon, who est his colony on the small island that bears his name. their fort was captured and destroyed by a Portuguese ex from Bahia under Mem de Sá, and in 1567 another ex under the same commander again destroyed the Frenc ments, which had spread to the mainland. The victory v on Jan. 20, the feast-day of St. Sebastian the Martyr, came the patron saint of the new settlement and gav name—São Sebastião do Rio de Janeiro. The French hac their colony La France Antarctique, and their island f been called Ft. Coligny. In 1710 a French expedition vessels and about 1,000 men under Duclerc attempted t possession, but was defeated; its commander was captu later assassinated. This led to a second French expeditio Duguay Trouin, who entered the bay on Sept. 12, 17 captured the town on the 22nd. Trouin released Ducle prisoned followers, exacted a heavy ransom and then w

The discovery of gold in Minas Geraes at the end of t century greatly increased the importance of the town. been made the capital of the southern captaincies in 16 in 1762 it became the capital of all Brazil. In 1808 the Portuguese court, under the regent Dom João VI., took in Rio de Janeiro, and gave a new impulse to its growth. thrown open to foreign commerce, foreign mercantile hou permitted to settle there, printing was introduced, indus strictions were removed, and a college of medicine, a academy and a public library were founded. Dom J returned to Portugal in 1821, and on Sept. 7, 1822, Br declared independent with Dom Pedro I. as its first emp Rio de Janeiro as its capital. In 1839 a steamship servi the coast was opened, but direct communication with Eur delayed until 1850, and with the United States until 1865 services added largely to the prosperity of the port. T section of the Dom Pedro II. railway was opened in 18 the second or mountain section in 1864, which brought into closer relations with the interior. In 1874 cable co cation with Europe was opened, which was soon afterw tended southward to the La Plata republics.

On Nov. 15, 1889, a military revolt in the city un leadership of Gen. Deodoro da Fonseca led to the declar a republic and the expulsion of the imperial family, wh accomplished without resistance or loss of life. Disord lowed, a naval revolt in 1891 causing the resignation of P Deodoro da Fonseca, and another in 1893–94 causing a b of the port for about six months and the loss of many li much property from desultory bombardments. There ha since that time some trifling outbreaks on the part of a allied with the extreme republican element, but at no ti the security of the Government in danger.

BIBLIOGRAPHY.—Nearly all books relating to Brazil dev attention to its capital city. *See* also M. D. Moreira de Azeved *de Janeiro* (Rio de Janeiro, 1877); A. J. Lamoureux, *Ha of Rio de Janeiro* (Rio de Janeiro, 1887); W. E. Curtis, *Ca Spanish America* (New York, 1888); E. Albes, *Rio de Jane* American Union (Washington, 1923); A. G. Bell, *The Beau de Janeiro* (1914); F. B. Ford, *The Brazan Guide to Rio d* (1922); P. Pessôa, *Guia da cidade do Rio de Janeiro* (1905 Vialoux, *Standard Guide and Handbook to Rio de Janeiro* F. F. do O. Freire, *Historia da Cidade do Rio de Janeiro* (191

RIO DE ORO, a Spanish possession on the north-we of Africa, extending north from Cape Blanco to Cape

North of Cape Bojador are two zones, the southern, reaching to Cape Juby, being a Spanish protectorate, and the northern, from Cape Juby to the Wad Draa being "occupied territory." The three divisions are known collectively as Spanish Sahara. The frontier on the south traverses the middle of Cape Blanco promontory, thence it goes east and north in an irregular and arbitrary line till it meets the southern frontier of Morocco. East and south Spanish territory is bounded by the French Sahara. The area of Rio de Oro is about 65,000 sq.m., that of the whole of Spanish Sahara about 100,000 sq.m., mainly desert. The population, made up of nomad Arabs or Arabized Berbers, does not exceed 100,000 and four-fifths of the people live in the two northern zones. Here, in the basin of the Saqiyet el Hamra, a river (300 m. long) reaching the Atlantic midway between Capes Juby and Bojador, are fertile regions which might repay cultivation, including the oasis of Smara, where is a permanent native settlement and a Kasbah (stone fort). The Spanish headquarters are at Villa Cisneros, on the peninsula forming the Rio de Oro inlet. It has about 500 European inhabitants, and since 1925 has acquired some importance as an air station. The chief advantage Spain derives from possession of the country is its convenience to the Canary Islands fishermen.

The peninsula of Rio de Oro is 23 m. long and 1¼ to 2 m. broad and it is on an average about 20 ft. above sea-level. The estuary between peninsula and mainland is 22 m. long, 5 broad, navigable over two-thirds of its extent, with good anchorage.

History.—The estuary was taken by its Portuguese discoverers in the middle of the 15th century for a river, and, obtaining there a quantity of gold dust from the natives, they named it Rio d'Ouro (Gold River), Rio de Oro being the Spanish form. The activity of the Portuguese was before long transferred to the true auriferous regions of the Gulf of Guinea.

Spain's interest in the Saharan coast dates from the 13th century, but was particularly directed to that part nearest the Canary Islands. The site of the fort of Santa Cruz de Mar Pequeña, established in 1476, though not identified, was north of Cape Bojador. The protection of the Canary Islanders engaged in the fisheries south of that point occasioned, however, the presence of Spanish warships in these waters, and small trading stations were formed at Rio de Oro, Cape Blanco and elsewhere. To preserve the interests thus acquired, Spain in January 1885 took the territories on the coast between capes Blanco and Bojador under her protection. The extension inland of Spanish influence was opposed by France, which claimed a protectorate over the Sahara. A convention of 1900 fixed the limits of Rio de Oro proper; by subsequent agreements with France (in 1904 and 1912) the Spanish zone was extended first from Cape Bojador to Cape Juby, and secondly from Cape Juby to the Wad Draa, the inland frontier being fixed at 8° 40′ West. The 1912 agreement settled a matter long in dispute by fixing the southern frontier of Morocco, which had claimed the Cape Juby district, at the Wad Draa. By that agreement Spain bound herself not to cede or alienate in any form her rights in her zone of influence. In 1916 a small Spanish force was stationed at Cape Juby. It was at Cape Juby that in 1878 a British trading post had been established by Donald Mackenzie; it was eventually made over to the Sultan of Morocco (1895). Spanish Sahara is under the control of the Captain-General of the Canaries and a sub-governor lives at Villa Cisneros. Over the interior the authority of Spain remained almost nominal.

See *Spanish Sahara* (1920), a British Foreign Office handbook with bibliography; also the *Rivista* and the *Boletin* of the Madrid Royal Geog. Soc. (F. R. C.)

RIO GRANDE, a North American river, which rises in the San Juan mountains of southern Colorado, flows south-east and south in Colorado, south by west and south-east through New Mexico and south-east between Texas and Mexico to the Gulf of Mexico. Its length is approximately 2,200m. and for about 1,300m. it forms the international boundary between the United States and Mexico. It presents many features of a complex physiographic type, being first a river of the Rocky Mountains, then of the interior deserts and then of the gulf coastal plain. The Mexicans call it the Río del Norte in its upper course, the Río Bravo in the middle section and the Río Grande only in its course through the coastal plain. From its headwaters, 12,000ft. above the sea, it rushes rapidly down a mountain canyon to San Luis valley, in Colorado. It flows with moderate speed through this broad valley, enters a long canyon with a maximum depth of 400ft., about 4m. above the boundary between Colorado and New Mexico, and is hemmed in between canyon walls or the sides of narrow mountain valleys throughout its course in New Mexico. It passes through a series of picturesque canyons, some of them 1,750ft. in depth, in the "Big Bend," and becomes a silt-laden stream with a shifting channel in its passage through the coastal plain. In its course through the plain its channel is so much obstructed by sand bars that it is of no importance for navigation. As the increasing diversion of the water of the upper Rio Grande for irrigation in Colorado and New Mexico resulted in a scarcity of water for this purpose in Mexico, that country complained, and to remedy the evil the Reclamation Service of the United States proposed the construction by the United States of a storage dam across the river, near Engle, New Mexico. Mexico agreed to this proposal and a treaty covering the matter was proclaimed in Jan. 1907. Mexico receives 60,000 ac.ft. of water annually from the Elephant Butte reservoir in New Mexico. Since 1910 the delta of the Rio Grande, known as the Lower Rio Grande valley, has been developed by water diverted from the river. The irrigated districts, over 200,000ac. in area, extend from the town Rio Grande to the gulf, a distance of about 100 miles. The semi-tropical climate of the region makes it ideal for citrus fruit and vegetables for the winter market. The principal cities on the river are: Brownsville, Texas; Matamoras, Mexico; Laredo, Texas; Del Rio, Texas; El Paso, Texas; Ciudad Juárez, Mexico and Albuquerque, N.M.

RIO GRANDE DO SUL, a southern frontier state of Brazil, bounded on the north by the state of Santa Catharina, on the east by the Atlantic, on the south by Uruguay, and on the west by Uruguay and Argentina—the Uruguay river forming the boundary line with the latter. Area, 91,333sq.m. The northern part of the state lies on the southern slopes of the elevated plateau extending southward from São Paulo across the states of Paraná and Santa Catharina, and is much broken by low mountain ranges whose general direction across the trend of the slope gives them the appearance of escarpments. A range of low mountains extends southward from the Serra do Mar of Santa Catharina and crosses the state into Uruguay. West of this range is a vast grassy rolling upland devoted principally to stock-raising—the south-western part being suitable in pasturage and climate for sheep and cattle. East of it is a wide coastal zone only slightly elevated above the sea; within it are two great tide-water lakes—Lagôa dos Patos and Lagôa Mirim—which are separated from the ocean by two sandy, barren peninsulas. In addition to the Lagôa dos Patos and Lagôa Mirim there are a number of small lakes on the sandy, swampy peninsulas that lie between the coast and these two. The largest lake is the Lagôa dos Patos (Lake of the Patos—an Indian tribe inhabiting its shores at the time of the discovery). The lake is comparatively shallow and filled with sand banks, making its navigable channels tortuous and difficult. The Lagôa Mirim occupies a similar position farther south on the Uruguayan frontier.

Rio Grande lies within the South Temperate zone and has a mild, temperate climate, except in the coastal zone, where it is semi-tropical. There are only two well-marked seasons, though the transition periods between them (about two months each) are sometimes described as spring and autumn. The winter months, June to September, are characterized by heavy rains and by cold westerly winds, called *minuanos,* which sometimes lower the temperature to the freezing point, especially in the mountainous districts. Snow is unknown, but ice frequently forms on inland waters during cold winter nights, only to disappear with the first rays of the sun. In summer, which is nominally a dry season, light rains are common, northerly and easterly winds prevail, and the temperature rises to 95° in the shade.

The principal industry of the state is stock-raising, especially

on the southern plains, where large *estancias* (ranches) are to be found. This industry originated with the Jesuit missions on the Uruguay early in the 17th century, and its development here has been much the same as in Argentina and Uruguay. No general effort was made before the 20th century to improve the herds by the importation of better breeds, and the industry was practically in a state of decay until higher tariff rates were imposed on imported *carne secca* (jerked beef) toward the end of the 19th century. The export of live-stock is insignificant, the practice being to sell the cattle to the *xarqueadas* or *saladeros,* or modern packing plants, where they are slaughtered for *xarque, charqui* or *carne secca,* which is usually prepared by salting and drying in the sun, or for frozen meats for southern Europe. The jerked beef is largely exported to other Brazilian states for consumption, while the hides and other by-products are exported to Europe and the United States. Horses, sheep and swine are also raised, the raising of sheep being fostered by the building of woollen factories, and that of swine by the duties on imported pork and lard. In some parts of the state agriculture claims much attention, especially in the forested districts of the north, where colonies of foreign immigrants are established. The forest products include *herva matte* or Paraguay tea (*Ilex paraguayensis*), timbers and lumber and vegetable fibre (*crina vegetal*). Coal of an inferior quality is mined at São Jeronymo, on a small tributary (Arroio dos Ratos) of the Jacuhy river, and has been discovered in other localities. Lime is burned at Caçapava, and at some other places. Gold, copper and iron are said to exist, but are not mined. Considerable progress has been made in manufacturing industries.

The total length of railway lines in the state is nearly 2,000m. The main lines include the one from Rio Grande to Uruguayana, from Revara, near Uruguay, through the central part of the state to the northern border, and one from Porto Alegre to Santa Maria. The Quarahim to Itaquy line belongs to an English company and runs from the Uruguayan frontier, where it connects with the North-Western of Uruguay, northward to Uruguayana and the naval station of Itaquy.

The population in 1900 was 1,149,070; in 1920, 2,182,713. There is a large foreign element; in 1905 the total number of foreigners residing in the state was estimated at 400,000 (not including children born in the country), and of Germans at 250,000. The first German colony was founded in 1824 and settled in 1825 in the rich forested country north of Porto Alegre, and many large and prosperous communities have been established since then in spite of the wars and political agitations in the state. Several of these colonies, such as São Leopoldo, Novo Hamburgo and Conde d'Eu (now Garibaldi), have become important towns and are no longer under colonial administration. Italian colonies were subsequently established, also with good results, but an Irish colony founded at Monte Bonito, near Pelotas, about 1851, failed completely. The capital of Rio Grande do Sul is Porto Alegre (pop. 1920, 179,263) at the northern extremity of Lagôa dos Patos, and its two next most important cities are Rio Grande and Pelotas, both at the southern extremity of the same lake.

Among other important cities and towns with population returns for 1920 are Alegrete (18,372), prettily situated in the western part of the state on the Porto Alegre to Uruguayana railway; Bagé (24,424), about 173m. by rail north-west of Rio Grande in a picturesque mountainous region, 702ft. above sea-level; Jaguarao (11,079), on a river of the same name and opposite the Uruguayan town of Artigas, with steamboat communication with Rio Grande; Caçapava (7,834) in a fine grazing district in the central part of the state, 1,732ft. above sea-level; Quarahim or Quarahy (10,369), a town of much commercial importance on the Quarahim river opposite the Uruguayan town of Santo Eugenio.

History.—The territory was settled along the Uruguay by the Jesuits when they were compelled to abandon their missions on the upper Paraná. Between 1632 and 1707 they founded on the east side of the Uruguay seven missions—all under Spanish jurisdiction—which became highly prosperous, and at the time of their transfer from Spanish to Portuguese rule by a treaty of 1750 had an aggregate population of about 14,000, living in villages and possessing large herds of cattle and many horses. A joint effort of the two powers in 1753 to enforce the treaty, remove the Indians to Spanish territory, and mark the boundary line, led to resistance and a three years' war, which ended in the capture and partial destruction of the missions. On the coast the first recognized settlement—a military post at Estreito, near the present city of Rio Grande—was made in 1737. Before this, and as early as 1680, according to some chroniclers, the region south of Santa Catharina was occupied by settlements, or penal colonies of *degradados* (banished men) and immoral women from Santos, São Vicente and São Paulo, and was known as the "Continente de São Pedro." In 1738 the territory (which included the present state of Santa Catharina) became the Capitania d'El Rei and was made a dependency of Rio de Janeiro. Territorial disputes between Spain and Portugal led to the occupation by the Spanish of the town of Rio Grande (then the capital of the *capitania*) and neighbouring districts from 1763 to 1776, when they reverted to the Portuguese. The capture of Rio Grande in 1763 caused the removal of the seat of government to Viamão at the head of Lagôa dos Patos; in 1773 Porto dos Cazaes, renamed Porto Alegre, became the capital. In 1801 news of war between Spain and Portugal led the inhabitants of Rio Grande to attack and capture the seven missions and some frontier posts held by the Spaniards since 1763; since 1801 the boundary lines established by treaty in 1777 have remained unchanged. The districts of Santa Catharina and Rio Grande had been separated in 1760 for military convenience, and in 1807 the latter was elevated to the category of a *capitania-geral,* with the designation of "São Pedro do Rio Grande," independent of Rio de Janeiro, and with Santa Catharina as a dependency. In 1812 Rio Grande and Santa Catharina were organized into two distinct *comarcas,* the latter becoming an independent province in 1822 when the empire was organized. In 1835 a separatist revolution broke out in the province and lasted ten years. It was reduced more through the use of money and favours than by force of arms; but the province had suffered terribly in the struggle and did not recover its losses for many years. An incident in this contest was the enlistment of Garibaldi for a short time with the forces of the separatists. In 1865 a Paraguayan army invaded the state and on Aug. 5 occupied the town of Uruguayana. On Sept. 18 following, the Paraguayan general (Estigarribia) surrendered without a fight—an unusual occurrence in the remarkable war that followed. Political agitations have been frequent in Rio Grande do Sul, whose people have something of the temperament of their Spanish neighbours, but no important revolution occurred after the "ten years' war" (1835–45) until the presidency at Rio de Janeiro of Gen. Floriano Peixoto, whose ill-considered interference with the State governments led to the revolt of 1892–94, under Gumersindo Saraiva. In this struggle the revolutionists occupied Santa Catharina and Paraná, capturing Curityba, but were eventually overthrown through lack of munitions.

RIO GRANDE DO SUL or **SÃO PEDRO DO RIO GRANDE DO SUL** (sometimes São Pedro and commonly Rio Grande); a city and port of the state, on the western side of the Rio Grande (as the outlet of the Lagôa dos Patos is called), about 6m. from its mouth and nearly 780m. S.W. of Rio de Janeiro, in lat. 32° 7′ S., long. 52° 8′ W. Pop. (1920) of the city, 43,139; of the city and its suburbs, 53,607. The principal streets are served by tramways, and the Rio Grande to Bagé railway has an extension to its shipping wharf called "Estação Maritima" (1½m.), a branch to some points on the river (1½m.), and a branch to Costa do Mar, on the sea coast (11m.). The city is a port of call for several steamship lines, and has direct communication with European ports. Vessels of 24ft. draught can cross the bar, and those not exceeding 22ft. draught can safely enter the port.

The city is built on a low sandy peninsula, barely 5ft. above sea-level, formed by two arms of the Rio Grande projecting westward from the main channel, the peninsula being part of a large sandy plain extending southward along the coast to Lagôa Mirim. The level of the plain is broken by ranges of sand dunes, some of which rise not far from the city on the south and south-

east. The openness of the surrounding country and the proximity of the sea give to Rio Grande unusually healthy conditions, which, however, are largely counteracted by defective sanitary arrangements. In pleasing contrast to the drifting sands which surround the city is the fertile Ilha dos Marinheiros (Sailors' island) lying directly in front of the port; it is highly cultivated and supplies the market with fruit and vegetables. The waterfront has been improved by substantial stone walls, which permit the mooring of light-draught vessels alongside.

Rio Grande is wholly a commercial and industrial city. Its exports include salted jerked beef (*carne secca* or *xarque*), preserved meats, tongues, hides, horns, hoofs, woollen fabrics, Paraguay tea, beans, onions, fruit, flour, *farinha de mandioca* (cassava flour), candles and leather. The pioneer woollen factory in Brazil, and one of the largest in the country, is in Rio Grande.

Rio Grande was founded in 1737 by José da Silva Paes, who built a fort on the river near the site of the present city and called it Estreito. In 1745 the garrison and settlement was removed by Gomes Freire d'Andrade to its present site, which became a "villa," in 1751, with the name of São Pedro do Rio Grande, and a "cidade" (city) in 1807. It was the capital of the captaincy down to 1763, when it was captured by a Spanish force from Buenos Aires under the command of its governor, Don Pedro Zeballos, the seat of government being then removed to Viamão at the northern end of Lagôa dos Patos. The city was occupied by the national forces in the ten years' war which began in 1835, and in 1894 it was unsuccessfully besieged by a small insurgent force that had attempted to overthrow the government at Rio de Janeiro.

RIOJA, LA, an Andean province of Argentina, bounded north by Catamarca, east by Catamarca and Córdoba, south by San Luis and San Juan and west by San Juan and Chile. Area, 37,839 sq. miles. Pop. (1914) 79,754; (1927) 93,408. The province is traversed from north to south by eastern ranges of the Andes and is separated from Chile by the Cordillera itself. The western part of the province is drained by the Bermejo, which flows southward into the closed lacustrine basin of Mendoza. The eastern side of the province is arid. In the extreme north some small streams flow northward into Catamarca. The scanty waters of these streams are used for irrigation purposes. The principal industry of the province is that of mining, its mineral resources including gold, silver, copper, nickel, tin, cobalt, coal, alum and salt. Its best known mines are those of the Sierra de Famatina 16,400 ft. above sea-level, where an aerial wire line is used for transportation to Chilecito in the valley. Alfalfa is grown to a considerable extent and is used for feeding the herds of cattle driven across country to Chile. The capital of the province is La Rioja (pop., 1914, 12,536), on the eastern flank of the Sierra de Velasco, about 1,770 ft. above sea-level and near the gorge of Sanagasta, through which a small stream, also called Rioja, flows northward and affords water for the gardens, vineyards and orchards that surround it. The wines of Rioja are an important source of income for the district. The town is connected by rail with Córdoba and Catamarca. It was founded in 1591 by Velasco and in 1894 was destroyed by an earthquake. The most important town in the province is the mining centre of Chilecito, or Villa Argentina (pop., 1914, about 4,000), about 2,950 ft. above sea-level near the Famatina mines.

RIOM, a town of central France, capital of an arrondissement in the department of Puy-de-Dôme, 8 m. N. by E. of Clermont-Ferrand by rail. Pop. (1926) 8,835. Riom (*Ricomagus* or *Ricomum* of the Romans) was, along with Auvergne, seized for the crown by Philip Augustus, and was the capital of this province under the dukes of Berry and Bourbon. Riom stands on the left bank of the Ambène, on a height above the fertile plain of Limagne. The houses, some of the 15th and 16th centuries, being built of black lava, have a sombre appearance. The church of St. Amable, restored, of Romanesque and early Gothic architecture, dates from the 12th century. The church of Notre-Dame du Marthuret (15th century) has a well-known statue of the Virgin at its western entrance. The Sainte-Chapelle of the 14th and 15th centuries is a relic of the palace of Jean de Berry duke of Auvergne. The rest of the site of the palace is occupied by the law courts. The 16th century belfry and a mansion of the same period known as the Maison des Consuls are notable. Riom is the seat of a sub-prefect and tribunal of commerce.

RÍO NEGRO, a national territory of Argentina lying between 37° 35′ and 42° S. lat. and 62° 50′ and 72° 15′ W. long., within the geographical area formerly known as Patagonia. It is bounded north by the territories of Neuquen and La Pampa, east by the Province of Buenos Aires and the Atlantic, south by the territory of Chubut and west by Chile and Neuquen. Area, about 77,500 sq.m.; pop. (1914) 42,242 of whom approximately 15,000 were foreigners; 1925 estimate 49,372. That part of it lying between the Colorado and Negro rivers has much of the formation and characteristics of the "sterile pampas," but with irrigation the greater part of it can be utilized for agriculture and grazing. South of the Negro the country is arid, barren and lies in a series of sloping tablelands. Lake Nahuel-Huapi (200 sq.m. in area), lying partly in the territory of Neuquen (*q.v.*), is the principal lake of the region. However, there are several chains of lakes in the valleys of the Andes that are considered as rivals to Swiss scenery. The Atlantic coast-line of the territory has one deep indentation—the Gulf of San Matías—in the north bend of which is the port of San Antonio. Stock-breeding is the principal industry. According to an estimate made in 1925 there were over 3,200,000 sheep, 100,500 cattle and 180,000 horses within the territory. Agriculture is little developed, but irrigation, especially in the upper valley of the Río Negro, is transforming arid regions into valuable soil, where grapes are raised. The capital is Viedma (pop., 1926 estimate, 5,000), on the right bank of the Río Negro, 22 m. from its mouth and opposite Carmen de Patagones, a port of Buenos Aires. There are numerous small settlements along the Río Negro and the railway extending inland from San Antonio, but the only other town of importance is Bariloche on the shore of Lake Nahuel-Huapi, western terminal of the railway from San Antonio. Other transportation facilities are furnished by the Great Southern railway which crosses the northern part of the territory.

RIO PARDO (formerly Villa do Rio Pardo), a town of Brazil in the State of Rio Grande do Sul, on the left bank of the Jacuhy at its confluence with the Pardo. Pop. (1920) of the municipality, 34,861. The town is about 80 m. due west of Porto Alegre, with which it is connected by rail and steamer. The Jacuhy is navigable by small steamers. The town had its origin in a frontier fort built at this point by the Portuguese in 1751.

RÍO PIEDRAS, a city situated on the northern coast of Porto Rico. Pop. (1920) 5,820; now estimated at from 15,000 to 20,000. The population of the municipal district in 1920 was 23,025; in 1928 it probably exceeded 35,000.

The rapid growth of Rio Piedras is due to its proximity to the capital city, San Juan. Although the centres of the two cities are about 8 m. apart, they appear now to be one city. As a business centre also Rio Piedras has gained in importance considerably; almost every industry is represented. It has a good system of water-works, electric light, well-kept streets, a superior market, railroad and trolley connection and motor-bus service. It has good schools both public and private. It is the seat of the University of Porto Rico, whose beautiful buildings and grounds adorn the city. Over 2,000 students are in attendance, and the number is rapidly increasing. A municipal hospital and several privately supported hospitals are situated here. (H. M. T.)

RIOT, the gravest kind of breach of the peace, short of treason, known to the English law. It consists in a tumultuous disturbance of the peace by an assemblage of three or more persons who, with intent to help one another against any one who opposes them in the execution of some enterprise, actually execute that enterprise in a violent and turbulent manner, to the terror of the people. It is not necessary that violence should be used to any person or damage done to any property. Whether the enterprise itself is lawful or unlawful is not material, the gist of the offence lying in the mode in which the enterprise is carried out (*Reg.* v. *Cunningham, Grahame and Burns,* 1888, 16 Cox. C.C. 420). Nor is it material whether the enterprise is of a private or a public nature, though in the latter case the rioters may also be guilty

of sedition or treason. An assembly in its inception perfectly lawful may become a riot if the persons assembled proceed to form and execute a common purpose in the manner above stated, although they had no such purpose when they first assembled. Riot differs from "affray" in the number of persons necessary to constitute the offence, from an "unlawful assembly" in that actual tumult or violence is an essential element, and from "rout" which is an unlawful assembly that has moved towards the execution of a common purpose.

According to the decisions in *Field* v. *Receiver of Metropolitan Police* (1907 2 K.B. 853) and *Ford* v. *Receiver of Metropolitan Police* (1921 2 K.B. 344) five elements are necessary to constitute a riot:—(1) the presence of three persons at least; (2) a common purpose; (3) the execution or inception of the common purpose; (4) an intent to help one another by force if necessary against any person who may oppose them in the execution of their common purpose; (5) force or violence not merely used in demolishing, but displayed in such a manner as to alarm at least one person of reasonable firmness and courage.

It is an indictable misdemeanor at common law, but the Riot Act (1714), creates certain statutory offences for riot attended by circumstances of aggravation. That act makes it the duty of a justice, sheriff, mayor or other authority, wherever 12 persons or more are unlawfully, riotously and tumultuously assembled together, to the disturbance of the public peace, to resort to the place of such assembly and read the following proclamation: "Our Sovereign Lord the King chargeth and commandeth all persons being assembled immediately to disperse themselves, and peaceably to depart to their habitations or to their lawful business, upon the pains contained in the act made in the first year of King George for preventing tumultuous and riotous assemblies. God save the King." It is a felony to obstruct the reading of the proclamation or to remain or continue together unlawfully, riotously and tumultuously for one hour after the proclamation was made or for one hour after it would have been made but for being hindered. The act requires the justices to seize and apprehend all persons continuing after the hour, and indemnifies them and those who act under their authority from liability for injuries caused thereby. The punishment for the felony is penal servitude for life.

By s. 11 of the Malicious Damage Act 1801 (which is a re-enactment of a similar provision made in 1827 in consequence of the frame-breaking riots), it is a felony for persons riotously and tumultuously assembled together to the disturbance of the public peace to unlawfully and with force demolish or begin to demolish or pull down or destroy any building, public building, machinery or mining plant. The punishment is the same as for a felony under the Riot Act. By s. 12 it is a misdemeanour to injure or damage such building, etc. The punishment is penal servitude for seven years, or imprisonment as in the case of the two felonies above described. Under the Shipping Offences Act (1793) a riotous assemblage of three or more seamen, ship's carpenters and other persons, unlawfully and with force preventing and hindering or obstructing the loading or unloading or the sailing or navigation of any vessel, or unlawfully and with force boarding any vessel with intent to prevent, etc., is punishable on a first conviction as a misdemeanour by imprisonment for 12 months, and on a second conviction as a felony by penal servitude for 14 years.

It is the duty of a magistrate at the time of a riot to assemble subjects of the realm, whether civil or military, for the purpose of quelling the riot. In this duty he is aided by the common law, and a statute of 1414 (Henry V.), under which all subjects of the realm are bound to assist on reasonable warning, and by various enactments enabling the authorities to call out the forces for the suppression of riot, and to close public-houses where a riot is apprehended. It is his duty to keep the peace; if the peace be broken, honesty of intention will not avail him if he has been guilty of neglect of duty. The question is whether he did all that he knew was in his power and which could be expected from a man of ordinary prudence, firmness and activity. The law as thus stated is gathered from the opinions of the judges on the trials of the lord mayor of London and the mayor of Bristol on indictments for neglect of duty at the time of the Gordon riots of 1780 and the Bristol riots in 1831.

A matter of interest is the extent of the protection afforded at common law and by the Riot Act to soldiers and others acting under the commands of their officers, and in this regard it must always be borne in mind that "a soldier for the purpose of establishing civil order is only a citizen armed in a particular manner." The question was dealt with by Lord Bowen and his fellow-commissioners in the report on the Featherstone riots (Parl. Paper, 1893–1894, *c.* 7234). The substance of their views is as follows:—

By the law of England every one is bound to aid in the suppression of riotous assemblages. The degree of force, however, which may be lawfully employed in their suppression depends on the nature of each riot, for the force used must always be moderated and proportioned to the circumstances of the case and to the end to be attained. The taking of life can only be justified by the necessity for protecting persons or property against various forms of violent crime, or by the necessity of dispersing a riotous crowd which is dangerous unless dispersed, or in the case of persons whose conduct has become felonious through disobedience to the provisions of the Riot Act, and who resist the attempt to disperse or apprehend them. The necessary prevention of such outrage on person or property justifies the guardians of the peace in the employment against a crowd of even deadly weapons. Officers and soldiers are under no special privileges and subject to no special responsibilities as regards the principle of the law. The whole action of the military if once called in, ought from first to last to be based on the principle of doing, and doing without fear, only that which is absolutely necessary to prevent serious crime, and of exercising care and skill with regard to what is done. No set of rules exists which governs every instance or defines beforehand any contingency that may arise. The presence of a magistrate is not essential, but is usual, and of the highest value to aid the commander of the troops by local knowledge. But his presence or absence has no legal effect on the duties or responsibilities of the military to use their arms when it becomes necessary to do so, and without recklessness or negligence and with reasonable care and caution; and where they have so acted the killing of a rioter is justifiable homicide, and the killing of an innocent bystander is homicide by misadventure. It is not usual to resort to extremities with rioters until after reading the proclamation under the Riot Act (1714), but this preliminary is by no means a condition precedent to the exercise of the common-law powers of suppressing riots.

It was decided in *Reg.* v. *Glamorganshire County Council, ex parte Miller* (1899 2 Q.B. 536) that there is no duty upon the county council to pay out of the county funds the expenses of the maintenance of troops which have upon the application of the county justices been brought into the county for the purpose of preserving peace and order in the county.

Until 1886 persons whose property was damaged by riot had a civil remedy of an exceptional character by action against the hundred in which the riot took place. But the old statutes were repealed and replaced by the Riot Damage Act 1886. Under this act compensation is payable where rioters have injured or destroyed houses, shops, buildings, fixed or movable machinery and appliances prepared or used for or in connection with manufactures or agriculture, or for mines or quarries, or have injured, stolen, or destroyed property in houses, shops or buildings. The compensation is payable out of the police rate for the district in which the damage is done. The remedy is available in the case of stranded ships plundered by rioters (s. 515 of the Merchant Shipping Act 1894). (X.; W. DE B. H.)

United States.—Most States have enacted statutes which, though conforming generally to the outlines of the English law, have nevertheless common differences. *See* 94 Am. Dec. 36 *et seq.* In a few States only two people are required. Ga. Penal Code, 1926, sec. 360; Calif. Penal Code, 1923, sec. 404. Some States require that the acts committed be independently unlawful. Page, Ann. Ohio Code, 1926, sec. 12,809. In many others independent illegality is not essential. Cahill's Ill. Rev. Sta. 1927, ch.

38, sec. 518. There is a tendency to abolish the distinction between unlawful assembly, rout and riot by requiring merely threats of, or assembly with intent to do, such acts. Comp. Sts. Neb., 1922, sec. 9,744; Calif. Penal Code, *loc. cit. supra.* Reading of the riot act is still frequently a condition. Conn. Rev. Sts., 1918, sec. 6,336. As an additional deterrent, many statutes hold municipalities responsible to those injured by mobs or riots. Gen. Mun. Law, N.Y., Dec. 71. Diligence of municipal officers is no defence. *Arnold* v. *City of Centralia* (1915), 197 Ill. App. 73, 13 A.L.R. 765. The punishment for riot is generally comparatively mild. Burns Ann. Ind. Sts., 1926, sec. 2,529 (maximum fine of $500 and/or imprisonment for maximum of three months).

Although the courts, in interpreting these statutes, still require that there be "concert of action," a defendant, who was one of the crowd, may be convicted even though he committed none of the prohibited acts. The burden of proving no participation is on him. *Commonwealth* v. *Merrick* (1917), 65 Pa. Super. 482. Concert of action will be "implied" from the facts. *Commonwealth* v. *Frishman* (1920), 235 Mass. 449, 126 N.E. 838. Similarly, "common intent," also said to be essential, is not necessarily lacking because of a failure to prove a previously existing specific agreement. It also will be "implied." *Grier* v. *State* (1912), 11 Ga. App. 767, 76 S.E. 70. To hold otherwise in any or all of these instances would make it extremely difficult to convict. The courts, for practical purposes, consider the objective realities, apply their own gauge of social desirability in a particular case, and then by the useful tool of "inference" find the elements previously said to be necessary. (L. A. Tu.)

RIOT AND CIVIL COMMOTION INSURANCE. These policies cover all that is provided for by explosion insurance (*q.v.*) and in addition protect against losses due to riot, insurrection, civil commotion and strike.

The rates are low, but in the case of strike, for example, they are trebled if the policy is taken out after the strike has been declared.

RIO TINTO (Minas de Rio Tinto), a mining town of south-western Spain, in the province of Huelva; near the source of the river Tinto, and at the terminus of a light railway from the port of Huelva. Pop. (1920), 9,669. Rio Tinto is one of the greatest copper-mining centres in the world. Its modern importance dates from 1872, when a syndicate of London and Bremen capitalists purchased the mines from Spain.

RIOUW-LINGGA ARCHIPELAGO, five groups of islands lying off the east coast of Sumatra and extending from the Straits of Singapore in the north, to the Straits of Berhala in the south. They comprise the Karimon group, the Batam group, the Bintang group, the Lingga group, and the Singkep group, with territory on the mainland opposite known as Indragiri, and collectively they form a residency of the Dutch East Indies known as Riouw and Dependencies. The islands vary considerably in height and area, from rocky crags and small coral reefs, to Bintang, or Riouw, the largest island, area 440 sq.m., with a height of 1,235 ft.; Lingga and Singkep are almost as large, and the former attains a height of 4,400 ft. above sea-level and has the largest alluvial plain of the archipelago. Coral reefs and currents about the islands make navigation difficult. The total area of the residency is 17,550 sq.m. and its population (1927) was 224,145, (468 Europeans and Eurasians and 27,797 Chinese). On the mainland territory of Indragiri, which consists of a long, triangular-shaped wedge of land between the government of Sumatra East Coast and Jambi residency, and is mainly the valley of the river Kuantan and its tributaries, the people are Malays; the people of the islands are Malays, Buginese and Chinese, with a few aboriginals, probably not more than 1,000, known as Benua. The chief products of the islands are gambir, rubber and pepper, although rice is grown very largely for food purposes, and trade in these, in fact the agriculture, shipping and finance of the islands, is very largely in Chinese hands, the Malays and Buginese selling their produce to the Chinese, who are cultivators, as well as traders. The capital of the residency is Tandjung Pinang, opposite Singapore, also known as Riouw, or Bintang, pop. 4,538, and the only free port in the archipelago. (E. E. L.)

RIPLEY, market town, urban district, Ilkeston parliamentary division, Derbyshire, England, 10 m. N. of Derby on the L.M.S railway. Pop. (1931) 13,415. It lies high between the valleys of the Derwent and the Erewash. The charter for the market was granted by Henry III. To the west of Ripley lies the township of Heage. Pop. (1931) 4,054.

RIPON, GEORGE FREDERICK SAMUEL ROBINSON, 1st Marquess of (1827–1909), British statesman, only son of the 1st earl of Ripon and his wife Lady Sarah, daughter of Robert Hobart, 4th earl of Buckinghamshire, was born in London on Sept. 24, 1827.

Ripon began his political life as *attaché* to a special mission to Brussels in 1849. In 1851 he married Henrietta Vyner (d. 1907), and their eldest son, afterwards known as Earl de Grey, was born in 1852. Under his courtesy title of Viscount Goderich he was returned to the House of Commons for Hull in 1852 as an advanced Liberal. In 1853 he was elected for Huddersfield, and in 1857 for the West Riding of Yorkshire. In Jan. 1859 he succeeded to his father's title, and in November of the same year to that of his uncle, Earl de Grey. A few months after entering the Upper House he was appointed under-secretary for war, and in Feb. 1861 under-secretary for India. Upon the death of Sir George Cornewall Lewis in April 1863 he became secretary for war, with a seat in the cabinet. In 1866 he was appointed secretary of State for India. On the formation of the Gladstone administration in Dec. 1868, Lord Ripon was appointed lord president of the council, and held that office until within a few months of the fall of the Government in 1873, when he resigned on purely private grounds. In 1871 Lord Ripon was appointed chairman of the High Joint-Commission on the Alabama claims, which arranged the Treaty of Washington. In recognition of his services he was elevated to a marquessate (1871). In 1874 he became a convert to Roman Catholicism.

On the return of Gladstone to power in 1880 Lord Ripon was appointed viceroy of India, the appointment exciting a storm of controversy, the marquess being the first Roman Catholic to hold the viceregal office. He went out to reverse the Afghan policy of Lord Lytton, and Kandahar was given up, the whole of Afghanistan being secured to Abdur Rahman. The new viceroy extended the rights of the natives, and in certain directions curtailed the privileges of Europeans. For the Ilbert bill of 1883—so named after its author Sir Courtenay Ilbert, *see* India: *History.*

In 1886 he became first lord of the admiralty in the third Gladstone ministry; and on the return of the Liberals to power in 1892 he was appointed colonial secretary, which post he continued to hold until the resignation of the Government in 1895. He was included in Sir Henry Campbell-Bannerman's cabinet at the close of 1905 as lord privy seal, an office which he retained in 1908 when Asquith formed his new ministry, but which he resigned later in the same year. He died at his seat, Studley Royal, near Ripon, on July 9, 1909, when his only son, Earl de Grey, treasurer of the queen's household since 1901, became the 2nd marquess.

RIPON, a cathedral city, and municipal borough in the West Riding of Yorkshire, England, 214 m. N.N.W. from London, 30 m. N. of Leeds, on the L.N.E. railway. Pop. (1931) 8,576. It is a foot-hill town of the Pennines, situated at the confluence of the Ure with its tributaries the Laver and the Skell.

Ripon (*In Rhypum, Ad Ripam*) owed its origin to the monastery founded in 661, of which St. Wilfred became the first abbot. Tradition says that Ripon was made a royal borough by Alfred the Great and that King Aethelstan in 937 gave the borough to the Archbishop of York, and granted him privileges, as lord of the manor, of holding a market and fair. Henry I. certainly granted, or confirmed, these privileges to the Archbishops of York, who retained them until they were handed over to the Bishop of Ripon in 1837. In 1857, they were transferred to the ecclesiastical commissioners from whom they were purchased by the Corporation of Ripon in 1880. About the year 950 the monastery and town were destroyed by King Edred during an expedition against the Danes, but the monastery was rebuilt by the Archbishops of York and about the time of the Conquest it became a collegiate church. In 1318, when the Scots invaded

England, Ripon escaped being burnt a second time only by the payment of 1,000 marks.

The streets of Ripon are for the most part narrow and irregular, and although most of the houses are comparatively modern, some of them retain the picturesque gables characteristic of earlier times. The Cathedral, with a large square central tower and two western towers, is celebrated for its fine proportions and contains various styles of architecture. It was founded on the ruins of St. Wilfred's Abbey of the 7th century, but of this Saxon building nothing now remains except the crypt which is known as St. Wilfred's Needle. Apart from the crypt, the oldest part of the fabric is a portion of the chapter house and vestry adjoining the south side of the choir, and terminating eastward in an apse. This is pure Norman work and beneath is a crypt of that period. The present building was begun about 1154 and to this transitional period belong the transepts and parts of the choir. The west front and twin towers are fine specimens of Early English architecture and were completed about 1255. The eastern portion of the choir was rebuilt in Decorated style about the close of the 13th century. The nave and parts of the central tower and two bays of the choir are Perpendicular and were rebuilt towards the end of the 15th century.

The diocese of Ripon was created in 1836 and comprises most of the West Riding and part of the North Riding of Yorkshire and a small part of Lancashire. The episcopal palace, a modern building in Tudor style, is 1 m. N.W. of the city. To the southwest lies Studley Royal, a seat of the Marquess of Ripon, which contains the celebrated ruins of Fountains Abbey. Several old charities include the hospital of St. John the Baptist, founded in 1109, and the hospital of St. Mary Magdalene, founded by the Archbishop of York early in the 12th century as a secular community whose special duty was to administer to lepers. In the 13th century a master and chaplain took the place of the lay brethren and a chantry was founded in 1334. The chapel survives with interesting Norman work and a rare example of a pre-Reformation altar of stone.

From before the Conquest until the incorporation charter of 1604, Ripon was governed by a wakeman and 12 elders, but in 1604 the title of wakeman was changed to mayor, and 12 aldermen and 24 councillors were appointed. Ripon was summoned to send 2 members to parliament in 1295, and at intervals from that time until 1328–9. The privilege was revived in 1553, and continued until 1867, when only one was allowed. This latter privilege was removed by the Redistribution Bill of 1885 and Ripon gives its name to a parliamentary division of the county.

See *Victoria County History. Yorkshire.*

RISDON: *see* HOBART.

RISHANGER, WILLIAM (*c.* 1250–*c.* 1312), English chronicler, made his profession as a Benedictine at St. Alban's abbey in 1271, of which he perhaps became the official chronicler. The most important of his writings is the *Narratio de bellis apud Lewes et Evesham.* Though written many years afterwards and drawn from other sources, it is a spirited account of the barons' war. He is so great an admirer of Simon de Montfort that this work has been called a hagiography. He is credited with the authorship of a chronicle covering the period 1259–1306; this has been disputed, but the work is printed under his name by Riley.

See *Wilhelmi Rishanger chronica et annales,* Rolls Series, Introduction ed. H. T. Riley; the *Narratio de bellis apud Lewes et Evesham,* ed. J. O. Halliwell, Camden Society, 1840.

RISK, hazard, chance of danger or loss, especially the chance of loss to property or goods which an insurance company undertakes to make good to the insurer in return for the recurrent payment of a sum called the premium (*see* INSURANCE).

RISTIĆ, JOVAN (1831–1899), Serbian statesman, was born at Kragugevaz in 1831. He was educated at Belgrade, Heidelberg, Berlin and Paris. In 1861 he became Serbian diplomatic agent at Constantinople, and secured the withdrawal of the Turkish troops from the Serbian fortresses in 1867. On his return from Constantinople he became the recognized leader of the Liberal party. After the assassination of Prince Michael in 1868, he sat on the council of regency, and the first Serbian constitution (Jan. 2, 1869) was mainly his creation. When Prince Milan attained his majority in 1872, Ristić became foreign minister, and then prime minister, but resigned in the following autumn (1873). He again became prime minister in April 1876, and conducted the two wars against Turkey (July 1876–March 1877 and Dec. 1877–March 1878). Owing to the failure to realise Serb aspirations at the Congress of Berlin, the Ristić government became unpopular, and resigned in 1880. In 1887 Milan recalled Ristić; a new constitution was granted in 1888, and in 1889 Ristić became head of the council of regency for the young king Alexander. On April 13, 1893, King Alexander, by a successful stratagem, imprisoned the regents and ministers in the palace, and, declaring himself of age, recalled the Radicals to office. Ristić died at Belgrade on Sept. 4, 1899.

RISTORI (*rĭst'ō-rē*), **ADELAIDE** (1822–1906), Italian actress, born at Cividale del Friuli Jan. 30, 1822, daughter of strolling players. As a child she appeared upon the stage, and at 14 made her first success as Francesca da Rimini in Silvio Pellico's tragedy. She was 18 when for the first time she played Mary Stuart in an Italian version of Schiller's play. She had been a member of the Sardinian company and also of the ducal company at Parma for some years before her marriage (1846) to the marchese Giuliano Capranica del Grillo (d. 1861); and after a short retirement she returned to the stage and played regularly in Turin and the provinces. In 1855 she took Paris by storm in the rôle of Alfieri's *Myrrha.* Furious partisanship was aroused by the appearance of a rival to the great Rachel. In 1857 she visited Madrid, playing in Spanish to enthusiastic audiences, and in 1866 she paid the first of four visits to the United States, where she had great success in Giacometti's *Elizabeth,* an Italian study of the English sovereign. She retired from professional life in 1885, and died on Oct. 9, 1906, in Rome. Her *Studies and Memoirs* (1888) contain valuable studies in the psychological explanation of the characters of Mary Stuart, Elizabeth, Myrrha, Phaedra and Lady Macbeth, in her interpretation of which Ristori combined high dramatic instinct with the keenest intellectual study.

See also E. P. Hingston, *Adelaide Ristori: A Sketch of her Life* (1856); K. Field, *Adelaide Ristori: A Biography* (1867); Adelaide Ristori, *Studies and Memoirs* (1888), new rev. ed., trans. by G. Mantellini, *Memoirs and Artistic Studies* (1907).

RITCHIE, CHARLES THOMSON RITCHIE, 1ST BARON (1838–1906), English politician, was born at Dundee on Nov. 19, 1838, and educated at the City of London school. He went into business, and in 1874 was returned to parliament as Conservative member for the working-class constituency of Tower Hamlets. In 1885 he was made secretary to the Admiralty, and from 1886 to 1892 president of the Local Government Board, in Lord Salisbury's administration with a seat in the cabinet after 1887, sitting as member for St. George's in the East. He was responsible for the Local Government Act of 1888, instituting the county councils; and a large section of the Conservative party always owed him a grudge for having originated the London County Council. In Lord Salisbury's later ministries, as member for Croydon, he was president of the Board of Trade (1895–1900), and home secretary (1895–1900); and when Sir Michael Hicks-Beach retired in 1902, he became chancellor of the exchequer in Balfour's cabinet. Though in his earlier years he had been a "fair-trader," he was strongly opposed to Chamberlain's movement for a preferential tariff (*see* the articles on BALFOUR, A. J., and CHAMBERLAIN, J.), and he resigned office in Sept. 1903. In Dec. 1905 he was created a peer, but he was in ill-health, and he died at Biarritz on Jan. 9, 1906.

See the article in the *Dict. Nat. Biog.* Suppl. 1901–21.

RITSCHL, ALBRECHT (1822–1889), German theologian, was born in Berlin on March 25, 1822. His father, Benjamin Ritschl (1783–1858), was from 1827 to 1854 general superintendent and evangelical bishop of Pomerania. Albrecht studied at Bonn, Halle, Heidelberg and Tübingen. At Halle he came under Hegelian influences. In 1845 he was entirely captivated by the Tübingen school, and in *Das Evangelium Marcions und das kanonische Evangelium des Lukas* (1846) he appears as a disciple of F. C. Baur. But the second edition (1857) of his most im-

portant work, on the origin of the old Catholic Church (*Die Entstehung der alt-kathol. Kirche*), shows considerable divergence from the first edition (1850), and reveals an entire emancipation from Baur's method. Ritschl was professor of theology at Bonn (extraordinarius 1852; ordinarius 1859) and Göttingen (1864; *Consistorialrath* also in 1874), his addresses on religion delivered at the latter university showing the impression made upon his mind by his study of Kant and Schleiermacher. Finally, in 1864, came the influence of Rudolf Lotze. He wrote *Die Christliche Lehre von der Rechtfertigung und Versöhnung* (1870–74), and *Die Geschichte des Pietismus* (1880–86). He died at Göttingen on March 20, 1889.

Ritschl claims to carry on the work of Luther and Schleiermacher. He criticizes especially the use of Aristotelianism and speculative philosophy in scholastic and Protestant theology. He holds that such philosophy is too shallow for theology. Hegelianism attempts to squeeze all life into the categories of logic: Aristotelianism deals with "things in general" and ignores the radical distinction between nature and spirit. Neither Hegelianism nor Aristotelianism is "vital" enough to sound the depths of religious life. Neither conceives "God" as correlative to human "trust" (cf. *Theologie und Metaphysik*, esp. p. 8 *seq.*). But Ritschl's recoil carries him so far that he is left alone with merely "practical" experience. "Faith" knows God in His active relation to the "kingdom," but not at all as "self-existent."

Ritschl's school, in which J. G. W. Herrmann, Julius Kaftan and Adolf Harnack were the chief names, diverged from his teaching in many directions; *e.g.*, Kaftan appreciated the mystical side of religion and Harnack's criticism was very different from Ritschl's arbitrary exegesis. They were united on the value of faith-knowledge as opposed to "metaphysic."

See H. Schoen, *Les Origines historiques de la théologie de Ritschl* (1893); G. Ecke, *Die theologische Schule, A. Ritschl's und die evangelische Kirche der Gegenwart* (1897); J. Orr, *The Ritschlian Theology and the Evangelical Faith* (1898) and *Ritschlianism: expository and critical essays* (1903); A. E. Gavire, *The Ritschlian Theology* (1899); E. A. Edghill, *Faith and Fact, a study of Ritschlianism* (1910); R. Mackintosh, *Ritschl* (1915). The chief authority for his biography is *Albrecht Ritschls Leben* (2 vols., Leipzig, 1896) by his son Otto Ritschl.

RITSCHL, FRIEDRICH WILHELM (1806–1876), German scholar, was born in 1806 in Thuringia. He was well taught in youth by Spitzner, a pupil of Gottfried Hermann, spent a year at Leipzig, and in 1826 went to Halle. He went to Bonn in 1839, where he controlled a philological seminary. The names of Georg Curtius, Ihne, Schleicher, Bernays, Ribbeck, Lorenz, Vahlen, Hübner, Bücheler, Helbig, Benndorf, Riese, Windisch, who were his pupils either at Bonn or at Leipzig, attest his fame and power as a teacher. In 1865 a violent quarrel arose between him and Otto Jahn, now his colleague; he resigned, went to Leipzig, and died there in 1876. His great faculty for organization is shown by his administration of the university library at Bonn, and by the eight years of labour which carried to success a work of infinite complexity, the famous *Priscae Latinitatis Monumenta Epigraphica* (Bonn, 1862). This volume presents in admirable facsimile, with prefatory notices and indexes, the Latin inscriptions from the earliest times to the end of the republic.

To the world in general Ritschl was best known as a student of Plautus. Ritschl's examination of the Plautine mss. was both laborious and brilliant, and greatly extended the knowledge of Plautus: for example, by the aid of the Ambrosian palimpsest he recovered the name T. Maccius Plautus, for the vulgate M. Accius, and proved it correct by strong extraneous arguments.

In spite of the incompleteness, on many sides, of his work Ritschl must be assigned a place in the history of learning among a very select few. His studies are presented principally in his *Opuscula* collected partly before and partly since his death. The *Trinummus* (twice edited) was the only specimen of his contemplated edition of Plautus which he completed.

The facts of Ritschl's life may be best learned from the elaborate biography by Otto Ribbeck (Leipzig, 1879). An interesting estimate of Ritschl's work is that by Lucian Müller (1877).

RITTENHOUSE, DAVID (1732–1796), American astronomer, was born at Germantown, Pa., on April 8, 1732. First a watchmaker and mechanician, he afterwards became treasurer of Pennsylvania (1777–89), and from 1792 to 1795 director of the U.S. mint (Philadelphia). He was a fellow of the Royal Society of London, and a member, and in 1791 president, of the American Philosophical Society. As an astronomer, Rittenhouse's principal merit is that he introduced in 1786 the use of spider lines in the focus of a transit instrument. His researches were published in the *Transactions of the American Philosophical Society* (1785–1799). He died at Philadelphia June 26, 1796.

See *Memoir* (1813) by William Barton.

RITTER, HEINRICH (1791–1869), German historian of philosophy, was born at Zerbst on Nov. 21, 1791, and died on Feb. 3, 1869, at Göttingen, where he had been professor of philosophy for nearly 30 years. Of his numerous works the most important are the *Geschichte der Philosophie* (Hamburg, 12 vols., 1829–53), and, written with Preller, the *Historia philosophiae Graeco-Romanae* (1838, 7th ed. 1888).

RITTER, KARL (1779–1859), German geographer, born at Quedlinburg on Aug. 7, 1779, had already travelled much when in 1817–18 he wrote *Die Erdkunde im Verhältnis zur Natur und zur Geschichte des Menschen* (Berlin, 2 vols., 1817–1818). In 1819 he became professor of history at Frankfort, and in 1820 professor extraordinarius of history at Berlin, where he remained till his death. The second edition of his *Erdkunde* (1822–58) was on a much larger scale than the first, but he completed only the sections on Africa and the various countries of Asia. Ritter brought to his work a new conception of the subject. Geography was, to use his own expression, a kind of physiology and comparative anatomy of the earth: rivers, mountains, etc., were so many distinct organs, each with its own functions; and the structure of each country is a leading element in the historic progress of the nation. His death occurred in Berlin on Sept. 28, 1859.

See G. Kramer, *Karl Ritter, ein Lebensbild* (Halle, 1864 and 1870; 2nd ed., 1875); W. L. Gage, *The Life of Karl Ritter* (1867); F. Marthe, "Was bedeutet Karl Ritter für die Geographie," in *Zeitsch. der Ges. f. Erdk.* (Berlin, 1879).

RITUAL [Lat. *ritus*, a custom], a term of religion, which may be defined as the routine of worship. This is a "minimum definition"; "ritual" at least means so much, but may stand for more. Without some sort of ritual there could be no organized method in religious worship. Indeed, viewed in this aspect, ritual is to religion what habit is to life and its function is similar; namely, by bringing subordinate functions under an effortless rule, to permit undivided attention in regard to vital issues. The chief task of routine in religion is to organize the activities necessary to its stability and continuance as a social institution, in order that all available spontaneity and initiative may be directed into spiritual channels.

But, whilst ritual at least represents routine, it tends, historically speaking, to have a far deeper significance for the religious consciousness. A recurrent feature of religion, which many students of its phenomena would even consider constant and typical, is the attribution of a more or less self-contained and automatic efficacy to the ritual procedure as such. Before proceeding to considerations of genesis, it will be convenient briefly to analyse the notion as it appears in the higher religions.

Two constituent lines of thought may be distinguished. Firstly, there is the tendency to pass beyond the purely petitionary attitude which as such can imply no more than the desire, hope or expectation of divine favour, and to take for granted the consummation sought, a deity that answers, a grace and blessing that are communicated. When such accomplishment of its end is assumed, efficacy can readily be held to attach to the act of worship as such. Secondly, there is the tendency to identify such a self-accomplishing act of worship with its objective expression in the ritual that for purposes of mutual understanding makes the body of worshippers one.

The Formal Element in Ritual.—Exactly similar tendencies—to impute efficacy, and to treat the ritual procedure as the

source of that efficacy—are typically characteristic of black magic, and their reappearance in religion can hardly be treated as a coincidence, seeing that magic and religion would appear to have much in common, at any rate during the earlier stages of their development. In magic a suggestion is made orally, or by dramatic action, or most often in both ways together, that is held *ipso facto* to bring about its own accomplishment. A certain conditionality attaches to the magical operation, inasmuch as each magician is subject to interference on the part of other magicians who may neutralize his spell by a counter-spell of equal or greater power; nevertheless, the intrinsic tone is that of a categorical assertion of binding force and efficacy. Again, in magic the self-realizing force is apt to seem to reside in the suggestional machinery rather than in the spiritual qualifications of the magician, though this is by no means invariably the case. On the whole, however, spells and ceremonies are wont to be regarded as an inheritable and transferable property containing efficacy in themselves. What is true of magic is true of much primitive religion.

Sir J. G. Frazer has pronounced the following to be marks of a primitive ritual: negatively, that there are no priests, no temples and no gods (though he holds that departmental, non-individual "spirits" are recognized); positively, that the rites are magical rather than propitiatory (*The Golden Bough,* 2nd ed. ii. 191). If we leave it an open question whether, instead of "spirits," it would not be safer to speak of "powers" to which there is attributed not a soul-like nature, but simply a capacity for acting with *mana* (q.v.) (which roughly is what Frazer means by "magical"), this characterization may be accepted as applying to many, if not to all, the rites of primitive religion.

As Lang well puts it, "Ritual is preserved because it preserves luck." Given an intrinsic sacredness, it is but a step to associate definite gods with the origin or purpose of a rite, whose interest it thereupon becomes to punish omissions or innovations by the removal of their blessing (which is little more than to say that the rite loses its efficacy), or by the active infliction of disaster on the community. In the primitive society it is hard to point to any custom to which sacredness does not in some degree attach, but, naturally, the more important and solemn the usage, the more rigid the religious conservatism. Thus there are indications that in Australia, at the highly sacred ceremony of circumcision, the fire-stick was employed after stone implements were known; and we have an exact parallel at a higher level of culture, the stone implement serving for the same operation when iron is already in common use. (*See* B. Spencer and F. Gillen, *The Native Tribes of Australia,* 401; *cf.* E. B. Tylor, *Early History of Mankind,* 3rd ed. 217.)

The Interpretation of Ritual.—A valuable truth insisted on by the late W. Robertson Smith (*Religion of the Semites,* 17 et sqq.) is that in primitive religion it is ritual that generates and sustains myth, and not the other way about. Sacred lore of course cannot be dispensed with; even Australian aboriginal society, which has hardly reached the stage of having priests, needs its *Oknirabata* or "great instructor" (Spencer and Gillen, *ibid.,* 303). The function of such an expert, however, is chiefly to hand on mere rules for the performance of religious acts. If his lore include sacred histories, it is largely, we may suspect, because the description and dramatization of the doings of divine persons enter into ritual as a means of suggestional control. Similarly, the sacred books of the religions of middle grade teem with minute prescriptions as to ritual, but are almost destitute of doctrine. Even in the highest religions, where orthodoxy is the main requirement, and ritual is held merely to symbolize dogma, there is a remarkable rigidity about the dogma that is doubtless in large part due to its association with ritual forms, many of them bearing the most primeval stamp.

As regards the symbolic interpretation of ritual, this is usually held not to be primitive; and it is doubtless true that an unreflective age is hardly aware of the difference between "outward sign" and "inward meaning," and thinks as it were by means of its eyes. Nevertheless, it is easier to define fetishism (q.v.) (a fetish differing from an idol in that it is worshipped in its own character, not as the symbol, image or occasional residence of a deity," *New Oxford Dictionary,* Oxford, 1901) than it is to bring such a fetishism home to any savage people, the West African negroes not excluded (*cf.* A. B. Ellis, *The Tshi-speaking Peoples of the Gold Coast of W. Africa,* 192). It is the intrinsic *mana,* virtue or grace residing in, and proceeding from, the material object—a power the communicability of which constitutes the whole working hypothesis of the magico-religious performance—that is valued in those cases where native opinion can be tested. Moreover, it must be remembered that in the act of magic a symbolic method is consciously pursued, as witness the very formulas employed: "As I burn this image, so may the man be consumed," or the even more explicit, "It is not wax I am scorching; it is the liver, heart and spleen of So-and-so that I scorch" (W. W. Skeat, *Malay Magic,* 570), where appearance and reality are distinguished in order to be mystically reunited.

Now it is important to observe that from the symbol as embodying an imperative to the symbol as expressing an optative is a transition of meaning that involves no change of form whatever; and, much as theorists love to contrast the suggestional and the petitionary attitudes, it is doubtful if the savage does not move quite indifferently to and fro across the supposed frontier-line between magic and religion, interspersing "bluff" with blandishment, spell with genuine prayer. Meanwhile the particular meanings of the detailed acts composing a complicated piece of ritual soon tend to lose themselves in a general sense of the efficacy of the rite, as a whole, to bring blessing and avert evil. Nay, unintelligibility is so far from invalidating a sacred practice that it positively supports it by deepening the characteristic atmosphere of mystery. Even the higher religions show a lingering predilection for cabalistic formulas.

Changes in Ritual.—Whilst ritual displays an extraordinary stability, its nature is of course not absolutely rigid; it grows, alters and decays. As regards its growth, there is hardly a known tribe without its elaborate body of magico-religious rites. In the exceptional instances where this feature is relatively absent (the Masai of East Africa offer a case in point), we may suspect a disturbance of tradition due to migration or some similar cause. Thus there is always a pre-existing pattern in accordance with which such evolution or invention as occurs proceeds. Unconscious evolution is perhaps the more active factor in primitive times; imitation is never exact, and small variations amount in time to considerable changes.

On the other hand, there is also deliberate innovation. In Australia councils of the older men are held day by day during the performance of their ceremonies, at which traditions are repeated and procedure determined, the effect being mainly to preserve custom but undoubtedly in part also to alter it. Moreover, the individual religious genius exercises no small influence. A man of a more original turn of mind than his fellows will claim to have had a new ceremony imparted to him in a vision, and such a ceremony will even be adopted by another tribe which has no notion of its meaning (Spencer and Gillen, *ibid.,* 272, 278, 281). Meanwhile, since little is dropped whilst so much is being added, the result is an endless complication and elaboration of ritual. Side by side with elaboration goes systematization, more especially when local cults come to be merged in a wider unity. Thereupon assimilation is likely to take place to one or another leading type of rite—for instance, sacrifice or prayer. At these higher stages there is more need than ever for the expert in the shape of the priest, in whose hands ritual procedure becomes more and more of a conscious and studied discipline, the naïve popular elements being steadily eliminated, or rather transformed. Not but what the transference of ritualistic duties to a professional class is often the signal for slack and mechanical performance, with consequent decay of ceremonial. The trouble and worry of having to comply with the endless rules of a too complex system is apt to operate more widely—namely, in the religious society at large—and to produce an endless crop of evasions.

Good examples of these on the part alike of priests and people are afforded by Toda religion, the degenerate condition of which is expressly attributed by Dr. W. H. R. Rivers to "the overdevelopment of the ritual aspect of religion" (*The Todas,* 454–5).

It is interesting to observe that a religion thus atrophied tends to revert to purely magical practices, the use of the word of power, and so on (*ibid.*, ch. x.). It is to be noted, however, that what are known as ritual substitutions, though they lend themselves to purposes of evasion (as in the case of the Chinese use of paper money at funerals), rest ultimately on a principle that is absolutely fundamental in magico-religious theory; namely, that what suggests a thing because it is like it or a part of it becomes that thing when the mystic power is there to carry the suggestion through.

The Classification of Rites.—More than one basis of division has suggested itself. From the sociological point of view perhaps the most important distinction in use is that between public and private rites. Whilst the former essentially belong to religion as existing to further the common weal, the latter have from the earliest times an ambiguous character and tend to split into those which are licit—"sacraments," as they may be termed—and those which are considered anti-social in tendency, and are consequently put beyond the pale of religion and assigned to the "black art" of magic. Or the sociologist may prefer to correlate rites with the forms of social organization—the tribe, the phratry, the clan, the family and so on.

Another interesting contrast (seeing how primary a function of religion it is to establish a calendar of sacred seasons) is that between periodic and occasional rites—one that to a certain extent falls into line with the previous dichotomy. A less fruitful method of classing rites is that which arranges them according to their inner meaning. As we have seen, such meaning is usually acquired *ex post facto*, and typical forms of rite are used for many different purposes; so that attempts to differentiate are likely to beget more equivocations than they clear up. The fact is that comparative religion must be content to regard all its classifications alike as pieces of mere scaffolding serving temporary purposes of construction.

Negative Rites.—A word must be added on a subject dealt with elsewhere (*see* TABU), but strictly germane to the matter in hand. Ritual interdictions have the best, if not the sole, right to rank as taboos (*see* M. Mauss in *L'Année sociologique*, ix. 249). Taboo, as understood in Polynesia, the home of the word, is as wide as, and no wider than, religion, representing one side or aspect of the sacred (*see* RELIGION). The very power that can help can also blast if approached improperly and without due precautions. Taboos are such precautions, abstinences prompted, not by simple dread or dislike, but always by some sort of respect as felt towards that which in other circumstances or in other form has healing virtue. Thus the negative attitude of the observer of taboo involves a positive attitude of reverence from which it becomes in practice scarcely distinguishable. To keep a fast, for instance, is looked upon as a direct act of worship. It must be noted, too, that, whereas taboo as at first conceived belongs to the magico-religious circle of ideas, implying a quasi-physical transference of sacredness from that having it to one not fit to receive it, it is very easily reinterpreted as an obligation imposed by the deity on his worshippers.

The law observed by a primitive religious community abounds in negative precepts, and if early religion tends to be a religion of fear it is because the taboo-breaker provides the most palpable objective for human and divine sanctions. In the higher religions, to be pure remains amongst the most laudable of aspirations, and, even though the ceremonial aversion of a former age has become moralized, and a purity of heart set up as the ideal, it is on "virtues of omission" that stress is apt to be laid, so that a timorous propriety is too often preferred to a forceful grappling with the problems of life. There are signs, however, that the religious consciousness has at length come to appreciate the fact that the function of routine in religion as elsewhere is to clear the way for action.

BIBLIOGRAPHY.—For leading ideas *see* E. B. Tylor, *Primitive Culture*, ii. 18 (1903); and A. Lang, *Myth, Ritual and Religion* (1899); Sir J. G. Frazer's *The Golden Bough* (1900); W. Robertson Smith, *Lectures on the Religion of the Semites* (1889); H. Hubert and M. Mauss, "Essai sur la nature et sur la fonction du sacrifice," in *L'Année sociologique*, ii.; S. Levi, *La Doctrine du sacrifice dans les Brâhmanas* (1899); W. Caland and V. Henry, *L'Agnistoma, description complète de la forme normale du sacrifice de Soma dans le culte védique* (1906); H. Oldenberg, *Die Religion des Veda* (1894); A. Hillebrant, *Ritual Litteratur: Vedische Opfer und Zauber* (1896). For descriptions of Australian ritual *see* Sir B. Spencer and F. J. Gillen, *The Native Tribes of Central Australia* (1899) and *The Northern Tribes of Central Australia* (1904). For North American rituals *see* A. C. Fletcher, "The Hako: A Pawnee Ceremony," in *22nd Report of Bureau of American Ethnology*; various papers in *Peabody Reports*; J. W. Fewkes, "Tusayan Katchinas," in *15th Rep. of B. of A. Eth.*; "Hopi Katchinas," in *21st Rep.*; M. C. Stevenson, "The Zuñi Indians," in *23rd Rep.*; *cf.* F. H. Cushing, "Zuñi Fetiches," in *2nd Rep.* Also *see* L. R. Farnell, *The Cults of the Greek States* (1896–1907); A. Moret, *Le Rituel du culte divin journalier en Égypte* (1902); A. de Marchi, *Il culto privato di Roma antica* (1902); A. N. Whitehead, *Religion in the Making* (1926). *See* also SPELL, MANA.

RITUAL MURDER, a general term for human sacrifice in connection with religious ceremonies. False accusations as to the practice of ritual murder by various bodies have often been made. Justin Martyr in his second apology (cap. xii.) vigorously defends the Christian community against the charge: Octavius, Minutius Felix, Tertullian, Origen, and other Church Fathers all refer to the subject and indignantly repudiate the atrocious libel that the Eucharist involved human sacrifice. The myth was revived against the Montanists, and in the later middle ages against various dissenting sects of Christians. In modern times the accusation has been again levelled against "foreigners" during the disturbances in China. The chief sufferers from the libel were however the Jews. The earliest form of it (the first instance is the case of William of Norwich, 1144) was that they immolated a Christian child at Easter in mockery of the Passion. In the course of the next century there came about the elaboration that the blood was used in the manufacture of the unleavened bread for Passover (which generally coincided with Easter) or for other purposes. Ultimately, it was actually alleged that "the Jews of every province annually decide by lot" which congregation or town was to be the scene of the mythical murder. Almost invariably, the accusations were followed by spoliation and persecution. Among the classical instances are the "martyrdoms" of Hugh of Lincoln (1255) and Simon of Trent (1475), the Damascus affair (1840), and the Beilis case (1911–13). It is easy to understand how in ages when the Jews were everywhere regarded with suspicious awe such stories would find ready credence; but the revival of the myth by the anti-Semite in modern times is a deplorable instance of degeneration. That there is no foundation whatsoever for the belief is proved in the classical treatise on the subject by Hermann L. Strack, regius professor of theology at the University of Berlin. Many proselytes to Christianity have strenuously defended the Jews from the charge. Several of the popes have issued bulls exonerating them, and temporal princes have often taken a similar step. Many Christian scholars and ecclesiastics have felt it their duty to utter protests against the libel, including the most eminent Gentile students of Rabbinism of modern times. Indeed, the vast majority of the literature refuting the charge comes from non-Jewish pens. That on the other side is entirely anti-Semitic, and in no case has it survived the ordeal of criticism.

See G. A. Zaviziano, *Un Raggio di Luce* (Corfu, 1891); H. L. Strack, *Das Blut im Glauben und Aberglauben* (8th ed., Munich, 1900), Eng. trans., *The Jew and Human Sacrifice* (1909); D. Chwolson, *Blutanklage* (1901); F. Frank, *Der Ritualmord vor den Gerichtshöfen der Wahrheit und der Gerichtigkeit* (1901, 1902). A list of some of the most important cases is given by J. Jacobs in the *Jewish Encyclopaedia*, iii. 266–267.

RIVAROL, ANTOINE DE (1753–1801), French writer and epigrammatist, was born at Bagnols in Languedoc on June 26, 1753, and died at Berlin on April 11, 1801. It seems that his father was an innkeeper of cultivated tastes. The son assumed the title of comte de Rivarol, and asserted his connection with a noble Italian family. After various vicissitudes he appeared in Paris in 1777. In his *Petit Almanach de nos grands hommes pour 1788*, in which he had the assistance of Richebourg de Champcenetz, he ridiculed contemporary authors. Rivarol wrote in the Royalist press, in the *Journal politique* of Sabatier de Castres (1742–1817) and the *Actes des Apôtres* of Peltier (1770–1825). He emigrated in 1792, and established himself at Brus-

sels, whence he removed successively to London, Hamburg and Berlin. Rivarol has had no rival in France except Piron in brilliant epigrams. His works include *Isman, ou le fatalisme* (1795), a novel; *Le Véridique* (1827), comedy; *Essai sur les causes de la révolution française* (1827).

See the *Oeuvres* (2nd ed., 1880) ed. M. de Lescure; also M. de Lescure, *Rivarol et la société française pendant la révolution et l'émigration* (1882), and Le Breton, *Rivarol, sa vie, ses idées* (1895).

RIVAS, ANGEL DE SAAVEDRA, DUKE OF (1791–1865), Spanish poet and politician, born at Cordova, March 19, 1791. He fought in the War of Independence, was a prominent member of the advanced Liberal Party (1820–23) and in the latter year was condemned to death. He escaped to London and lived successively in Italy, Malta and France, until the amnesty of 1834, when he returned to Spain, shortly afterwards succeeding his brother as duke of Rivas. In 1835 he became minister of the interior under Istúriz, and along with his chief had again to leave the country. Returning in 1837, he joined the Moderate Party, became prime minister, and was subsequently ambassador at Paris and Naples. He died June 22, 1865. In 1813 he published *Ensayos poéticos,* and between that date and his first exile several of his tragedies (the most notable being *Alatar,* 1814, and *Lanuza,* 1822) were put upon the stage. Traces of foreign influence are observable in *El Moro Expósito* (1834), a narrative poem dedicated to John Hookham Frere; these are still more marked in *Don Alvaro ó La Fuerza del sino* (first played March 22, 1835), a drama of historical importance inasmuch as it established the new French romanticism in Spain.

See *Obras completas del Duque de Rivas* (Madrid, 1894–1904, 7 vols.); M. Cañete, *Escritores españoles é hispano-americanos* (Madrid, 1884); E. Allison Peers, *Angel de Saavedra, Duque de Rivas . . .* in *Revue Hispanique,* lviii. (1923), p. 1–600.

RIVER AND RIVER ENGINEERING. A river is any natural stream of fresh water, larger than a brook or creek, which flows in a well-defined channel. Usually it discharges into another and larger body of water, the ocean, a lake, or another river. In rare instances in regions of porous soil it soaks into the ground, or, in excessively arid regions, evaporates, in which case it becomes a "lost river." In other regions of favourable rock conditions it may also run under ground for certain distances, disappearing and reappearing one or more times. A river with a well-cut channel and a graded bed, usually reaching base-level at its mouth, is an adolescent river. Rivers as they grow older usually widen their valleys accordingly unless prevented by certain geological formations or occurrences. A river whose upper waters sometime in the past suddenly found a new outlet, diminishing the volume and force of the original river and also its length, is known as a beheaded river. For other facts relating to the origin and subsequent development of rivers and their valleys *see* GEOGRAPHY and GEOLOGY.

The river works which the engineer may be called upon to execute vary widely in their character and object. The more important of these which are described in the present article may be grouped under the following heads:—(1) The prevention of river inundations and the mitigation of their effects; (2) the improvement for navigation of the non-tidal portions of rivers; and (3) works for the improvement of navigation in the tidal compartments of rivers, in their estuaries, and at the outlets of rivers flowing into tideless seas.

Other river engineering works are dealt with under separate headings, for instance, the utilization of river waters for power production (*see* ELECTRICAL POWER GENERATION; HYDROELECTRIC GENERATION, etc.); works for water storage and supply for various purposes including irrigation (*q.v.*); works connected with fisheries (*q.v.*); and reclamation of land (*see* COAST EROSION and RECLAMATION). *See* also the articles on HYDRAULICS, CANAL AND CANALISED RIVERS, WEIR, and particular rivers, *e.g.,* MISSISSIPPI and DANUBE.

PHYSICAL CHARACTERISTICS OF RIVERS

River Basins.—In general the size of rivers above any tidal limit and their average fresh-water discharge are proportionate to the extent of their basins, and the amount of rain over those basins. They vary in extent according to the configuration of the country, ranging from the insignificant drainage-areas of streams rising on high ground near the coast and flowing straight down to the sea, to immense parts of continents, where rivers rising on the slopes of mountain ranges far inland have to traverse vast stretches of valleys and plains before reaching the ocean.

The comparative size of the principal river systems of the world is shown in the following table:

River	Drainage basin, square miles	Length in miles
1. Amazon	7,050,000	5,500
2. Congo	3,700,000	4,640
3. Mississippi-Missouri	3,250,000	6,970
4. Rio de la Plata	3,100,000	3,880
5. Ob	2,915,000	3,640
6. Nile	2,800,000	5,920
7. Niger	2,800,000	4,160
8. Yenisei	2,570,000	4,750
9. Lena	2,320,000	4,600
10. Amur-Kerulen	2,080,000	4,480
11. Yangtze	1,775,000	5,300
12. Mackenzie	1,660,000	4,600
13. Volga	1,460,000	3,895
14. Zambesi	1,430,000	2,660
15. St. Lawrence	1,200,000	3,500
16. Hoang-Ho	980,000	4,150
17. Indus	965,000	3,200
18. Orinoco	944,000	3,000
19. Murray	910,000	2,870
20. Danube	817,000	2,900
21. Brahmaputra	670,000	2,900

Available Rainfall.—The rainfall varies considerably in different localities, both in its total yearly amount and in its distribution throughout the year; also its volume fluctuates from year to year. Even in small river basins the variations may be considerable according to differences in elevation or distance from the sea, ranging, for instance, in the Severn basin, with an area of only 4,350 sq.m., from an average of under 30 in. in the year to over 80 in. The proportion, moreover, of the rain falling on a river basin which actually reaches the river, or the available rainfall in respect to its flow, depends very largely on the nature of the surface strata, the slope of the ground and the extent to which it is covered with vegetation, and varies greatly with the season of the year. The available rainfall has, indeed, been found to vary from 75% of the actual rainfall on impermeable, bare, sloping, rocky strata, down to about 15% on flat, permeable soils.

Fall of Rivers.—The rate of flow of rivers depends mainly upon their fall, though where two rivers of different sizes have the same fall, the larger river has the quicker flow, as its retardation by friction against its bed and banks is less in proportion to its volume than that of the smaller river. The fall of a river corresponds approximately to the slope of the country it traverses. As rivers rise close to the highest part of their basins, generally in hilly regions, their fall is rapid near their source and gradually diminishes, with occasional irregularities, till, in traversing plains along the latter part of their course, their fall usually becomes quite gentle. Accordingly, in large basins, rivers in most cases begin as torrents with a very variable flow, and end as gently flowing rivers with a comparatively regular discharge.

Variations in the Discharge of Rivers.—In tropical countries, subject to periodical rains, the rivers are in flood during the rainy season and have hardly any flow during the rest of the year; whilst in temperate regions, where the rainfall is more evenly distributed throughout the year, evaporation causes the available rainfall to be much less in hot summer weather than in the winter months, so that the rivers fall to their low stage in the summer and are liable to be in flood in the winter. In fact, with a temperate climate, the year may be divided into a warm and a cold season, extending, in the northern hemisphere, from May to October and from November to April respectively. The rivers are low and moderate floods are of rare occurrence during the first period, and they are high and subject to occasional heavy floods after a considerable rainfall during the second period. The

only exceptions are rivers which have their sources amongst mountains clad with snow, and are fed by glaciers; their floods occur in the spring and summer from the melting of the snows and ice, as exemplified by the Rhone above the Lake of Geneva, and the Arve which joins it below. But even these rivers are liable to have their flow modified by the influx of tributaries subject to different conditions, so that the Rhone below Lyons has a more uniform discharge than most rivers, as the summer floods of the Arve are counteracted to a great extent by the low stage of the Saone flowing into the Rhone at Lyons, which has its floods in the winter when the Arve on the contrary is low.

Transportation of Materials by Rivers.—In flood-time rivers bring down a large quantity of detritus, derived mainly from the disintegration of the surface-layers of the hills and slopes in the upper parts of the valleys by glaciers, frost and rain. The power of a current to transport materials varies approximately as the square of its velocity, so that torrents with a rapid fall near the sources of rivers can carry down rocks, boulders and large stones. These are by degrees ground by attrition in their onward course into shingle, gravel, sand and silt which are carried forward by the main river towards the sea, or partially strewn over flat alluvial plains during floods. The size of the materials forming the bed of the river or borne along by the stream becomes less as the reduction of velocity diminishes the transporting power of the current. In the Po, for instance, pebbles and gravel are found for about 140 m. below Turin, sand along the next 100 m., and silt and mud in the last 110 m. When, however, the fall is largely and abruptly reduced, as in the case of rivers emerging straight from mountainous slopes upon flat plains, deposit necessarily occurs owing to the sudden reduction of velocity. If the impeded river is unable to spread its detritus over the plains, its bed becomes raised by deposit, causing the river in flood-time to rise to a higher level. The materials, moreover, which are carried in suspension or rolled along the bed of the river tend to deposit when the flow of the river slackens and is finally brought to rest on encountering the great inert mass of the sea. This is the cause of the formation of the bars and, especially in the absence of a tide and any littoral current, of the deltas with their shallow outlets which occur at the mouths of many rivers.

Influence of Lakes on Rivers.—A depression along part of a valley, with a rocky barrier at its lower end, causes the formation of a lake in the course of the river flowing down the valley. The intervention of a lake makes the river, on entering at the upper end, deposit all the materials with which it is charged in the still waters of the lake. The river issues at the lower end as a perfectly clear stream with a regular discharge, because the floods, in flowing into the lake, are spread over a large surface, and so produce only a very slight raising of the level. This effect is illustrated by the river Rhone, which enters the lake of Geneva as a turbid, torrential, glacier stream, and emerges at Geneva as a sparkling, limpid river with uniform flow, though in this particular case the improvement is not long maintained, owing to the confluence a short distance below Geneva of the large, rapid, glacial river, the Arve.

The influence of lakes on rivers is, indeed, wholly beneficial, in consequence of the removal of their burden of detritus and the regulation of their flow. Thus the Swine outlet channel of the Oder into the Baltic is freed from sediment by the river having to pass through the Stettiner Haff before reaching its mouth. The St. Lawrence, again, deriving most of its supply from the chain of the Great Lakes possesses a very uniform flow.

River Channels.—The discharge of the rainfall erodes the beds of rivers along the lowest parts of the valleys; but floods occur too intermittently to form and maintain a channel large enough to contain the augmented flow. A river channel, indeed, generally suffices to carry off the average flow of the river, which, whilst comprising considerable fluctuations in volume, furnishes a sufficiently constant erosive action to maintain a fairly regular channel. But rivers having soft beds and carrying down sediment erode their beds during floods and deposit alluvium in dry weather. As the velocity of a stream increases with its fall, the size of a channel conveying a definite average flow varies inversely with the fall, and the depth inversely with the width. A river channel, accordingly, often presents considerable irregularities in section, forming shallow rapids when the river flows over a rocky barrier with a considerable fall, and a succession of pools and shoals when the bed varies in compactness and there are differences in width, or when the river flows round a succession of bends along opposite banks alternately.

A river flowing through a flat alluvial plain has its current readily deflected by any chance obstruction or by any difference in hardness of the banks, and generally follows a winding course, which tends to be intensified by the erosion of the concave banks in the bends from the current impinging against them in altering its direction round the curves. (For Prof. James Thomson's theory of the concave banks of rivers *see* his *Collected Papers* [1912], also the article HYDRAULICS and Hunter's *Rivers and Estuaries*.) Large rivers bringing down a considerable amount of detritus shift their courses from time to time, owing to the obstructions produced by banks of deposit.

Floods of Rivers.—The rise of rivers in flood-time depends not merely on the amount of the rainfall, but also on its distribution and the nature of the strata on which it falls. The upper hilly part of a river basin often consists of impermeable strata, sometimes almost bare of vegetation. Consequently the rain flowing quickly down the impervious, sloping ground into the watercourses and tributaries feeding the main river produces rapidly rising and high floods in these streams, which soon pass down on the cessation of the rain. The river Marne, draining an impermeable part of the upper Seine basin, is subject to these sudden torrential floods in the cold season. On the contrary, rain falling on permeable strata takes longer in reaching the rivers, and the floods rise more gradually, are less high, continue longer and subside more slowly. A river fed by several tributaries, some from impermeable and others from permeable strata, experiences floods of a mixed character. An example is the Seine at Paris, below the confluence of the torrential Marne and Yonne, where the floods of the gently flowing Upper Seine and other tributaries with permeable basins also contribute to the rise of the river.

High floods are caused by a heavy rainfall on land already sodden by recent rains at a period of the year when evaporation is inactive, and especially by rain falling on melting snow. A fairly simultaneous rainfall over the greater part of a moderate-sized river basin is a tolerably common occurrence; and under such conditions, the floods coming from the torrential tributaries reach their maximum height and begin to subside before the floods from the gently flowing tributaries attain their greatest rise.

THE REGULATION OF NON-TIDAL RIVERS

Mitigation of Floods and Protection from Inundations.—As the size of the channel of a river is generally inadequate to carry down the discharge of floods, the river overflows its banks in flood-time and inundates adjacent low-lying lands. An enlargement of the river bed, principally by deepening it, in order to increase its discharging capacity, is precluded by the cost, and also, in rivers bringing down sediment, by the large deposit that would take place in the enlarged channel from the reduction in the velocity of the current when the flood begins to subside. Where, however, the depth of a tidal river has been considerably increased by dredging, the enlargement of its channel and the lowering of its low-water line facilitate the passage of the land water and consequently reduce the danger of flooding. The Glasgow quays, for instance, along the deepened Clyde are no longer subject to inundation, and the lands and quays bordering the Tyne have been relieved from flooding for 10 m. above Newcastle by the deepening of the river from Newburn to the sea. (*See* fig. 7.)

In certain cases it is important to restrict or to prevent the inundation of some riparian districts by embankments; and occasionally low-lying lands are so unfavourably situated that pumping has to be employed.

The flow of water off the slopes of a valley can be retarded by planting trees on mountain slopes, which have too often been denuded by the reckless clearing of forests.

Proposals have sometimes been made to reduce the height of floods in rivers and restrict the resulting inundations by impounding some of the flood discharge by the construction of one or more dams across the upper valley of a river, and letting it out when the flood has passed down. This arrangement, however, is open to the objection that in the event of a second flood following rapidly on the first, there might not be time to empty the reservoir for its reception. When this provision against floods can be combined with the storage of water for economic use it becomes financially practicable. Two masonry dams erected across the narrow valley of the river Furens, a torrential tributary of the Loire, form reservoirs for the supply of the town of St. Étienne. The most notable instance of the construction of a dam to form a regulating reservoir is the Gatun dam on the Panama canal (*q.v.*), one of the principal functions of which is the control of the flood waters of the river Chagres. The provision of flood-control reservoirs in the Mississippi basin has often been advocated and, since the 1927 inundation, it has received renewed consideration.

Methods of Increasing the Discharging Efficiency of River Channels.—The discharging efficiency of a river within the limits of its bed depends on the fall and the cross-section of the channel. The only way of increasing the fall is to reduce the length of the channel by substituting shorter cuts for a winding course. This involves some loss of capacity in the channel as a whole, and in the case of a large river with a considerable flow it is very difficult to maintain a straight cut, owing to the tendency of the current to erode the banks and form again a sinuous channel. Cuts therefore should be in the form of one or more flat curves. Nevertheless, where the available fall is exceptionally small, as in lands originally reclaimed from the sea, such as the English fen districts, and where, in consequence, the drainage is in a great measure artificial, straight channels have been formed for the rivers and "drains."

The removal of obstructions, whether natural or artificial, from the bed of a river furnishes a simple and efficient means of increasing the discharging capacity of its channel, and, consequently, of lowering the height of floods. Every impediment to the flow, in proportion to its extent, raises the level of the river above it so as to produce the additional fall necessary to convey the flow through the restricted channel, thereby reducing the total available fall. In the absence of legal enactments for the conservancy of rivers, numerous obstructions have in many cases been placed in their channel, such as mining refuse, sluice-gates for mills, fish-traps, unduly wide piers for bridges and solid weirs, which impede the flow and raise the flood-level.

Prediction of Floods.—The rise of floods in the tributaries of a river, and the periods they take in passing down to stations on the main river, are ascertained by means of gauges at suitable points. With the help of these records, and full information of the rainfall over the basin area, the time of arrival and height of the top of the flood at any station can be predicted with remarkable accuracy. By telegraphing warnings to places on the river, weir-keepers are enabled to open fully beforehand the movable weirs for the passage of the flood, and the riparian inhabitants receive timely warning. On some rivers, as for example the Mississippi, the Danube and the Po, the flood-prediction services serve also for the dissemination of information as to conditions of navigation, as for instance on the river Danube.

Embankments.—Where it is important to protect land from inundations, the overflow of the river must be confined within continuous embankments. By placing these embankments somewhat back from the margin of the river-bed, a wide flood-channel is provided for the discharge of the river directly it overflows its banks. Low embankments may be sufficient where only exceptional summer floods have to be excluded from meadows. Occasionally the embankments are raised high enough to retain the floods during most years, whilst provision is made for the escape of the rare exceptionally high floods at special places in the embankments, where the scour of the issuing current is guarded against, and the inundation of the neighbouring land is least injurious. Both the above methods afford the advantage of relieving the embanked channel of some of the sediment deposited in it by the confined flood-waters, when the surplus flow passes over the embankments.

When complete protection from inundations is required, the embankments have to be raised well above the highest flood-level, after allowing for the additional rise resulting from the confinement of the flood within the embankments. The system has been adopted where tracts of fertile alluvial land below flood-level stretch for long distances away from the river. Thus the fens of Lincolnshire, Cambridgeshire and Norfolk are protected from inundations by embankments along their rivers and drains; a great portion of Holland is similarly protected; and the plains of Lombardy are shut off from the floods of the Po by embankments along each side of the river for a distance of about 265 miles.

When towns like New Orleans on the Mississippi, and Szegedin on the Theiss in Hungary, have been established below the flood-level of an adjoining river, the channel of the river should be improved to facilitate the passage of floods past the town. The town also should be enclosed within embankments raised above the highest possible flood-level to obviate the contingency of an exceptional flood, or a gradually raised flood-level leading to a catastrophe such as overwhelmed the greater part of Szegedin in March 1879 and threatened New Orleans in 1927.

The Mississippi.—The system of embankments has been extensively developed along the alluvial valley of the Mississippi which lies below the highest flood-level of the river from Cape Girardeau, 45 m. above Cairo, to the gulf of Mexico, and has a length of 600 m. in a straight line with a width ranging between 20 and 80 m., and an area of 30,000 sq.m. These embankments, begun by the French settlers in Louisiana, are called levees, and had in 1928 a total length of over 1,815 m. The river is confined between a line of levees extending from Cairo to an outlet in the delta called the Jump (1,048 m.) on its western bank, and by levees and a line of hills above overflow-level for a distance of about 1,070 m. on its eastern bank. Below the levee lines are the several outlets through the delta of the river to the gulf of Mexico. The levees (fig. 1) are as a rule spaced apart with a width between them at least double that of the ordinary channel, thus providing a much enlarged sectional area for the river in times of flood. In some parts of the river the spacing is very much greater, as, for instance, where several sharp bends occur close together (fig. 1). The low-water discharge, measured at New Orleans, 109 m. from the mouth of the South Pass, has been as low as 135,000 cu.ft. per sec. At Vicksburg a discharge of 2,278,000 ft.sec. was recorded in 1927 which compares with the minimum of 97,000 ft.sec. at that place. The levees do not afford complete protection from inundations; they are not always strong enough to withstand the water pressure of high floods which had (before the record floods of 1927) a maximum rise at Vicksburg of 61⅓ ft. above the lowest stage of the river at that point. In 1927 the river at Vicksburg rose 3⅔ ft. higher or to 65 ft. above lowest water. The floods tend to increase in height owing to the improved drainage following on the extension of cultivation. Breaches, or crevasses as they are termed in the United States, are of not infrequent occurrence and produce a sudden rush of the flood waters through the opening which is much more damaging to the land in the neighbourhood of the breach than a gradual inundation. Moreover, the velocity of the out-flowing water is intensified by the sloping down of the land on the alluvial plains for some distance away from the river owing to the raising of the ground nearest the river by the gradual deposit of layers of sediment from the flood waters when they begin to overflow the banks. The levees on the Mississippi are breached in weak places almost every year during the spring floods, and they are liable to be overtopped by exceptional floods, and thereby rapidly eroded, as well as to be undermined by changes in the course of the river from the erosion of concave banks.

The great floods of the Mississippi and its tributary rivers in April–June 1927, were the most serious which had occurred since records of these rivers began to be kept. They were due to the extraordinary coincidence of flood conditions in all the chief tributaries of the river; whereas normally the eastern floods usually

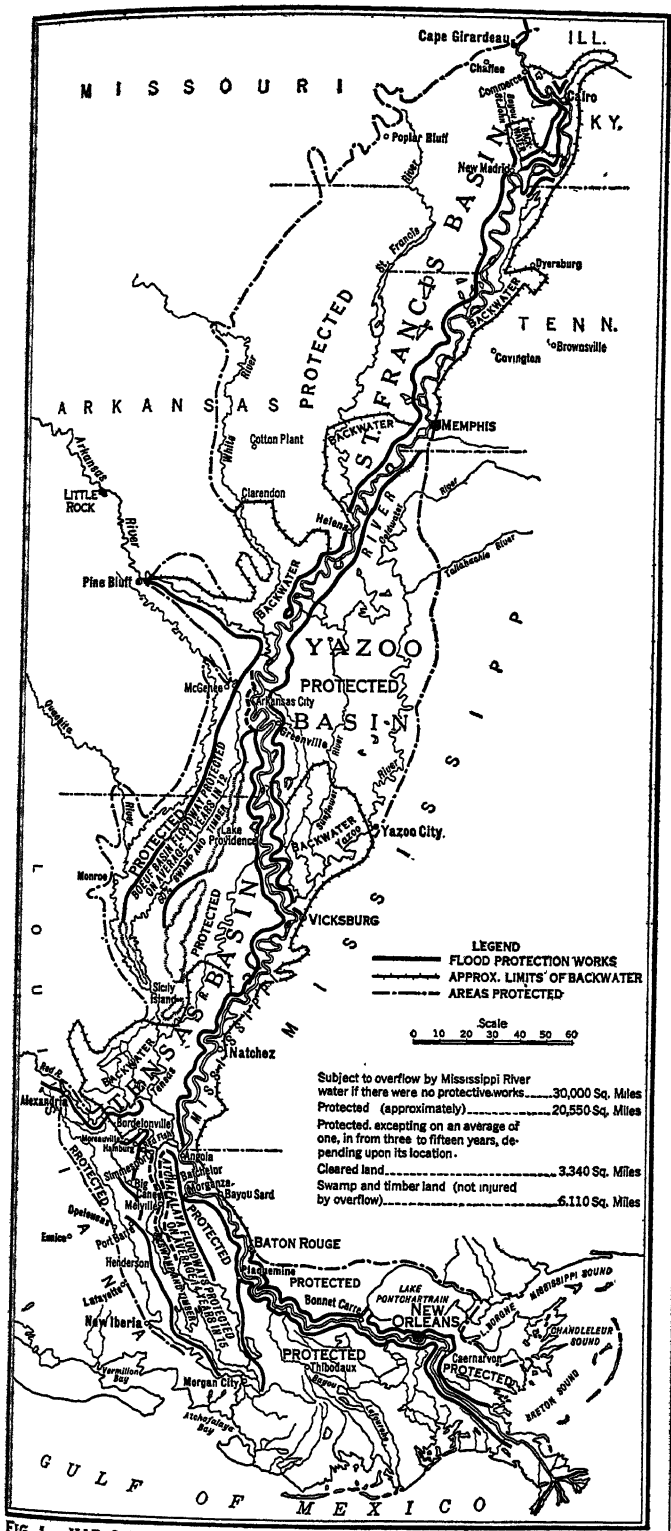


FIG. 1.—MAP OF MISSISSIPPI RIVER SHOWING AREAS SUBJECT TO OVERFLOW AND REQUIRING PROTECTIVE ENGINEERING

culminate between January and April, while the crests of the Missouri river floods usually enter the Mississippi in June. The levees were breached or the flood-waters overflowed them throughout the alluvial valley. An area of over 18,000 sq.m. was inundated and 700,000 people were driven from their homes. Further disaster was only averted at the city of New Orleans by cutting a wide gap in the levees at Poydras, a few miles below the city, thus permitting a part of the flood-waters to take a short course of about 5 m. to an arm of the sea instead of following the normal course of the river through the delta. (*See* also MISSISSIPPI RIVER, *Engineering*.)

Effect of Embankments upon the River Levels and Bed.—The confinement of a river to a flood-channel of restricted width necessarily produces an increase in the elevation of the high-water surface. It has also been frequently asserted that this confinement by the construction of embankments is accompanied by a progressive and consequential rising of the river bed, but there does not appear to be sufficient evidence to bear out this contention. That river beds in those reaches where the steeper slope of hill valleys changes to the lesser slope in the plain become raised by deposit has already been mentioned. The river Po and the Hwang-Ho or Yellow river in China are frequently adduced as affording evidence of the raising of river beds in consequence of embanking; but where elevation, not attributable to the natural deposit, has taken place it seems to have been due to changes in the locus of the bed or to be local in character and accompanied by a corresponding deepening elsewhere. This question is discussed at length by Van Ornum, Townsend, Freeman (*Trans. Am. Soc. of C.E.* 1928) and other authorities who are unable to accept the theory of consequential raising of the river bed.

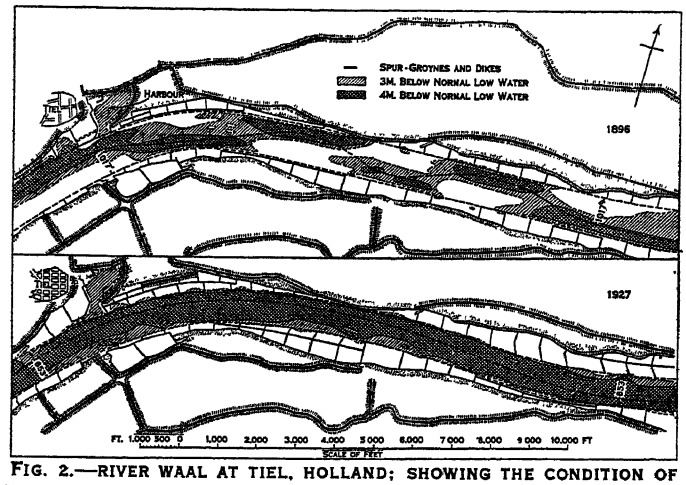


FIG. 2.—RIVER WAAL AT TIEL, HOLLAND; SHOWING THE CONDITION OF THE TIEL REACH IN 1896 AND 1927

The regulation works completed in this reach in 1911 have effected a permanent deepening of the channel and no dredging has been necessary since

REGULATION OF THE NON-TIDAL PORTIONS OF RIVERS FOR NAVIGATION

As rivers flow onward towards the sea, their current becomes more gentle and their discharge larger in volume and less subject to abrupt variations. Large rivers, therefore, often furnish important natural highways for inland navigation in the lower portion of their course, as, for instance, the Rhine, the Danube and the Mississippi. Works are, however, often required in such rivers for preventing changes in the course of the stream, for regulating its depth, and especially for fixing the low-water channel and concentrating the flow in it, so as to increase as far as practicable the navigable depth at the lowest stage of the water-level. Regulation works for increasing the navigable capabilities of rivers can only be advantageously undertaken in large rivers with a moderate fall and a fair discharge at their lowest stage; for with a large fall the current presents a great impediment to up-stream navigation, and there are generally great variations in water-level. Consequently, when the discharge becomes very small in the dry season it is impossible to maintain a sufficient depth of water in the low-water channel.

Removal of Shoals.—The possibility of securing uniformity of depth in a river by the lowering of the shoals obstructing the channel depends upon the nature of the shoals. A soft shoal in the bed of a river is due to deposit from a diminution in velocity of flow, produced by a reduction in fall and by a widening of the channel, or to a loss in concentration of the scour of the main current in passing over from one concave bank to the next on the opposite side. These changes from one side of the river to the other are called *crossings*. The lowering of such a shoal by dredging merely effects a temporary deepening, for it soon forms again. The removal, moreover, of the rocky obstructions at

rapids produces a lowering of the river above the rapids by facilitating the efflux, which may result in the appearance of fresh shoals at the low stage of the river. Where, however, narrow rocky reefs or other hard shoals stretch across the bottom of a river and present obstacles to the erosion by the current of the soft materials forming the bed of the river above and below, their removal may enable the river permanently to deepen its bed by natural scour.

The deepening of the bed of a non-tidal river along a considerable length by dredging merely lowers the water-level of the river during the low stage; and though this deepening facilitates the passage of floods in the first instance, it does not constitute a permanent improvement even in this respect, for the deposit of the detritus brought down by the river as the floods abate soon restores the river to its original condition. Nevertheless, where sand-banks obstruct and divert the channel of a river at its low stage, as in parts of the Mississippi below Cairo, it has been found possible before the river has fallen to its lowest level to form a channel through these sand-banks, with a depth of 9 or 10 ft. and 250 ft. wide, by suction dredgers, aided by revolving cutters or water-jets (*see* DREDGING). The dredged sand is discharged through floating pipe-lines into a part of the river away from the channel; and the navigation can thus be maintained through the low stage at a reasonable cost. Though, however, these channels across the shoals, connecting the deeper parts of the river, can be easily kept open on the Mississippi till the return of the floods, they are obliterated by the currents in flood-time, and have to be dredged out afresh every year on the abatement of the floods.

Low-water Channel.—The concentration and fixation of the low-water channel is effected by closing subsidiary low-water channels with dikes across them, and narrowing the channel at the low stage by low-dipping cross-dikes extended from the river banks down the slope, and sometimes pointing slightly up-stream so as to direct the water flowing over them into a central channel. The contraction of the channel can occasionally be more effectually accomplished, though at a greater cost, by low longitudinal dikes placed along either side of the low-water channel, some distance forward from the banks but connected with them generally at intervals by cross dikes at the back to prevent the current from scouring out a channel behind them during floods. By raising these dikes only slightly above the surface of the bed of the river, except where it is expedient to produce accretion for closing an old disused channel or rectifying the course of the river, the capacity of the channel for discharging floods is not affected; for the slight obstruction to the flow produced by the dikes at the sides is fully compensated by the deepening of the low-water channel in the central course of the river.

This system of obtaining a moderate increase in depth during the low stage of a river, whilst leaving the river quite open for navigation, has been adopted on the Rhône, the Rhine and the Mississippi. The improvement of the navigation of the river Po by extensive regulation works of this description has recently been begun. In the case of the Rhône below Lyons regulation works were preferred to canalization, in spite of the rapid fall of the river amounting in some places to 1 in 250, on account of the large quantities of sand and gravel carried down by it. The comparative regularity of the discharge, owing to the flow being derived from tributaries having their floods at different times of the year, has aided the effects of the works. Owing, however, to the unfavourable natural condition of the river, the depth does not exceed 5 ft. at lowest water level; and the rapid current forms a serious impediment to up-stream navigation.

The Rhine is much better adapted for improvement by regulation works than the Rhône, for it has a basin more than double the area of the Rhône basin, and its fall does not exceed 3·1 ft. per mile at Strasbourg and 2·5 ft. per mile through the rocky defile from Bingen to Kaub, and is much less along most of the length below Strasbourg. These works systematically carried out in wide shallow reaches between the Dutch frontier and Mainz, aided by dredging where necessary, have secured a navigable depth at the low stage of the river of 10 ft. from the frontier to Cologne, 8½ ft. from Cologne to Kaub, and 6½ ft. up to Bingen, beyond which the same depth is maintained up to Philippsburg, 22½ m. above Mannheim, and is being extended up to Strasbourg. (*See* also CANAL AND CANALIZED RIVERS.)

Soon after reaching the Dutch frontier in its seaward course the Rhine divides into three branches of which the most important is the Waal taking about ⅔ of the water of the undivided river. The Waal and its westward continuations under various names form the main navigable waterway between Germany and Rotterdam and the sea. Its importance to inland navigation may be gauged by the volume of river traffic passing Lobith at the frontier which increased from 28 million tons in 1903 to 73 million tons in 1927. The improvement of the Waal was commenced about the middle of the 19th century, but the works carried out in it between 1909–16 afford one of the most interesting and successful examples of river regulation effected in the present century (fig. 2). The channel at its low stage has been deepened, throughout its length of 53 m., from 7½ ft. to 11½ ft. almost entirely by training works, regulation of width, and its reformation in curved reaches, so that nowhere is there a straight section left in the river. Low spur-groynes or cross-dikes have been largely employed and very little dredging work was necessary. Since 1916 no dredging has been required to maintain the depths.

The Mississippi also, with its extensive basin and its moderate fall in most parts, is well suited for having its navigable depth increased by regulation works, which have been carried out below St. Paul in shallow and shifting reaches, with the object of obtaining a minimum navigable depth during the low stage along the upper river from St. Paul to St. Louis just above the confluence of the Missouri, thence 9 ft. to New Orleans.

On the Rhône below Lyons with its rapid current, the dikes are constructed of rubble, consolidated above low water with concrete. The dikes on the Rhine consist for the most part of earthwork mounds protected by a layer of rubble or pitching on the face, with a rubble mound forming the toe exposed to the current; but occasionally fascines are employed in conjunction with the stone or simple rubble mounds. On the Waal the newer cross-dikes have a core of sand protected by a mattress weighted with stone. The dams closing subsidiary channels on the Mississippi are almost always constructed of fascine-mattresses weighted with stone; but whereas the regulating dikes on the upper river are usually similar in construction, a common form for dikes in the United States consists of two parallel rows of piles filled in between with brushwood or other materials not affected by water, and protected at the sides from scour by an apron of fascines and stone.

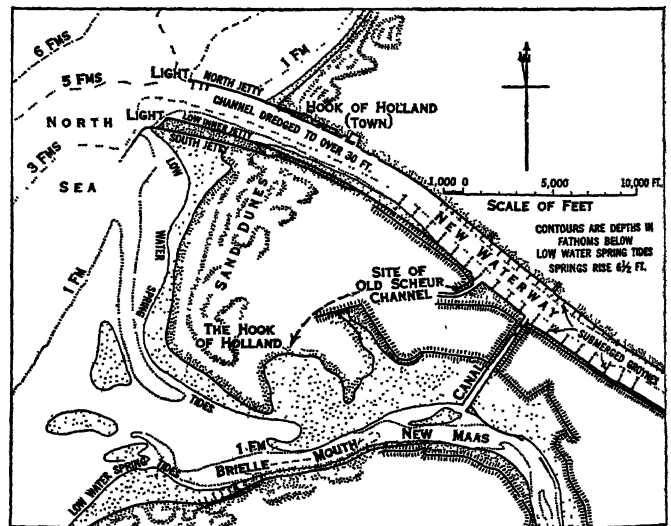


FIG. 3.—JETTY OUTLET OF THE RIVER MAAS INTO THE NORTH SEA. THE ARTIFICIAL CUT FOR THE RIVER MAAS THROUGH THE HOOK OF HOLLAND, BEGUN IN 1864

Protecting and Easing Bends.—Unless the concave banks of a river winding through wide, alluvial plains are protected from the scour of the current, the increasing curvature presents

serious impediments to navigation, sometimes eventually becoming so intensified that the river at last makes a short cut for itself across the narrow strip of land at the base of the loop it has formed. This, however, produces considerable changes in the channel below, and disturbances in the navigable depth. Protection, accordingly, of concave banks is necessary to prevent excessive curvature of the channel and changes in the course of a river. On the Mississippi the very easily eroded banks are protected along their upper, steeper part by stone pitching or a layer of concrete, and below low-water level by fascine-mattresses weighted with stone, extended a short distance out on the bed to prevent erosion at the toe. Dikes, also, projecting into the channel from the banks reduce the curvature of the navigable channel by pushing the main current into a more central course; whilst curved longitudinal dikes placed in the channel in front of concave banks are also effective in keeping the current away from the banks, which is sometimes still further promoted by dipping cross-dikes in front.

Regulation of Depth.—Regulation works at bends, besides arresting erosion, also reduce the differences in depth at the bends and the crossings. The excessive depth round the concave banks is diminished and the channel along the crossings deepened by giving a straighter course to the current and concentrating it by a reduction in width of the channel between the bends. Where there are deep pools at intervals in a river, shoals are always found above them, owing to the increased fall which occurs in the water line on approaching the pool, to compensate for its very slight inclination where it crosses the pool, whose ample cross-section serves for the discharge of the river through this part of the river bed. These variable depths can be regulated to some extent by submerged rubble-dikes or fascine-mattress *sills* deposited across the bed of the pool, so as to reduce its excessive depth, but not raised high enough to interfere at all with the navigable depth. These obstructions in the pool raise the water-line towards its upper end, in order to provide the additional fall needed to effect the discharge through the pool with its diminished cross-section.

Protection of Vessels During Floods.—On large rivers, where vessels during high floods are exposed to injury from floating débris and ice-floes, shelter can be provided for them in refuge ports, formed in a recess at the side under the protection of a solid jetty or embankment constructed in the river parallel to the bank. These ports are closed against floods at their upper end and have their entrance at the lower end facing down-stream. There are numerous examples of such river harbours on the Danube, the Rhine and other European rivers and in the rivers of North America. Many of them, made in the vicinity of towns, as at Düsseldorf, are inland ports of considerable size.

Many rivers have been improved, for the purpose of navigation, by canalization; and in some cases lateral canals have been constructed alongside portions of rivers to avoid rapids, falls or other serious obstructions. (*See* CANALS AND CANALIZED RIVERS.)

SMALL RIVER OUTLETS EXPOSED TO LITTORAL DRIFT

Rivers with a small discharge flowing into the sea on an exposed coast are more or less obstructed at their outlet by drift of shingle or sand along the coast. When the flow falls very low in dry weather, the outlet of a river is sometimes completely closed by a continuous line of beach, any inland or tidal waters merely trickling through the obstruction; and it is only on the descent of floods that the outlet is opened out. In rivers which always have a fair fresh-water discharge, or a small fresh-water flow combined with a tidal flow and ebb, the channel sometimes has its direct outlet closed, and is deflected parallel to the shore till it reaches a weak place in the line of beach, through which a new outlet is formed; or, where the current keeps the outlet open, a bar is formed across the entrance by the littoral drift, reducing the navigable depth. (*See* HARBOURS and JETTY.)

Jetties at River Outlets.—The bar formed across the outlet of a river not heavily charged with sediment and flowing into a tideless sea can be lowered by carrying out solid jetties on each side of the outlet across the foreshore, so as to scour the bar by concentrating the issuing current over it. Thus by means of jetties slightly curved in plan, aided by dredging, the depth at the entrance to the Swine mouth of the Oder has been increased from 7 ft. to 27 ft.; the approach channels to the river Pernau and other rivers flowing into the Baltic have been deepened by jetties, and the outlet channels of some of the rivers flowing into the Great Lakes of North America have been improved by cribwork jetties and dredging.

Where the littoral drift is powerful enough to divert the outlet of a river, as in the case of the river Yare, which at one time was driven to an outlet 4 m. south of its direct course into the sea at Yarmouth, and the river Adour in France, whose outlet, owing to the violent storms of the Bay of Biscay, was liable to be shifted 18 m. from its proper position, it has proved practicable to fix as well as to deepen the outlet by means of jetties. In such cases, however, where the rivers flow into tidal seas, it is important to place the jetties sufficiently apart to avoid any loss of tidal influx, since the tidal flow assists the fresh-water discharge in keeping the outlet open; whereas, with rivers flowing into tideless seas, a moderate restriction of the width between the jetties increases the scour. The tortuous and somewhat shifting outlet channel of the Scheur branch of the river Maas emerging on to a sandy coast where the rise of tide is small, and obstructed at its mouth by a bar, has been replaced by a straight cut across the Hook of Holland. The outlet across the foreshore is fixed in position by fascine-mattress jetties (*see* JETTY), the maintenance of the depth at the mouth by the tidal and fresh waters being aided by frequent dredging (fig. 3).

DELTAIC OUTLETS OF TIDELESS RIVERS

Large rivers heavily charged with sand and silt, when their current is gradually arrested on entering a tideless, or nearly tideless, sea, deposit these materials as a constantly advancing fan-shaped shoal through which comparatively shallow diverging channels, almost devoid of fall, have to force their way in order to convey the fresh-water discharge into the sea. These deltaic channels deposit their burden of sediment in front of their outlets, forming bars which advance with the delta and whose rate

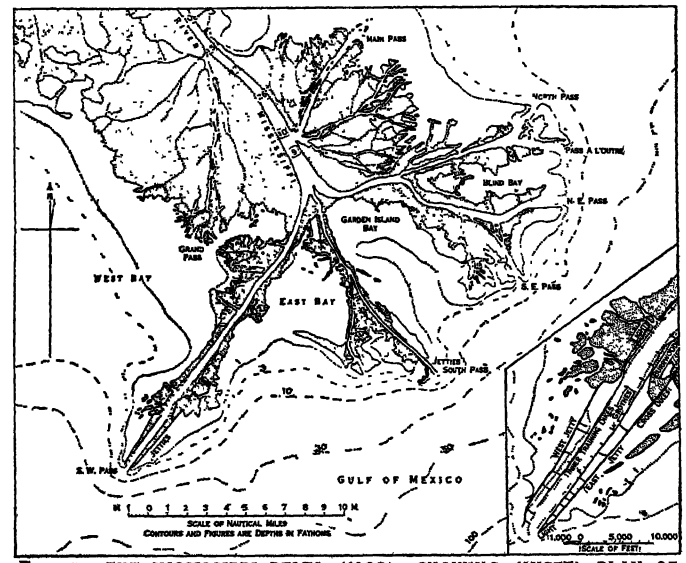


FIG. 4.—THE MISSISSIPPI DELTA (1928), SHOWING (INSET) PLAN OF S. W. PASS JETTIES

of progress seawards and distance in front of each outlet are proportionate to the discharge of the several channels. A channel dredged on the bar in front of one of the outlets of a deltaic river retains its depth only for a moderate period on account of the deposit continually accumulating at the outlet.

Parallel Jetties at Delta Outlets.—The construction of parallel jetties prolonging seaward the banks of the channel, concentrates the scour of the issuing current on the bar at the outlet and under favourable conditions will procure and maintain for some time an adequate depth for navigation. The requisite

conditions for the success of this system of improvement are (1) a sufficient depth in the sea beyond the bar, to allow of a considerable deposit of alluvium before the increased depth is interfered with, and (2) a littoral current carrying a portion of the alluvium away from the outlet. Both of these conditions retard the progression of the delta in front of the outlet and the inevitable eventual formation of a new bar farther out. The rate of advance of a delta depends also on the proportion of solid matter carried in suspension by the river and on the specific gravity and size of the particles of alluvium discharged into the sea; for the heavier and coarser materials, and especially those which are rolled along the bed of the channels, come first to rest. Moreover, the larger channels of a delta bring down a larger volume of alluvium on account of their larger discharge, and their bars form farther seawards from their outlets owing to the issuing current being less rapidly arrested in proportion to the volume discharged. Thus the rate of advance of the delta in front of an outlet is proportionate to the size of the channel, and the length of the jetties required is proportionate to the discharge of the channel. Consequently, the conditions are more unfavourable for the improvement of the outlets of the larger delta channels than of the smaller ones; though, on the other hand, the larger channels crossing the delta are generally more suitable for navigation on account of their size, and the natural depth over their bars is greater owing to the larger discharge.

The Rhône Outlets.—The discharge of the main branch of the Rhône, which formerly flowed into the Mediterranean at the gulf of Foz through six mouths, was in 1852–57 concentrated in the direct eastern channel by embankments along its sides, which closed all the lateral channels. The entire flow of the river, being thus discharged through the eastern outlet, increased for a time the depth over its bar from 4½ to 9½ ft.; but as the great volume of alluvium brought down, including an unusually large proportion of sand rolled along the bed of the river, was also all discharged through the one outlet, the bar soon formed again farther out, and naturally advanced with the delta in front of the outlet more rapidly than formerly when the deposit was distributed through six divergent mouths. Accordingly, the very moderate deepening produced by the embankments was not long maintained, and the average depth over the bar has not exceeded 5 ft. for many years past. The St. Louis lateral canal, an artificial waterway between the gulf of Foz and the river 4 m. above its bar, was constructed in 1864–73 to afford a deeper navigable outlet, the entrance being 2½ m. north of the river outlet. The want of success of the Rhône outlet jetties was due to the selection for training of a channel opening on a sheltered, somewhat shallow bay, instead of a southern outlet discharging into deep water in the open Mediterranean and having a deep littoral current flowing across it. The closing of all the other outlets whereby the whole of the deposit, as well as all the discharge, was concentrated in front of the badly situated eastern outlet likewise contributed to the failure. The southern Roustan branch was reopened in 1893 to prevent the silting up of the outlet of the St. Louis canal.

The Delta of the Danube.—The Danube traverses its delta in three branches, the northern one of which, though conveying nearly two-thirds of the discharge of the river, is unsuitable for improvement owing to its splitting up along portions of its course into several channels, and eventually flowing into the sea through twelve mouths of a small independent delta advancing about 250 ft. annually across a shallow foreshore. The central Sulina branch was selected for improvement in 1858 in preference to the southern St. George's branch, which had a more favourable outlet and a better channel through the delta. The distance of the Sulina bar from the shore was only half that of the St. George's bar owing to the much smaller discharge of the Sulina branch. The jetties, begun provisionally in 1858 and subsequently consolidated and somewhat extended, were completed in 1877. They increased the depth over the bar from an average of about 9 ft. previously to 1858 up to 20½ ft. in 1873, which was maintained for many years. In 1894, however, the increasing draught of vessels rendered a greater depth necessary; the wide inshore portion of the jetty channel was therefore narrowed by inner parallel jetties, and a powerful suction dredger was set to work in the jetty channel and outside, whereby the depth was increased to 24 ft. in 1897, and was fairly maintained up to 1907, when a second dredger became necessary to cope with the shoaling. The depth contours gradually advanced seawards whilst the deepest channel was deflected northwards by the action of current and waves. During the World War the decrease in depth, accelerated by the interference with dredging which occurred, was so rapid that the navigable depth was reduced at one time to 18 feet. In 1922 the seaward extension of the jetties was commenced leaving temporary gaps, between the old heads and the new works, which were closed after the new channel had been opened for traffic (fig. 5). This extension of the jetties for about 6,000 ft. and dredging operations restored for the time being the ruling depth of 24 ft. in the direct channel. A further extension of 2,000 ft. is proposed. The new jetties, like the original ones, are formed of fascine-mattresses covered with stone-rubble.

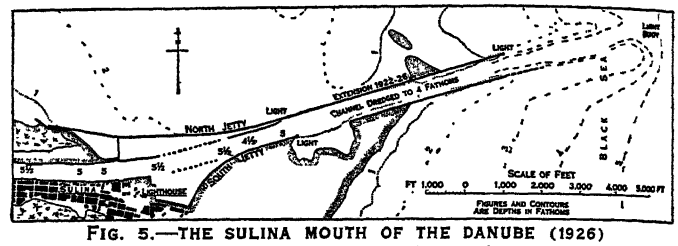


FIG. 5.—THE SULINA MOUTH OF THE DANUBE (1926)
The full lines show the water levels in the river during the flood tide, the ebb tide levels are shown by dotted lines. Further extensions of the jetties are under consideration

The Mississippi Delta.—The selection of the outlet of the south pass of the Mississippi delta for improvement by parallel jetties in 1876–79, in spite of the south-west pass possessing a larger channel and a better depth over its bar, was due, as at the Danube, to motives of economy, as the bar of the south-west pass was twice as far off from the shore as that of the south pass (fig. 4). Fascine-mattress jetties, 2¼ and 1½ m. long, weighted with limestone, and with large concrete blocks at their exposed ends, were constructed. The jetties, which were curved slightly southwards at their outer ends to direct the sediment-bearing current more directly at right angles to the westerly littoral current, increased the depth of 8 ft. over the bar in 1875 up to 31 ft. between the jetties and out to deep water. The prolonged flow of the river produced by the jetties has, as at the Sulina outlet, carried the main portion of the heavier sediment into fairly deep water, so that the greatest advance of the foreshore in front of the south pass has occurred in the 70-ft. line of soundings, though the shallower soundings have also advanced. The shoaling, however, in the jetty channel necessitated its reduction in width by mattresses and spurs from 1,000 ft. to 600 ft., and eventually the jetties were rebuilt on lines reducing the channel width to about 650 ft. Dredging was also required to maintain the stipulated central depth of 30 ft., and 26 ft. depth for a width of 200 ft. out to deep water; whilst the outer channel was deflected to the east and narrowed by the alluvium carried westwards by the littoral current and also deposited in front of the jetty outlet. Since 1901 suction dredging, the construction of additional sills, and the increased discharge at the south pass (due to the works carried out in the south-west pass) have widened the channel across the bar to over 600 ft., and given it a minimum depth of 32 feet.

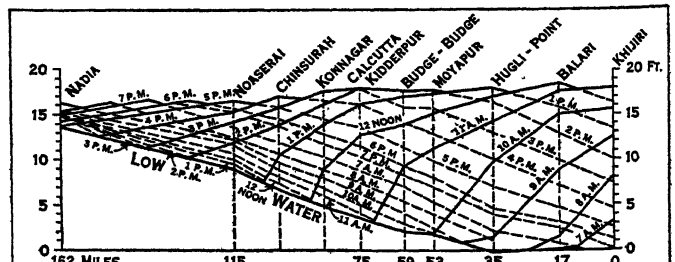


FIG. 6.—SIMULTANEOUS TIDAL LINES: RIVER HUGLI

In order to provide for the increasing requirements of sea-going vessels, the formation of a channel 35 ft. deep and 1,000 ft. wide through the larger south-west pass and its 9 ft. bar to deep water in the gulf was begun at the end of 1903. The discharge through this pass is rather more than three times that through the south pass and the bar was double the distance seaward of the outlet. Converging jetties, about 5,600 ft. apart at their land ends, and about 3,000 ft. apart at the seaward outlet, were substituted for the parallel jetties constructed at the south pass, and suction dredging was relied upon to maintain the channel between the jetties. The channel dredging was soon found to be excessive in quantity and in 1916 the project was modified by limiting the channel to a width of 2,400 ft. between two parallel interior jetties, and the extension of the latter to the 30 ft. contour beyond the bar. In 1923 the width was still further restricted to 1,750 ft. by building spur-dikes or groynes, and by 1924 a depth of 35 ft. was secured by dredging aided by the scour of the current. The jetties are formed of fascine-mattresses weighted with stone and capped with rubble and concrete (*see* JETTY.) They have been extended seawards from time to time and in 1927 the east jetty was about $4\frac{1}{4}$ m. in length from the shore. The west jetty has a length of about $3\frac{3}{4}$ m. The amount of dredging required to maintain the 35 ft. deep channel through the pass and over the bar has been much reduced since the contraction of the width has been effected. The artificial improvement and simultaneous maintenance of two mouths of a river is an unique experiment. (See *Reports* of the Chief of Engineers, U.S. Army [annually]; also Townsend, XIVth Int. Con. of Navigation, 1926, paper 33.)

IMPROVEMENT OF TIDAL RIVERS FOR NAVIGATION

Whereas the size of tideless rivers depends wholly on their fresh-water discharge, the condition of tidal rivers is due to the configuration of their outlet, the rise of tide at their mouth, the distance the tide can penetrate inland, and the space available for its reception. Accordingly, tidal rivers sometimes, even when possessing a comparatively small fresh-water discharge, have a much better natural navigable channel at high tide than the largest deltaic rivers, as shown by a comparison of the Thames, the Humber and the Elbe with the Danube, the Nile and the Mississippi. Tidal water is, indeed, unlimited in volume; but, unlike the drainage waters, which must be discharged into the sea, it only flows up rivers where there is a channel and space available for its reception. Consequently, works which exclude the tide from a river may have injurious effects on the channel, as did the sluices which were erected long ago across the fen rivers of eastern Anglia to secure the low-lying lands from the inroads of the sea. The tidal influx is also liable to be reduced by the accretion which may result in an estuary from the construction of training works. The aims of all tidal river improvement should

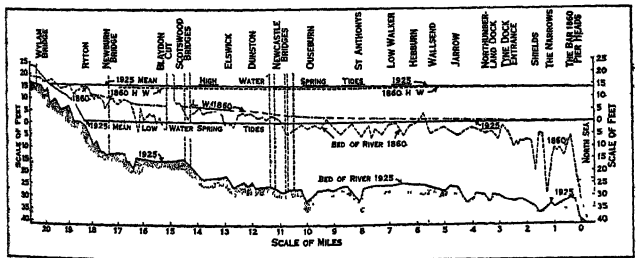


FIG. 7.—RIVER TYNE FROM THE SEA TO WYLAM: LONGITUDINAL SECTION ON THE CENTRE LINE OF THE RIVER SHOWING THE DEEPENING OF THE CHANNEL AND ALTERATION IN WATER LEVELS BETWEEN 1860 AND 1925

be to facilitate to the utmost the flow of the flood-tide up a river, to remove all obstructions from the channel so as to increase the scouring efficiency of the flood and ebb tides, and to reduce to a minimum the period of slack tide when deposit takes place.

Tidal Flow in a River.—The progress of the flood-tide up a river and the corresponding ebb are clearly shown by a diagram giving a series of tidal lines obtained from simultaneous observations of the height of the river Hugli during a high spring-tide in the dry season. The observations were taken at intervals at several stations along the river and the lines exhibit on a very distorted scale the actual water-levels of the river at these periods (fig. 6). The steep form assumed by the foremost part of the flood-tide lines from the entrance to beyond Chinsura, attaining a maximum in the neighbourhood of Konnagar and Chinsura, indicates the existence of a *bore*. This is caused by the sand-banks in the channel obstructing the advance of the flood-tide, till it has risen sufficiently in height to rush up the river as a steep, breaking wave, overcoming all obstacles and producing a sudden reversal of the flow and abrupt rise of the water-level. Such phenomena are observed on the Severn, the Seine, the Amazon and other rivers. A bore indicates defects in the tidal channel, which can only be reduced by lowering the obstructions and by the regulation of the river. No tidal river of even moderate length is ever completely filled by tidal water; for the tide begins to fall at its mouth before the flood-tide has produced high-water at the tidal limit. This is clearly shown in the case of a long tidal river by the Hugli tidal diagram. Every improvement of the channel, however, expedites and increases the filling of the river, whilst the volume of water admitted at each tide is further augmented by the additional capacity provided by the greater efflux of the ebb, as indicated by the lowering of the low-water line.

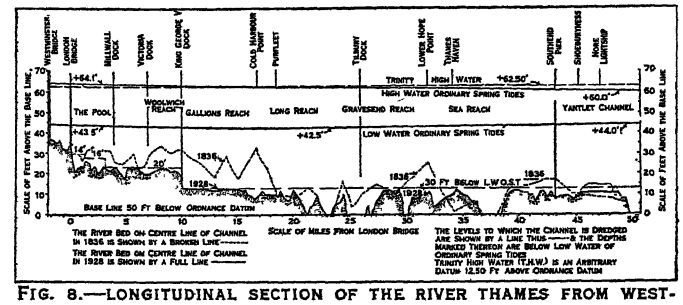


FIG. 8.—LONGITUDINAL SECTION OF THE RIVER THAMES FROM WESTMINSTER BRIDGE TO THE NORE

Deepening Tidal Rivers by Dredging.—The improvement of tidal rivers mainly by dredging is specially applicable to small rivers which possess a width sufficient for navigation like the Clyde and the Tyne; for such rivers can be considerably deepened by an amount of dredging which would be quite inadequate for producing a similar increase in depth in a large, wide river, with shifting channels. Both the Clyde below Glasgow and the Tyne below Newcastle were originally insignificant rivers, almost dry in places at low-water of spring-tides; and the earliest works on both rivers consisted mainly in regulating their flow and increasing their scour by jetties and training works. They have been improved, since 1840 on the Clyde and 1861 on the Tyne, by continuous systematic dredging. The Clyde has been given a minimum depth of 27 ft. in the channel at low-water of spring-tides up to Port Glasgow; 25 ft. up to Rothesay Dock, and 24 ft. up to Glasgow Harbour. A depth of 32 ft. at low-water has been provided alongside some of the quays. The Tyne has been progressively deepened (fig. 7) until in 1929 the channel from the sea to the Northumberland dock ($3\frac{1}{2}$ m.) has a minimum depth at low-water spring-tides of 30 ft.; from thence to Derwenthaugh, above Newcastle, 25 ft.; and about 12 ft. on to Newburn, the rise of tide at springs increasing these depths by 15 feet.

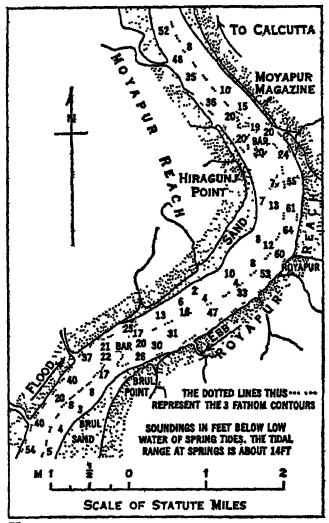


FIG. 9.—RIVER HUGLI SHOWING THE MOYAPUR AND ROYAPUR BAR CROSSINGS, 1923

The minimum low-water depth in the river Thames below Thames Haven in its natural state was about 27 ft. (*see* HARBOURS). A channel at least 30 ft. deep at low-water spring-tides

now extends from the sea to the King George V. dock, 37 m. above the Nore and Shoeburyness (fig. 8). Shallow portions of the channel between Shoeburyness and Purfleet have been dredged and above Purfleet the river has been considerably deepened in recent years throughout its course to secure this depth. Above the King George V. dock the river has been dredged to lesser depths at low water, decreasing to 14 ft. at London Bridge.

Regulation and Dredging of Tidal Rivers.—Considerable improvements in the navigable condition of tidal rivers above their outlet or estuary can often be effected by regulation works aided by dredging, which ease sharp bends, straighten their course and render their channel depth and flow more uniform. Examples are the Nervion between Bilbao and its mouth, the Weser from Bremen to Bremerhaven at the head of its estuary, and the Whangpoo from Shanghai to Woosung where it enters the Yangtse estuary. These works resemble in principle the regulation works on large rivers with only a fresh-water discharge, previously described; but on tidal rivers the main low-water channel should alone be trained with an enlarging width seawards to facilitate the tidal influx, and the tidal capacity of the river above low water should be maintained unimpaired.

To secure a good and fairly uniform depth on a tidal river, it is essential that the flood and ebb tides should follow the same course in order to combine their scouring efficiency and form a single, continuous deep channel. In wide, winding reaches, however, the flood tide in ascending a river follows as direct a course as practicable; and on reaching a bend, the main flood-tide current, in being deflected from its straight course, hugs the concave bank, and, keeping close alongside the same bank beyond the bend, cuts into the shoal projecting from the convex bend of the bank higher up, forming a blind shoaling channel as clearly indicated near Brul point in fig. 9. This effect is due to the flood-tide losing its guidance and consequently its concentration, at the change of curvature beyond the termination of the concave bank, where it spreads out and passes gradually over, in its direct course, to the next concave bend above along the opposite bank. The ebb tide, on the contrary, descending the river, follows the general course of the fresh-water discharge in all rivers, its main current keeping close along the concave bank and crossing over opposite Brul point to the next concave bank below. The main currents, accordingly, of the flood and ebb tides in such reaches act quite independently between the bends, forming channels on opposite sides of the river and leaving a central intervening shoal or bar crossing.

In tidal rivers the main ebb-current, being reinforced by the fresh-water discharge, generally forms the navigable channel, which is scoured out during floods. Narrowing the river between the bends to bring the two channels together would in certain cases unduly restrict the tidal flow; and, in a river like the Hugli

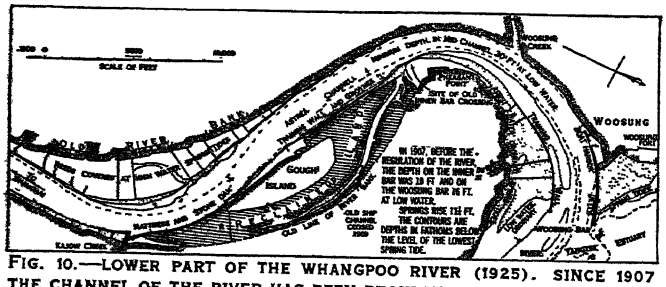


FIG. 10.—LOWER PART OF THE WHANGPOO RIVER (1925). SINCE 1907 THE CHANNEL OF THE RIVER HAS BEEN REGULATED BY BUILDING TRAINING WALLS AND GROYNES INDICATED BY HEAVY BLACK LINES

dependent on the tidal flow for the maintenance of its depth for two-thirds of the year, with channels changing with the wet and dry seasons and even shifting their position from day to day, deepening by dredging can never be permanent. Hitherto frequent re-dredging has been relied on for maintaining the requisite depths at the bar crossings in the Hugli.

The training and dredging works carried out in the Whangpoo since 1906[1] have been successful in deepening the alluvial channel of the river to about 30 ft. at low-water up to Shanghai including the bar crossing in a wide reach between Gough island and Woosung where formerly the low-water depth was no more than 13 to 15 ft. The problem which had to be faced differed from that of the Hugli in that the volume of the land-water run-off is relatively small. Moreover the concave bank of the river above the crossing was being rapidly eroded, accentuating a sharp bend below it. The condition of the lower part of the river before and after the improvement works were effected is shown in fig. 10.

The erosion of the Taylor's bank, forming the concave side of the main sea-channel of the river Mersey, which threatened to

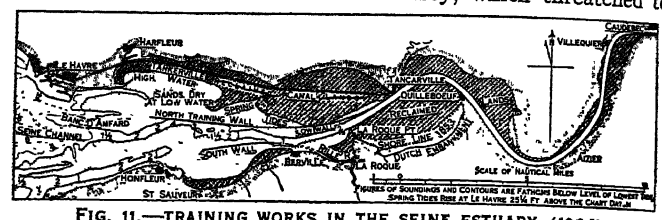


FIG. 11.—TRAINING WORKS IN THE SEINE ESTUARY (1924)

intensify the bend to a dangerous degree, has been countered by the revetting with stone of the concave face of the bank below low-water (*see* HARBOURS).

The average rate of enlargement (of width) adopted for the trained channel of the Nervion, in proportion to its length, is 1 in 75 between Bilbao and its mouth; 1 in 71 for the Weser from Bremen to Bremerhaven; and about 1 in 73 for the Whangpoo from Shanghai to its outlet; and these ratios correspond very nearly to the enlargement of the regulated channel of the Clyde from Glasgow to Dumbarton of 1 in 83, and of the Tyne from Newcastle to its mouth of 1 in 75. Accordingly a divergence comprised between 1 in 70 and 1 in 80 for the regulated or trained channel of the lower portion of a tidal river with a fairly level bed may be expected to give satisfactory results. The divergence as originally laid down for the Seine training works, 1 in 200, was found to be too small. (*See* fig. 11.) In rivers in which the channels are more or less in natural condition, such as the Thames, the Humber and the Scheldt the divergence is nearly 1 in 50.

Effect of River Deepening on Tidal Levels.—The general effect of deepening and regulating the tidal compartment of a river by dredging and the removal of obstructions is to facilitate the propagation of the flood-tide up the channel and the efflux of the ebb. Consequently such works often result in the lowering of the low-water lines and the raising of the high-water levels in the upper part of the improved channel and sometimes above it. Thus the deepening of the river Tyne raised the level of mean high-water spring tides at Newcastle by about 1 ft. between 1860 and 1904, and lowered the low-water level by 2 ft. at Newcastle quay. Low-water level at Glasgow has fallen nearly 2 ft. since 1873 and the rise of spring tides has been increased by 1′ 8″.

The average high-water level in the Thames at Chelsea increased 8 in. between 1890 and 1927, a period which corresponds with the dredging carried out on a large scale in the lower reaches of the river. The maximum flood-levels have also steadily increased since 1874 when a tide rose 16′ 10″ above O.D. at Westminster, considerably higher than any previous record. This height has been exceeded on several occasions since, the highest recorded at Westminster (up to the end of 1927) being 17′ 6″ in 1881, the same level being reached again in 1882. These high levels were, however, far surpassed by the disastrous tidal-flood of Jan. 6–7, 1928 (see *Report: Floods from the River Thames,* Cmd. 3045; 1928) when 18′ 3″ above O.D. was reached at London Bridge (equivalent to about 18′ 5″ at Westminster). It is difficult to estimate how far the increase in average and maximum tidal levels in the upper part of the tidal Thames is accounted for by the deepening of the river, for the problem is complicated by the extensive building of embankments and the rebuilding (with enlarged waterways) of several of the bridges which span the river. There is little doubt that the deepening of the channel has resulted in raising the high-water levels in the Thames as in other rivers where similar improvements have been effected.

Works at the Outlet of Tidal Rivers.—Tidal rivers flowing straight into the sea, without expanding into an estuary, are sub-

[1] H. von Heidenstam, *Int. Nav. Congress Papers,* 1919, and 1923.

ject to the obstruction of a bar formed by the heaping-up action of the waves and drift along the coast, especially when the fresh-water discharge is small. The scour of the currents is often in such cases concentrated and extended across the beach by parallel jetties for lowering the bar, as at the outlets of the Maas and the Nervion rivers. Except in the case of large rivers, the jetties have to be placed too close together, if the scour is to be adequate, to form an easily accessible entrance on an exposed coast. Accordingly, in the small bay into which the Nervion flows, a harbour has been formed by two converging breakwaters, which provide a sheltered approach to the river and protect the outlet from drift. Similar provision has been made at Sunderland for the mouth of the Wear; whilst the Tynemouth piers formed part of the original design for the improvement of the Tyne, under shelter of which the bar has been removed by dredging (*See* HARBOURS and JETTIES.)

Training Works Through Estuaries.—Many tidal rivers flow through bays, estuaries or arms of the sea before reaching the open sea, as, for instance, the Mersey through Liverpool bay, the Tees through its enclosed bay, the Liffey through Dublin bay, the Thames, the Ribble, the Dee, the Shannon, the Seine, the Scheldt, the Weser, the Elbe and the Yangtse, through their respective estuaries, the Yorkshire Ouse and Trent through the Humber estuary, the Garonne and Dordogne through the Gironde estuary, and the Clyde, the Tay, the Severn and the St. Lawrence through friths or arms of the sea. These estuaries vary greatly in their tidal range, the distance inland of the ports to which they give access, and the facilities they offer for navigation. Some possess a very ample depth in their outer portion, though they generally become shallow towards their upper end; but dredging often suffices to remedy their deficiencies and to extend their deep-water channel. Thus the St. Lawrence, which possesses an ample depth from the Atlantic up to Quebec, has been rendered accessible for large sea-going vessels up to Montreal by a moderate amount of dredging; whilst dredging has been resorted to in parts of the Thames and Humber estuaries, and on the Elbe below Hamburg, to provide for the increasing draught of vessels; and the Mersey bar in Liverpool bay, about 11 m. seawards of the actual mouth of the river, has been lowered by suction dredging from a depth of about 9 ft. down to about 26 ft. below low-water of equinoctial spring-tides.

The Weser from Bremen down to Bremerhaven, a distance of over 40 m., has been regulated by constructing longitudinal training walls, cross dikes and groynes, while in the estuary between Bremerhaven and the Hoheweg light, a distance of about 18 m., there are occasional low training-walls and dikes and minor channels have been closed. These operations have secured a minimum low-water depth in the channel up to Bremerhaven of about 25 ft. and to Bremen of about 17 feet.

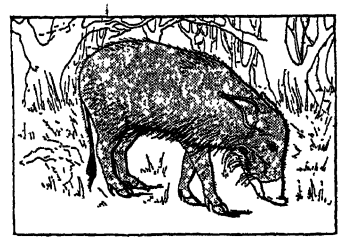
A remarkable improvement has been effected in the navigable condition of the upper portion of the Seine estuary by training works, begun in 1848; for in place of a shallow, intricate channel through shifting sand banks, whose dangers were at times intensified by a *bore*, a stable channel has been provided down to St. Sauveur, rendering access easy as far up the river as Rouen for vessels drawing up to 23 ft. at high-water neaps and up to 27 ft. at high water of spring tides. The channel itself, however, was originally made too narrow between Aizier and Berville and was subsequently enlarged, and large tracts of land were reclaimed in the upper estuary. The reduction in tidal capacity due to the reclamations, together with the fixing and undue restriction in width of the channel, occasioned large accretions at the back of the lower portions of the training walls and at the sides of the estuary beyond them, and an extension of the sand banks seawards.

Experience has proved that training works through sandy estuaries, by stopping the wanderings of the navigable channel, produce an increase in its depth, and, consequently, in the tidal scour for maintaining it. This scour, however, being concentrated in the trained channel, is withdrawn from the sides of the estuary, which in its natural condition is stirred up periodically by the wandering channel; and, therefore, accretion takes place in the parts of the estuary from which the tidal scour and fresh-water discharge have been permanently diverted, especially where an abundance of sand from outside, put in suspension by the action of the prevalent winds blowing into the estuary, is brought in by the flood-tide, as in the cases of the estuaries of the Dee, the Ribble and the Seine. This accretion reduces the tidal capacity of the estuary, and, producing a diminution in the tidal volume passing through the outlet, promotes the extension of the sand banks seawards. To prevent as far as possible the reduction in tidal capacity, the training walls should not be raised more above low-water level than absolutely necessary to fix the channel; and the rate of enlargement of their width apart should not be less than 1 in 80 at the upper end, and increase towards the mouth of the estuary. Training works carried partially out through an estuary have the advantage of reducing the length of the shallow channel to be traversed between deep water and the entrance to the deepened river; but as the influence of these works on the channel terminates close to their seaward end, a shallow, shifting channel is always found between the end of the trained channel and deep water. Accordingly, when training works are started at the head of a sandy estuary, provision should always be made in their design for their eventual prolongation to deep water at the mouth of the estuary, to ensure the formation of a stable, continuous, navigable channel. Experiments with a model, moulded to the configuration of the estuary under consideration and reproducing in miniature the tidal ebb and flow and fresh-water discharge over a bed of very fine sand, in which various lines of training walls can be successively inserted, are capable in some cases of furnishing valuable indications of the respective effects and comparative merits of the different schemes proposed for works which have often evoked very conflicting opinions.

BIBLIOGRAPHY.—*See* list at end of article CANALS AND CANALIZED RIVERS. The works by Vernon-Harcourt, D. Stevenson and Thomas & Watt (vol. 1, Free Rivers, vol. 2, Canalised Rivers) mentioned therein are important. *See* also W. H. Hunter, *Rivers & Estuaries* (1913); J. L. Van Ornum, *The Regulation of Rivers* (1914 an excellent and comprehensive work dealing mainly with non-tidal rivers); C. McD. Townsend, *Hydraulic Principles of River and Harbour Construction* (1922 contains bibliography); *Encyclopédie de Génie Civil* (2 vols. by Vidal deal with rivers, 1921–22); and L. Fargue, *La Forme du Lit des Rivières* (1908). The *Annual Reports* of Chief of Engineers, U.S. Army, should be consulted for the waterways of the United States. The *Proceedings* Inst. Civ. Eng.; *Transactions* American Soc. C. E. and the International Navigation Congress publications contain valuable papers. The Bibliographies issued by the I.N.C. bureau (Brussels) are exhaustive. (L. F. V-H.; N. G. G.)

RIVER BRETHREN: *see* BRETHREN IN CHRIST.

RIVER-HOG, a name for the African wild pig. It constitutes a genus, *Potamochoerus*, allied to the typical pigs of the genus *Sus* (*see* SWINE), from which they are distinguishable by the presence in the males of a long horny ridge below the eye, by their thick coat of bristly and often brightly coloured hair, and by tufts at the tips of the elongated ears. *P. choeropotamus*, of southern and eastern Africa, is typically a greyish-brown animal, but one of its eastern representatives is orange-red. *P. johnstoni* and *P. hassama* occur in north-east Africa. The most remarkable member of the group is the red river-hog, *P. porcus*, which is a heavy, short-legged species remarkable for its bright red colour, the great length of the ear-tufts and the white rings round the eyes. It is a native of the great equatorial forest-tracts. A small yellow-haired representative of the group (*P. larvatus*) occurs in Madagascar, and must have reached its present habitat from the mainland.



BY COURTESY OF THE N.Y. ZOOLOGICAL SOCIETY

THE RIVER-HOG, A WILD HOG NATIVE OF AFRICA

RIVERINA, an important district occupying the central south portion of New South Wales, Australia, bounded on the south by the River Murray, on the north by the Lachlan–Murrumbidgee from about Hillston down to the Murray confluence. The eastern boundary is less easy to draw. That of the administrative district runs from the Lachlan (30 miles above Hillston)

in a sinuous line curving eastwards and then westwards to the Murray at Corowa, but the lower slopes of the southern tableland—the administrative "South Western Slopes"—is perhaps to be included in the natural Riverina region. Except for these eastern and north-eastern parts, where lie the fairly open upper-middle basins of the Murrumbidgee and Murray systems, the whole area is flat. The fall of the rivers varies from 10 in. per mile in the east to 4–5 in. in the west of the area, and they meander across vast alluvial plains, periodically flooding and forming distributaries and lagoons (anabranches, billabongs) and sometimes even flowing up-stream. Higher up they are stronger, more definite, and more constant in flow and their valleys offer also sites for dams. The soil is prevailingly rich; the climate is generally mild and warm but the summers are hot and dusty and the rain, which falls in winter, is variable. (Av. ann. temps.: 75°–49° F, with extremes: 117°–20° F; av. ann. rainfall: from 12 in. in the north-west to 25 in. in the south-east.) The eastern valleys have yielded considerable quantities of gold, both alluvial and reef, and some alluvial dredging still continues (Adelong and Gundagai districts). In 1915 a deposit of soft black (Permian) sub-bituminous coal was discovered near Oaklands (area: 5 miles by 3 miles, with seams 8 ft. 6 in. to 36 ft.). It is important because of its position near the overland (Sydney–Melbourne) railway line in an otherwise fuelless area of growing population and because of the valuable kaolin deposits which overlie it.

The greater part of the western plains, which normally provide good natural fodder (including salt-bush), is used for sheep grazing, and these are still the home of the large "squatter." But improvements in wheat-growing (seed-selection, dry-farming) have enabled considerable areas to be put to the plough and by 1922 wheat was being grown as far north-west as Hillston, and, in the south, as far west as Balranald (9·12 in. and 7·89 in. winter, April–Oct., rainfall respectively). The Riverina, indeed, ranks second amongst the wheat-growing districts of New South Wales and has also a relatively high average yield (12·3–17·8 bu. per ac.). Along the south-eastern slopes, with their cooler temperatures and more reliable rain, a good deal of arable farming and dairying is carried on, and fruits, including vines, are grown, the wines of the Albury district having an established reputation. Further west mixed wheat and sheep farming is increasingly practised. But perhaps the greatest potential wealth of the Riverina lies in its irrigation agriculture. The development of this branch is in its infancy but it is already important. Of the total 83,800 ac. under irrigated crops in New South Wales in 1925–26, *c.* 61,200 were included in the Murrumbidgee and Hay (Riverina) areas. The Murrumbidgee Irrigation area, supplied from the Burrinjuck reservoir below Yass, had (1926) nearly 2,000 occupied holdings (1–250 ac. each, average 15–25 ac.) occupying 112,000 ac. or ⅛ of the total projected area (561 sq. miles). The principal settlements are Leeton, Yanco and Griffith. Fruit (sub-tropical and temperate climate types) is grown, dairying and pig-raising, with butter and cheese making, bacon-curing and fruit-canning carried on largely by cooperative methods. Electricity and water-supplies are provided and education and experimental research are well cared for. In Hay the area is smaller (1926, *c.* 1,000 ac. occupied for irrigation and 2,900 ac. non-irrigated) and is devoted mainly to dairying and pig-raising. The Murray River development scheme, with the great Hume dam above Albury as headworks, will provide further facilities. The economic and financial aspects of the irrigation projects have presented difficulties and these may still be regarded as expensive if promising experiments. A recent development is rice-growing, the hope being that Australia's needs can be satisfied from this source. Of similar importance is the great Wyangala Dam project, on the upper Lachlan river near Corowa, now (1929) being inaugurated. One million acres will be made available along the Lachlan for wheat growing and mixed (wheat and sheep) farming for 700 families at a cost of about £2,000,000. Though not an irrigation project some irrigation blocks will be provided for fodder (lucerne, etc.) growing, and the railway from Hillston will be extended to Roto.

The area of the Riverina Administrative Division (*see* above) is 26,600 sq. miles, its population 70,920 (2·7 per sq. mile). (Murrumbidgee Irrigation area alone: 561 sq. miles; pop. 12,360=22·0 per sq. mile). The chief towns are: Albury (*q.v.*, pop. 8,200), Wagga Wagga (8,400), Junee (3,650) and Narrandera in the east, important as business centres for wheat-farming, fruit-growing, and grazing districts and also as railway junctions and river-crossing (bridge) towns with small industries; Leeton, and other irrigation centres with butter, cheese and bacon factories, electricity-supply and machine-repairing works; Jerilderie, Deniliquin, pastoral and agricultural centres with good road or rail connections; Hay, Hillston, Balranald, also pastoral centres (Hay has irrigation settlement also) and both river and rail-head importance. The rivers are still used, when seasons permit, mainly for wool transport, but railway and motor transport are increasingly opening up and serving the "back blocks." Interesting and significant is the way in which the southern borderlands—by agreement between the Victorian and New South Wales Governments—are increasingly tapped by Victorian lines, and, yielding to geographical necessity, are being drawn within the economic sphere (hinterland) of Melbourne.

Production: (1925–26): Riverina (administrative division): wool: 58,500,000 lb.; wheat: 9,800,000 bu.; butter: 1,850,000 lb.; minerals: £46,000; manufactures: £392,000.

RIVER PLATE: *see* PLATA, RIO DE LA.

RIVER ROUGE, a city of Wayne county, Michigan, U.S.A., on the Detroit and the Rouge rivers, 6 m. S.W. of Detroit; served by the New York Central railroad and for freight also by the Michigan Central and by lake steamers. The population was 9,822 in 1920 (24% foreign-born white) and was 17,314 in 1930 by Federal census. Since 1915 it has been one of the manufacturing centres of the Ford Motor company. The village was incorporated in 1899, and in 1922 it was chartered as a city.

RIVERS, ANTHONY WOODVILLE, or WYDEVILLE, 2ND EARL (*c.* 1442–1483), statesman and patron of literature, and author of the first book printed on English soil, was born probably in 1442. He was the son of Richard de Wydeville and his wife, Jacquetta de Luxemburg, duchess of Bedford. His father was raised to the peerage in his son's infancy, and was made earl of Rivers in 1466. Anthony, who was knighted before he became of age, and fought at Towton in 1461, married the daughter of Lord Scales, and became a peer *jure uxoris* in 1462, two years after the death of that nobleman. Being lord of the Isle of Wight at the time, he was in 1467 appointed one of the ambassadors to treat with the duke of Burgundy, and he exalted his office by challenging Anthony, comte de la Roche, the bastard of Burgundy, to single fight in what was one of the most famous tournaments of the age. (*See* Bentley's *Excerpta Historica,* 176–182.) In 1469 Anthony was promoted to be lieutenant of Calais and captain of the king's armada, while holding other honorary posts. His father and brother were beheaded after the battle of Edgecot, and he succeeded in August of that year to the earldom. He accompanied Edward in his temporary flight to the Continent, and on his return to England had a share in the victory of Barnet and Tewkesbury and defended London from the Lancastrians. In 1473 he became guardian and governor to the young prince of Wales. In 1475 and 1476 he went on pilgrimage to the holy places of Italy.

Caxton had in 1476 rented a shop in the Sanctuary at Westminster, and here had set up a printing-press. The first book which he undertook in London was one sent to him by "the noble and puissant lord, Lord Antone, Erle of Ryvyers," consisting of a translation "into right good and fayr Englyssh" of Jean de Teonville's French version of a Latin work, "a glorious fair mirror to all good Christian people." In 1477 Caxton brought out this book, as *Dictes and Sayengis of the Philosophers.* (*See* CAXTON.) To this succeeded the *Moral Proverbs* of Christine de Pisan, in verse, in 1478, and a *Cordial,* in prose, in 1479. The original productions of Lord Rivers, and, in particular, his *Balades against the Seven Deadly Sins,* are lost.

In 1478 a marriage was arranged between him and Margaret, sister of King James III. of Scotland, but it was mysteriously broken off. He was beheaded by order of Richard III. at Pontefract on June 25, 1483. His protection and encouragement of Caxton were of inestimable value to English literature, and in

the preface to the *Dictes* the printer gives an account of his own relations with the statesman which illustrates the dignity and modesty of Lord Rivers in a very agreeable way. Rivers was one of the purest writers of English prose of his time.

"Memoirs of Anthony, Earl Rivers" are comprised in the *Historical Illustrations of the Reign of Edward the Fourth* (ed. W. H. B[lack]).

RIVERS, RICHARD SAVAGE, 4TH EARL (*c.* 1660–1712), the son of Thomas, 3rd earl, was styled Viscount Colchester after the death of his elder brother Thomas (*c.* 1680), until he succeeded to the peerage. Richard Savage was one of the most conspicuous rakes in the society of the period. In 1694 he succeeded his father as 4th Earl Rivers. On the fall of the Whigs, Rivers went over to the Tories, and in 1711 was appointed master-general of the ordnance, a post hitherto held by Marlborough. In June 1712 Rivers was promoted to the rank of general, and became commander-in-chief in England; he died a few weeks later, on Aug. 18, 1712. Rivers' intrigue with Lady Macclesfield was the cause of that lady's divorce from her husband in 1701. Richard Savage (*q.v.*) the poet, claimed identity with Lady Macclesfield's son by Lord Rivers, but the evidence in its support is insufficient.

See William Coxe, *Memoirs of Marlborough* (3 vols., 1818); *Letters and Despatches of Marlborough, 1702–1712,* vol. v., edited by Sir G. Murray (5 vols., 1845); Gilbert Burnet, *History of his Own Time* (6 vols., Oxford, 1833); F. W. Wyon, *History of Great Britain during the Reign of Queen Anne* (2 vols., 1876); G.E.C., *Complete Peerage,* vol. vi. (1895).

RIVERS, RICHARD WOODVILLE OR **WYDEVILLE,** EARL (d. 1469), served under the duke of Bedford in France, and after his master's death married his widow Jacquetta of Luxemburg. Henry VI. created him Baron Rivers in 1448. His associations made him a strong Lancastrian. For some years he was lieutenant of Calais in Henry's interests. In 1459 he was taken prisoner, and was sent with his son Anthony to the earl of Warwick at Calais. He was, however, released in time to fight for Henry VI. at Towton. Early in the reign of Edward IV. Rivers recognized that the Lancastrian cause was lost and made his peace with the new king. The marriage of his eldest daughter, Elizabeth, widow of Sir John Grey of Groby, to Edward on May 1, 1464, secured the fortunes of his family.

Rivers was appointed treasurer in 1466, and a little later created earl. Elizabeth found great alliances for her younger brothers and sisters, and the Woodville influence became all-powerful at court. The power of this new family was very distasteful to the old baronial party, and especially so to Warwick. Early in 1468 Rivers's estates were plundered by Warwick's partisans, and the open war of the following year was aimed to destroy the Woodvilles. After the king's defeat at Edgecot, Rivers and his second son, John, were taken prisoners at Chepstow and executed at Kenilworth on Aug. 12, 1469. Rivers had a large family. His third son, Lionel (d. 1484), was bishop of Salisbury. All his daughters made great marriages: Catherine, the sixth, was wife of Henry Stafford, 2nd duke of Buckingham (*q.v.*).

BIBLIOGRAPHY.—The chief contemporary authorities are the *Paston Letters,* ed. Dr. James Gairdner, *The Chronicles of London,* ed. C. L. Kingsford (1905), and the *Chronicles* of Commines and Waurin. *See* also some notices in *Calendars of State Papers, Venetian,* ed. Rawdon Browne. For modern accounts *see* Sir James Ramsay's *Lancaster and York* (1892), *The Political History of England,* vol. iv., by Professor C. Oman, and *The Complete Peerage,* by G. E. C[okayne]. For Earl Anthony's connection with Caxton consult William Blades's *Life of Caxton* (1861–63).

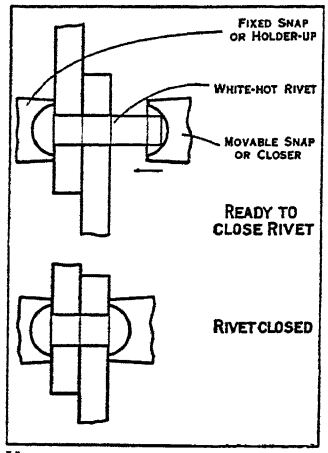
RIVERS, WILLIAM HALSE RIVERS (1864–1922), British psychopathologist, was educated at Tonbridge and St. Bartholomew's hospital, London. He was made university lecturer at Cambridge in physiological and experimental psychology in Dec. 1867, and in 1907, when the two subjects were separated, lecturer in the physiology of the senses. He founded during this period the Cambridge school of experimental psychology, and was made fellow of St. John's college. In 1898, with his pupils C. S. Myers and William MacDougall, he joined the anthropological expedition to Torres Straits led by A. C. Haddon, and had charge of the psychological work. By the genealogical method of social investigation he obtained such valuable results that whereas he joined the expedition as a pure psychologist he returned an enthusiastic ethnologist. *The Todas* (1906) records his investigation on these lines among the Todas in Southern India in 1902. His first expedition to Melanesia was in 1908. He revisited that area later, and in the *History of Melanesian Society* (2 vol., 1914) abandoned the evolutionary theory of society in favour of that of cultural migration. During the World War he obtained many valuable results as a psychopathologist (see *Instinct and the Unconscious,* 1920) and while critically interested in Freudian methods of psycho-analysis he came to very different conclusions on matters of principle and practice, holding that "though dreams are the attempted solutions of conflicts, the nature of the solution is largely determined by the affective attitude dominant before going to sleep." His *Psychology and Politics* (1923), *Medicine, Magic and Religion* (1924), *Social Organisation* (1924), were published after his death. He died at Cambridge on June 4, 1922.

RIVERSIDE, a city of southern California, U.S.A., on the Santa Ana river, at the base of the San Bernardino range, 56 m. E. by S. of Los Angeles; the county seat of Riverside county. It has a commercial aviation field, and is served by the Santa Fe, the Southern Pacific, the Union Pacific and electric railways, and by motor coach and truck lines. Pop. (1920), 19,341; and was 29,696 in 1930 by Federal census. Riverside is a beautiful city, at an altitude of 800–1,000 ft., situated in the centre of the finest orange-growing district in the State. It has an area of 40 sq.m. The climate is dry and warm, tempered by breezes from the ocean (60 m. W.). The mean annual temperature is 63° F. and the mean annual rainfall is 10·6 inches. The prevailing style of architecture is the modified Spanish type of the early missions; a noteworthy example is the Glenwood Mission inn, containing an historical museum and an art gallery. The avenues are lined with pepper and other sub-tropical trees. On the rock-crowned summit of Mt. Rubidoux, just outside the city, religious services attended by thousands are held at sunrise on Easter morning. Riverside is the seat of Sherman Institute, the largest of the Government non-reservation schools for Indians, with an attendance of over 1,000; and of the citrus experiment station of the University of California. Over 6,000 car-loads of oranges, lemons and grapefruit are packed and shipped annually, and the annual revenue from the poultry business is estimated at $4,000,000. Much of the machinery used in handling citrus crops has been invented and perfected in Riverside and is manufactured there. The total factory output in 1927 was valued at $2,672,055. In 1870 the site of Riverside (called Jurupa Rancho, the name of the old Spanish grant) was bought by the Southern California Colony Association, and in 1873 the cultivation of navel oranges was introduced from Brazil, laying the foundation of one of the leading industries of the State. One of the parent trees (at the head of Magnolia avenue, protected by an iron grill) is still bearing (1928). The city was chartered in 1883.

RIVES, WILLIAM CABELL (1793–1868), American political leader and diplomat, was born in Nelson county, Va., on May 4, 1793. He attended Hampden-Sidney and William and Mary colleges, was admitted to the bar, and practised in Nelson and Albemarle counties. A Democrat, he served in the State Constitutional convention, in the Virginia house of delegates and in the Federal House of Representatives. From 1820 to 1832 he was minister to France; in 1833 he entered the United States Senate, but resigned in the following year. From 1836 to 1845 he again served in the Senate, and in 1849–53 was again minister to France. In Feb., 1861, he was a delegate to the Peace Conference in Washington; he opposed secession, but was loyal to his State when it seceded, and was a representative in the Confederate Congress during the Civil War. He died at the country estate of Castle Hill, Albemarle county, Va., on April 25, 1868. Rives was the author of *Life and Times of James Madison* (3 vols., Boston, 1859–68), the completion of which was prevented by his death. He was the father of ALFRED LANDON RIVES (1830–1903), an engineer of some prominence, whose daughter, AMÉLIE RIVES (Princess Troubetzkoy) (1863–), became well known as a novelist.

RIVET is a headed pin or bolt used as a permanent fastening in metal work by beating out the headless end. Cold riveting is practicable for small sizes in copper, brass, aluminium, iron and steel, but the larger sizes have to be heated in the cases of iron and steel, in order to secure rapid and easy closing.

Machine riveting in small sizes is done either in a power-press, the ram of which works a snap and closes the tail with a blow, or with a rotary rivet spinning machine, with hard steel rollers which spin the tail quickly and noiselessly into shape. In engineering structures, machine riveting is employed whenever practicable, portable pneumatic hammers, or fixed or portable hydraulic riveters being used.

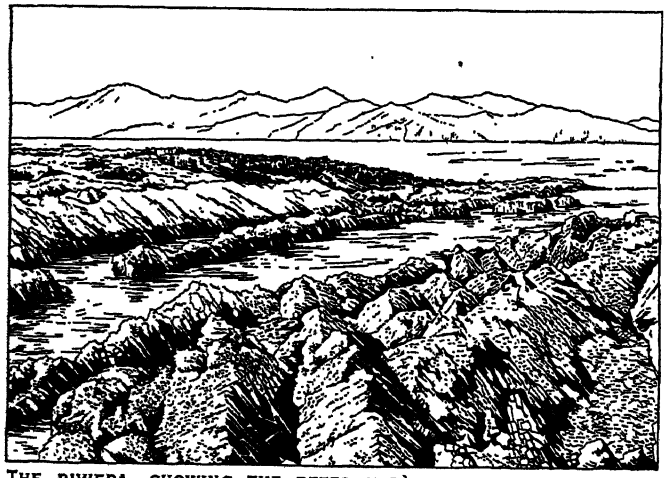


METHOD OF MACHINE RIVETING, IN A PRESS, OR BY PNEUMATIC OR HYDRAULIC RIVETER

The various shapes of rivet heads or tails include the *countersunk*, beaten flush into a conical recess in the plate, the *cup* or *round* head (as illustrated) the *pan* head, which has sloping sides and flat top, the *conical* with sloped sides ending in a point, and the thin *flat head* coopers' or tinmen's rivets. *Bifurcated* rivets for belting and harness have thin heads, but the tails are split, and opened like a paper fastener. A great deal of gas or electric welding is now substituted for riveting in the case of hollowware and other sorts of sheet metal product.

(*See* also BOILER-MAKING and PNEUMATIC TOOLS.)

RIVIERA, the narrow coast-land between the mountains and the sea around the Gulf of Genoa in the north of Italy and in France from Nice on the west to Spezia on the east. The name is derived from *riva* (Lat. *ripa*) meaning bank. It is usually spoken of as Riviera di Ponente ("the coast of the setting sun," the portion between Nice and Genoa), and as Riviera di Levante ("the coast of the rising sun," the portion from Genoa to Spezia). All this district, being open to the south and sheltered from the north and east winds, enjoys a remarkably mild climate (winter mean, about 49° F); the vegetation in many places partakes of a


THE RIVIERA, SHOWING THE REEFS "FRÈRES ET MOINES" OF ST. HONORAT

subtropical character (*e.g.*, the pomegranate, agave, prickly pear, date, palm and banana). Large numbers of flowers, especially roses, violets, hyacinths, etc., are grown near Nice, Mentone, Bordighera and other towns, for the London and Paris markets. The uncommon mildness of the climate, conjoined with the natural beauty of the coast scenery,—the steep sea-crags, the ruined towers and the range of the Maritime alps,—attracts thousands of invalids and convalescents to spend the winter there, and these resorts are frequented for sea-bathing in summer. Proceeding from west to east, the following are the places to which visitors principally resort: Nice, Monaco (an independent principality), Monte Carlo, Mentone (the last town on the French Riviera), Bordighera, Ospedaletti, San Remo, Alassio, Nervi, Santa Margherita, Rapallo, Sestri Levante, Levanto. The railway which runs close through the Riviera burrows through the many projecting headlands by means of more than 80 tunnels.

RIVIERE, BRITON (1840–1920), English artist, was born in London on Aug. 14, 1840. He was educated at Cheltenham and Oxford, and received his art training from his father, an art master. His first pictures appeared at the British Institution, and in 1857 he sent three works to the Royal Academy, becoming from 1863 a regular exhibitor. He contributed illustrations to *Punch* and other journals. In 1878 he became associate, and in 1881 full member, of the Royal Academy, and in 1891 received the degree of D.C.L. at Oxford. He died on April 20, 1920.

See Sir Walter Armstrong, "Briton Riviere, R.A.; His Life and Work," *Art Annual* (1891).

RIVINGTON, CHARLES (1688–1742), British publisher, was born at Chesterfield, Derbyshire, in 1688. He was apprenticed to a bookseller in London, and in 1711 took over the business of Richard Chiswell (1639–1711), at the sign of the Bible and the Crown in Paternoster row. His business was almost entirely theological and educational; he published one of Whitefield's earliest works, and brought out an edition of the *Imitation of Christ*. In 1736 Rivington founded the company of booksellers called the "New Conger," in rivalry with the "Conger" which dated from about 1700. The business was handed down through the family until 1890, when it was sold to Messrs. Longmans. A business of the same character was carried on by Septimus Rivington (b. 1846) and J. G. Percival, as Percival and Co. (1889–93), and in 1897 the title of Rivington and Co. was revived.

See S. Rivington, *The House of Rivington* (1894); also *The Publishers' Circular* (Jan. 15, 1885 and June 2, 1890).

RIVINGTON, CHARLES ROBERT (1846–1928), English solicitor, was born on Dec. 7, 1846, and educated at King's college, London. He entered the old family firm of Rivington and Sons in 1869, and for 47 years held the post of clerk to the Stationers' company. His most important work was the publication of the *Records of the Stationers' Company*. He died at Appleby, on Aug. 22, 1928.

RIVOLI VERONESE, a village of Venetia, Italy, in Verona, on the Adige, 13 m. N.W. of Verona. Pop. (1921) 1,710. It was the scene of the battle in which, on Jan. 15, 1797, Napoleon defeated the Austrians commanded by Josef Alvintzi, Baron von Barberek (1735–1810). (*See* FRENCH REVOLUTIONARY WARS.) A famous street in Paris (rue de Rivoli) commemorates the victory, and under the empire Marshal Masséna received the title of duke of Rivoli.

The Battle of Rivoli.—This battle, fought on Jan. 14, 1797, was the climax of the repeated Austrian efforts to relieve the vital fortress of Mantua, which blocked Napoleon's advance towards Vienna. Napoleon's victory cleared the way for his advance into Austria. *See* FRENCH REVOLUTIONARY WARS.

RIXDORF, a suburb of Berlin, Germany. Rixdorf was a foundation of Moravian Brethren from Bohemia, who settled here in 1737. German Rixdorf was a much more ancient place, and appears as Richardsdorf in 1630 and as Riegenstorp in 1435. Before 1435 it belonged to the order of the Knights of St. John.

RIYADH, a city of the Nejd (*q.v.*) in the heart of Arabia with a population of from 10,000 to 20,000. It is the capital of the region and the headquarters from which Ibn Sa'ud (*q.v.*) rules over most of Desert Arabia.

The city is situated on an oasis in a hollow of the great plateau and is surrounded on all sides, except the north-east, by palm groves. The actual site is on limestone rock, forming a well marked mound on the crest of which is the royal palace. The settlement is encircled by a thick wall some 25 ft. high, pierced by many gates. The Thamairi gate on the east is the entry from the desert tracks to the north and east and south, while the Dhuhairi gate gives access to the north-western route to Washm

and the roads to Mecca. Other gates lead to roads or desert trackways making for the south or south-west. Riyadh is thus a great desert focus.

Within the walls irregular streets converge upon a central square. In the open space north of the royal palace is the market place. The great Mosque of Jami'da is a rectangular building some 60 yards by 50 yards. Architecturally it reflects the severity of the puritan Wahhabi. Besides the great Mosques there are between 15 and 20 smaller ones. To the north of the main thoroughfare, about half way between the palace and the Thamairi gate, is the great fort built in the form of a square, but it is the royal palace of Ibn Sa'ud that commands the whole city, and in its simplicity represents "all that is best in modern Arabian architecture."

The water supply of the city is obtained from numerous wells among the palm groves without the city, and beneath the shades of these groves there tend to grow up suburban residential quarters.

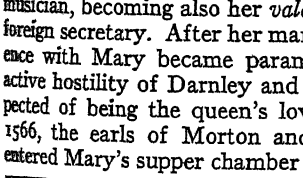
See H. St. J. B. Philby, *The Heart of Arabia*, vol. i.

RIZA KHAN PAHLAVI (1877–), shah of Persia, was born in Savad Kūh, the son of an army officer. He joined the army in early youth and later became one of the senior officers of the Cossack Division. In 1917 he went to Tehrān from Hamadan with his regiment and compelled Col. Clergé, the then commander of the Cossack Division, to relinquish his command and replaced him by Col. Starosselsky. In 1921 with a force of about 4,000 men at his disposal he captured Tehrān, and as a result became commander-in-chief of the Persian army and minister for war. In 1923 he took over the premiership and instituted a series of reforms, rendering assistance to the American Financial Mission which was already in the employ of the Persian Government for the purpose of modernizing the various departments. In Oct. 1924 on the departure of the shah, Sultan Ahmad Kadjar, Riza Khan Pahlavi was appointed by the Majliss to be head of a temporary Government until the form of a new constitution was drawn up. On Dec. 13, 1925 Riza Khan Pahlavi was appointed shah of Persia and the sovereignty was vested in the Pahlavi dynasty. The coronation took place in the Gulistan Palace in Tehrān on April 25, 1926. The new shah proceeded to carry out reforms on western lines. He had married the daughter of Taimur Khan, an army officer of high rank under whom he had served earlier in his career. There was a son of this marriage, by name Mohammed Riza, who thus became vahliad or crown prince and henceforth known as Shahpur Mohammed Riza.

RIZAZKAT: *see* BAKKARA.

RIZZIO or **RICCIO, DAVID** (*c.* 1533–1566), secretary of Mary (*q.v.*), queen of Scots, was a native of Turin, and came to Scotland in 1561 in the train of the Piedmontese ambassador. The queen wanted a bass singer, and he entered her service as a musician, becoming also her *valet de chambre*, and in 1564 private foreign secretary. After her marriage to Darnley in 1565 his influence with Mary became paramount. His elevation aroused the active hostility of Darnley and the other nobles, and he was suspected of being the queen's lover. On the evening of March 9, 1566, the earls of Morton and Lindsay, with armed followers, entered Mary's supper chamber at Holyrood, seized Rizzio, hacked him to death with daggers, and threw his body into the courtyard.

See Ruthven's *Narrative of Riccio's Murder* (1836); and the articles on MARY, QUEEN OF SCOTS.



BY COURTESY OF THE NEW YORK ZOOLOGICAL SOCIETY

THE PEARL ROACH (SCARDINEUS ERYTHROPHTHALMUS)

ROACH (*Rutilus rutilus*), a cyprinid fish of England, Europe and Siberia. It is a moderately deep, silvery fish. Specimens of more than 3 lb. are rare.

ROAD ROLLER, a self-propelled machine primarily designed for compacting loose or granular material composing the surface or sub-base of a road. In conjunction with scarifying and scraping attachments it is used for breaking up or loosening the road surface or sub-base, preliminary to further treatment. It is also used for scraping, compacting or smoothing the road surface or its base. Two general types are in common use, the macadam roller and the tandem roller.

The Macadam Road Roller has three wheels or rolls, two being mounted on a common shaft for driving the machine and the third for steering purposes. The steam engine-driven macadam roller is customarily fitted with a boiler of the locomotive type the supporting structure of which forms the main frame, where the wheels, engine and other necessary parts are mounted. Some machines have been built fitted with boilers of the vertical fire-tube type. The steam engine has two high pressure cylinders and cranks at 90°. Engines of one cylinder are occasionally used. Two speeds are usually provided, the speed change being accomplished by means of sliding gears. Macadam rollers are also fitted with gasolene or kerosene internal combustion engines. The engine is usually mounted on a structure which constitutes the main frame of the roller. The engines in common use have one horizontal cylinder, two horizontal opposed cylinders or four vertical cylinders in line. A power-driven air compressor is commonly used for operating an attached scarifier.

The Tandem Road Roller has two wheels or rolls mounted one behind the other on a frame which carries the driving mechanism and accessory parts. One of the rolls is driven and is commonly called the driving roll. The steering roll is separated into three or four parts to facilitate steering and to prevent marking the road surface. The rolls are approximately the same length, but if there is any difference in length the steering roll is shorter. The steering roll is of smaller diameter than the driving roll.

The tandem roller is designed primarily to compact and smooth bituminous road surfaces, the work being done while the surface is readily compressible. It is used only to a limited extent to compact non-bituminous surfaces or sub-bases. It is not usually provided with attached road scarifiers or scrapers. Means are provided for wetting the face of the driving roll to prevent the bituminous matter adhering to it. For the same reason the work done by the roller is usually confined to that which will not indent the working surfaces of the rolls. In order to prevent the rolls from marking a soft bituminous surface it is necessary that the engine be provided with a quick acting reverse mechanism so that the stop will be momentary. Manual and mechanical steering devices are provided. The steam engine-driven tandem roller is fitted with a boiler of the vertical fire-tube type. The steam engine has two high pressure cylinders with cranks at 90° and may be either vertical or horizontal. No change speed gears are provided. The internal combustion engine-driven tandem roller is provided with a two-cylinder opposed or four-cylinder vertical engine using gasolene as fuel. Sliding gears are provided for speed changes and reversing. On account of the time element involved in changing gears the operation of the roller is not as uniform or flexible as with the steam engine, except with expert operation. Steam engine-driven road rollers are usually designed to use coal as fuel. Wood may be used without boiler change if the work to be done is not too exacting. Petroleum fuel oil may be used by providing a special fuel tank and oil burner and special brick work in the fire-box of the boiler. At the present time (1929) the Diesel or semi-Diesel type of internal combustion engine is not used for power because a suitable design of engine has not been commercially developed. (F. A. BR.)



BY COURTESY OF THE NATIONAL ASSOCIATION OF AUDUBON SOCIETIES

THE ROAD-RUNNER (GEOCOCCYX CALIFORNIANUS)

ROAD-RUNNER (*Geococcyx californianus*), a bird characteristic of the deserts of north-west South America, Mexico and southern U.S.A. It runs with head lowered and tail horizontal, stopping from time to time, when the tail assumes an almost vertical position. It belongs to the cuckoo family (*Cuculidae*).

ROADS AND STREETS. In current usage "road" is applied as a general term for all broad made ways from place to place, whether with separate side-paths for foot-passengers or not, while "street" is confined to the roads through towns, villages and other inhabited places, more or less lined by houses and other buildings on either side. The present article is confined to the methods adopted in making roads, from the first great road-makers, the Romans, down to modern times. The roadways of times anterior to the Romans, at least in Europe, were merely the tracks worn by the feet of pedestrians and animals, and the wheels of vehicular traffic.

Roman Roads.—The earliest roads about which anything definite is known, so far as construction is concerned, are those of ancient Rome, one of the oldest of which and the most celebrated for the grandeur of its works—the Appian Way—was commenced in 312 B.C. Roman roads are remarkable for preserving a straight course from point to point regardless of obstacles which might have been easily avoided. They appear to have been often laid out in a line with some prominent landmark, and their general straightness is perhaps due to convenience in setting them out. In solidity of construction they have never been excelled, and many of them still remain, often forming the foundation of a more modern road, and in some instances constituting the road surface now used. In England many lengths of Roman road which had fallen into disuse have been re-opened and modernized since 1920. It is possible, with the help of allusions of ancient writers, to follow the ideal mode of construction, though this was not always adopted. Two parallel trenches were first cut to mark the breadth of the road; loose earth was removed until a solid foundation was reached; and it was replaced by proper material consolidated by ramming, or other means were taken to form a solid foundation for the body of the road. This appears often to have been composed of four layers, generally of local materials, though sometimes they were brought from considerable distances. The lowest layer consisted of two or three courses of flat stones, or, when these were not obtainable, of other stones, generally laid in mortar; the second layer was composed of rubble masonry of smaller stones, or a coarse concrete; the third of a finer concrete, on which was laid a pavement of polygonal blocks of hard stone jointed with the greatest nicety. The four layers are found to be often 3 ft. or more in thickness, but the lower ones were dispensed with on rock, on which the paving stones were sometimes laid almost directly. The paved part of a great road appears to have been about 14 ft. wide, and on either side, and separated from it by raised stone edgings, were unpaved sideways, each of half the width of the paved road. Where, as on many roads, the surface was not paved, it was made of hard concrete, or pebbles or flints set in mortar. Sometimes clay and marl were used instead of mortar, and it would seem that where inferior materials were used the road was made higher above the ground and rounder in cross section. Streets were paved with large polygonal blocks laid as above described, and footways with rectangular slabs. Specimens are still to be seen in Rome and Pompeii, while in Britain many of the roads were of hard gravel or had a cobbled surface. There are no traces of Roman influence in the later roads in England, but in France the Roman method appears to have been followed to some extent when new roads were constructed about the beginning of the 18th century. A foundation of stones on the flat was laid, and over that two layers of considerable thickness, of larger and smaller stones, bordered by large stones on edge, which appeared on the surface of the road. A French *chaussée* with *accotements* still retains some resemblance to the old Roman roads.

English Roads, 18th Century.—The almost incredibly bad state of the roads in England towards the latter part of the 17th century appears from the accounts cited by Macaulay (*Hist.* c. iii.). It was due chiefly to the state of the law, which compelled each parish to maintain its own roads by statute labour, but the establishment of turnpike trusts and the maintenance of roads by tolls do not appear to have effected any great improvement. At the time of Arthur Young's six months' tour in 1770 the roads would seem to have been almost as bad as ever, and it is doubtful if there was much improvement up to the beginning of the 19th century. The turnpike roads were generally managed by ignorant and incompetent men until Telford and McAdam brought scientific principles and regular system to their construction and repair. The name of Telford is associated with a pitched foundation, which he did not always use, but which closely resembled that which had been long in use in France, and the name of McAdam often characterizes roads on which all his precepts are disregarded. Both insisted on thorough drainage and on the use of carefully prepared materials, and adopted a uniform cross section of moderate curvature instead of the exaggerated roundness given before; but, while Telford paid particular attention to a foundation for the broken stone, McAdam disregarded it, contending that the subsoil, however bad, would carry any weight if made dry by drainage and kept dry by an impervious covering. McAdam was engaged more with the repair of old roads than with the construction of new ones, and, though it is not possible to agree with all his doctrines, the improvement which he effected in road management and maintenance was great and lasting. When McAdam died in 1836 the turnpike system had attained its widest extension, no less than 1,100 trusts being then in existence. The dawn of the railway era brought disaster to the turnpike trusts, and roads suffered a long period of neglect at the hands of the parochial authorities who were mainly responsible for their upkeep.

The Public Health Acts of 1848 and 1875 and the Local Government Acts of 1888 and 1894 set up, stage by stage, the system of road-administration which now prevails in Great Britain,—the responsibility for main roads resting generally upon county councils, while less important roads are in the hands of urban district councils and rural district councils. The Development and Road Improvement Funds Act (1909) established the road board, now merged in the Ministry of Transport, which makes grants from the Government's road fund towards the expenses incurred by the highway authorities just named.

Construction of Roads.—The progressive transfer of traffic from railways to roads during the first quarter of the 20th century and the increase in the volume of road traffic and in the consequent strain upon the road surface impel the road engineer to seek more and more permanent and impervious materials which will avoid the vexatious process of frequent renewal.

Incidentally, an impervious surface will prevent the deterioration of the foundation and will enable the camber or crown of the carriage way to be reduced, thereby adding to the safety and convenience of drivers. Cambers of 1 in 24[1], and even steeper, used to be common. In modern practice this has been reduced to 1 in 48. In the design of new highways sufficient land is frequently acquired to enable all pipes, mains and conduits to be laid under the verges, shoulders or margins, so that the carriageway itself may not be subject to future disturbance. Dimensions of 100 ft. or 120 ft. between fences are becoming common in England, while in the United States even more generous figures are adopted. In England it has become common to adopt a 10 ft. factor for the width of carriageways, *e.g.*, for three streams of traffic a 30-ft. carriageway would be provided, for four streams 40 ft.

The wide road allows space for tree planting and keeps noise and vibration at a tolerable distance from the householder's windows. Spacious footways and verges on each side of a carriageway extend the motorist's view as he rounds a curve and promote the safety of vehicles entering from side roads. Drivers gain a wider range of vision on each side and secure an extra fraction of a second for deliberation before venturing into the main stream of traffic.

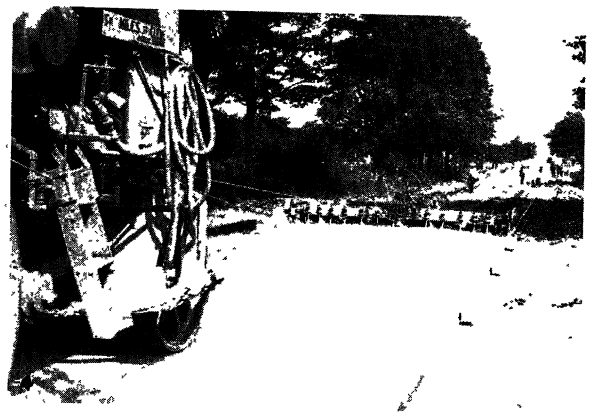
Sharp bends and abrupt changes of direction are now discountenanced in favour of easy curves of long radius. Where, owing to the configuration of the ground, curves of less radius than 1,000 ft. are unavoidable the outer edge of the carriageway is super-elevated or "banked," following the invariable practice

[1]The British refer to cambers in this way; in the United States they are referred to as ½ in. to 1 ft. or ¼ in. to 1 ft. (ED. E.B.)

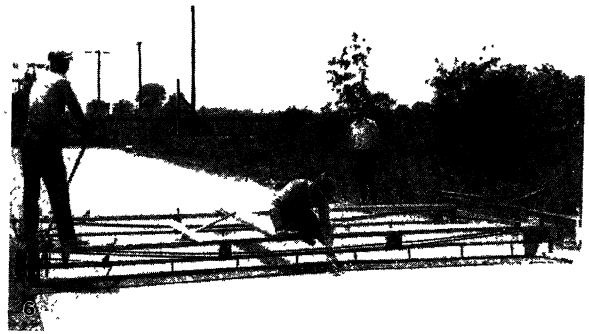


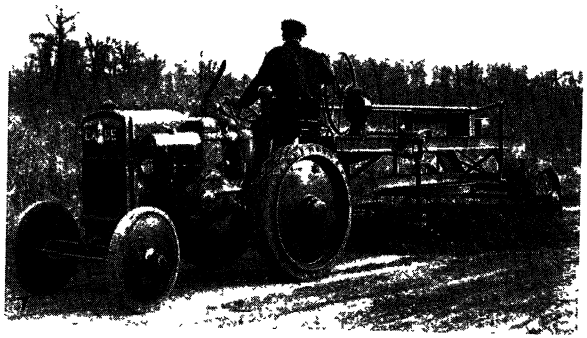


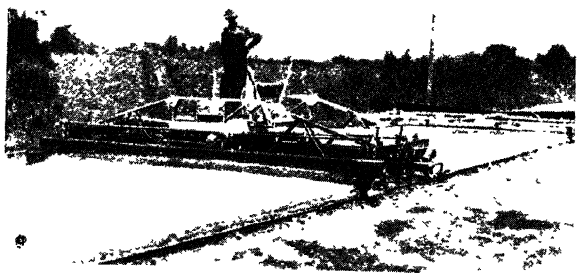












BY COURTESY OF (1, 7) THE J. I. CASE THRESHING MACHINE COMPANY, (2) THE CATERPILLAR TRACTOR COMPANY, (3) THE CLEVELAND TRACTOR COMPANY, (4, 5, 6, 8) THE LAKEWOOD ENGINEERING COMPANY

ROAD BUILDING MACHINERY AT WORK ON GRADING AND SURFACING OF ROADS

1. Grader (right background) with tractor. 2. "Bulldozing" dirt over a metal culvert. 3. Crawler tractor grading a road. 4. Sub-grader drawn by steam roller. 5. "Straightedge," a machine used for surfacing a concrete road. 6. "Float bridge" in use where centre joint on concrete road-surface must be "edged." 7. Road planer with tractor. 8. Finishing machine on a concrete road

of railway engineers. The width of the carriageway should be increased at such points. Steep gradients which disfigure the rigidly straight Roman roads are avoided by moulding the line to the contours of the hillside. In laying out new arterial roads of which upwards of 200 miles have been built in the neighbourhood of London since the year 1920, it has almost invariably been found possible to limit the gradients to 1 in 30. Gradients of excessive flatness (less than 1 in 300) are to be avoided, owing to the difficulty of effectively draining the surface.

The elimination of level crossings over railways is an important item in the programme of modern road-improvements, and the time is fast approaching when, in the interest of public safety bridges may have to be provided at points where important highways cross one another.

Single and Duplicate Carriageways.—In designing new arterial roads, varying opinions prevail as to the relative advantages and disadvantages, on the one hand, of a single wide carriageway, or, on the other hand, of duplicate carriageways for up and down traffic respectively. While the single carriageway 50 ft. wide will probably carry a greater volume of traffic in the year than two 30 ft. carriageways each reserved for one-way traffic, the separate tracks will conduce to the safety of the driver and to that of the pedestrian who, in crossing each carriageway, knows from which direction the traffic will be approaching him.

Again the duplicate carriageway lends itself to progressive development. In the first instance, while the country alongside the road remains open, a single carriageway can be formed and will meet travellers' needs until such time as population and traffic increase, when the second carriageway can be constructed without interfering with the road which is already in use. The general tendency of road practice to assimilate railway methods, encourages the view that separate carriageways (up and down lines) are likely to prevail in the case of new arterial roads.

In the older and more settled countries where a tolerably complete network of old highways already exists, the road engineer's task is usually confined to the improvement of these, rather than to the construction of entirely new communications. Due to the steady increase in funds available through taxation it became possible to launch in Great Britain in 1925 the so-called "trunk road programme" for the systematic transformation of the most important through routes of the country. The expenditure incurred or approved for this purpose had reached by March 1928 a total of about £6,500,000. In their unimproved state these roads usually possess a carriageway varying from 14 ft. to 24 ft. in width, with little, if any, footway. Generally speaking, where improvement is now undertaken, sufficient land is being acquired to allow a dimension of 60 ft. between fences. This affords space for a carriageway 30 ft. wide, two 8 ft. footways and two 7 ft. verges. In more rural areas the carriageway is limited for the present to 20 ft., only one footway is constructed, and the verges are widened to absorb the additional space.

Plank and Log Roads.—In opening up a new country, roads, temporary or permanent, must be made with such materials as may happen to be at hand. The plank road often used in American forests makes an excellent track for all kinds of traffic. Upon that side of the space devoted to the road, which the heavy traffic leading to a town will use, two parallel rows of sills are laid longitudinally flatwise, the earth being well packed and rammed to the level of their faces. The joints are not opposite; a short piece of sill is put either under or by the side of each joint. Cross-boards are laid down loosely, so that groups of four boards together will project on alternate sides of the road forming a shoulder to enable vehicles to get on to the track at any point. The remainder of the road space is formed as an earthen track, for light vehicles. Its slope outwards may be 1 in 16, that of the plank road 1 in 32. If the soil is too bad for the earthen track, short lengths of plank road of double width are made at intervals to form passing places. The cross boards are spiked down on five sills, and are sprung so as to give a fall both ways.

The log road is formed across swamps by laying young trees of similar length close together. This is ridiculed as a "corduroy" road, but it is better than the swamp. Good temporary roads may be made by laying down half logs roughly squared upon the ground, close together or with spaces between of a couple of inches, into which earth is well rammed.

The mode of carrying a road across a bog upon a foundation of faggots or brushwood is well known. In India the native roads have been made equal to heavy traffic by laying branches of the mimosa across the track. And in the great plains, where the soil, when dry, would otherwise lie deep in dust, this is entirely prevented by laying across the track a coarse reed or grass like the pampas-grass, and covering it with 3 or 4 in. of loam.

THE MAKING OF CITY STREETS

In the principal streets of the world's great cities where highly durable paving materials on a concrete foundation have long been in use—mastic asphalt, compressed asphalt, wood blocks, granite setts, etc.—recent changes of method are mainly confined to the strengthening of the concrete foundation by an increase in thickness or the introduction of metal reinforcement. In some areas in London it is now the practice to lay as a foundation for wood blocks a bed of cement-concrete as much as 12 in. thick, containing a steel reinforcing fabric. Intolerance of traffic interruptions encourages the introduction of time-saving devices. Growing use is made in the busiest thoroughfares of quick-setting cements, such as *ciment fondu* and ferrocrete, which reduce by a fortnight or more the period which must elapse before the road can be opened to traffic. Various experiments have been tried in the use of rubber as a paving material; in some instances it has taken the form of a wearing cap applied to a block of wood or other material; in other instances the entire block is composed of rubber. The elasticity of the material renders it somewhat liable to displacement under the stress of traffic.

Foundations.—The choice of materials for foundations is usually dictated by considerations of transport, though in certain favoured districts the hard, compact subsoil of chalk or rock needs but little improvement. On a firm stratum of chalk a well-compressed layer of clinker will often serve to carry the surfacing coat. Equally serviceable as a natural foundation is a well-drained bed of coarse gravel; finer gravels, and even so fine a material as sand, are not to be despised, provided that the latter has no opportunity of escaping laterally under pressure. In France a thick bed of river sand is not infrequently used as the foundation for sett paving. The bearing capacity of clay, loam and other similar subsoils is so diminished by the presence of water that great care must be taken to ensure adequate drainage before road-making operations are begun. The want of uniformity and reliability in the chance supplies of materials formerly used as "hardcore" foundation for new roads in areas devoid of quarries has led to a notable extension in the use of cement concrete as a road foundation. Hardcore derived from demolished buildings consists of ingredients possessing every degree of durability from broken fragments of plaster to the hardest vitrified bricks. These heterogeneous materials thrown down pell-mell in a layer 12 in. thick and subsequently crushed under a 10-ton steam roller form the foundation of most of the roads on outskirts of great cities, and it is not surprising that carriageways so constructed show obvious signs of weakness under the stress of modern traffic.

Surfacing Methods.—Water-bound macadam (composed of broken granite, trap or hard limestone) still remains in use on lightly trafficked roads, but as it does not possess impervious qualities it is usually treated with hot surface dressings such as tar or various bituminous mixtures, applied in warm, sunny weather to a thoroughly swept, dry carriageway, the surface of which is then "gritted" with chippings or shingle. As surface dressings, various asphaltic or bituminous emulsions are applied cold, regardless of weather. Tar is used as a surface dressing and as a "binder" for mixing with materials prior to their application so as to give cohesive qualities to the entire thickness of the road crust. By this means such materials as limestone and slag can be utilised, which are not so well adapted to waterbound methods.

Natural asphalts after a 70 years' test still remain in high favour for the paving of streets in wealthy cities. During the twelve years 1916–1928, however, much research has been devoted

to the problem of utilising the valuable properties of asphalts and bitumens in some cheaper form of pavement suitable for wider adoption. Asphaltic and bituminous mixtures are now utilised as a matrix to bind together an aggregate of broken stone or clinker, applied in one or two coats as a road-surfacing material.

In this category fall the processes known as bituminous macadam, grouted macadam, single-coat bituminous carpet, bituminous sand-carpet on a bituminous sub-crust, bituminous clinker carpet on a bituminous sub-crust. In many cases these surfacing materials are laid upon the old macadam road-crust suitably regulated, but where this does not afford sufficient strength a concrete foundation is formed. In all these bituminous surfacing methods, the need for securing the greatest possible compactness by the elimination of voids is achieved by elaborate precautions in grading the materials. It is necessary to determine experimentally the exact proportions of ingredients of varying grades needed to attain the highest degree of density in the resultant mixture.

Cement-concrete, after gaining a wide vogue in Canada and the United States, is now extending its sphere of use in Great Britain as a running surface for carriageways. Its use as a foundation for asphalt or wood blocks has long been an established practice. Special interest attaches to the application of concrete in view of the wide range of materials utilisable as aggregate, as compared with the very uneven geographical distribution of good road-stone supplies. On the other hand, concrete is somewhat handicapped by the lengthy period of setting and "curing," which is requisite before the new surface can be subjected to the strain of traffic. This difficulty may be mitigated in future by the use of quick-setting cements, several types of which (*ciment fondu,* ferrocrete and other aluminous cements) are now available.

Standardisation.—Standard specifications and practice have not yet been evolved for concrete road construction. There is considerable variety of method. The construction may take the form of one-course work or two-course work, the former consisting of one grade of concrete for the full thickness, while the latter provides two layers of concrete mixed in varying proportions. One-course work is simpler, and avoids the risk of cleavage between two layers of differing consistency. For two-course work a poorer concrete can be used for the lower layer.

Methods of Laying.—In the actual process of laying the concrete, there is much variety of practice, some engineers preferring to proceed continuously, while others adopt the "alternate bay" system, in which the carriageway is divided into slabs of uniform length, each extending the full width of the carriageway. The odd numbers would be laid first, separated by gaps representing the even numbers; these gaps would not be filled until the odd numbers had completely set, thus counteracting the effects of expansion and contraction. The transverse joints separating the slabs are sometimes disposed at right angles across the road; in other instances they lie at an angle of 60° or so to the kerb-line, so that the impact of the wheels of the vehicle does not strike any slab simultaneously.

The aggregate, consisting of crushed stone or gravel, should be clean and well graded in size, so as to reduce the percentage of voids to a minimum. Risks of failure in the concrete are greatly reduced by washing the aggregate. The proportions commonly adopted vary from 1 cement, 1½ sand and 3 gravel to 1 cement, 2 sand and 4 gravel. Only a bare sufficiency of water should be added—a very wet mixture encourages voids. Mechanical mixing plant is generally adopted.

The precautions to be taken during the setting of the concrete depend largely on the climatic conditions. In moist weather no harm will arise from leaving the green concrete uncovered for a few hours, but in hot sunny weather exposure will lead to the formation of hair cracks. Heavy canvas is often used for protecting the concrete during the first 24 hours of setting. The canvas is then removed, and a layer of earth spread over the surface about 2 in. thick and left there for a fortnight or so. For the purpose of indurating the surface of the cement concrete, recourse is sometimes had to two or three applications of a weak solution of silicate of soda.

In London several interesting experiments are being tried (1929) in the use of rubber as a paving material for carriageways, but the high cost appears likely to hinder any general adoption of this method.

Reinforcement.—Where anxiety is felt as to the soundness of the subsoil on which concrete is laid, and it is accordingly desired to form a slab qualified to serve as a raft or bridge, one or two layers of metal reinforcement are often introduced into the concrete. In other cases reinforcement is adopted owing to the fact that the thickness of the concrete has had for various reasons to be reduced.

There are large numbers of fabrics in use, expanded metal of 6 in. and other meshes, woven wire, mesh fabrics in which the main tension wires of drawn mild steel run longitudinally with cross-wires welded thereto at regular intervals; other systems make use of twisted or vertical bars; double reinforcement is frequently used in "mattress" form, the upper and lower layers being connected by diagonal members. The weight of reinforcement varies in ordinary practice from 5 lb. to 25 lb. per yard superficial of concrete foundation.

Traffic problems (*see* Traffic and Traffic Regulations and various articles under the heading of Transport) have created many new problems in road construction. These developments have necessitated the elimination to a great extent of narrow bridges and under passes, sharp curves, blind intersections and crossings.

(C. H. Br.)

ROADS AND ROAD CONSTRUCTION IN THE UNITED STATES

There are approximately 3,000,000 m. of public rural roads in the United States. Of these 550,064 m. are surfaced and 627,259 m. are graded and drained according to engineering standards. Of the surfaced mileage, 81,107 m. are improved with sand-clay, 324,810 m. with gravel, 61,160 m. with waterbound macadam, 24,578 m. with bituminous macadam, 8,422 m. with bituminous concrete, 2,438 m. with sheet asphalt, 42,341 m. with Portland cement concrete, 5,207 m. with brick and other block pavements. These figures are as of Jan. 1927.

Highway construction is progressing at the rate of 55,000 m. of surfaced road a year. This figure includes new surfaced roads and reconstructed roads. Between 30,000 and 40,000 m. of newly surfaced roads are built yearly. Approximately 60,000 m. of highways are graded and drained annually. The net increase in graded and surfaced roads is between 90,000 and 100,000 m. a year.

The 3,000,000 m. of roads are divided into three main classes —Federal-aid roads, constructed with Federal-aid funds and State funds under supervision of the State highway departments and the Federal Bureau of Public Roads; State roads, built with State and local funds under the supervision of the State highway departments; county and local roads constructed with county and local funds by county and local authorities.

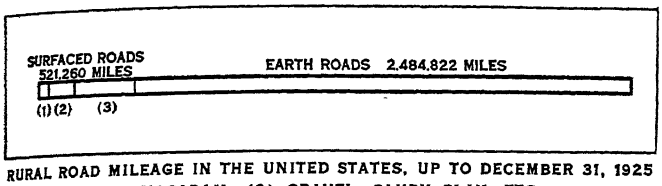
In the Federal-aid system there are 187,000 m. of road, of which, on July 1, 1928, 71,074 m. had been improved with Federal aid. All roads in the Federal-aid system are free of toll and are maintained by the State highway departments.

The Federal-aid Highway System.—The Federal-aid highway system was designated co-operatively by the Secretary of Agriculture, acting through the Bureau of Public Roads, and the officials of the several State highway departments, in accordance with the Federal highway act passed by Congress, 1921. The system thus designated comprises the main interstate roads, and reaches directly nearly every city of 5,000 population or greater, and the roads are so chosen that if a zone 10 m. wide were marked off on each side of them, these zones would include the homes of 90% of the population. (*See* Highways.)

The Federal-aid system is improved with funds appropriated by acts of Congress from funds available in the U.S. Treasury. No Federal tax is levied for road construction. The original Federal-aid road act authorized the Secretary of Agriculture to participate in the improvement of roads up to 50% of the cost of the improvement, provided that the aid granted to any particular project did not exceed $10,000 a mile, exclusive of the

cost of bridges more than 20 ft. long. Recent amendments permit the States to use 100% of Federal-aid funds upon certain roads in the public land States. The other 50% of the improvement is borne by the State highway departments. No Federal-aid funds are applied to county or local roads.

In addition to its contribution to Federal-aid roads, the Federal Government has also assumed as a rightful obligation the



RURAL ROAD MILEAGE IN THE UNITED STATES, UP TO DECEMBER 31, 1925
(1) PAVED, (2) MACADAM, (3) GRAVEL, SANDY CLAY, ETC.

duty of building those sections of the major national system which lie in the national forests and parks and other parts of the public domain. In the forest highway system are 13,842 m. of road, of which 3,775 m. have been improved. The system is divided into three classes. In class 1 are 1,079 m. of roads. These are the more important highways which are necessary sections or extensions of the Federal-aid highway system wholly within forest areas. In class 2 are 7,060 m., which also extend the Federal-aid system. Class 3 comprises 5,703 m., which serve the communities within the forests.

Of the 71,074 m. of road improved with Federal aid, 10,611 are graded and drained; 6,471 m. are sand-clay; 27,698 m. are gravel; 1,427 m. are waterbound macadam; 4,317 m. are bituminous macadam; 1,993 m. are bituminous concrete; 17,516 m. are Portland cement concrete; and 818 m. are brick. The completed mileage also includes 223 m. of Federal-aid bridges and approaches.

Of the 3,775 m. of improved forest roads, 2,123 m. are graded and drained; 79 m. are of sand-clay; 685 m. are of gravel; and 884 m. of waterbound macadam. There are also 4 m. of bridges.

State Highway Systems.—There are approximately 300,000 m. of roads in the 48 State highway systems. These systems include, in most States, all the roads of the Federal-aid system and a number of others of important State significance. In some States the Federal-aid system is larger than the designated State system. In some States the selected roads have been designated by name and description in the laws of the State, in others the designation has been left to the State highway departments.

State highway systems are constructed with State funds only and with State and county or other local funds.

Of the total State highway mileage, on Jan. 1, 1927, 163,059 m. were surfaced. Of the surfaced mileage, 11,396 m. are of sand-clay and top soil, 79,286 m. are of gravel, chert and shale (treated and untreated), 18,428 m. are waterbound macadam (treated and untreated), 12,927 m. are of bituminous macadam by penetration, 890 m. are of sheet asphalt, 4,815 m. are of bituminous concrete, 31,936 m. are Portland cement concrete, 3,216 m. are of vitrified brick, 88 m. are of asphalt block, 34 m. are of wood block and 43 m. are of stone block.

Of the unsurfaced mileage, amounting to 124,869 m., 96,413 m. are unimproved or only partly graded, and 28,456 m. are improved to established grade and drained.

County and Local Roads.—There are approximately 2,712,000 m. of county and local rural roads in the county and local road systems. All roads not included in the Federal-aid and State highway systems are classified as county and local rural roads. They are built by local officials with local funds.

By far the larger part of the unimproved mileage of the country is in the county and local road system. There are hundreds of thousands of miles on which the traffic is so small that improvement is not justified. Of the local road mileage, 598,803 m. of earth roads have been built to established grade and drained; and 387,005 m. have been surfaced. Of the surfaced mileage, 69,711 m. are of sand-clay, 245,524 m. are of gravel (treated and untreated), 42,732 m. are of waterbound macadam, 11,651 m. are of bituminous macadam by penetration, 1,548 m. are of sheet asphalt, 3,607 m. are of bituminous concrete, 10,405 m. are of Portland cement concrete, 1,384 m. are of brick, 87 m. of stone block, 37 m. of wood block, and 319 m. of asphalt block.

Administration of Federal-aid Road Construction.—Federal-aid roads are constructed under the immediate supervision of the several State highway departments subject to the approval of the Secretary of Agriculture, who has delegated the details of administration to the Bureau of Public Roads. The bureau has established 11 districts, each in charge of a district engineer who co-operates directly with the State highway engineers of the States included in his district. The four western districts are under the general supervision of a deputy chief engineer, with headquarters at San Francisco, who is responsible to the chief engineer at Washington. All other districts are directly under the supervision of the chief engineer.

When a State highway department desires Federal aid in financing a road on the Federal-aid system, it notifies the district engineer, who, if he has not already done so, immediately makes an examination of the road and the plans proposed for its improvement. If he approves the State's proposals he submits the project either to the deputy chief engineer at San Francisco or to the chief engineer at Washington with appropriate recommendations. However, he may at once authorize the State highway department to proceed with the construction subject to subsequent agreement or any modifications of plans which may be required by his superior authorities. A formal agreement is made between the State and the Federal Government. Construction then proceeds with full authority of the Government under the immediate supervision of State highway engineers and subject to frequent inspection by Federal engineers.

The Federal Government has no official relations with county and local officials.

Administration of State Highways.—Control over the State roads is vested in the State highway departments. In more advanced States the highway department determines the order in which the roads of the State system are to be improved, prepares the plans for the improvement, supervises the construction, and pays for it with State funds entirely under its own control, and, after completion, maintains the roads also with State funds under its own control. In less advanced States control is divided between the State highway department and the county or local governing bodies. In some States initiation of improvement rests with the counties; in others, a part of the money to pay for the improvement is raised by the counties; in others, the actual construction work may be carried on by the counties subject to the approval of the State highway department. In some States the maintenance of the roads is left to the county officials. When the State and county share in the cost of construction the road is generally called a State-aid road.

STATE PARTICIPATION

The Development of State Highway Departments.—In 1891 New Jersey passed a law providing for a certain measure of State participation in road building. With one exception, it was the first instance in which any State had undertaken to participate directly in the construction of roads. The exception is Kentucky, which had a State highway department and a well defined State road policy from 1821 to 1837, and had completed some 340 m. of roads.

Following New Jersey's example, laws providing for establishment of State highway departments and for granting of State aid were passed in Massachusetts in 1892, in California and Connecticut in 1895, and in Maryland, New York and Vermont in 1898.

Between 1900 and 1915, 38 other States had established highway departments and empowered them with some degree of authority. Several of these previously established departments were materially strengthened and similar agencies were created in the three remaining States when, in 1916, the Federal-aid road act required the establishment of adequate State agencies as a condition of the granting of Federal aid. The establishment of adequate State highway departments by the 48 States was the most important immediate effect of the Federal-aid law. The first administrative act of the Bureau of Public Roads under the Federal-aid law was to request all States to submit a five-year programme

map showing the system of roads upon which the State highway departments would request Federal aid. The rapid and consistent improvement of the main highways of the United States is due to concentration of authority in the State highway departments, to the engineering control thus established and especially to the correlating influence of the Federal Government. The several State systems were substantially welded into a national network by the designation in 1921 of the Federal-aid highway system.

The purpose of the New Jersey law was to establish a State department, employing skilled engineers, which would act in an advisory capacity to county officials, for improvement of road construction. The highway department developed plans and specifications, inspected and supervised the construction, but contracts were let by the counties and the roads were to remain county roads subject to maintenance by the county. As an inducement for counties to seek State aid, funds were appropriated by the State legislature to pay one-third the cost of road construction.

With minor modifications, the New Jersey principle of State aid was subsequently adopted by many other States. In some States joint participation of the State and county in construction of the most important roads was made mandatory. Other variations differentiated the systems as adopted by the several States.

Organization of State Highway Departments.—In 33 of the 48 States, the highway departments are called State highway commissions, consisting of three to five members, appointed by the Governor, with the consent of the Senate in some States, for a period of from two to six years. The commission of one State—Mississippi—is elected by popular vote. In the majority of States, the executive officer of the commission is the State highway engineer, appointed by the commission. In two States—Michigan and Arkansas—he is elected by popular vote. In some States the Governor serves as chairman of the commission. In eight States, highway departments are bureaux or divisions of highways which are part of the Department of Public Works. The executive officer may have the title of State Highway Engineer, Director of Highways or Commissioner of Highways. In six States the chief executive of the highway department is a State highway commissioner, appointed by the governor, except in one State—Michigan—where he is elected by popular vote.

Construction of practically all roads of the Federal-aid and State highway systems is by contract let by the State highway departments, to the lowest bidder. All work is advertised. Each State highway department makes its own tests of materials either in its own laboratory or in a nearby commercial laboratory. It likewise conducts its own inspections of construction work. Federal-aid highways are subject also to Federal inspection.

FINANCE

Administration of Local Roads.—County roads, in general, are built and maintained by county officials with funds raised, as a rule, by taxation of real and personal property within the county. The more advanced counties employ a county engineer or an engineering organization to supervise the technical details of construction, the county governing body acting only as an administrative body. In some States the lesser roads in each county are administered, constructed and maintained by a host of township and district officials, each of whom may have charge of only a few miles of road. In other States, special road-improvement districts are created upon petition, by the State legislature, and the construction of the road or roads included in the district is supervised by special appointed commissioners. In general, the roads thus built revert to the county authorities for maintenance.

Sources of Highway Revenue.—For many years, the property tax and poll tax were the only sources of road revenues. They were collected and expended by the local Governments. Commutation of the poll tax was permitted. As an indirect source of revenue, prison labour, while not a large factor, has been used, mainly to give employment to prisoners.

The first motor vehicle fees levied by the States were nominal and were designed merely to cover cost of registration. The rapid growth in motor vehicle registration increased the demand for improved roads with the resulting issuance of State and county bonds to secure funds to speed the improvements beyond the rate possible with limited current revenues. With improved roads, special benefits resulted to operators of motor vehicles and the motor vehicle taxes have been increased in recognition of this fact.

In recent years the States have levied a gasolene tax as a source of additional revenue. The tax was first levied in 1919 by four States: Colorado, a 1 cent tax per gallon; New Mexico, 2 cents per gallon; North Dakota, ¼ cent per gallon; and Oregon, 1 cent per gallon. In 1920 Kentucky joined the four and levied a gas tax of 1 cent per gallon. In 1921, 15 States levied taxes from ¼ cent to 2 cents per gallon. In 1922, four additional States levied taxes. In 1923, 35 States levied a gasolene tax. This year marked an increase in the amount per gallon for some of the States. The lowest tax was 1 cent, the highest 3 cents, and the total revenue collected was $38,566,338. In 1925, 44 States and the District of Columbia collected $148,358,087 in gasolene taxes. In 1927, all but two States levied a tax from 1 cent to 5 cents a gallon and collected $258,966,851.

In the majority of States, the total gasolene tax, less collection and other costs, is used by the State highway department in construction of State roads. In some States a division of the funds is made, a portion going to the State highway department and a portion to the county and local roads. In some States the money is divided half and half, but in most cases the greater amount goes to State roads; in one State the local roads get a greater portion than the State roads. Distribution of gasolene funds is according to State law. In a few States a portion of the gasolene taxation is applied to the State and county bond payments and the balance divided between the State and county roads or applied only to State construction. In some States, the gasolene tax revenue is used largely for maintenance on the theory that motor vehicles should be directly assessed with this cost. In most of the States all revenues from motor vehicle fees and gasolene taxation are applied to State and county and local road construction, after certain sums for collection fees and for miscellaneous purposes have been deducted.

With the increase in fees from motor vehicles and gasolene, appropriations are decreasing. Revenues from motor vehicle fees pay about 28% of the annual State road bill; revenues from gasolene taxation pay about 17% of the annual bill. These two sources contribute about 35% toward payment of the annual State bill.

There are no marked increases in bond revenues to the States. They remain approximately constant, and contribute about 12% to the States' available funds.

Since the passage of the Federal-aid road act, in 1916, a total of $990,000,000 has been authorized, including the sum for the fiscal year 1931. From 1925 to 1931, the annual appropriation authorized has been $75,000,000. Federal-aid appropriations contribute slightly less than 10% to the total annual available funds to the States.

Revenues for county and local road construction are still largely raised from property taxes.

MODERN ROAD PRACTICE

Types of Road.—Prior to 1904, the major types of surfacing were gravel and macadam, which gave entire satisfaction under the normal traffic of relatively light horse-drawn, steel-tired vehicles, with a bicycle traffic near the cities. The outpouring of motor vehicles from the cities which began about 1904 caused the macadam roads to "ravel," and maintenance under such traffic was impossible. Tars and asphalts were substituted for the weaker binders; first, as dust layers, as protective surface coatings, and then as binders introduced into roads of the macadam type by penetration, and finally as hot admixtures according to the bituminous concrete principle. These types were entirely satisfactory for automobile traffic.

From 1904 to 1914 is the period of bituminous construction. In 1904, there were in the entire country only 18 m. of bituminous rural roads, all in the two States of Massachusetts and Ohio. By 1914, there were 10,500 m., a mileage which was nearly three-quarters of the aggregate length of all roads of higher type than

macadam. The decline in the surface-treated and penetration types of macadam began when motor trucks in considerable numbers began to appear on the rural highways. They brought a demand for rigid pavements of concrete and brick and bituminous concrete on a concrete base.

Although the first concrete road had been built in 1893, in Bellefontaine, O., there were no more than five m. of that type on rural highways in the entire country in 1909. The first big increase occurred in 1912 when more than 250 m. of rural highways were paved, to be followed in 1913 with 500 m., and in 1914 with more than 1,500 miles. At the close of 1914, there were in the entire country 2,348 miles of concrete roads. Ten years later the mileage had increased to 31,186 and construction was proceeding at the rate of more than 6,000 miles a year, a rate approached by no other type better than gravel.

The increase of motor trucks on the highways also caused a more extensive use of brick, and the bituminous pavements of the mixed type on concrete bases. In 1914 there were approximately 1,600 m. of brick pavement; in 1924 there were 4,319 m. In 1914, the bituminous concrete or sheet asphalt mileage on rural highways was negligible; in 1924 there were more than 9,700 m. of these types.

Current Policies and Practices in Road Construction.—In recent years the realization has been growing that the cost of highway transportation is made up of the cost of the highways and the cost of operating the vehicles over the highways. It is agreed that the common purpose of the public highway officials, vehicle manufacturers and operators should be to reduce the total cost of transportation rather than one or the other of the elemental costs. It has been proved that the number of large-capacity trucks already using some of the highways, principally those radiating from and connecting the larger cities, has already grown to the point where the combined savings in operating costs would more than balance the greater cost of providing highway service for them. To build a type of surface adequate for the heavy truck traffic on such roads has been found to be a real economy.

Working on the theory that all roads should be improved to the degree justified by the operating savings that may be expected to accrue to traffic, and that no road should be improved to any greater degree, the stage-construction plan has been generally adopted. The plan takes into account the rapid growth of traffic, which is a characteristic especially of the main roads, by providing fully in the initial stage of improvement for the subsequent requirements. Grades and alignment are designed to meet ultimate requirements; drainage structures are built of durable materials; rights of way of ample width for the future are obtained; and the initial surfacing becomes the sub-base of the second-stage surfacing.

Eighteen ft. predominates as the width of pavement on highways, although pavements 20 ft. wide and wider are not uncommon. This is an increase of 4 ft. over the 14 to 16 ft. width of some ten years ago. There is a tendency to build highways from large commercial centres in multiples of 20 ft., and thus make them four or six way roads.

Nearly all States now require that hard-surfaced pavements shall meet a surface trueness test, and this has resulted in greater care in finishing and has permitted a reduction in crown until the pavement now appears to be almost flat. The crown on cement concrete, brick, sheet asphalt or any of the bituminous concrete pavements on rigid foundations is rarely more than $\frac{1}{4}$ in. per foot. The trend of practice is toward a $\frac{1}{10}$ in. per foot crown. On sand-clay, gravel and waterbound macadam roads the prevailing crown is $\frac{1}{2}$ in. per foot and on bituminous macadam roads $\frac{3}{8}$ in. per foot is quite general.

The trend toward easy horizontal curves and longer vertical curves is apparent. The length of vertical curves has increased with the volume and speed of traffic, which have made greater sight distances necessary.

There is a continual upward trend of standards of alignment. The alignment is becoming straighter. Relocation of crooked roads and the use of long, easy curves are becoming common. Super-elevation and widening curves are now universally practised, but there is no agreement in formula or method in the various States.

There is a decided trend toward wider shoulders on rural highways. At least 80% of the current plans provide for shoulders more than 4 ft. in width. Most of them provide for 5 ft. and a few require 6 ft. or more. Grade crossings are being eliminated by means of relocation or by overpass or underpass.

CO-OPERATION OF INTERESTS

The United States Highway System.—Through the co-operation of all States and the Federal Government, effected initially through the agency of the Joint Board on Interstate Highways, and continued by the American Association of State Highway Officials, a system of main transcontinental highways, known as the U.S. highway system, has been designated in recent years. This system, which is a portion of the Federal-aid system, includes approximately 96,000 m., composing 17 through routes, many of which extend from one border of the country to the other. The various routes are designated by the distinctive numbers which are displayed upon them, on standard, shield-shaped markers. Arrangements have also been made for the erection of standard danger and direction signs on these roads in all States. The standard signs adopted are of two general classes. One group, the danger and caution signs, are of four different shapes representing as many degrees of danger. These have a yellow background with black letters and symbols. The other group includes the standard route marker in the form of a U.S. shield and directional and informational signs, with white backgrounds and black letters.

The standard railroad crossing sign is round, 24 in. in diameter, with the letters R R in black in the upper quadrants on the yellow background. At danger points, the stop sign is octagonal, 24 in. in size, and has the word STOP in large black letters on a yellow background. At curves, narrow bridges, steep hills and other dangerous points, a diamond-shaped yellow sign, 24 in. on each side, is erected with the character of the danger described in black letters and symbols. At points of lesser or occasional danger, the 24 in. square yellow sign is used, with the caution explained in black letters in a single word, such as SCHOOL, HOSPITAL, CHURCH, etc.

The standard United States shield adopted as the route marker is 16 in. vertically. At the top on the white background is the name of the State in black letters, and below in the section of the shield in which the red and white stripes ordinarily appear are the initials U.S. and the route number in large numerals. At the approach to forks or junctions of the interstate routes with other roads, a smaller shield, 9 in. vertically, with the single letter R or L is erected below the numbered shield to indicate the direction the United States highway branches. Distances along the main routes to cities and towns are indicated on rectangular white signs with the names of the points and the distances to them, and an arrow pointing the proper direction in black. Distances to points not on the interstate roads are posted at the intersecting routes. The rectangular signs bear the names of the cities with their distances in black on the white background. No arrows are used on these signs. The side of the road on which they are posted indicates the direction. At creeks, rivers, lakes, etc., crossed or passed by interstate roads, rectangular white and black signs are erected. The change of speed limit is indicated by a standard black and white sign prescribing the limit.

Highway Research.—As a result of the co-operation of the Bureau of Public Roads with State highway departments and universities, in scientific research looking to the development of types of construction and methods of administration and finance adequate to meet the demands of the fast-growing traffic, there is being built up a new science of highway engineering.

The investigations conducted include studies of the characteristics of materials; determination of the forces applied to road surfaces by standing and moving vehicles; of stresses developed in the structure of roads and bridges by live loads, and by temperature and other natural causes; analyses of subgrade soils

and tests of methods designed for their improvement; studies of the flow of water through drainage structures, of the run-off from drainage areas, of the effect of moisture on soils and many others of fundamental importance and value.

The tests made on the Bates road in Illinois, the Pittsburg (Calif.) experiments, the impact tests at Arlington, Va., and the intensive studies of highway traffic conducted by the Bureau of Public Roads in co-operation with the authorities of Connecticut, Maine, New Hampshire, Vermont, Pennsylvania, Ohio, California, Tennessee and Cook County, Ill., were made in the interest of scientific research, and have yielded data of considerable value to the highway engineer.

BIBLIOGRAPHY.—Students should consult the proceedings of the Institute of Transport (London), the Surveyors' Institution (London) and the International Road Congresses held at Seville, 1923, and Milan, 1926, besides the technical journals dealing with civil engineering. *See* also for English practice E. L. Leeming, *Road Engineering* (1924); H. Bradley and C. C. Hancock, *Modern Roadmaking* (1928); and the Stationery Office *Annual Reports* upon the administration of the road fund. J. H. Bateman, *American Highway Engineering* (1928) and A. H. Blanchard and H. B. Drowne, *Textbook of Highway Engineering* (1913); T. R. Agg and J. E. Brindley, *Highway Administration and Finance* (1927); T. Aitken, *Roadmaking and Maintenance;* G. R. Chatburn, *Highways and Highway Transportation* (1923); Barton and Doane, *Sampling and Testing Highway Materials* (1925); Green and Ridley, *Science of Road Making* (1927); C. C. Wiley, *Principles of Highway Engineering* (1928); H. G. Whyatt, *Streets, Roads and Pavements* (1928); N. P. Lewis, *Planning Street Widths for Street Needs;* F. Wood, *Modern Road Construction* (1920); K. G. Fenelon, *Economics of Road Transport* (1925); E. E. Bauer, *Highway Materials* (1928); F. R. Hunt, *Taxation of Motor Vehicles and its relation to Highway Finance* (1925). (T. H. MACD.; H. S. F.)

ROADSTER. The term is commonly applied to a small open type automobile body seating two people on one seat, and equipped with a folding top and removable curtains. Usually there is provided behind the seat a compartment to carry baggage.

ROAD TRANSPORT: *see* MOTOR TRANSPORT.

ROANNE, a town of east-central France, capital of an arrondissement in the department of Loire, on the left bank of the Loire, 54 m. N.W. of Lyons on the P.L.M. railway to Moulins. Pop. (1926) 36,091. Roanne (*Rodomna,* or *Roidomna*) was an ancient city of the Segusiani and a station on the great Roman road from Lyons to the sea. In 1447 the lordship of Roannais became the property of the celebrated banker Jacques Coeur, from whom it passed to the family of Gouffier. In their favour the title was raised to the rank of marquisate and in 1566 to the rank of duchy; it became extinct in the early 18th century. A fine bridge of seven arches connects Roanne with the industrial suburb of Le Côteau on the right bank of the river. The town is the seat of a sub-prefect, of a tribunal of commerce, of a chamber of commerce and a board of trade-arbitrators. It is the terminus of the Roanne-Digoin Canal and starting-point of Loire navigation.

ROANOKE, a river of the south Atlantic slope, U.S. With the Staunton, which rises in the Appalachian valley in south-western Virginia, it constitutes one river, and, flowing in a general south-easterly direction, crosses the boundary between Virginia and North Carolina just above the Fall line and discharges into Albemarle sound. It is nearly 400m. long, with a drainage area of 9,237 sq. miles. In 1829 the Weldon canal, 12m. long, was opened to afford a passage around the falls, but was abandoned in 1850.

ROANOKE, a city of south-western Virginia, U.S.A., on the Roanoke river, 175 m. W.S.W. of Richmond; in Roanoke county, but administratively independent. It is on Federal highways 11 and 311, and is served by the Norfolk and Western and the Virginian railways. Pop. 50,842 in 1920, 80% native white and 18% negroes; 69,206 in 1930 by the Federal census, with an additional 10,000 in the immediate suburbs. The city occupies 10 sq.m. in a beautiful amphitheatre formed by the Blue Ridge and the Allegheny mountains, 940 ft. above sea-level. Most of it is of recent construction. There are commodious hotels and business buildings, a city auditorium seating 5,000, a municipal market, 17 public schools, 66 churches, a handsome municipal building, 6 parks and 7 playgrounds. The assessed valuation for 1927 was $55,017,241. The city has a commission-manager form of government. Six miles west is Salem, the county seat, and Roanoke college for men (1853); and 6 m. north is Hollins college for women (1842). Roanoke is an intersection point for railroads and highways, as formerly for Indian trails. It is headquarters of the Norfolk and Western railway. A village called Big Lick (from the salt marshes to which the cattle and wild game came) was founded here about 1852. In 1880 it had a population of 669. In 1882, when the Shenandoah Valley railroad (now part of the Norfolk and Western) made this its southern terminus and moved its general offices here, the name was changed to Roanoke; and in 1884, with a population of 5,000, was chartered as a city.

ROARING FORTIES, the belt between latitudes 40° and 50° south latitude characterized by boisterous westerly winds. In this belt the barometric gradients, both in summer and in winter, are steep, and the "planetary circulation" is but little interrupted by land; the "brave west winds" are very strong.

ROBBEN ISLAND, an island at the entrance of Table bay, 7 m. N.N.W. of Cape Town. It is some 4 m. long by 2 broad. At its southern end is a lighthouse with a fixed light visible for 20 m. It got its name (*robben,* Dutch for seal) from the seals which formerly frequented it, now only occasional visitants. The island when discovered was uninhabited. In 1614 ten criminals from London were landed on the island to form a settlement and supply fresh provisions to passing ships. The attempt, which ended in failure, is interesting as the first recorded settlement of English in South Africa. As early as 1657 criminals were banished to the island by the Dutch authorities at Cape Town; it has also served as the place of detention of several noted Kaffir chiefs. It is now noted for its leper asylum. The island has a lighthouse with an occulting (7 second) white light. It is visited by a boat from Cape Town four days a week.

See G. F. Gresley, "The Early History of Robben Island," in *The Cape Illustrated Magazine* (Oct. 1895).

ROBBER FLY, the name given to the large, powerful, predacious flies of the family Asilidae. (*See* DIPTERA.)

ROBBER SYNOD, the name given to an irregular ecclesiastical council held at Ephesus in A.D. 449. *See* EPHESUS, COUNCIL OF.

ROBBERY, a felony in English law, is the unlawful and forcible taking of goods or money from the person of another by violence or threatened violence. Robbery is larceny (*q.v.*) with violence. It is a specific offence under the Larceny Act, 1916, which provides by s. 23 that every person who (*a*) being armed with any offensive weapon or instrument, or being together with one other person or more, robs, or assaults with intent to rob, any person; (*b*) robs any person and, at the time of or immediately before or immediately after such robbery, uses any personal violence to any person; shall be guilty of felony and on conviction thereof liable to penal servitude for life, and, in addition, if a male, to be once privately whipped. Also every person who robs any person shall be guilty of felony and on conviction thereof liable to penal servitude for any term not exceeding 14 years, and every person who assaults any person with intent to rob shall be guilty of felony and on conviction thereof liable to penal servitude for any term not exceeding five years. To constitute the offence there must be violence or the placing of the prosecutor in bodily fear; the goods or money must be taken from the person or in the presence of the prosecutor; and in fact a larceny (*q.v.*) must be proved under the before mentioned circumstances. The elements of the offence are essentially the same under American law.

ROBERT I. (*c.* 865–923), king of France, or king of the Franks, was the younger son of Robert the Strong, count of Anjou, and the brother of Odo, or Eudes, who became king of the western Franks in 888. He did not claim the crown of France when his brother died in 898; but recognizing the supremacy of the Carolingian king, Charles III., the Simple, he continued to defend northern France from the attacks of the Normans as "duke of the Franks." About 921 Robert, supported by many of the clergy and by some of the most powerful of the Frankish nobles, took up arms, drove Charles into Lorraine, and was himself crowned king of the Franks at Reims on June 29, 922. Collecting an army, Charles marched against the usurper, and on June 15, 923, in a stubborn and sanguinary battle near Soissons, Robert was killed, according to one tradition in single combat with his rival.

Robert left a son, Hugh the Great, duke of the Franks, and his grandson was Hugh Capet, king of France.

See F. Lot, *Les Derniers Carolingiens* (1891); and E. Lavisse, *Histoire de France,* tome ii. (1903).

ROBERT II. (*c.* 970–1031), king of France, was a son of Hugh Capet, and was born at Orleans. He was educated at Reims under Gerbert, afterwards Pope Silvester II. As the ideal of mediaeval Christianity he won his surname of "Pious" by his humility and charity, but he also possessed some of the qualities of a soldier and a statesman. His father associated him with himself in the government of France, and he was crowned in December 987, becoming sole king on Hugh's death in October 996. In 988 he had married Rosala, or Susanna, widow of Arnold II., count of Flanders. He repudiated her in 989, fixing his affections upon Bertha, daughter of Conrad the Peaceful, king of Burgundy, or Arles, and wife of Eudes I., count of Blois; and although the pair were related, and the king had been godfather to one of Bertha's children, they were married in 996, a year after the death of Eudes. Pope Gregory V. excommunicated the king, and a council at Rome imposed a seven years' penance upon him. For five years the king braved all anathemas, but about 1002 he gave up Bertha and married Constance, daughter of a certain Count William. Still attached to Bertha, Robert took this lady with him to Rome in 1010, but the pope refused to recognize their marriage, and the king was forced to return to Constance. By this wife Robert had four sons, and in 1017, the eldest of these, Hugh, (1007–1025), was crowned as his father's colleague and successor. After Hugh's death Robert's concluding days were troubled by a rising on the part of his younger sons, and after a short war, in which he was worsted, the king died at Melun on July 20, 1031.

His life was written by his chaplain, Helgaud, and this panegyric, *Epitoma vitae Roberti regis,* is published by J. P. Migne in the *Patrologia Latina,* tome cxli. (Paris, 1844). *See* also C. Pfister, *Études sur le règne de Robert le Pieux* (1885); and E. Lavisse, *Histoire de France,* tome ii. (1901).

ROBERT (1275–1343), king of Naples, was the son of Charles II., duke of Anjou and king of Naples. On the death of Charles in 1309 Robert succeeded to the throne, although his nephew Caroberto (Carlo Roberto), son of his elder brother Charles Martel, who had died before his father, had a prior claim. He was crowned by Pope Clement V. at Avignon, and on the descent into Italy of the emperor Henry VII. was appointed papal vicar in Romagna to resist the imperialists; thenceforth he became the recognized leader of the Guelphs or papal faction in Italy and took part in all the wars against the Ghibellines. On various occasions he obtained for himself or his sons the suzerainty over Rome, Florence and other cities, and was regarded as the most powerful Italian prince of his day. Pope John XXII. created him papal vicar in Italy against the emperor Louis the Bavarian. In 1320 Robert summoned his kinsman Philip V. of France to Italy, and he waged war against Sicily once more from 1325 to 1341, but failed to drive out the Aragonese. He died in 1343, just as he was about to lead another expedition to the island. Robert was a man of learning, devoted to literature, and a generous patron of literary men: he befriended Petrarch. Dante described Robert as a *re da sermone* (word king).

See G. Villani, *Cronache;* M. Murena, *Vita di Roberto d'Angiò, re di Napoli* (Naples, 1770); and *Archivio storico Siciliano* (1884, viii. 511 *seq.*)

ROBERT I., "THE BRUCE" (1274–1329), king of Scotland, the son of Robert de Bruce VII., earl of Carrick by right of his wife Marjorie, was a direct descendant of a Norman baron who accompanied William I. to England. He was probably born at Turnberry, Ayrshire, on July 11, 1274, and is said to have spent his youth at the court of Edward I., where he must have watched the progress of the suit for the crown of Scotland. After the death of Margaret, the "maid of Norway," Bruce's grandfather claimed the crown by right of his descent from David I.; but John de Balliol, grandson of Margaret, being preferred by the commissioners of Edward I., he resigned his estates to Bruce's father, who assumed the title of Lord of Annandale (1295). In 1292, Bruce became earl of Carrick, by which title he is often known. Some four years later Bruce and his father swore fealty to Edward I., but when Sir William Wallace raised his standard, Bruce followed the popular leader and harried the forces of John de Warenne, Edward's general. In July, 1297, however, he was forced to sign the capitulation of Irvine, whereby the Scottish lords were pardoned in return for their allegiance.

Bruce thus took no part in the momentary triumph and final defeat of Wallace, who continued the struggle almost unaided. Soon after Bruce again appears to have sided with his countrymen, but he was not yet regarded as an open enemy of the English, for his estates were left intact, and in 1299 he was appointed co-regent of Scotland, together with William Lamberton, bishop of St. Andrews, and John Comyn the younger. For the next four years he remained passive, and in 1304 even supported Edward I. in the capture of Stirling, but secretly he entered into a bond with Lamberton which bound him to the patriotic cause.

The second period of his life, which was occupied by the contest for the kingdom, now began. After the execution of Wallace in 1305, Edward sought to conciliate the Scottish nobles by granting a liberal constitution to Scotland. Bruce is reputed to have been one of the advisers, but his fidelity was already suspected and in 1306 he returned to Scotland secretly. In the same year he murdered his old enemy Comyn, and was thenceforward definitely committed to the Scottish cause. Collecting his adherents, Bruce marched to Scone where he was crowned on March 27, 1306, and a few days later was placed on the throne according to an ancient Celtic ceremony, by the Macduffs, earls of Fife. He then set out to win his kingdom, but after being defeated at Methven and at Dalry in Strathfillan, he fled almost alone to the island of Rathlin. Proclaimed an outlaw, excommunicated by the pope, his wife and daughter in the hands of the English, and his brother executed, Bruce's cause seemed hopeless, but on July 7, 1307, Edward I. died, and Bruce was opposed only by his incompetent son Edward II. In the winter of 1307 and in 1308, hurrying to Aberdeenshire, he harried the lands of the earl of Buchan, whom he defeated near Inverurie on May 22, 1308, while his brother Edward reduced Galloway. He then crossed to Argyllshire, took the pass of Brander (1309), captured Dunstaffnage, and in March held his first parliament at St. Andrews.

A truce having been effected by Pope Clement V. in 1309, Bruce was recognized as king by the clergy of Scotland in Feb. 1310, in spite of his excommunication; and with this backing he set out to reduce the strongholds still held by the English. Linlithgow fell towards the end of 1310, Dumbarton in Oct. 1311, Perth in Jan. 1312, two raids into the north of England were also successful in March 1313, Roxburgh and Edinburgh were captured and in May the Isle of Man was subdued. By the end of 1313, Stirling, Bothwell and Berwick alone remained English and these Edward II. made a determined effort to save. He reached Falkirk on June 22, 1314, and two days later the battle of Bannockburn was fought, in which the defeat of the English determined the independence of Scotland and confirmed the title of Bruce. On April 26, 1315, at the parliament of Ayr, the succession was unanimously settled on Bruce and his heirs.

The last part of Bruce's life, from 1315 to 1329, began with the rising of the whole Celtic race against the English. Robert Bruce declined the offer of the Irish crown, but in 1315, Edward Bruce crossed to Ireland at the invitation of the natives, and in 1317 he was joined by Robert, who defeated the English at Slane in Louth. But although they enjoyed a temporary success, Edward was finally killed at Dundalk in Oct. 1318, having previously been proclaimed king of Ireland. In 1317, Robert Bruce had been obliged to return to protect his own borders, and in 1318 he laid siege to Berwick. Refusing all offers of mediation on the part of the pope, unless his title were recognized, Bruce continued his struggle and after the capitulation of Berwick, laid waste to the English border. In Dec. 1318, he held a parliament at Scone, where the succession was settled, and legislation for the defence and administration of the kingdom was initiated.

The king's position was now so strong that foreign countries began to recognize him, and in 1323 his title was confirmed by the pope. Hostilities against England continued, however, and

on May 30, 1323, Edward was forced to make a truce of 13 years. On the accession of Edward III., 1327, the treaty of York was signed, whereby "Scotland according to its ancient bounds in the days of Alexander III., should remain to Robert, king of Scots, and his heirs free and divided from England, without any subjection, servitude, claim or demand whatsoever." This was ratified by the marriage of Edward's sister, Joanna, to David, Bruce's infant son (July 12, 1328).

The chief author of Scottish independence barely survived his work. In 1327 he conducted an expedition into Ireland, but on his return, he spent his remaining years at Cardross, on the Clyde, where he died from leprosy on June 7, 1329. His body was buried at Dunfermline, his heart at Melrose.

BIBLIOGRAPHY.—The chief contemporary authorities for the life of Bruce are coloured to some extent by the nationality of the writers. On the Scottish side, *The Brus*, a poem by John Barbour, ed. by W. W. Skeat (Edinburgh, 1894), and the *Chronica gentis Scotorum* of John of Fordun, ed. by W. F. Skene (Edinburgh, 1871–72), are perhaps the most valuable. The *Chronicon de Lanercost*, ed. by J. Stevenson (Edinburgh, 1839), is also very important. The English chronicles which may be consulted with advantage are those of Walter of Hemingford, ed. by H. C. Hamilton (1848–49) and of Peter Langtoft, ed. by T. Wright (1866–68), and the *Scalacronica* of Thomas Gray, ed. by J. Stevenson (Edinburgh, 1836). For the documents of the time reference should be made to the *Calendar of Documents relating to Scotland*, ed. by J. Bain (Edinburgh, 1881–88), *Documents and Records Illustrating the History of Scotland*, vol. i., ed. by F. Palgrave (1837); the *Rotuli Scotiae* (1814–19), and the *Foedera* of T. Rymer, vol. i. (1704). *See* also Sir H. Maxwell, *Robert the Bruce* (1897).

ROBERT II. (1316–1390), called "the Steward," king of Scotland, a son of Walter, the steward of Scotland (d. 1326), and Marjorie (d. 1316), daughter of King Robert the Bruce, was born on March 2, 1316. In 1318 the Scottish parliament decreed that if King Robert died without sons the crown should pass to his grandson; but the birth of a son, afterwards King David II., to Bruce in 1324 postponed the accession of Robert for nearly 42 years. Soon after the infant David became king in 1329, the Steward began to take a prominent part in the affairs of Scotland. He was one of the leaders of the Scottish army at the battle of Halidon Hill in July 1333; and together with John Randolph, 3rd earl of Moray (d. 1346), was chosen co-regent of Scotland, while David sought safety in France. The colleagues soon quarrelled; Randolph fell into the hands of the English, and Robert became sole regent until the return of David in 1341. The Steward escaped from the battle of Neville's Cross in 1346, and was again regent while the king was a captive in England.

Soon after this event some friction arose between Robert and his royal uncle. Accused, probably without truth, of desertion at Neville's Cross, the Steward as heir-apparent was chagrined by David's recognition of Edward III. as his successor.

In 1363 he rose in rebellion, and after having made his submission was seized and imprisoned together with his three sons, being only released a short time before David's death in February 1371. By the terms of the decree of 1318 Robert now succeeded to the throne, and was crowned at Scone in March 1371. His reign was unimportant; for relations with England and France *see* SCOTLAND: *History*. The king died at Dundonald on May 13, 1390, and was buried at Scone.

See Andrew of Wyntoun, *The Orygynale Cronykil of Scotland*, edited by D. Laing (Edinburgh, 1872–79); John of Fordun, *Scotichronicon*, continued by Walter Bower, ed. T. Hearne (Oxford, 1722); John Major, *Historia maioris Britanniae* translated by A. Constable (Edinburgh, 1892); and P. F. Tytler, *History of Scotland* (Edinburgh, 1841–43).

ROBERT III. (*c.* 1340–1406), king of Scotland, was the eldest son of King Robert II. by his mistress, Elizabeth Mure, and was legitimatized when his parents were married about 1349. In 1368 he was created earl of Carrick, and he took some part in the government of the kingdom until about 1387, when he was disabled by the kick of a horse. It was probably in consequence of this accident that his brother Robert, earl of Fife, and not the crown prince himself, was made guardian of the kingdom in 1389; but the latter succeeded to the throne on his father's death in May 1390. At this time he changed his baptismal name of John, which was unpopular owing to its connection with John de Baliol, for that of Robert, being crowned at Scone in August 1390 as King Robert III. The new king was only the nominal ruler of Scotland, the real power being in the hands of his brother, the earl of Fife. In 1399, his elder son, David, duke of Rothesay, was appointed lieutenant of the kingdom; but this event was followed by an English invasion of Scotland, by serious differences between Rothesay and his uncle, Robert, now duke of Albany, and finally in March 1402 by Rothesay's mysterious death at Falkland. Early in 1406 the king's only surviving son, afterwards King James I., was captured by the English; and on April 4, 1406, Robert died, probably at Rothesay, and was buried at Paisley.

ROBERT, the name of two dukes of Normandy.

ROBERT I. (d. 1035), called Robert the Devil, was the younger son of Richard II., duke of Normandy (d. 1026), and father of William the Conqueror. In 1028 he succeeded his brother, Richard III., whom he was accused of poisoning, as duke of Normandy. Robert sheltered the exiled English princes, Edward, afterwards King Edward the Confessor, and his brother Alfred, and fitted out a fleet for the purpose of restoring them to their inheritance, but this was scattered by a storm. When returning from a pilgrimage to Jerusalem, he died at Nicaea on July 22, 1035. Robert is the subject of several poems and romances. (*See* ROBERT THE DEVIL below.)

ROBERT II. (*c.* 1054–1134), called Robert Curthose, was the eldest son of William the Conquerer. Although recognized in boyhood as his father's successor in Normandy, he twice revolted against his father. (*See* WILLIAM I.) When the Conqueror died in September 1087 Robert became duke of Normandy, but not king of England; although he received offers of help, he took no serious steps to displace his younger brother, King William II. In Normandy his rule was weak and irresolute. He lost the county of Maine, which for some years had been united with Normandy, and he was soon at variance with his brothers, the younger of whom, Henry, he seized and put into prison. In 1089 his duchy was invaded by William II., who soon made peace with Robert, the two agreeing to dispossess their brother Henry of his lands in Normandy. This peace lasted until 1094, when occasions of difference again arose and another struggle began, Robert being aided by King Philip I. of France.

This warfare ended in 1096, when Robert set out on the first crusade, having raised money for this purpose by pledging his duchy to William for 10,000 marks. He returned to Normandy in September 1100.

William Rufus died while Robert was on his homeward way, and in Italy the Norman duke was greeted as king of England; but when he reached Normandy he learned that the English throne was already in the possession of Henry I. In July 1101 he crossed over to England, intending to contest his brother's title, but Henry met him near Alton, in Hampshire, and an amicable arrangement was made between them. But there was no lasting peace. In 1106 the English king crossed over to Normandy, and at the battle of Tinchebrai (Sept. 28, 1106), Henry took his brother prisoner and carried him to England. For twenty-eight years Robert was a captive, first in the Tower of London, and later in the castles of Devizes and Cardiff. He died probably at Cardiff on Feb. 10, 1134.

The chief sources for the life of Robert II. are Ordericus Vitalis, William of Malmesbury and other chroniclers of the time. *See* E. A. Freeman, *History of the Norman Conquest* (1870–76), and *The Reign of Rufus* (1882).

ROBERT, HUBERT (1733–1808), French artist, born at Paris on May 22, 1733, deserves to be remembered not so much for his skill as a painter as for the liveliness and point with which he treated his subjects. His work has a scenic character, and it was this quality which led Voltaire to entrust him with the decorations of his theatre at Ferney. Robert died of apoplexy on April 15, 1808.

See C. Blanc, *Hist. des peintres;* Villot, *Notice des tableaux du Louvre;* Julius Meyer, *Gesch. mod. fr. Malerei.*

ROBERT GUISCARD [*i.e.*, "the resourceful] (*c.* 1015–1085), the most remarkable of the Norman adventurers who conquered southern Italy. From 1016 to 1030 the Normans served either Greeks or Lombards as mercenaries, and then Sergius of

Naples, by installing the leader Rainulf in the fortress of Aversa in 1030, gave them their first pied-à-terre and they began an organized conquest of the land. In 1030 William and Drogo, the two eldest sons of Tancred of Hauteville, a petty noble of Coutances in Normandy, joined in the attempt to wrest Apulia from the Greeks, who by 1040 had lost most of that province. In 1042 Melfi was chosen as the Norman capital, and in September of that year the Normans elected as their count William "Iron Arm," who was succeeded in turn by his brothers Drogo, "comes Normannorum totius Apuliae et Calabriae," and Humfrey, who arrived about 1044. In 1046 arrived Robert, the sixth son of Tancred of Hauteville.

Guiscard soon rose to distinction. The Lombards turned against their allies and Leo IX. determined to expel the Norman freebooters. The army which he led towards Apulia in 1053 was, however, overthrown at Civitate on the Fortore by the Normans united under Humfrey, Guiscard and Richard of Aversa. In 1057 Robert succeeded Humfrey as count of Apulia and, in company with Roger his youngest brother, carried on the conquest of Apulia and Calabria, while Richard conquered the principality of Capua. The Papacy, foreseeing the breach with the emperor over investitures, now resolved to recognize the Normans and secure them as allies. Therefore at Melfi, on Aug. 23, 1059, Nicholas II. invested Robert with Apulia, Calabria, and Sicily, and Richard with Capua. Guiscard "by Grace of God and St. Peter duke of Apulia and Calabria and future lord of Sicily" agreed to hold by annual rent of the Holy See and to maintain its cause.

In the next twenty years Guiscard made an amazing series of conquests. Invading Sicily with Roger, the brothers captured Messina (1061) and Palermo (1072). Bari was reduced (April 1071) and the Greeks finally ousted from southern Italy. The territory of Salerno was already Robert's; in December 1076 he took the city, expelling its Lombard prince Gisulf, whose sister Sikelgaita he had married. The Norman attacks on Benevento, a papal fief, alarmed Gregory VII., but pressed by the emperor, Henry IV., he turned again to the Normans, and at Ceprano (June 1080) reinvested Robert, securing him also in the southern Abruzzi, but reserving Salerno. Guiscard's last enterprise was his attack on the Greek Empire, a rallying ground for his rebel vassals. He contemplated seizing the throne of the Basileus and took up the cause of Michael VII., who had been deposed in 1078 and to whose son his daughter had been betrothed. He sailed against the empire in May 1081, and by February 1082 had occupied Corfu and Durazzo. He was, however, recalled to the aid of Gregory VII., besieged in San Angelo by Henry IV. (June 1083). Marching north he entered Rome and forced Henry to retire, but an émeute of the citizens led to a three days' sack of the city (May 1084), after which Guiscard escorted the pope to Rome. His son Bohemund, for a time master of Thessaly, had now lost the Greek conquests. Robert, returning to restore them, occupied Corfu and Kephalonia, but died of fever in the latter on July 15, 1085.

Guiscard was succeeded by Roger "Borsa," his son by Sikelgaita; Bohemund, his son by an earlier Norman wife Alberada, being set aside. At his death Robert was duke of Apulia and Calabria, prince of Salerno and suzerain of Sicily. His successes had been due not only to his great qualities but to the "entente" with the Papal See. He created and enforced a strong ducal power which, however, was met by many baronial revolts, one being in 1078, when he demanded from the Apulian vassals an "aid" on the betrothal of his daughter. In conquering such wide territories he had little time to organize them internally. In the history of the Norman kingdom of Italy Guiscard remains essentially the hero and founder, as his nephew Roger II. is the statesman and organizer.

The best modern authorities are F. Chalandon, *Histoire de la domination normande en Italie et en Sicile* (Paris, 1907), and L. von Heinemann, *Geschichte der Normannen in Unteritalien* (Leipzig, 1894). Contemporary authors: Amatus, *Ystoire de li Normant*, ed. Delarc (Rouen, 1892); Geoffrey Malaterra and William of Apulia, both in Muratori Rer. Ital. SS., vol. v., and Anna Comnena in *Corpus script. hist. Byz.* (Bonn, 1839). (E. Cu.)

ROBERT OF AUXERRE (*c.* 1156–1212), French chronicler, was an inmate of the monastery of St. Marien at Auxerre. At the request of Milo de Trainel (1155–1202), abbot of this house, he wrote a *Chronicon*, or universal history, which covers the period between the creation of the world and 1211. Robert is an original authority for the period from 1181 to 1211. Two continuators took the work down to 1228 and it was extensively used by later chroniclers. The original manuscript is now at Auxerre.

See A. Molinier, *Les Sources de l'histoire de France*, tomes iii. and iv. (1903–04).

ROBERT OF COURTENAY (d. 1228), emperor of Rumania, or Constantinople, was a younger son of the emperor Peter of Courtenay, and was descended from the French king, Louis VI., while his mother, Yolande, was a sister of Baldwin and Henry of Flanders, the first and second emperors of Constantinople. When it became known in France that Peter of Courtenay was dead, his eldest son, Philip, renounced the succession in favour of his brother Robert, who set out to take possession of his distracted inheritance. Crowned emperor on March 25, 1221, Robert appealed for help to the pope and to the king of France; but meanwhile his lands were falling into the hands of the Greeks. Some little aid was sent from western Europe, but soon Robert was compelled to make peace with his chief foe, John Ducas Vatatzes, emperor of Nicaea, who was confirmed in all his conquests. Robert repudiated his affianced bride Eudoxia, daughter of Theodore Lascaris I., and married a French lady, already the fiancée of a Burgundian, by whom Robert was driven from Constantinople, and early in 1228 he died in Achaia.

See Gibbon, *Decline and Fall of the Roman Empire*, ed. Bury (1912), vol. 6, p. 449.

ROBERT OF GLOUCESTER, English chronicler, is known only through his connection with the work which bears his name. This is a vernacular history of England, from the days of the legendary Brut to the year 1270, and is written in rhymed couplets. The lines are of 14 syllables, with a break after the eighth syllable. He probably wrote about the year 1300. The earlier part of his chronicle (up to 1135) may be from another hand, since it occurs in some manuscripts in a shorter form, and with an exceedingly brief continuation by an anonymous versifier. The authorities employed for the earlier part were Geoffrey of Monmouth, Henry of Huntingdon, William of Malmesbury, the English chronicles, and some minor sources; Robert, in making his recension of it, also used the *Brut* of Layamon. From 1135 to 1256 Robert is still a compiler, although references to oral tradition become more frequent as he approaches his own time. From 1256 to 1270 he has the value of a contemporary authority. But he is more important to the philologist than to the historian. His chronicle is one of the last works written in Old English.

Robert's chronicle was first edited by T. Hearne (2 vols., Oxford, 1724); but this text is now superseded by that of W. Aldis Wright (2 vols., Rolls Series, 1887). Minor works attributed to the author are: a *Life of St. Alban* in verse (ms. Ashmole 43); a *Life of St. Patrick*, also in verse (ms. Tanner 17); a *Life of St. Bridget* (ms. C.C.C. Cambridge, 145); and a *Life of St. Alphege* (ms. Cott., Julius D. ix.). A *Martyrdom of St. Thomas Becket* and a *Life of St. Brendan*, both attributed to Robert, were printed by the Percy Society in 1845.

See T. D. Hardy's *Descriptive Catalogue of mss.* i. 25, 68, iii. 181–9, 623; K. Brossman, *Über die Quellen der Chronik des R. von Gloucester* (Striegau, 1887); W. Ellmer in *Anglia* (1888), x. 1–37, 291–322; H. Strohmeyer, *Der Stil der Reimchronik R. von Gloucester* (1891).

ROBERT OF JUMIÈGES (d. *c.* 1070), archbishop of Canterbury, was a Norman who became prior of St. Ouen at Rouen and then abbot of Jumièges. A close friend of the future king of England, Edward the Confessor, he crossed over to England with Edward in 1042, and in 1044 became bishop of London. Robert was the most trusted and the most prominent of the king's foreign friends, and was the leader of the party hostile to the influence of Earl Godwine. In 1051, although the chapter had already made an election, Edward appointed him archbishop of Canterbury. He seems to have been sent by the king on an errand to Duke William of Normandy, and on the return of Godwine

from exile in 1052 he fled in great haste from England. He was outlawed and deposed, and he died at Jumièges about 1070.

See *Two Saxon Chronicles*, edited by J. Earle and C. Plummer (Oxford, 1892); and E. A. Freeman, *History of the Norman Conquest* (Oxford, 1870–76).

ROBERT OF TORIGNI (*c.* 1110–1186), mediaeval chronicler, was prior of Bec in 1149, and in 1154 became abbot of Mont St. Michel, whence he is also sometimes called Robertus de Monte. He died, according to Potthast, on May 29, 1186. He wrote additions and appendices to the chronicle of Sigebert of Gembloux, covering the period A.D. 385–1100, and a chronicle in continuation of Sigebert, extending from 1100 to 1186, of great value for Anglo-Norman history. It is for continental affairs between 1154 and 1170 that his information is valuable.

The best modern editions are the *Chronique de Robert de Torigni*, etc., edited by Léopold Delisle for the *Soc. de l'histoire de Normandie* (Rouen, 1872–1873), and *Chronicle of Robert of Torigni*, edited with an introduction, by Richard Howlett (Rolls Series, No. 82, iv. 1889).

ROBERTS, FREDERICK SLEIGH ROBERTS, EARL (1832–1914), British soldier, second son of General Sir Abraham Roberts, G.C.B., was born at Cawnpore, India, on Sept. 30, 1832. Educated at Eton, Sandhurst and Addiscombe, he obtained a commission in the Bengal Artillery on Dec. 12, 1851. In the following year he was posted to a field battery at Peshawar, where he also acted as aide-de-camp to his father, who commanded the Peshawar division. In 1856 Roberts was appointed to the quartermaster-general's department of the staff, in which he remained for 22 years, passing from one grade to another until he became quartermaster-general in India. On the outbreak of the Mutiny in 1857, Roberts, at first, was staff officer to the movable column operating against the mutineers in the Punjab, but, towards the end of June, he joined the Delhi Field Force, and was deputy assistant quartermaster-general with the artillery during the operations against Delhi. He served under Sir Colin Campbell at the second relief of Lucknow in November, at the battle of Cawnpore on Dec. 6 and the subsequent pursuit and defeat of the Gwalior contingent near Shinrajpur.

Roberts distinguished himself at the engagement of Khudaganj, on Jan. 2, 1858, and he was recommended for the Victoria Cross for acts of gallantry there. He was present at the reoccupation of Fatehgarh on Jan. 6, the storm of Mianganj in February, the siege and capture of Lucknow in March, and the action at Kursi on the 22nd of that month, after which he went home on sick leave. For his services in the Mutiny he was seven times mentioned in despatches, received the medal with three clasps, the Victoria Cross, and on his promotion to captain, in Oct. 1860, a brevet majority. On May 17, 1859 he married, at Waterford, Miss Nora Bews, and on his return to India was entrusted with the organization of the viceroy's camps during the progresses through Oudh, the North-West Provinces, the Punjab and Central India in 1860 and 1861. In Dec. 1863 he took part, under Major-General Garvock, in the Umbeyla campaign among the mountains to the north of Peshawar, and was present at the storm of Lalu, the capture of Umbeyla and the destruction of Mulka.

In 1867 Roberts was appointed assistant quartermaster-general to Sir Donald Stewart's Bengal Brigade for Abyssinia. He showed judgment in embarking each unit complete in every detail, instead of despatching camp equipage in one ship, transport in another, and so on, as was customary. He arrived at Zula, Annesley Bay, in the Red Sea, the base of the expedition, on Feb. 3, 1868, and remained there as senior base staff officer during the four months' campaign. At its close he superintended the re-embarkation of the whole army. He returned to India the following year as first assistant quartermaster-general. In the autumn of 1871 he made the arrangements for the expedition into Lushai, between south-east Bengal and Burma, fitted out two columns under Brigadier-Generals Bourchier and Brownlow, and himself accompanied the first. A road, over 100 m. long, was cut through dense gloomy forests in stifling heat, and the column was attacked by cholera; but the object of the expedition was successfully accomplished, and Roberts, who was present at the capture of the Kholel villages and the action in the Northlang range, and commanded the troops at the burning of Taikum, was mentioned in despatches and made a Companion of the Bath. On his return in March 1872, he became deputy quartermaster-general in Bengal, and in 1875 quartermaster-general and colonel. He settled the details of the great camp of exercise at Delhi on the occasion of the visit of the prince of Wales in January 1876, and attended H.R.H. at the manoeuvres. He also superintended the arrangements for the great durbar at Delhi on Jan. 1, 1877, when Queen Victoria was proclaimed empress of India.

In 1878 Roberts was appointed to the command of the Frontier Field Force at Abbottabad, in Hazara; but in the autumn, on the repulse of the Chamberlain Mission by the Afghans, and the formation of three columns to advance into Afghanistan by the Khyber, the Bolan and the Kurram passes, he was given the command of the Kurram Field Force, with the rank of major-general. Concentrating his column at Thal, he advanced to Kurram towards the end of November, and having formed an advanced base there, moved on to Habib Kila. Under cover of preparations for a front attack on the Peiwar Kotal, he reconnoitred that formidable position, and on the night of Dec. 1, moved part of his force to attack the Spingawi Kotal, in order to turn the Afghan left flank, leaving the remainder of the force to feign a front attack on the Peiwar, and to guard the camp. After a very difficult night march the Spingawi Kotal was carried at daybreak on the 2nd, and, later, the Afghans on the Peiwar Kotal, threatened in rear, abandoned the position. The next morning Roberts occupied the Peiwar, and on the 6th advanced to Ali Khel. He reconnoitred the Shutargardan and the Sapari passes, and made a strong reconnaissance through Khost, in which some fighting took place, and at the end of January returned to Hagir Pir, in Kurram, where his force remained in occupation. In July Major Cavagnari, the British envoy to the new amir, Yakub Khan, passed through Kurram on his way to Kabul, and, shortly afterwards, Roberts left his Kurram command and went to Simla to take his seat on the army commission, where he strongly advocated the abolition of the three Presidency armies, and the substitution for them of four army corps, a measure which was carried out sixteen years later.

While Roberts was at Simla, news arrived on Sept. 5 of the murder of Cavagnari and his companions at Kabul. The Peshawar Valley Force had been broken up; Sir Donald Stewart was still at Kandahar, but most of his troops had started for India; Roberts, therefore, had the only force ready to strike rapidly at Kabul. It was hastily reinforced, and he hurried back to Kurram to take command, as a lieutenant-general, of the Kabul Field Force (7,500 men and 22 guns). By Sept. 19, a brigade was entrenched on the Shutargardan, and as Roberts advanced, the Amir Yakub Khan came into his camp. An Afghan force of 8,000 men blocked the way in a strong position on the heights beyond Charasia, and on Oct. 6, Roberts repeated the tactics that had done him such good service at the Peiwar in the previous year, and sending Brigadier-General T. D. Baker with the greater part of his force to turn the Afghan right flank, threatened the pass in front with the remainder. By the afternoon Baker had seized the position, and the enemy, severely defeated, were in full retreat. Kabul was occupied without further opposition.

The city was spared, but punishment was meted out to those convicted of complicity in the murder of the British Mission. Yakub Khan abdicated on Oct. 12, and was eventually deported to India. The troops occupied the Sherpur cantonments; but in November a religious war was proclaimed by the Mullahs, and early in December, in order to prevent a threatening combination of Afghan tribes against him, Roberts moved out two columns to attack them in detail. After considerable fighting near Kabul, the numbers of the enemy became so great that he was forced to concentrate his troops again at Sherpur, the defences of which had been greatly improved and strengthened. Sherpur was invested by the enemy, and early on Dec. 23, was attacked by over 100,000 Afghans. They were driven off with great loss; and on making a second attempt to storm the place, were met by Roberts, who moved out, attacked them in flank, and defeated them.

Roberts now recommended the political dismemberment of Afghanistan, and negotiations were carried on with the northern

tribes for the appointment of an amir for the Kabul district only. On May 5, Sir Donald Stewart arrived with his column from Kandahar and assumed the supreme command in Afghanistan, Roberts retaining, under Stewart, the command of the two Kabul divisions, and organizing an efficient transport corps under Colonel R. Low, which was soon to be of inestimable value. On July 22, Abdur Rahman was proclaimed Amir of Kabul; and Roberts was preparing to withdraw his troops to India by the Kurram route, when news arrived that a British brigade had been totally defeated at Maiwand on July 27, and that Lieutenant-General Primrose was besieged in Kandahar. Roberts was ordered to proceed thither at once with a specially selected column of 10,000 troops and his new transport corps. He started on his famous march on Aug. 9, and arrived at Kandahar on the morning of the 31st, having covered 313 miles in twenty-two days. On the following day he fought the battle of Kandahar and gained a complete victory. Roberts was now created K.C.B., G.C.B. and a baronet, and was given the command of the Madras army.

Before proceeding to Madras, Roberts went home on furlough, and when the news of the disaster at Majuba Hill in South Africa arrived in London at the end of February 1881, he was appointed governor of Natal and commander-in-chief in South Africa. He arrived at Cape Town to find that peace had been made with the Boers, and that instructions were awaiting him to return home. The same year he attended the autumn manoeuvres in Hanover as the guest of the German emperor. He declined the post of quartermaster-general to the forces in succession to Sir Garnet Wolseley, and returned to India, arriving at Madras in November. The following year he visited Burma with the viceroy, and in 1885 attended the meeting between Abdur Rahman and Lord Dufferin at Rawalpindi at the time of the Panjdeh incident, in connection with which he had been nominated to the command of an army corps in case of hostilities. In July he succeeded Sir Donald Stewart as commander-in-chief in India, and during his seven years' tenure of this high position instituted many measures for the benefit of the army, and greatly assisted the development of frontier communications and defence. At the end of 1886, at the request of the viceroy, he took personal command for a time of the forces in Burma, and organized measures for the suppression of dacoity. In 1892 he was created Baron Roberts of Kandahar and Waterford. In 1893 he left India for good, and the G.C.S.I. was bestowed upon him. He was promoted to be field-marshal in 1895, and in the autumn of that year succeeded Lord Wolseley in the Irish command and was sworn a privy councillor.

After the disastrous actions in the Boer war in South Africa in December 1899 at Magersfontein, Stormberg and Colenso, where his only son was killed, Lord Roberts was sent out as commander-in-chief. He arrived at Cape Town on Jan. 10, 1900, and after organizing his force, advanced with sound strategy on Bloemfontein, the capital of the Orange Free State, and soon changed the aspect of affairs. The sieges of Kimberley and Ladysmith were raised, and the Boer general, Cronje, flying towards the capital, was overtaken at Paardeberg and, after a fine defence, compelled to surrender, with 5,000 men, on the anniversary of Majuba Day, Feb. 27, 1900. Roberts entered Bloemfontein on March 13, and after six weeks' preparation, advanced on Pretoria, the capital of the Transvaal. Mafeking was relieved on May 17, and Pretoria occupied on June 5. The two Boer states were annexed, and the war gradually assuming a guerrilla character, Roberts handed over the command to Lord Kitchener and returned to England to fill the office of commander-in-chief of the army in succession to Lord Wolseley.

On his return in 1901 he received an earldom, the thanks of both Houses of Parliament and a grant of £100,000 for his services in South Africa. In 1905 he resigned his post on the Committee of National Defence, and devoted himself to attempting to rouse his countrymen to the necessity of cultivating rifle-shooting and of adopting systematic general military training and service. As head of the National Service League, he took part in the movement in favour of compulsory military service for home defence and published in 1911, *Fallacies and Facts,* in support of his views. On the outbreak of the World War he was a frequent visitor at the War Office, and shortly after the arrival of the two Indian divisions in France he crossed the Channel to visit them in the trenches. He was attacked by pneumonia while at the front, and he died at St. Omer on Nov. 14, 1914, the title going by special remainder to his elder daughter, Aileen Mary. He was buried in St. Paul's Cathedral, London.

Earl Roberts was the author of the following works: *The Rise of Wellington* (1895); *Forty-one years in India* (1897); *Letters written during the Indian Mutiny* (1924). *See* also H. Hensonan, *The Afghan War of 1879–1880* (1881); *The Anglo-Afghan War* (official account, 1881); Sir T. F. Maurice and M. H. Grant (Official), *History of the War in South Africa 1899–1902* (1906–1910); Sir G. W. Forrest, *The Life of Lord Roberts* (1914).

ROBERTSON, FREDERICK WILLIAM (1816–1853), English divine, known as Robertson of Brighton, was born in London on Feb. 3, 1816. He studied at Edinburgh university, and at Brasenose college, Oxford. He had intended to go into the army, but Oxford changed the bent of his mind, and he was ordained in 1840, and served in curacies at Winchester and Cheltenham. He entered in 1847 on his famous ministry at Trinity Chapel, Brighton, where his church was thronged with thoughtful men of all types. Robertson was not a scientific theologian; but his insight into the principles of the spiritual life was unrivalled. As his biographer says, thousands found in his sermons "a living source of impulse, a practical direction of thought, a key to many of the problems of theology, and above all a path to spiritual freedom." His closing years were full of suffering, arising mainly from the opposition aroused by his sympathy with the revolutionary ideas of the 1848 epoch. He died on Aug. 15, 1853.

Robertson's works include 5 vols. of sermons, 2 vols. of expository lectures, on Genesis and on the epistles to the Corinthians, a volume of miscellaneous addresses, and an *Analysis of "In Memoriam." See* Stopford A. Brooke, *Life and Letters* (1865).

ROBERTSON, THOMAS WILLIAM (1829–1871), English actor and dramatist, was born at Newark on Jan. 9, 1829. Robertson was familiar with the stage from his childhood; he was the eldest of a large family, the actress Margaret (Madge) Robertson (Mrs. Kendal) being the youngest. A farcical comedy by him, *A Night's Adventure,* was produced, without great success, at the Olympic, under Farren's management as early as 1851. He remained for some years longer in the provinces, varying his work as an actor with miscellaneous contributions to newspapers. In 1860 he went to London, and edited a mining journal. He was at one time prompter at the Olympic under the management of Charles Mathews. He wrote a farce entitled *A Cantab,* which was played at the Strand theatre in 1861. This brought him a reputation in a Bohemian clique, but so little practical assistance that he thought of abandoning the profession to become a tobacconist. Then, in 1864, came *David Garrick,* produced at the Haymarket with Edward Sothern in the principal character, which has kept the stage ever since.

But his name was made by the production of *Society* at the Prince of Wales Theatre in 1865, under the management of Miss Marie Wilton, afterwards Mrs. Bancroft. Play-writer and company were exactly suited one to another; the plays and the acting together—the small size of the playhouse being also in their favour—were at once recognized as a new thing. Although some critics sneered at the "cup-and-saucer comedy," voted it absurdly realistic, said there was nothing in it but commonplace life represented without a trace of Sheridanian wit and sparkle, all London flocked to the little house in Tottenham Street, and the stage was at once inundated with imitations of the new style of acting and the new kind of play. All Robertson's best known plays (except *David Garrick*) were written for the old Prince of Wales's under the Bancrofts, and that régime is now an historical incident in the progress of the English stage. *Ours* was produced in 1866, *Caste* in 1867, *Play* in 1868, *School* in 1869, *M.P.* in 1870. Robertson died in London on Feb. 3, 1871.

See *Principal Dramatic Works of Robertson; with Memoir by his son* (1889); and T. E. Pemberton, *Life and Writings of Robertson* (1893).

ROBERTSON, WILLIAM (1721–1793), Scottish historian, born at Borthwick, Midlothian, on Sept. 19, 1721, was the eldest

son of the Rev. William Robertson. He was educated at the school of Dalkeith and the University of Edinburgh. In 1743 he was presented to the living of Gladsmuir in East Lothian. His services in the '45 were rewarded by his election as a member of the General Assembly, where his influence as leader of the "moderate" party was for many years nearly supreme. (*See* PRESBYTERIANISM.)

Robertson's *History of Scotland during the Reigns of Queen Mary and of James VI. until his Accession to the Crown of England* begun in 1753, was published in two volumes in 1759 (19th ed. 1812). Before the end of the author's life the book had reached its 14th edition; and it soon brought him other rewards than literary fame. In 1759 he was appointed chaplain of Stirling castle, in 1761 one of His Majesty's chaplains in ordinary, and in 1762 he was chosen principal of the University of Edinburgh. In May 1763 he was elected Moderator of the General Assembly, and in August king's historiographer. His other works were: *History of the Reign of the Emperor Charles the Fifth* (3 vols., 1769) which had a European reputation and was translated into French in 1771, German, 1770–71, Italian, 1835, and Spanish, 1846; *History of America* (2 vols., 1777); *Disquisition concerning the Knowledge which the Ancients had of India* (1791).

There are lives of Robertson by Dugald Stewart (Edinburgh, 1801 and 1802), prefixed to most of the collective editions of his works; by George Gleig, bishop of Brechin (Edinburgh, 1812); and by Lord Brougham in *Lives of Men of Letters*, etc. (1845–1846). Robertson's works were edited with a life by D. Stewart (8 vols. 1817) and were translated into French in 12 vols. (1829) by J. B. Suard and others.

ROBERTSON, SIR WILLIAM ROBERT (1860–), British field marshal, was born at Welbourn, Lincs., on Sept. 14, 1860. He enlisted as a private in the 16th Lancers in 1877, and served in the ranks of that regiment until 1888, when he won a commission in the 3rd Dragoon Guards, then in India. He eagerly studied his profession in all its branches and he learned the native languages. He was railway staff officer in the Miranzai and Black Mountain operations of 1891, and in the following year joined the intelligence department at Simla; while on its staff he carried out a reconnaissance to the Pamirs, and in 1895 served with the Chitral Relief Force, being wounded and receiving the D.S.O. He passed through the Staff College in 1897–8—the first officer risen from the ranks to do so—and then, after a few months at the War Office, went out to South Africa on the Intelligence Staff; he accompanied Lord Roberts on his advance from Cape Colony into the Transvaal, and was promoted brevet lieutenant-colonel for his services. He spent the period from 1901 to 1907 at the War Office, being promoted colonel in 1903, and he then went to the staff at Aldershot, where he spent three years. In 1910 he was appointed commandant of the Staff College, was shortly afterwards promoted major-general and in 1913 became director of military training at the War Office.

On the mobilization of the army for the World War, Robertson became quartermaster-general of the Expeditionary Force, and in Jan. 1915 chief of the general staff to Sir John French. In the following December he was brought back to the War Office as chief of the imperial general staff and immediately introduced great improvements in the office organization. Convinced that the Western Front represented the decisive theatre of war, and fully aware how mischievous was dispersion of force in principle, he saw to it that, where operations in distant regions were unavoidable, the commanders on the spot were furnished with what was deemed essential to achieve success—with the result that the position of affairs in Mesopotamia, on the Suez frontier and in East Africa was completely transformed within a very few months. His services were recognized by promotion to general in 1916 and by the G.C.B. in 1917.

In the later months of 1917 he found it more and more difficult, in view of the disappointing results of Allied offensives in France and Flanders, to persuade the War Cabinet that diversion of fighting resources to other theatres of war endangered prospects of victory at the decisive point and might lead to disaster near home. His anxieties were increased by the manner in which the problem of man-power was treated. He moreover foresaw that the Supreme War Council, introduced towards the end of the year, would not provide effective means for combining the operations of the Allies. In Feb. 1918 he was transferred by the Government to the charge of the eastern command in England—just one month before the success that attended the great German offensive of March proved how correct had been his appreciation of the situation. Three months later he succeeded French as commander-in-chief in Great Britain. After the War he received a baronetcy, a grant of £10,000, and in 1919, the G.C.M.G. From April 1919 to March 1920 he commanded the British troops on the Rhine, and, after relinquishing that appointment on the force being reduced, was promoted field-marshal. Robertson received many English and foreign honours.

See his *From Private to Field-marshal* (1921); and *Soldiers and Statesmen 1914–1918* (1926).

ROBERT THE DEVIL, hero of romance. He was the son of a duke and duchess of Normandy, and by the time he was 20 was a prodigy of strength, which he used, however, only for outrage and crime. At last he learnt from his mother, in explanation of his wicked impulses, that he was born in answer to prayers addressed to the devil. He was directed by the pope to a hermit, who imposed on him by way of penance that he should maintain absolute silence, feign madness, take his food from the mouth of a dog, and provoke ill-treatment from the common people without retaliating. He became court fool to the emperor at Rome, and delivered the city from Saracen invasions in three successive years in the guise of an unknown knight, having each time been bidden to fight by a celestial messenger. The emperor's dumb daughter recovered speech to declare the identity of the court fool with the deliverer of the city, but Robert refused the hand of the princess and the imperial inheritance and ended his days in the hermitage of his old confessor. The French romance of *Robert le Diable* is one of the oldest versions of the legend. The story had undergone much change before it was used by E. Scribe and C. Delavigne in the libretto of Meyerbeer's opera of *Robert le Diable.*

See *Robert le Diable,* ed. E. Löseth (Soc. des anc. textes fr., 1903); *Sir Gowther,* ed. K. Breul (Oppeln, 1886); M. Tardel, *Die Sage v. Robert d. Teufel in neueren deutschen Dichtungen* (1900); L. A. Hibbard, *Medieval Romance in England* (1924).

ROBERT THE STRONG (le Fort) (d. 866), count of Anjou and of Blois, appears as rector of the abbey of Marmoutier in 852, and as one of Charles the Bald's *missi dominici,* in 853; but soon afterwards he was among those who rebelled against Charles, and invited the king's half-brother, Louis the German, to invade West Francia. In 860 Robert came to terms with Charles, who made him count of Anjou and of Blois, and entrusted him with the defence of that part of his kingdom which lay between the Seine and the Loire, a district which had suffered greatly from the ravages of the Normans and the Bretons. He was killed in battle at Brissarthe in October 866, leaving two sons, Odo, or Eudes, and Robert, both of whom became kings of the Franks. Robert was the ancestor of the Capetian kings of France.

See K. von Kalekstein, *Robert der Tapfere* (1871); and E. Favre, *Eudes, comte de Paris et roi de France* (1893).

ROBERVAL, GILLES PERSONNE (or PERSONIER) **DE** (1602–1675), French mathematician, was born at Roberval, near Beauvais, on Aug. 8, 1602. In 1632 he became professor of mathematics in the Collège de France. He died in Paris on Oct. 27, 1675. Roberval studied the quadrature of surfaces and the cubature of solids, which he accomplished, in some of the simpler cases, by an original method which he called the "Method of Indivisibles." He discovered a general method of drawing tangents, by considering a curve as described by a moving point whose motion is the resultant of several simpler motions. (*See* INFINITESIMAL CALCULUS.) He also discovered a method of deriving one curve from another, by means of which finite areas can be obtained equal to the areas between certain curves and their asymptotes. To these curves, which were also applied to effect some quadratures, Evangelista Torricelli gave the name of "Robervallian lines." Roberval invented the balance which goes

by his name.

His works were published in 1693 by the Abbé Gallois, in the *Recueil* of the *Mémoires de l'Académie des Sciences.*

ROBES, the name generally given to a class of official costume, especially as worn by certain persons or classes on occasions of particular solemnity. The word robe was earliest used, in the sense of a garment, of those given by popes and princes to the members of their household or their great officers. It would be going too far to assume that, *e.g.,* peers' robes were originally the king's livery, but in most early cases where robes are mentioned, if not of cloth of gold, etc., they are of scarlet, furred. A robe is properly a long garment, and the term "robes" is now applied only in those cases where a long garment forms part of the official costume, though in ordinary usage it is taken to include all the other articles of dress proper to the costume in question. The term "robes," moreover, connotes a certain degree of dignity or honour in the wearer. We speak of the king's robes of State, of peers' robes, of the robes of the clergy, of academic robes, judicial robes, municipal or civic robes; we should not speak of the robes of a cathedral verger, though he too wears a long gown of ceremony, and it is even only by somewhat stretching the term "robes" that we can include under it the ordinary academical dress of the universities. In the case of the official costume of the clergy, too, a distinction must be drawn. The sacerdotal vestments are not spoken of as "robes"; a priest is not "robed" but "vested" for Mass; yet the rochet and chimere of an English bishop, even in church, are more properly referred to as robes than as vestments, and while the cope he wears in church is a vestment rather than a robe, the scarlet cope which is part of his parliamentary full dress is a robe, not a vestment. The official, non-liturgical costume of the clergy is dealt with under the general heading VESTMENTS and the subsidiary articles.

The coronation robes of emperors and kings, representing as they do the sacerdotal significance of Christian kingship, are essentially vestments rather than robes. Apart from these, however, are the royal robes of State; in the case of the king of England a crimson velvet surcoat and long mantle, fastened in front of the neck, ermine lined, with a deep cape or tippet of ermine. The sovereign's coronation robes are described in "The King's Coronation Ornaments," by W. St. John Hope, in *The Ancestor,* vols. i. and ii., also by L. Wickham Legg, *English Coronation Records* (1901).

All countries, East and West, which boast an ancient civilization have some sort of official robes, and the tendency in modern times has been to multiply rather than to diminish their number. In the United States few save Federal judges wear robes. The scarlet judicial robes were discarded at the Revolution. Those of black silk now worn are slightly modified academic gowns. John Jay, first chief justice of the Supreme Court (1789), set the fashion by sitting in the LL.D. gown granted him by Columbia university. The present article does not attempt to deal with any but British robes, under the headings of (1) peers' robes, (2) robes in the House of Commons, (3) robes of the Orders of Knighthood, (4) judicial and forensic robes, (5) municipal and civic robes, (6) academic costume.

Peers' Robes.—As early as the end of the 14th century peers seem to have worn at their creation some kind of robe of honour. An illumination on the foundation charter of King's college, Cambridge, represents the peers in 1446 wearing gowns, mantles and hoods of scarlet, furred with miniver, the mantle opening on the right shoulder and guarded with two, three or four bars of miniver, in the form of short stripes high up on the shoulder. The origin of these is as yet unknown, and it is not certain precisely when the peers' velvet robe of estate was first used. During the reign of Henry VIII., references are found to the "parliament robes" of peers. By the time of James II.'s coronation, the baron and viscount had the velvet robes of estate. The colour of these seems to have been crimson at first, sometimes varying to purple. They consisted of a long gown or surcoat with girdle, a mantle lined with ermine, a hood and a tippet of ermine, the rows being as follows: for a duke 4, a marquess 3½, an earl 3, a viscount 2½ and a baron 2.

Till late in the 18th century peers continued to attend the House of Lords in parliamentary robes, with the stars and ribbons of their orders, but robes are now only worn in the House of Lords, *e.g.,* at the opening of parliament, on occasions when the sovereign gives his assent to bills by "royal commission" (when five or six peers on the Government side appear in robes, and the lord chancellor also wears his peer's robe of scarlet ermine), and at the introduction of a newly created peer, when the new peer and his two introducers wear their parliamentary robes (over morning dress) during the ceremony of introduction only. The mover and seconder of the Address no longer wear robes, but uniform. On all the above occasions, and when the peers as a body attend church or some other ceremony, the parliamentary robe of scarlet cloth is worn; in the present day it takes the form of a mantle opening on the right shoulder, with a collar of ermine, and guarded with rows of ermine and gold lace round the right shoulder, varying in number according to the rank of the wearer. The modern coronation robes consist of a crimson velvet surcoat and a mantle with a tippet of ermine and with rows of ermine as in the parliamentary robes. The surcoat is no longer a gown, but a short sleeveless garment.

As regards peeresses' robes, the order of the earl-marshal for the regulation of these at the coronation of James II. shows that by then all peeresses wore the robes of state of crimson velvet, and minutely regulates all details, such as shape, powderings, length of train and width of the fur edging of the mantle. They have changed very little up to the present day.

House of Commons.—The speaker of the House of Commons wears on state occasions a black damask robe with gold lace and a full-bottomed wig; in the House itself he wears a black silk robe with train and a full-bottomed wig. The clerks at the table wear barristers' gowns and wigs.

Robes of the Orders of Knighthood.—The robes of the Garter were originally of blue woollen stuff, the surcoat and hood being powdered with garters embroidered in silk and gold. The surcoat varied in colour from year to year; the hood was made of the same material as the surcoat and, when hats began to be worn, was carried hanging over the shoulder. Robes were sometimes granted to ladies in the early days. The last lady to receive the robes was Margaret, countess of Richmond, in 1488. At the present day the mantle is of dark blue velvet, of the same colour as the ribbon, lined with taffeta, and with the star embroidered on the left shoulder, the hood and surcoat of crimson velvet lined with white taffeta, and with these are worn a doublet and trunk-hose of white satin and a plumed hat.

The robes worn by the knights of the Bath created at the coronation of Henry IV. were green with furred hoods, and a white silk cord hanging from the left shoulder. The mantle in the present day is of crimson velvet lined with white over a white satin under-coat and trunk-hose, and a plumed hat and white boots with red tops are worn. The mantle of the Thistle is of dark green velvet over surcoat, etc., of cloth of silver; that of St. Patrick azure, with doublet and trunk-hose of white satin; that of St. Michael and St. George of Saxon blue satin lined with scarlet; and that of the Star of India of light blue satin lined with white.

Judicial and Forensic Robes.—It is frequently stated that judicial robes had their origin in the dress of ecclesiastics. But though ecclesiastics in early days frequently acted as judges, and though, as Fortescue says, the serjeant's long robe was "after the fashion of a priest," judicial robes more probably arose from the ordinary civilian dress of the early 14th century. The chief argument for the ecclesiastical origin has been found in the coif, a cap of white linen or silk, tied under the chin, and described by Fortescue as "the principal or chief insignment and habit wherewith serjeants-at-law at their creation are decked," which is said to have been used by ecclesiastics to hide the tonsure when in court. More probably the coif was a head-dress in common use in the 13th century, which survived as the distinguishing mark of men of law.

About the time of Queen Elizabeth the square cap, otherwise known as the cornered, black or sentence cap (the last from the

fact of its being put on by the judge when pronouncing sentence of death), began to appear. Sometimes it was worn over the coif only, sometimes over the coif and skull-cap. Sometimes it had ear-flaps, sometimes, as in its present form, it had not.

Towards the end of the 17th century the judges took to wearing wigs, and they have continued to wear them ever since. The wearing of wigs naturally concealed the coif and velvet skull-cap, so a device had to be invented by which they could still be displayed. The expedient was hit upon of putting a round patch of white stuff, with a black spot in the middle of it, on the crown of the wig of certain of the judges, to represent the coif and skull-cap. Serjeant being appointed no longer, this round patch has now disappeared, the only trace of it left being the circular depression on the crown of the wig.

Minute details of court and levée dress, judicial and legal, of the present day, will be found in *Dress worn at Court* (pp. 60–61), issued with the authority of the Lord Chamberlain—also details of mourning costume.

Municipal and Civic Robes.—The word "livery," the use of which is now practically confined to the costume of the "livery companies," the dress of men-servants, etc., originally meant an allowance of food or clothing granted to certain persons. It is still used of the allowances of food made to the fellows of certain colleges. As early as the 13th century, the citizens of London used to assume a uniform dress to do honour to some great occasion, as when 600 citizens rode out to meet Queen Margaret, wife of Edward I., "in one livery of red and white, with the cognizances of their misteries embroidered upon their sleeves." By the 14th century there is evidence of the adoption of liveries by the trades and fraternities; and when the livery companies were incorporated, they took care to have their liveries authorized by their charters.

As to the costume of the mayor, aldermen, sheriffs, etc., the scarlet, violet and black robes, still worn by them, were early in use. The provincial mayors and aldermen at quite an early date followed the fashion of London. An account of the robes of modern provincial mayors will be found in St. John Hope's *Corporation Plate and Insignia*.

At the present day the lord mayor has several sets of robes; a special coronation robe, a crimson velvet robe of State like that of an earl, worn with the chain and jewel, *e.g.*, in the presence of the sovereign when in the city; a black robe of State trimmed with gold, which is worn with the chain and jewel, *e.g.*, at the Guildhall on lord mayor's day; the scarlet robes, which are worn, with or without the chain, on most public occasions, such as the service at St. Paul's on the first day of the Easter law term, audiences of the sovereign, the election of the lord mayor, the opening of the central criminal court, etc.; a violet gown, which is worn, *e.g.*, when the lord mayor elect is presented to the king, when he is sworn in, at the election of sheriffs, etc., and a black gown worn in church on Good Friday, etc. The aldermen wear scarlet on most occasions of ceremony, ex-mayors "having the Cap of Dignity attached to their gown, and being entitled to introduce a sword and mace into their badges." Violet robes are also worn on certain occasions marked in the almanac of the *Alderman's Pocket-Book;* and black gowns when the lord mayor wears his. The sheriffs and recorders have scarlet, violet and black gowns, and the members of the common council have deep mazarine blue gowns, which seem to have been first prescribed in 1761.

Academic Costume, like judicial robes, has been considered to be of ecclesiastical origin, but though the mediaeval scholar was of course a clerk, and had to wear the clerkly gown and the tonsure, his robes probably developed out of the ordinary civilian costume. The statutes of certain colleges required of the scholars as early as the 14th century the tonsure and a "decent habit" suitable to a clerk, *i.e.*, a long gown, which it is stipulated in some cases must be closed in front. Some colleges had liveries, prescribed perhaps by the founder of the college and laid down by the statutes. The differences of colour and shape in the undergraduate gowns of most of the Cambridge colleges are supposed to be a survival of this.

The gown was worn by all degrees, as befitting clerks. It is hard to determine whether there was at first any difference between the gown of the higher degrees and that of the lower degrees, but it seems improbable. It was frequently fur-lined, but the use of the more costly furs was forbidden to all below the degree of master, except sons of noblemen, or those possessing a certain income, bachelors using budge. Students, and even doctors in theology were also restricted to budge, and to sad-coloured habits. The robes of masters had to be flowing and reach to the ankles.

The cope probably originated in the ordinary everyday mantle of the clergy. This kind of cope, closed in front, sometimes, for convenience's sake, had a slit in front to allow of the passage of the hands. By the 16th century all copes were scarlet. It has survived to the present day at Cambridge as the dress worn by the vice-chancellor and by regius professors of divinity, law and medicine when presenting for degrees.

The hood was originally worn by all scholars, as by everybody, and had evidently no academic significance. Sometimes a cap was also worn, the hood being thrown back. There were evidently hoods of two kinds for masters. At a later date, at Cambridge, a distinction was made between the hoods of non-regent masters, which were lined with silk, and those of regents, which were lined with miniver. Later again the regents wore their hoods in such a way as to show the white lining, while the non-regents wore theirs "squared," so that the white did not show. Hence the name "White Hoods" and "Black Hoods" given to the upper and lower houses of the old Senate respectively. It is not settled when the modern colourings of hoods arose; they probably followed those of the gowns of the faculties, but about these we are equally uncertain. The Oxford proctor still wears a miniver hood. The modern Cambridge hood has preserved the original shape more closely than the Oxford one, being a hood and tippet combined, the hood having square corners.

There seem to have been originally at least three varieties of academic head-dress, one of which, the round cap of velvet for doctors, survives as part of their full dress to the present day. The square cap was adopted at the universities, according to Robinson, after 1520, in imitation of the University of Paris. In this connection should be mentioned the term "tuft-hunting," *i.e.*, attempting to thrust oneself into the society of one's social superiors, derived from the gold tufts or tassel worn by noblemen and fellow-commoners on their college caps.

Academic dress underwent much inquiry and some revision at the time of the Reformation, chiefly in the direction of sobriety and uniformity, "excess of apparel" being repressed as severely as ever, but not with much more effect. There have been few far-reaching changes since the 17th century. Cambridge has of late years inquired into and revised her regulations as to dress, and in the *Ordinances* (latest ed. 1908, Statute A, cap. VII. p. 303) clear rules are laid down; the Oxford regulations (see *Statuta et Decreta Univ. Oxon.* for 1909, Tit. xiv., *de vestitu et habitu,* pp. 327–328) have not been revised lately, and some of them are a dead letter.

Doctors of both universities have three sets of robes: firstly, the full-dress gown of scarlet cloth; secondly, the congregation habit and hood of scarlet (now at Cambridge a cope, at Oxford the so-called "cope"); thirdly, the black gown. The first is worn by all doctors except the doctor of music, and is accompanied by the round cap of velvet. The Oxford D.D. also wears a cassock, sash and scarf. The scarlet gown is of a different and older shape than the M.A. and B.A. gowns. As now worn, it is faced with silk of the same colour as the hood of the faculty. The second, or cope, has now gone almost out of use, but is still worn when presenting for degrees, etc. It is sometimes worn over the black gown. There are several types of black gown, but the tufted gown of Loggan's day has now gone out of use. The M.D. and Mus.D. black gowns at Cambridge are now made after the pattern of the LL.D. gown, with wing-like sleeve and flap collar, trimmed with black lace, but the D.D., D.Sc. and Litt.D. wear the M.A. gown, the former with the scarf, the two latter with lace on the sleeve, placed horizontally for D.Sc. and vertically for Litt.D. Some doctors of divinity wear the full-sleeved gown with scarf. The head-dress of a D.D. is the square cap, of lay doctors the velvet bonnet with gold cord.

The Oxford sleeveless commoner's gown, though still by statute *talaris*, now reaches little below the waist, the full-sleeved scholar's gown to the knees. The tufted silk gown of the gentleman-commoner and the nobleman's gold-laced gown are not yet abolished by statute, but have fallen into disuse. Vice-chancellors have no official costume, but wear the habit of their degree. The chancellors of the older universities wear a black damask robe with gold lace, and a black velvet square cap with gold tassel or a doctor's velvet bonnet with gold cord; those of the newer universities have robes "created" by the robe-makers, who are nowadays to a large extent the arbiters of academic dress.

United States.—An intercollegiate commission in 1893 drafted a uniform code for academic caps, gowns, and hoods which has since been accepted by some 700 colleges and universities in the United States. Three types of gowns and three types of hoods are provided for bachelors, masters and doctors respectively. The square caps remain the same except that the doctor's may be made of velvet and have a tassel of gold. The bachelor's gown is made of black worsted material and may be distinguished by its pointed sleeves hanging nearly to the knee. The master's gown, made of silk, has closed sleeves (the arm coming through a slit at the elbow), which are square at the end, and extend well below the knee. The doctor's gown is also made of silk, and, like a judge's gown, has full round open sleeves, is faced with velvet and has three bars of velvet on each sleeve. The hoods are lined in silk with the colors of the institution granting the degree and trimmed with velvet of the color that represents the department of learning in which the degree was obtained. The velvet trimming of the doctor's gown may also be of the departmental color or it may be black if preferred. Colors of the more common departments of learning are as follows: arts and letters, white; theology and divinity, scarlet; laws, purple; philosophy, blue; science, golden yellow; medicine, green; dentistry, lilac; music, pink; engineering, orange. A few institutions, notably Harvard, retain an individual code for their hoods.

ROBESON, PAUL (1898–), American negro actor and singer, was born at Princeton, N.J., on Apr. 9, 1898. He graduated at Rutgers College with the highest scholastic average in the college's history, in addition to being a five-letter man in athletics and All-American football end for two successive years. In 1923 he completed the law course at Columbia University. His first stage appearance was in *Taboo* (1922) but he made his reputation with his creation of the rôle of Jim Harris in *All God's Chillun's Got Wings* and his playing of the title roles in *The Emperor Jones* (1923) and *Black Boy* (1926). In 1925 he played in *Voodoo* and *The Emperor Jones* in London. He afterwards played a short time in *Porgy* and in *Show Boat* in New York and in 1928 went to London in the latter play. His concert recitals of negro spirituals and work songs, first given in Paris in 1925 and New York in 1926, were highly successful and were continued in England and on the Continent in 1929.

ROBESPIERRE, MAXIMILIEN FRANÇOIS MARIE ISIDORE DE (1758–1794), French revolutionist, the son of an advocate, was born at Arras on May 6, 1758. His family, according to tradition, was of Irish descent. Maximilien was one of a family of four orphan children who were left in the care of their relatives, when their father left Arras after the Reformation on account of religion; and his direct ancestors in the male line had been notaries at the little village of Carvin near Arras from the beginning of the 17th century. His grandfather, being more ambitious, established himself at Arras as an advocate; and his father followed the same profession, marrying Jacqueline Marguerite Carraut, daughter of a brewer in the same city, in 1757. Of this marriage four children were born, two sons and two daughters, of whom Maximilien was the eldest; but in 1767 Madame Derobespierre, as the name was then spelt, died, and the disconsolate widower at once left Arras and wandered about Europe until his death at Munich in 1769. Maximilien was sent to the college of Arras, and the college of Louis-le-Grand at Paris. Here he had for fellow-pupils Camille Desmoulins and Stanislas Fréron.

Admitted an advocate in 1781, Robespierre returned to his native city to seek for practice. His reputation had already preceded him, and the bishop of Arras, M. de Conzié, appointed him criminal judge in the diocese of Arras in March 1782. This appointment, which he soon resigned, to avoid pronouncing a sentence of death, did not prevent his practising at the bar, and he speedily became a successful advocate. He now turned to literature and society, and came to be esteemed as one of the best writers and most popular dandies of Arras. He was a member of an Arras literary and musical society known as the "Rosati," of which Carnot was a member. The sympathetic quality of his voice won for his verses recited before this society applause not justified by their merits. In 1788 he took part in the discussion as to the way in which the states-general should be elected, showing clearly and forcibly in his *Adresse à la nation artésienne* that, if the former mode of election by the members of the provincial estates were again adopted, the new states-general would not represent the people of France. By the *Avis aux habitants de campagne* (Arras, 1789), which is almost certainly by him, he secured the support of the country electors, and, though but thirty years of age, poor and without influence, he was elected fifth deputy of the *tiers état* of Artois to the states-general. This election opened the way to his public career.

The Constituent Assembly.—When the states-general met at Versailles on May 5, 1789, the young deputy of Artois already possessed the one faculty which was to lead him to supremacy: he was a fanatic. Robespierre believed in the doctrines of Rousseau with all his heart, and would have gone to death for them; and in the belief that they would eventually succeed and regenerate France and mankind, he was ready to work with unwearied patience. While the Constituent Assembly occupied itself in drawing up a constitution, Robespierre turned from the assembly of provincial lawyers and wealthy *bourgeois* to the people of Paris. However, he spoke frequently in the Constituent Assembly, and often with great success, and was eventually recognized as second only to Pétion de Villeneuve—if second to him—as a leader of the small body of the extreme left,—the thirty voices, as Mirabeau contemptuously called them. When he instinctively felt that his doctrines would have no success in the Assembly, he turned to the Society of the Friends of the Constitution, known later as the Jacobin Club. The death of Mirabeau strengthened Robespierre's influence in the Assembly; but on May 15, 1791, he showed his jealous suspicion of his colleagues by proposing and carrying the motion that no deputies who sat in the Constituent could sit in the succeeding Assembly. The flight of the king on June 20, and his arrest at Varennes made Robespierre declare himself at the Jacobin Club to be *ni monarchiste ni républicain*. After the "Massacre" of the Champ de Mars (on July 17, 1791) he established himself, in order to be nearer to the Assembly and the Jacobins, in the house of Duplay, a cabinetmaker in the Rue St. Honoré, and an ardent admirer of his, where he lived (with but two short intervals) till his death. At last came his day of triumph, when on Sept. 30, on the dissolution of the Constituent Assembly, the people of Paris crowned Pétion and himself as the two incorruptible patriots.

On the dissolution of the Assembly he returned for a short visit to Arras, where he met with a triumphant reception. In November he returned to Paris and on Dec. 18 made a speech which marks a new epoch in his life. Brissot de Warville, the *âme politique* of the Girondin party which had been formed in the Legislative Assembly, urged vehemently that war should be declared against Austria, and the queen was equally urgent, in the hope that a victorious army might restore the old absolutism of the Bourbons. Two men opposed the projects of the queen and the Girondins—Marat and Robespierre. Robespierre feared a development of militarism, which might be turned to the advantage of the reaction. From that moment began the struggle which ended in the *coups d'état* of May 31 and June 2, 1793. Robespierre persisted in his opposition to the war; the Girondins, especially Brissot, attacked him violently; and in April 1792, he resigned the post of public prosecutor at the tribunal of Paris, which he had held since February, and started a journal, *Le Défenseur de la Constitution*, in his own defence. It is noteworthy that during

the summer months of 1792 in which the fate of the Bourbon dynasty was being sealed, neither the Girondins in the Legislative Assembly nor Robespierre took any active part in overthrowing it. But Robespierre, though shocked at the shedding of blood, was willing to take his seat on the Commune of Paris, which had overthrown Louis XVI., and might check the Girondins. The strong men of the Commune were glad to have Robespierre's assistance not because they cared for him or believed in him, but because of the help got from his popularity, his reputation for virtue, which had won for him the surname of "The Incorruptible," and his influence over the Jacobin Club and its branches, which spread all over France. He therefore presented the petition of the commune of Paris on Aug. 16, to the Legislative Assembly, demanding the establishment of a revolutionary tribunal and the summoning of a Convention. The massacres of September in the prisons, which Robespierre in vain attempted to stop, showed that the Commune had more confidence in Billaud than in him. Yet, as a proof of his personal popularity, he was a few days later elected first deputy for Paris to the National Convention.

The Convention.—On the meeting of the Convention the Girondins immediately attacked Robespierre; they were jealous of his influence in Paris, and knew that his single-hearted fanaticism would never forgive their intrigues with the king at the end of July. All personal disputes, however, gave way in December 1792 before the question of the king's trial, and here Robespierre took up a position which is at least easily understood. These are his words spoken on Dec. 3.

> This is no trial; Louis is not a prisoner at the bar; you are not judges; you are—you cannot but be—statesmen, and the representatives of the nation. You have not to pass sentence for or against a single man, but you have to take a resolution on a question of the public safety, and to decide a question of national foresight. It is with regret that I pronounce the fatal truth: Louis ought to perish rather than a hundred thousand virtuous citizens; Louis must die, that the country may live.

This great question settled by the king's execution, the impracticable plans of the Girondins drove Danton, Lazare Carnot, Robert Lindet, and even Billaud-Varenne to the side of Robespierre, whom, it is apparent, they thoroughly understood. In the month of May 1793 Camille Desmoulins, acting under the inspiration of Robespierre and Danton, published his *Histoire des Brissotins* and *Brissot démasqué;* Maximin Isnard declared that Paris must be destroyed if it pronounced itself against the provincial deputies; Robespierre preached insurrection at the Jacobin Club; and on May 31 and June 2 the Commune of Paris destroyed the Girondin party.

Committee of Public Safety.—On July 27, 1793; when the struggle was practically decided, the Convention elected Robespierre to the new Committee of Public Safety. Robespierre was always in a minority in the committee of twelve; at least seven of whom, Carnot, Billaud-Varenne, Collot d'Herbois, Prieur Duvernois, Prieur, Saint André and Lindet were men of action and not under his personal influence. Robespierre was not the inventor of the Terror or its machinery, the revolutionary tribunal and the representatives of the committee on mission in the provinces. He served it by his gift of eloquence. He had a fanatical following among the Jacobins and was one of the most popular orators in the Convention, on which his carefully prepared addresses made a deep impression. His panegyrics on the system of revolutionary government and his praise of virtue led his hearers to believe that the system of the Terror, instead of being monstrous, was absolutely laudable; his pure life and admitted incorruptibility threw a lustre on the Committee of which he was a member; and his colleagues were glad to avail themselves of these advantages so long as he did not interfere with their work. Moreover, he alone never left Paris, whilst all the others, except Barère, were constantly engaged on missions to the armies, the navy and the provinces. It has been asserted that Robespierre, Couthon and Saint-Just took upon themselves the direction of "la haute politique," while the other members acted only in subordinate capacities; undoubtedly it would have suited Robespierre to have had this believed, but as a matter of fact he was in no way especially trusted in matters of supreme importance.

It is clear therefore that Robespierre was not the sole author of the overthrow of the Dantonists and the Hébertists, though he thoroughly agreed with the majority and had no desire to save them, the Hébertist principle of decentralization and the Dantonist moderatism being equally obnoxious to him.

Fall of Danton.—Both parties must be crushed. Before the blows at the leaders of those two parties were struck, Robespierre retired for a month (from Feb. 13–March 13, 1794) from active business in the Convention and the Committee, apparently to consider his position; but he came to the conclusion that the cessation of the Reign of Terror would mean the loss of that supremacy by which he hoped to establish the ideal of Rousseau: for Danton, he knew, was essentially a practical statesman and laughed at his ideas and especially his politico-religious projects. He must have considered too that the result of his siding with Danton would probably have been fatal to himself. The result of his deliberations was that he abandoned Danton and co-operated in the attacks of the Committee on the two parties. On March 15 he reappeared in the Convention; on the 19th Hébert and his friends were arrested; and on the 24th they were guillotined. On March 30 Danton, Camille Desmoulins and their friends were arrested, and on April 5 they too were guillotined.

It was not until after the execution of Danton that Robespierre began to develop a policy distinct from that of his colleagues in the Committee, an opposition which ended in his downfall. He began by using his influence over the Jacobin Club to dominate the Commune of Paris through his devoted adherents, two of whom, Fleuriot-Lescot and C. F. de Payan, were elected respectively mayor and *procureur* of the Commune. He also attempted to usurp the influence of the other members of the Committee over the armies by getting his young adherent, Saint-Just, sent on a mission to the frontier. In Paris Robespierre determined to increase the pressure of the Terror: no one should accuse him of moderatism; through the increased efficiency of the revolutionary tribunal Paris should tremble before him as the chief member of the Committee; and the Convention should pass whatever measures he might dictate. To secure his aims, Couthon, his other ally in the Committee, proposed and carried on June 10 the outrageous law of 22nd Prairial, by which even the appearance of justice was taken from the tribunal, which, as no witnesses were allowed, became a simple court of condemnation. The result of this law was that between June 12 and July 28, the day of Robespierre's death, no less than 1,285 victims perished by the guillotine in Paris. It was the bloodiest and the least justifiable period of the Terror. But before this there had taken place in Robespierre's life an episode of supreme importance, as illustrating his character and his political aims: on May 7 he secured a decree from the Convention recognizing the existence of the Supreme Being. This worship of the Supreme Being was based upon the ideas of Rousseau in the *Social Contract,* and was opposed by Robespierre to Catholicism on the one hand and the Hébertist atheism on the other. In honour of the Supreme Being a great fête was held on June 8; Robespierre, as president of the Convention, walked first and delivered his harangue, and as he looked around him he may well have believed that his position was secured and that he was at last within reach of a supreme power which should enable him to impose his belief on all France, and so ensure its happiness. The devotion of Robespierre's adherents was further excited by the news that a half-witted girl, named Cécile Renault, had been found wandering near his house, with a knife in her possession, intending to play the part of Charlotte Corday. She was executed on June 17, on the very day that Vadier raised a laugh at Robespierre's expense in the Convention by his report on the conspiracy of Catherine Théot, a mad woman, who had asserted that Robespierre was a divinity.

The 9th Thermidor.—Robespierre felt that he must strike his blow now or never. Yet he was not sufficiently audacious to strike at once, as Payan and Jean Baptiste Coffinhal, the ablest of his adherents, would have had him do, but retired from the Convention for some weeks, as he had done before the overthrow of the Hébertists and the Dantonists, to prepare his plan of action. These weeks, the last of his life, Robespierre passed very

peacefully. He continued to live with the Duplays, with whose daughter Éléonore he had fallen in love, and used to wander with her in the Champs Élysées during the long summer evenings. At last, on July 26, Robespierre appeared, for the first time for more than four weeks, in the Convention and delivered a carefully studied harangue, which lasted for more than four hours, in which he declared that the Terror ought to be ended, that certain deputies who had acted unjustly and exceeded their powers ought to be punished, and that the Committees of Public Safety and General Security ought to be renewed. The majority of the Committee of Public Safety determined to act promptly. The Convention, moved by Robespierre's eloquence, at first passed his motions; but he was replied to by Joseph Cambon the financier, Billaud-Varenne, Amar and Vadier, and the Convention rescinded their decrees and referred Robespierre's question to their committees. On the following day, July 27, or in the revolutionary calendar the 9th Thermidor, Saint-Just began to speak on behalf of the motions of Robespierre, when violent interruptions showed the temper of the Convention. Jean Lambert, Tallien, Billaud-Varenne and Vadier again attacked Robespierre; cries of "Down with the tyrant!" were raised; and, when Robespierre hesitated in his speech in answer to these attacks, the words "C'est le sang de Danton qui t'étouffe" showed what was uppermost in the minds of the Mountain. Robespierre tried in vain to gain a hearing, the excitement increased and at five in the afternoon Robespierre, Couthon and Saint-Just, with two young deputies, Augustin Robespierre (younger brother of Maximilien) and Philippe François Joseph Lebas, the only men in all the Convention who supported them, were ordered to be arrested. Robespierre was speedily rescued from his prison, with the other deputies, by the troops of the Commune and brought to the Hôtel de Ville. There he was surrounded by his faithful adherents, led by Payan and Coffinhal. But the day was past when the Commune could overawe the Convention; for now the men of action were hostile to the Commune, and its chief was not a master of *coups d'état*. On the news of the release of Robespierre, the Convention had again met, and declared the members of the Commune and the released deputies outlawed. The national guards under the command of Barras made their way to the Hôtel de Ville; Robespierre was shot in the lower jaw by a young gendarme named Meda while signing an appeal to one of the sections of Paris to take up arms for him, though the wound was afterwards believed to have been inflicted by himself; and all the released deputies were again arrested. After a night of agony, Robespierre was the next day taken before the tribunal, where his identity as an outlaw was proved, and without further trial he was executed with Couthon and Saint-Just and nineteen others of his adherents on the Place de la Révolution on the 10th Thermidor (28th July) 1794.

Character.—The character of Robespierre, when looked upon simply in the light of his actions and his authenticated speeches, and apart from the innumerable legends which have grown up about it, is comparatively simple. A well-educated and accomplished young lawyer, he might have acquired a good provincial practice and lived a happy provincial life had it not been for the Revolution. Like thousands of other young Frenchmen, he had read the works of Rousseau and taken them as gospel. Just at the very time in life when this illusion had not been destroyed by the realities of life, and without the experience which might have taught the futility of idle dreams and theories, he was elected to the states-general. At Paris he was not understood till he met with his audience of fellow-disciples of Rousseau at the Jacobin Club. His fanaticism won him supporters; his singularly sweet and sympathetic voice gained him hearers; and his upright life attracted the admiration of all. As matters approached nearer and nearer to the terrible crisis, he failed, except in the two instances of the question of war and of the king's trial, to show himself a statesman, for he had not the liberal views and practical instincts which made Mirabeau and Danton great men. His admission to the Committee of Public Safety gave him power, which he hoped to use for the establishment of his favourite theories, and for the same purpose he acquiesced in and even heightened the horrors of the Reign of Terror. It is here that the fatal mistake of allowing a theorist to have power appeared: Billaud-Varenne systematized the Terror because he believed it necessary for the safety of the country; Robespierre intensified it in order to carry out his own ideas and theories. Robespierre's private life was always respectable: he was always emphatically a gentleman and man of culture, and even a little bit of a dandy, scrupulously honest, truthful and charitable. In his habits and manner of life he was simple and laborious; he was not a man gifted with flashes of genius, but one who had to think much before he could come to a decision, and he worked hard all his life.

On the family of Robespierre *see* A. J. Paris in the *Mémoires* (2nd series, vol. iii.) of the Academy of Arras; the *Oeuvres de Maximilien Robespierre* (3 vols., 1840), published by Laponneraye with preface by Armand Carrel, contain some of his speeches and the memoirs of Charlotte Robespierre on her brothers. A new edition of the Oeuvres (2 vols., 1913) is edited by A. Lesueur. The standard work on Robespierre's career is Ernest Hamel, *Histoire de Robespierre d'après des papiers de famille, les sources originales et des documents entièrement inédits* (3 vols., 1865–67). After the appearance of the first volume, the publisher refused to proceed for fear of prosecution until compelled to do so by the author. Another edition with a different title appeared in 1878. *See* also Ch. d'Hericault, *La Révolution de Thermidor* (2nd ed., 1878); Karl Brunnemann, *Maximilien Robespierre* (Leipzig, 1880); F. A. Aulard, *Les Orateurs de l'Assemblée Constituante* (1882); M. de Lescure, "Le Roman de Robespierre," in *La Société française pendant la Terreur* (1882); E. Hamel, *La Maison de Robespierre* (1895); Hilaire Belloc, *Robespierre* (1901); C. F. Warwick, *Robespierre and the French Revolution* (1909); A. Mathiez, *Études Robespierristes* (2 vols., 1897, 1918), and *Autour de Robespierre* (1925). Many of the books which have been written about Robespierre are most untrustworthy, and the picture of him given by Thomas Carlyle in his *French Revolution* is unjust.



BY COURTESY OF THE NATIONAL ASSOCIATION OF AUDUBON SOCIETIES

THE AMERICAN ROBIN (TURDUS MIGRATORIUS), ALSO CALLED ROBIN REDBREAST IN NEW ENGLAND

ROBIN, the name applied to a number of familiar birds; in England to *Erithacus rubecula* (*see* REDBREAST); in North America to *Turdus migratorius* and *P. confinis,* which are thrushes with a loud cheery song, reddish breast and dark slate back and wings. *T. migratorius* breeds north to Alaska, wintering from the northern United States southwards. The western robin (*T. m. propinquus*) is found from the eastern base of the Rocky Mountains to the Pacific.

ROBIN HOOD, English legendary hero. The oldest datable mention of Robin Hood at present known occurs in the second edition of *Piers Plowman,* the date of which is about 1377. In that poem the figure of Sloth is represented as saying—

> "I can nou3te perfitly my pater-noster, as
> the prest it syngeth:
> But I can rymes of Robyn Hood and Randolf
> Erle of Chestre."

He is next mentioned by Andrew of Wyntoun in his *Original Chronicle of Scotland,* written about 1420. Of his popularity in the latter half of the 15th and in the 16th centuries there are many signs. In the Elizabethan era and afterwards mentions abound. Of the ballads themselves, *Robin Hood and the Monk* is possibly as old as the reign of Edward II. (see Thomas Wright's *Essays on England in the Middle Ages,* ii. 174); *Robin Hood and the Potter* and *Robyn and Gandelyn* are certainly not later than the 15th century. Most important of all is *A Lytell Geste of Robyn Hode,* which was first printed about 1510 (*see* A. W. Pollard's *Fifteenth Century Prose and Verse,* 1903). This is evidently founded on older ballads; we read in *The Seconde Fytte,* ll. 176 and 177—

> "He wente hym forthe full mery syngynge,
> As men have told in tale."

In fact, it does for the Robin Hood cycle what a few years before Sir Thomas Malory had done for the Arthurian romances.

These are the facts about him and his balladry. Of conjectures there is no end. He has been represented as the last of the Saxons—as a Saxon holding out against the Norman conquerors

so late as the end of the 12th century (*see* Augustin Thierry's *Norman Conquest*, and compare Sir Walter Scott's *Ivanhoe*). J. M. Gutch maintains that he was a follower of Simon de Montfort. The Robin Hood story has probably some historical basis. Sloth in Langland's poem couples him with Randle, earl of Chester, whom we believe to have been the third Randle (*see* Bishop Percy's Folio Ms., ed. Hales and Furnivall, i. 260); and, possibly enough, Hood was contemporary with that earl, who "flourished" in the reigns of Richard I., John and Henry III. His myth was, as is evident from what we have already said, full-grown in the first half of the 14th century.

That the Robin Hood story attracted to it and appropriated other elements is illustrated by its subsequent history. Thus later on we find it connected with the Morris dance; but the Morris dance was not known in England before the 16th century or late in the 15th. The Maid Marian (*q.v.*) element has been thought to have been introduced for the purpose of these performances, which were held on May-day and were immensely popular (*see* Latimer's *Frutefull Sermons* [1571], p. 75; also *Paston Letters*, (ed. J. Gairdner, iii. 89). After 1615, the date of the pageant prepared for the mayoralty of Sir John Jolles, draper, by Anthony Munday and entitled *Metropolis Coronata*, the yeoman of the older version was metamorphosed into the earl of Huntingdon, for whom in the following century William Stukeley discovered a satisfactory pedigree! The earl of Huntingdon was probably a nickname for a hunter. The rise, development and decay of the myth deserve thorough study.

What perhaps is its greatest interest is its expression of the popular mind about the close of the middle ages. Robin Hood was at that time the people's ideal, as Arthur is that of the upper classes. He is the ideal yeoman, as Arthur is the ideal knight. He readjusts the distribution of property; he robs the rich and endows the poor. He is an earnest worshipper of the Virgin, but a vigorous hater of monks and abbots. He is the great sportsman, the incomparable archer, the lover of the greenwood and of a free life, brave, adventurous, jocular, open-handed, a protector of women. The story is localized in Barnsdale and Sherwood, *i.e.*, between Doncaster and Nottingham. In Yorkshire, Nottinghamshire and Lincolnshire a host of place-names testify to the popularity of the Robin Hood legend—Robin Hood's Bay, Robin Hood's Cave, Robin Hood's Chase, Robin Hood's Cup (a well), Robin Hood's Chair, Robin Hood's Pricks and many more.

The best collections of Robin Hood poems are those of J. Ritson (1795), F. J. Child in the 5th volume of his *English and Scotch Popular Ballads* (Boston, 1888); and F. Jackson, *Popular Ballads of the Olden Time*, 4th Series (1912). *See* also F. B. Gummere, *Old English Ballads* (Boston, 1894). The versions in the Percy Folio (edited by Hales and Furnivall, 1867, vol. i.) are unhappily mutilated; but they should be consulted, for some are of a unique character, and that on "Robin Hoode his death" is of singular interest. The earliest "Garland" was printed in 1670, and in 1678 appeared a prose version which was reprinted by W. J. Thomas in his *Early English Prose Romances* (vol. ii. 1858). Sir S. Lee's memoir in the *Dictionary of National Biography* is extremely erudite, and two valuable articles, contributed by Sir E. Brabrook to the *Antiquary* for June and July 1906, might be consulted. *See* also W. Stukeley, *Paleographia Britannica*, No. i. 115 (1795); A. Thierry, *Conquête de l'Angleterre* (1830); J. Hunter, *Great Hero of the Ancient Minstrelsy of England, Robin Hood* (1852).

ROBIN HOOD'S BAY, a fishing town and seaside resort in the Scarborough and Whitby parliamentary division of the North Riding of Yorkshire, England, 6½ m. S.E. of Whitby by the L.N.E. railway. The bay is a shallow indentation of the coast, fringed with a line of high cliffs which is broken in places by steep-sided gullies. On the adjoining moor are prehistoric British tumuli popularly called Robin Hood's Butts.

ROBINIA or **LOCUST-TREE,** a genus of about 15 species natives of North America and Central America, belonging to the family Leguminosae. The best-known species (*R. Pseudacacia*) was introduced into Europe in 1636. This tree, the false acacia, often called erroneously acacia, is now widely cultivated as an ornamental tree in Europe. It grows from 30 to 60 ft. high, and bears long, graceful compound leaves with 9 to 17 bright green oblong leaflets, and white fragrant flowers in loose pendulous racemes, recalling the laburnum. There are many varieties varying in the method of growth, the presence or absence of thorns (persistent spinose stipules) on the branches and the colour of the flower.

In the eastern United States, where it is native, it grows from 70 to 80 ft. high with a trunk 3 or 4 ft. in diameter. It is a valuable timber tree; the wood is heavy, hard, strong, close-grained and durable.

The clammy false acacia (*R. viscosa*), a tree sometimes 40 ft. high, with pinkish flowers, and the rose acacia or moss locust (*R. hispida*), a small shrub, with showy rose-coloured flowers, both natives to the south-eastern United States, are also cultivated for ornament.

ROBINSON, BENJAMIN LINCOLN (1864–), American botanist, was born at Bloomington, Ill., on Nov. 8, 1864, brother of James Harvey Robinson (*q.v.*). He graduated at Harvard university in 1887 and pursued further botanical study at the Universities of Strasbourg (Ph.D., 1889) and Bonn (Ph.D., 1890). He became assistant at the Gray herbarium in 1890, curator in 1892 and in 1899 was made Asa Gray professor of systematic botany, Harvard university. He was editor of portions of the *Synoptical Flora of North America*, by Asa Gray, Sereno, Watson, Robinson, and others (1892–97), and, with M. L. Fernald (*q.v.*), edited the 7th edition of *Gray's New Manual of Botany* (1908). In 1899 he became editor of *Rhodora*. He published a *Flora of the Galapagos Islands* and numerous papers on the classification of the higher plants of North America, Mexico and northern South America, especially on the Eupatorieae.

ROBINSON, EDWARD (1794–1863), American Biblical scholar, was born in Southington, Conn., on April 10, 1794. In 1837 he became professor of Biblical literature in Union Theological seminary, and left America for three years of study in Palestine and Germany, the fruit of which, his *Biblical Researches* (published simultaneously in England, Germany and America in 1841), brought him the gold medal of the Royal Geographical Society in 1842. *Later Biblical Researches* appeared in 1856. His plans to sum up his important topographical studies in a work on Biblical geography were cut short by cataract in 1861 and by his death in New York city on Jan. 27, 1863. A great Biblical scholar and exegete, Robinson must be considered the pioneer and father of Biblical geography. His *Biblical Researches*, supplemented by the *Physical Geography of the Holy Land* (1865), were based on careful personal exploration and tempered by a thoroughly critical spirit, which was possibly at times too sceptical of local tradition. Of scarcely less value in their day were his *Greek Harmony of the Gospels* (1845) and his *Greek and English Lexicon of the New Testament* (1836).

See H. B. Smith and R. D. Hitchcock, *The Life, Writings and Character of Edward Robinson* (1863); a biography of Mrs. Robinson was published, with a collection of her stories, in Leipzig, in 1874.

ROBINSON, EDWIN ARLINGTON (1869–), an American poet, was born at Head Tide (Maine), Dec. 22, 1869. From the public schools of Gardiner (Maine), he proceeded in 1891 to Harvard, but withdrew after two years. Most of his later life was spent in New York city, where he was for a time a subway inspector and, through President Roosevelt's recognition of his merit, a clerical worker in the Customs House. He received several awards of the Pulitzer prize for poetry.

His verse includes *The Torrent and the Night Before* (1896), *The Children of the Night* (1897), *Captain Craig* (1902), *The Town Down the River* (1910), *The Man Against the Sky* (1916), *Merlin* (1917), *Lancelot* (1920), *The Three Taverns* (1920), *Avon's Harvest* (1921), *Collected Poems* (1921), *Roman Bartholow* (1923), *The Man Who Died Twice* (1924), *Dionysus in Doubt* (1925), *Tristram* (1927) and *Cavender's House* (1929). Experiments in a different medium are the prose plays *Van Zorn* (1914) and *The Porcupine* (1915). Mr. Robinson's work, of singularly uniform poetic excellence and of penetrating insight, gives him a foremost place among contemporary writers.

See biographical and critical monographs by Lloyd Morris (with a bibliography by W. Van R. Whitall, 1923), by B. R. Redman (1926), and by Mark Van Doren (1927).

ROBINSON, HENRY CRABB (1775–1867), English journalist and diarist, the son of a tanner, was born at Bury St. Edmunds on March 13, 1775. He travelled much on the Continent of Europe, and acted as special war correspondent for the

Times in 1807–08. From 1813 to 1828 he practised at the bar. He is remembered chiefly as the friend of Lamb, Coleridge, Wordsworth and Southey. He was a great conversationalist, and his breakfast parties rivalled those of Samuel Rogers. He died in London on Feb. 5, 1867.

His *Diary* of 35 volumes, his *Journals* of 30 volumes, and his *Letters and Reminiscences* in 36 volumes, contain vivid pictures, drawn by an acute and sympathetic observer who had exceptional opportunities of studying contemporary celebrities. They are preserved at Dr. Williams's library in Gordon Square, London. Crabb Robinson seems to have intended to edit these for publication, but except for a selection edited by Thomas Sadler and entitled *The Diary, Reminiscences, and Correspondence of H. Crabb Robinson* (3 vols. 1869), and the *Correspondence of Henry Crabb Robinson with the Wordsworth Circle* ed. E. J. Morley (2 vols., 1927), they have never been reprinted. Crabb Robinson was one of the founders of the Athenaeum Club and of University college, London.

ROBINSON, JAMES HARVEY (1863–), American historian, was born in Bloomington (Ill.), on June 29, 1863. On graduating from Harvard university in 1887 he went to Germany, and studied history at Freiburg university. In 1891 he was lecturer on European history at the University of Pennsylvania and in 1892 he was appointed associate professor of history at Columbia university, becoming professor in 1895. He resigned his professorship in 1919 and devoted himself to the organization of the New School for Social Research in New York city. The "new history," of which he has been a leading exponent, challenges the traditional choice of material, maintaining that in the past far too much stress has been placed upon the course of politics and State rivalries, and too little on the rôle of thought in world changes. Dr. Robinson was an editor of the *Annals* of the American Academy of Political and Social Science (1891–95) and associate editor of *The American Historical Review* (1911–20). He wrote *An Introduction to the History of Western Europe* (1902–03; enl. ed. 1924–26); and other works.

ROBINSON, JOHN (1575–1625), English Nonconformist divine. Robinson settled in Amsterdam in 1608, but in the following year removed, with a large contingent, to Leiden, where he ministered to a community whose numbers gradually grew from one hundred to three hundred. In 1620 a considerable minority of these sailed for England in the "Speedwell," and ultimately crossed the Atlantic in the "Mayflower"; it was Robinson's intention to follow as soon as practicable, with the rest of his flock, but he died before the plan could be carried out, on March 1, 1625.

Amongst his publications may be mentioned *Justification of Separation from the Church* (1610), *Apologia Brownistarum* (1619), *A Defence of the Doctrine propounded by the Synod of Dort* (1624), and a volume of *Essays, or Observations Divine and Moral,* printed in 1625. His Works (with one exception, *A Manumission to a Manduction,* since published by the Massachusetts Historical Society, ser. iv., vol. i.), including a memoir, were reprinted by R. Ashton in three vols. in 1851. A summary of their contents is given in G. Punchard, *History of Congregationalism* (New York, 1867), iii. 300–344. *See* further CONGREGATIONALISM, and the literature there cited; also O. S. Davis, *John Robinson* (Hartford, Connecticut, 1897).

ROBINSON, SIR JOSEPH BENJAMIN (1840–1929), South African mine-owner, was born on Aug. 3, 1840, at Cradock, Cape Colony. He made his fortune in the diamond rush of 1867 on the Vaal river, by purchasing the stones from the natives and afterwards by buying diamond-bearing land. He was mayor of Kimberley in 1880, and for four years was a representative of Griqualand West in the Cape parliament. On the discovery of gold in the Witwatersrand district in 1886, Robinson purchased the Langlaagte and Randfontein estates. His views as to the westerly trend of the main gold-bearing reef were entirely contrary to the bulk of South African opinion at the time, but events proved him to be correct. In 1908 he was created a baronet. He died at Cape Town on October 30, 1929.

ROBINSON, JOSEPH TAYLOR (1872–), American politician, was born at Lonoke, Ark., on Aug. 26, 1872. After graduating at the University of Arkansas and receiving his law degree at the University of Virginia, he returned to Lonoke in 1895 to practise. He became interested in politics at once, was elected a member of the State legislature, 1895–97, and served as delegate to the Democratic national convention in 1900. In 1902 he was elected U.S. representative, in which office he was continued until he was elected governor of Arkansas in 1912. He was governor but a few weeks when he was elected by the State legislature to fill the position of U.S. senator left vacant by the death of Senator Jefferson Davis. Robinson was re-elected senator in 1918 and in 1924. In 1923 he was chosen to succeed Senator Underwood as chairman of the minority conference and Democratic floor leader. He possesses an unusual knowledge of parliamentary procedure, is a ready debater, and has been influential in securing much-needed legislation. He served as permanent chairman of the Democratic convention of 1928, and received the nomination of his party for the office of vice-president.

ROBINSON, LENNOX (1886–), Irish dramatist and author, was born at Douglas, county Cork, on Oct. 4, 1886, and educated at Bandon grammar school. His first play, *The Clancy Name,* was produced in 1908 at the Abbey theatre, Dublin, of which he was manager from 1910 to 1914. In 1915 he was appointed organizing librarian to the Carnegie Trust, a post which he held until 1925. From 1919–23 he was again manager of the Abbey theatre, and in 1923 became director. His plays *The Lost Leader* (1918) and *The Whiteheaded Boy* (1916) were both produced in London and in the United States. In addition to numerous plays, he has written one novel, *A Young Man from the South* (1917) and several volumes of short stories.

His plays include *The Cross Roads* (1909); *Two Plays* (1910); *Patriots* (1912); *The Dreamers* (1915); *The Round Table* (1924); *Crabbed Youth and Age* (1924); *The White Blackbird and Portrait* (1926). A collected edition was issued in 1928.

ROBOT. This term has long been in use in many languages. It is derived from the Czech word *robit* (work). It passed into popular use after 1923 to describe either mechanical devices so ingenious as to be almost human, or workers whom mechanical and repetitive work was making almost into machines. Its popular usage is based on the play *R.U.R.* (Rossum's Universal Robots), written by the Czechoslovakian writer, Karel Capek, in which society is described as depending on mechanical workers called robots, which can do any kind of mental or physical work and which when worn out are scrapped and replaced by new. In the play the robots develop intelligence and a spirit of revolt, turn upon their employers, and exterminate their creators.

The construction of a mechanical man has captivated the imagination of men since antiquity and early literature contains many schemes for the construction of some device that would require no human effort. It is not improbable that this idea has had a marked influence upon the development of mechanics and other branches of physics. In the Icelandic saga, Frithiof's ship needed no helmsman; she understood what was said to her and obeyed. In 1927 a steamship made a run of 21 days from San Francisco to Auckland, New Zealand, during which no human hand touched her steering apparatus. A modern robot had held her true to her compass course. (*See* NAVIGATION; GYROSCOPE.)

In the *Arabian Nights'* tale of the "Forty Thieves," Ali Baba stood before the cave and said "Open Sesame." The portal swung open without the aid of human hands. A robot controlling the door of an industrial plant in America actually opens when addressed in precisely the same words; addressed in any other manner the door remains immovable. In a mediaeval romance a great brazen head in the castle of a giant would tell those who inquired whatever they wished to know about the past, present or future. In Washington is a robot, known as the "Great Brass Brain" and to it are put questions about future ocean tides, which are promptly answered. It predicts the tides (*q.v.*) for every port in the world for years ahead with great precision. (*See* MATHEMATICAL INSTRUMENTS: *Harmonic Analyzers.*)

Mythical manlike monsters permeate the folklore of all peoples. Albertus Magnus in the Middle Ages, Roger Bacon, Descartes and other philosophers built androids or automatons in human form, which could open doors and play musical instruments. Anthropoid figures which apparently perform actions which call for independent thought are still to be seen and are often accepted with credulity by the public. On the other hand modern mechanical men have been constructed and placed at the disposal

of industry, that have sensitive fingers and ears, talk with a predetermined conversation, that are able to test by "a sense of taste" chemicals, and with some equivalent of the sense of smell and balance. By the use of photo-electric cells, the partial equivalent of the sense of sight has been accomplished. (*See* the articles SELENIUM CELLS, PHOTOELECTRICITY, AUTOMATIC MACHINES.)

Perhaps the most valuable outcome of these endeavours will be the development of mechanisms capable of taking over those tasks that men and women find too monotonous or otherwise burdensome. One such device is the Televox, invented in 1927 by R. J. Wensley of the Westinghouse Electric and Manufacturing Co. This device permits the use of the network of the telephone system for the distant control of an electrical mechanism by means of certain sounds. The mechanism is arranged to answer the telephone and execute orders in a manner peculiarly similar to that of a human being. It was developed for the use of public utility companies to supplement the use of supervisory control systems of electrical sub-stations, reservoir systems, gas regulators, etc.

The Televox can transmit electric meter readings, heights of water, gas pressures, position of valves and switches, and can execute actual mechanical operations at the direction of a distant operator. In using the Televox a call is put through exactly as though there were a human operator on the other end of the phone. The person making the call uses certain tones of the desired pitch to transmit the message. It is essential that a consistency of pitch be maintained. These tones are ordinarily delivered by electrically driven tuning forks. The telephone transmitter converts the tones into electrical vibrations, which at the distant station are caused to actuate steel reeds, which in turn actuate the selecting and operating relays. The responses are obtained from an instrument placed near the transmitter which sounds certain combinations of long and short notes, to form a code understandable by the operator at the other phone. The machine "hangs up" the receiver when the order has been executed, thereby ending the "conversation."

There are a number of processing machines which control all processes in a given industry, including temperature and humidity control during the process, starting, stopping, and varying the different materials which enter into the process in accordance with a time schedule, and independent of an outlet. If anything goes wrong, the machine stops and shows a red light until the operator has made the necessary changes. At the conclusion of the operation the machine shows a green light until the operator has removed the material in process. The Tagliabue Automatic Flue-Gas Analyzing Machine which makes an analysis for CO_2 and for CO every minute, and records the results, is such a robot.

The Product Integraph (*q.v.*) is a robot which solves almost any second-order differential equation. It performs, by a combination of electrical and mechanical means, certain computations which are actually beyond the power of the human brain, so far demonstrated. Other processes, which if performed by mathematics would require from a week to a year to solve, are solved by the integraph in a few minutes or hours.

(For New York City traffic control system *see* TRAFFIC AND TRAFFIC REGULATION.) (W. H. TU.)

ROB ROY (1671–1734), the designation of a Highland outlaw whose prowess is the theme of one of Sir Walter Scott's novels, and who was by descent a Macgregor. He received the name Roy from his red hair, and latterly adopted Campbell as his surname on account of the acts proscribing the name of his own clan. At first he devoted himself to rearing cattle on his estates on the Braes of Balquhidder, but having formed a band of clansmen, he obtained, after the accession of William III., a commission from James II. to levy war on all who refused to acknowledge him as king. Shortly afterwards he married Helen Mary, daughter of Macgregor of Comar. On the death of Gregor Macgregor, the chief of the clan, in 1693 he was acknowledged chief, obtaining control of the lands stretching from the Braes of Balquhidder to the shores of Loch Lomond, and situated between the possessions of Argyll and those of Montrose. To assist in carrying on his trade as cattle-dealer he borrowed money from the 1st duke of Montrose, and, being unable to repay it, was in 1712 evicted and declared an outlaw. Taking refuge in the Highlands, Rob Roy supported himself by depredations on the duke and his tenants, all attempts to capture him being unsuccessful. During the rebellion of 1715, though nominally siding with the Pretender, he took no part in the battle of Sheriffmuir except in plundering the dead on both sides. He was included in the Act of Attainder; but through the influence of the duke of Argyll, he obtained, on making his submission at Inveraray, a promise of protection. He now established his residence at Craigroyston, near Loch Lomond, whence for some time he levied blackmail as formerly upon Montrose. Ultimately, through the mediation of Argyll, he was reconciled to Montrose, and in 1722 he made submission to General Wade; he was carried off, and imprisoned in Newgate, and in 1727 was pardoned just as he was to be transported to Barbados. He died at Balquhidder on Dec. 28, 1734, and was buried in Balquhidder churchyard.

The best lives are K. Macleay, *Historical Memoirs of Rob Roy* (1818; new ed., 1881); A. H. Millar, *Story of Rob Roy* (1883). *See* also Sir W. Scott's introduction to the novel *Rob Roy*. An early account, *The Highland Rogue, etc.* (1723), is ascribed to Defoe.

ROBSART, AMY, first name of LADY AMY DUDLEY (1532–1560), wife of Lord Robert Dudley, afterwards earl of Leicester. She was the daughter of Sir John Robsart of Norfolk, and was married to Lord Robert on June 4, 1550. When Elizabeth became queen in 1559 Lord Robert was soon known to be her favourite, and it was believed that she would marry him if he were free. His wife never came to court and was never in his company. In 1560 she went by her husband's directions to Cumnor Place, a house near Oxford, rented by his agent Anthony Forster or Forrester, member of parliament for Abingdon. Here she was found lying dead on the floor of the hall on Sept. 8, 1560, by her servants. The circumstances of her death were never cleared up.

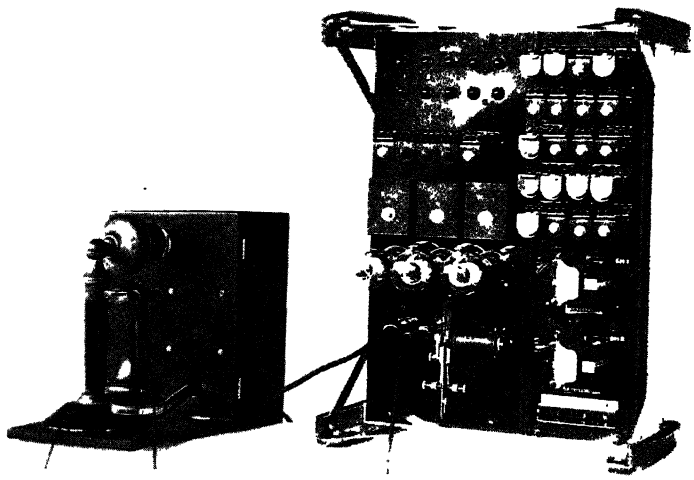
See G. Adlard, *Amy Robsart and Leycester* (London, 1870), and W. Rye, *The Murder of Amy Robsart* (London, 1885).

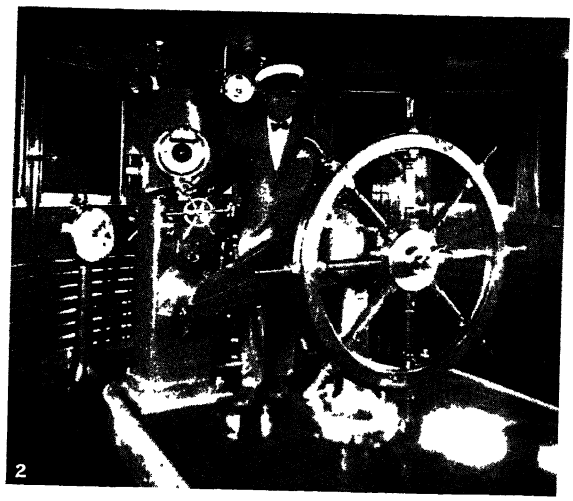
ROC, or more correctly RUKH, a fabulous bird of enormous size which carries off elephants to feed its young. The legend of the roc, familiar from the *Arabian Nights*, was widely spread in the East; and in later times the home of the monster was sought in Madagascar, whence gigantic fronds of the *Raphia* palm very like a quill in form appear to have been brought under the name of roc's feathers (*see* Yule's *Marco Polo*, bk. iii. ch. 33). Such a feather was brought to the Great Khan, and we read also of a gigantic stump of a roc's quill being brought to Spain by a merchant from the China seas. The roc is hardly different from the Arabian *'ankā* (*see* PHOENIX); it is also identified with the Persian *sīmurgh*.

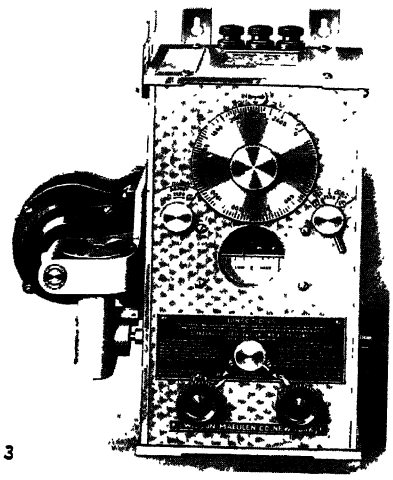
BIBLIOGRAPHY.—For a collection of legends about the roc, *see* E. W. Lane, *Arabian Nights* (1839), chap. xx., notes 22, 62; H. Yule, *The Book of Ser Marco Polo* (1871). *See* also S. Bochart, *Hierozoicon* (1663), bk. vi., ch. 14; Al Kazwīnī, *Kosmographie* (1847–48), i. 419 *seq.*; Ibn Batūta, *Voyages* (1853), iv., 305 *seq.*; Ad Damīrī, *Hayat al-Hay-awan*, trans. A. S. G. Jayakar (1906).

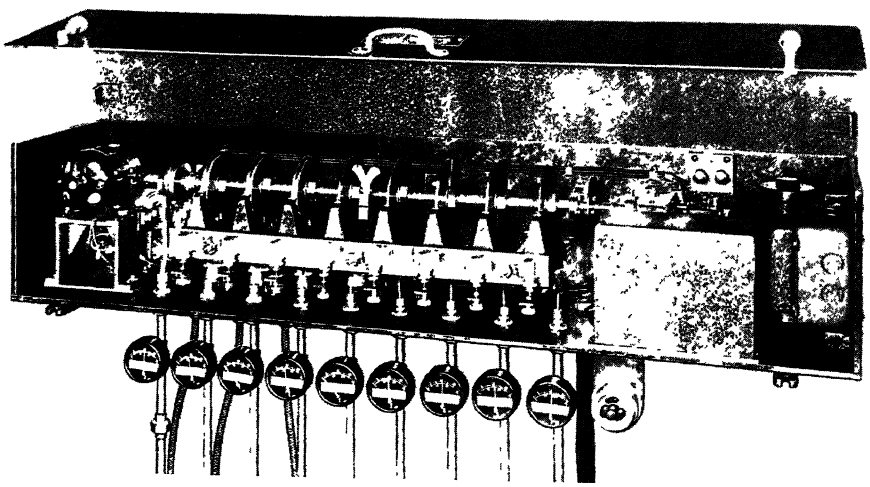
ROCAILLE, in architecture, a form of ornament much used in the rococo styles, based originally on the grotesque, artificial rockeries and shells of the Louis 15th period. (*See* LOUIS STYLES; ROCOCO.)

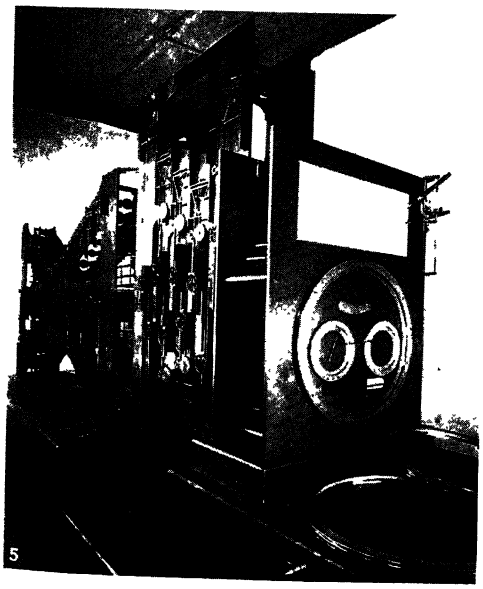
ROCAMADOUR, a village of south-western France, in the department of Lot, 36 m. N.N.E. of Cahors by road. Pop. (1926) 208. Rocamadour owes its origin to St. Amadour or Amateur, who, according to tradition, chose the place as a hermitage for his devotions to the Virgin Mary. The renown of Rocamadour as a place of pilgrimage dates from the early middle ages. Rocamadour is most strikingly situated. Its buildings rise in stages up the side of a cliff on the right slope of the gorge of the Alzou. Flights of steps ascend from the lower town to the churches half-way up the cliff. The chief of them is the church of Notre-Dame (1479), containing the wooden figure of the Madonna reputed to have been carved by St. Amadour. The interior walls of the church of St. Sauveur are covered with paintings and inscriptions recalling the pilgrimages of celebrated persons. The subterranean church of St. Amadour (1166) extends beneath St. Sauveur and contains relics of the saint. On the summit of the

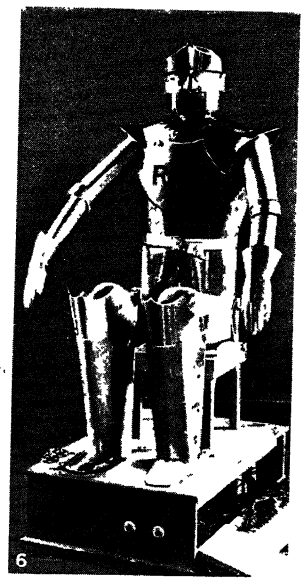

1

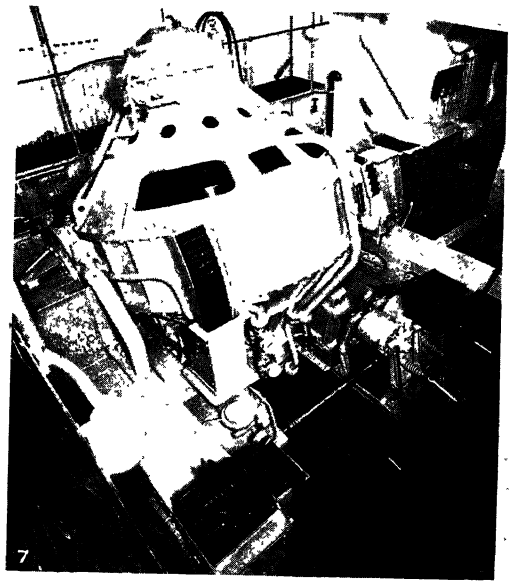

2


3


4


5


6


7

BY COURTESY OF (1) THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, (2, 7) THE SPERRY GYROSCOPE COMPANY. (3) THE WILSON-MAUELEN COMPANY, (4) THE C. J. TAGLIABUE MANUFACTURING COMPANY, (5) THE U S COAST AND GEODETIC SURVEY, THE U.S. DEPARTMENT OF COMMERCE, (6) THE DAILY MAIL, LONDON

ROBOTS AND THEIR FUNCTIONS IN VARIOUS INDUSTRIES

1. The American developed Televox which answers questions put to it and automatically executes orders, in a human-like manner, enabling the use of the telephone for remote control. 2. Wheel-house in an automatically steered steamship. The gyro-pilot and the gyro-compass by which it is controlled are shown to the left. By properly adjusting the small hand-wheel, the large rudder wheel is operated to maintain the ship upon its course. 3. A single Robot used in pyrometry. 4. An automatic cycle controller, used in industry for the regulation of the various steps in a manufacturing process, in this case for controlling all the operations in the curing of rubber. 5. American Coast and Geodetic Survey tide predicting machine. 6. "Eric," a novel theatrical adaptation of the Robot, which moves and talks by means of concealed apparatus. 7. The Gory ship stabilizer by means of which freedom from undue rolling is obtained

cliff stands the mediaeval château built to defend the sanctuaries.

ROCAMBOLE, *Allium Scorodoprasum* (family Liliaceae), a hardy bulbous perennial occurring in a wild state in sandy pastures and waste places throughout Europe, but not common in the south; in Great Britain it is rare, and found only in the north of England and the south of Scotland. The plant is grown for its bulbs, which are smaller and milder than those of garlic, and consist of several cloves chiefly produced at the roots. The cloves are planted about the end of February or in March, and treated like shallot.

ROCH, ST. (Lat. Rochus; Ital. Rocco; Span. Roque; Fr. Roch) (d. 1327), a confessor whose death is commemorated on Aug. 16; he is specially invoked against the plague. According to his *Acta,* he was born at Montpellier, France, about 1295. On the death of his parents in his twentieth year he gave all his substance to the poor. Coming to Italy during an epidemic of plague, he tended the sick in the public hospitals at Aquapendente, Cesena and Rome, and effected many miraculous cures by prayer and simple contact. After similar ministries at Piacenza he himself fell ill. He was expelled from the town, and withdrew into the forest, where he would have perished had not a dog belonging to a nobleman named Gothardus supplied him with bread. On his return to Montpellier he was arrested as a spy and thrown into prison, where he died on Aug. 16, 1327, having previously obtained from God this favour—that all plague-stricken persons invoking him should be healed. His cult spread through Spain, France, Germany, Belgium and Italy. A magnificent temple was raised to him at Venice.

See *Acta sanctorum,* August iii. 380–415; Charles Cahier *Les Caractéristiques des saints* (Paris, 1867), pp. 216–217. (H. De.)

ROCHAMBEAU, JEAN BAPTISTE DONATIEN DE VIMEUR, Comte de (1725–1807), French soldier, was born at Vendôme (Loir-et-Cher) on July 1, 1725. He was brought up at the Jesuit college at Blois, but entered a cavalry regiment. He served in Bohemia and Bavaria and on the Rhine, and in 1747 had attained the rank of colonel. He became governor of Vendôme in 1749, and after distinguishing himself in 1756 in the Minorca expedition was promoted brigadier of infantry. In 1757 and 1758 he fought in Germany, notably at Crefeld, received several wounds in the battle of Clostercamp (1760), and was appointed *maréchal de camp* in 1761 and inspector of cavalry. In 1780 he was sent, with the rank of lieutenant-general, in command of 6,000 French troops to help the American colonists under Washington against the English. He landed at Newport, Rhode Island, on July 10, but was held here inactive for a year, owing to his reluctance to abandon the French fleet, blockaded by the British in Narragansett Bay. At last, in July 1781, Rochambeau's force was able to leave Rhode Island and joined Washington on the Hudson. Then followed the celebrated march of the combined forces to Yorktown, where on Sept. 22, they joined the troops of Lafayette; Cornwallis was forced to surrender on Oct. 19. Congress voted Rochambeau and his troops the thanks of the nation and presented him with two cannon taken from the English. These guns, which Rochambeau took back to Vendôme, were requisitioned in 1792. On his return to France he was loaded with favours by Louis XVI. and was made governor of Picardy. During the Revolution he commanded the Army of the North in 1790, but resigned in 1792. He was arrested during the Terror, and narrowly escaped the guillotine. He was subsequently pensioned by Bonaparte, and died at Thoré (Loir-et-Cher) on May 10, 1807.

A statue of Rochambeau by Ferdinand Hamar, the gift of France to the United States, was unveiled in Lafayette square, Washington, by President Roosevelt on May 26, 1902.

The *Mémoires militaires, historiques et politiques, de Rochambeau* were published by Luce de Lancival in 1809. Of the first volume a part, translated into English by M. W. E. Wright, was published in 1838 under the title of *Memoirs of the Marshal Count de R. relative to the War of Independence in the United States.* Rochambeau's correspondence during the American campaign is published in H. Doniol, *Hist. de la participation de la France à l'établissement des États Unis d'Amérique,* vol. v. (1892). *See* Duchesne, "Autour de Rochambeau" in the *Revue des facultés catholiques de l'ouest* (1898–1900); E. Gachot, "Rochambeau" in the *Nouvelle Revue* (1902); H. de Ganniers, "La Dernière Campagne du maréchal de Rochambeau" in the *Revue des questions historiques* (1901); and J. J. Jusserand, "Rochambeau and the French in America" in *With Americans of Past and Present Days* (1916).

ROCHDALE, municipal, county and parliamentary borough, Lancashire, England, on the river Roch and the Rochdale canal, 10½ m. N.E. from Manchester and 196 m. N.W. from London by L.M.S. railway. Pop. (1931) 90,278. The site rises sharply from the Roch, near its confluence with the Spodden, and there are fine views from the high-lying public park. Several interesting old houses remain near the town. The parish church of St. Chad, mainly Perpendicular, has early English nave piers and a tower the lower part of which is Decorated. Of educational charities the principal is the Archbishop Parker free grammar school (founded 1565). There are also technical and art schools; and a large Roman Catholic orphanage. Rochdale was the birthplace of the co-operative movement. The Equitable Pioneers society was founded here in 1844. A statue of John Bright (1891) recalls the connection of the statesman's family with Rochdale. Rochdale was incorporated in 1856, but the parliamentary borough has returned one member since 1832. The county borough was created in 1888.

Rochdale (Recedham, Rachedam, Rachedal) takes its name from the river on which it stands. A Roman road passed the site, and a Saxon castle stood in Castleton. In Edward the Confessor's reign most of the land was held by Gamel the Thane, but after the Conquest the manor came into the hands of Roger de Poictou, from whom it passed to the Lacys and became merged in the duchy of Lancaster. From 1462 to 1625 the crown leased it to the Byron family. In 1625 Charles I. conveyed the manor in trust, and in 1638 it was sold to Sir John Byron, afterwards Baron Byron of Rochdale, whose descendants held it till 1823 when it was sold to the Deardens. Manor courts are still held periodically. Henry III. (1240–41) granted to Edmund de Lacy the right to hold a weekly market on Wednesday and an annual fair on the feast of SS. Simon and Jude (Oct. 28).

ROCHDALE PIONEERS: *see* Co-operation.

ROCHEFORT, HENRI, Marquis de Rochefort-Luçay (1830–1913), French politician, was born in Paris on Jan. 30, 1830. He was already known as a successful journalist and writer of vaudevilles when he started a paper of his own, *La Lanterne.* The paper was seized on its eleventh appearance, and in August 1868 Rochefort was fined 10,000 francs, with a year's imprisonment. He then published his paper in Brussels, whence it was smuggled into France. Printed in French, English, Spanish, Italian and German, it went the round of Europe. After a second prosecution he fled to Belgium. A series of duels, of which the most famous was one fought with Paul de Cassagnac apropos of an article on Joan of Arc, kept Rochefort in the public eye. In 1869 he was returned to the Chamber of Deputies by the first *circonscription* of Paris. He renewed his onslaught on the empire, starting a new paper, the *Marseillaise,* as the organ of political meetings arranged by himself at La Villette. The staff was appointed on the votes of the members, and included Victor Noir and Pascal Grousset. The violent articles in this paper led to the duel which resulted in Victor Noir's death at the hands of Prince Pierre Bonaparte. The paper was seized, and Rochefort and Grousset were sent to prison for six months. The revolution of September was the signal for his release. He became a member of the government of National Defence, but he openly expressed sympathy with the Communards, and on May 11, 1871, he fled in disguise from Paris. A week earlier he had resigned with a handful of other deputies from the National Assembly rather than countenance the dismemberment of France.

Condemned under military law to imprisonment for life, he was transported to New Caledonia. In 1874 he escaped to San Francisco. He lived in London and Geneva until the general amnesty permitted his return to France in 1880. He then founded *L'Intransigeant* in the Radical interest. He was condemned to detention in a fortress in August 1889 at the same time as General Boulanger, whom he had followed into exile. After his return

(1895) to Paris he became a leader of the anti-Dreyfusards. Subsequently he was editor of *La Patrie*. Rochefort died at Aix-les-Bains in 1913.

Besides his plays and articles in the journals he published several separate works, among them being: *Les Petits Mystères de l'Hôtel des Ventes* (1862), a collection of his art criticisms; *Les Dépravés* (Geneva, 1882); *Les Naufrageurs* (1876); *L'Évadé* (1883); *Napoléon dernier* (3 vols., 1884); and *Les Aventures de ma vie* (5 vols., 1896).

ROCHEFORT, a small town of Belgium, on the Lomme, a tributary of the Lesse, in the south-east of the province of Namur close to the Ardenne. Resident pop. (1920) 3,248, doubled in July and August. It has ruins of the old castle, which gave the place its name and a title to a long line of counts who had the right of coining their own money. This castle underwent many sieges and suffered much in the earlier wars, especially at the hands of Marshal de Chatillon in 1636. Rochefort is noted for its healthiness, and is a favourite place of residence and resort. There are many grottoes, one of which, in the town itself, contains six halls or chambers; the largest, called the Sabbat, is remarkable for its great height. But the most famous are the grottoes of Han, three miles from Rochefort where the river Lesse passes by a subterranean and undiscovered passage under the hill called Boème or Boine. The endeavour to trace the course of the river led to the discovery of the grottoes, which consist of fifteen separate halls, connected by passages more or less short and emerging on the river in a dark and extensive cavern forming a sort of side creek or bay. Near Rochefort are the famous red marble quarries of St. Remy, and the old Cistercian abbey of that name is now a Trappist seminary.

ROCHEFORT, a town of western France, capital of an arrondissement in the department of Charente-Inférieure, 20 m. S.S.E. of La Rochelle on the State railway from Nantes to Bordeaux. Pop. (1926) 24,110.

The lordship of Rochefort, held by powerful nobles in the 11th century, was united to the French Crown by Philip the Fair early in the 14th century; but it was alternately seized during the Hundred Years' War by the English and the French, and in the Wars of Religion by the Catholics and Protestants. Colbert in 1665 chose Rochefort as the seat of a repairing port between Brest and the Gironde, so the town rapidly increased in importance, and the Dutch admiral Cornelius Tromp with his fleet failed to destroy the new arsenal. The naval school, afterwards transferred to Brest, was originally founded at Rochefort. Its fleet, under Admiral la Gallissonnière, a native of the place, defeated Admiral Byng in 1755 and did good service in the wars of the republic. But the destruction of the French fleet by the English in 1809 in the roadstead of Île d'Aix, the preference accorded to Brest and Toulon and the unhealthiness of its climate diminished its prosperity.

Rochefort is capital of the fourth maritime arrondissement, which stretches from the bay of Bourgneuf to the coast of Spain. The commercial harbour, higher up the river than the naval harbour, has two small basins, a third basin with a depth at neap-tide of 24 ft., at spring-tide of 30 ft., and a dry dock. Trade is in wood, cereals, salt and coal.

ROCHESTER, JOHN WILMOT, 2ND EARL OF (1647–1680), English poet and wit, the son of Henry Wilmot, the 1st Earl, was born at Ditchley in Oxfordshire on April 10, 1647, and succeeded his father as 2nd earl in 1658. He was educated at Wadham college, Oxford, and in 1661, although he was only 14 years of age, received the degree of M.A. On leaving Oxford he travelled in France and Italy with a tutor. He returned in 1664, and at once made his way to Charles II.'s court, where his youth, good looks and wit assured him of a welcome. In 1665 he joined the fleet serving against the Dutch as a volunteer. He became gentleman of the bedchamber to Charles II. John Dryden had dedicated to him his *Marriage-à-la-Mode* (1672); but his *Aurengzebe* (1675) was dedicated to Lord Mulgrave, who was Rochester's enemy. Consequently Rochester thwarted Dryden at every turn, and in 1679 a band of roughs set on the poet in Rose Alley, Covent Garden, and beat him. Rochester obviously felt no shame for this infamous attack, for in his "Imitation of the First Satire of Juvenal" he says, "Who'd be a wit in Dryden's cudgelled skin?" His health was already undermined, and spring of 1680 he retired to High Lodge, Woodstock Pa began to show signs of a more serious temper, and at request was visited (July 20 to July 24) by Bishop Burn attested the sincerity of his repentance. He died, howe days after the bishop left him. When his son Charles, the died on Nov. 12, 1681, his titles became extinct.

As a poet Rochester was a follower of Abraham Cow of Boileau, to both of whom he was considerably indebt love lyrics are often happy, but his real vigour and a best shown in his critical poems and satires. The political are notable for their fierce exposure of Charles II.'s we

BIBLIOGRAPHY.—*Poems on Several Occasions by the Right able the Earl of Rochester . . .* (Antwerp, 1680) was really in London. Other issues, slightly varying in title and appeared in 1685, 1691 and 1696. *Valentinian, A Tragedy,* from Beaumont and Fletcher, was printed in 1685; a scurrilou on Charles II. in the shape of a play in heroic couplets, *Sod* printed in 1684, and is supposed, in spite of Rochester's d have been chiefly his work. No copy of this is known, but t two mss. extant. The completest edition of his works is *The Works of the Earl of Rochester* (1731–32). Expurgated co are to be found in Johnson's, Anderson's and Chalmers's edi the *British Poets*. His *Familiar Letters* were printed in 168 and 1699. His Political Satires are available, with those of S Denham and Andrew Marvell, in the *Bibliotheca Curiosa,* Som cal Satires of the Seventeenth Century, vol. i., Edinburgh, 188

ROCHESTER, LAWRENCE HYDE, EARL OF 1711), English statesman, second son of Edward Hyde, Clarendon, was born in March 1641. After the restora Charles II. he sat as member of parliament, first for New Cornwall and afterwards for the university of Oxford, fro to 1679. In 1661 he was sent on a complimentary emb Louis XIV. of France, while he held the court post of ma the robes from 1662 to 1675. In 1665 he married Henrie 1687), daughter of Richard Boyle, earl of Burlington an When his father was impeached in 1667, Lawrence joined v elder brother, Henry, in defending him in parliament, but of Clarendon did not injuriously affect the fortunes of hi They were connected with the royal family through the m of their sister, Anne, with the duke of York, afterwards Jam and were both able and zealous royalists. In 1687 Lawrenc was made Viscount Hyde of Kenilworth, and in November ing earl of Rochester. He was compelled to join in arrang treaty of 1681, by which Louis XIV. agreed to pay a sub Charles, at the very moment when he was imploring W prince of Orange, to save Europe from the ambitions of the monarch. In August 1684 he was removed from the treas the post of president of the council. He was still president council when James II. became king in February 1685, was at once appointed lord treasurer. But in spite of their relationship and their long friendship, James and his tr did not agree. In January 1687 he was removed from hi of treasurer.

After the revolution of 1688 Rochester, after a brief p accepted the new régime. From December 1700 until Fe 1703 he was lord lieutenant of Ireland, and in 1710 he wa made lord president of the council. He died on May 2, and was succeeded by his only son, Henry (1672–1758), 1724 inherited the earldom of Clarendon. When Henr without issue on December 10, 1758, all his titles became e

The correspondence of Rochester with his brother the Clarendon, together with other letters written by him, was pu with notes by S. W. Singer (1828). Other authorities are G. *History of his Own Time,* edited by O. Airy (Oxford, 1897– John Evelyn, *Diary,* edited by H. B. Wheatley (1879); and Ma *History of England.*

ROCHESTER, a city and municipal borough of Kent land, on the river Medway, 33 m. E.S.E. of London by th Pop. (1931) 31,196. Its situation on the Roman way fr Kentish ports to London, as well as at a Medway crossing Rochester (Durobrivae, Hrofescester or Hrobicester, Ro early importance. It was a walled Romano-British town, a original bridge across the Medway probably dated from period. The church of St. Andrew was founded by King

bert, who also made Rochester a bishop's see. Rochester was a royal borough in the time of William I., who raised a castle here, probably on Boley hill. Richard I. granted the citizens quittance of *passagium* from crusaders in the town of Rochester. In 1227 Henry III. granted them the city at a fee farm rent of £25; he also granted them a gild merchant, the right to be impleaded only within the city walls, and other liberties. These charters were confirmed by subsequent sovereigns down to Henry VI., who in 1446 incorporated the city by the title of the bailiff and citizens, and granted them the power of admiralty and many privileges. Edward IV. by his charter of 1461 altered the incorporation to the mayor and citizens. Charters were granted in successive reigns down to Charles I., whose charter of 1629 remained the governing charter until 1835.

Chatham lies east of the city on the same bank of the river, while Strood is opposite. The cathedral church of St. Andrew was originally founded by Augustine in 604, for whom Aethelbert built the church. It was partially destroyed by the Danes, but was rebuilt by Bishop Gundulph, the second Norman bishop (1077–1108). Gundulph at the same time (1089) established an order of Benedictine monks here. Bishop Ernulf (1115–24) completed and also renovated the church, lengthening it by two bays eastward; the old chapter-house remains. The Norman west front was built about 1125–30, and in 1130 the new cathedral was consecrated. The work included an extended choir by William de Hoo (1227), enlargement of the main transepts, the building of piers for a central tower, and treatment of the nave to the third bay. About 1352 a low central tower was built, to which a spire was added in the next century. Towards the end of the 15th century St. Mary's chapel was added.

The ruins of Gundulph's Tower stand detached from and are earlier than the church; it was built by Bishop Gundulph probably as a defensive work for the eastern boundary of the city. The crypt beneath the choir is Early Norman in the western part. The remainder is Early English, and there are traces of mural painting. The library attached to the modern chapter-house contains, among various relics, the *Textus Roffensis*, being records of the cathedral compiled in the time of Bishop Ernulf.

On the eminence overlooking the right bank of the river and commanding a wide view of the surrounding country are the remains of the Norman castle, part of which was built by Bishop Gundulph at the order of William Rufus in the 11th century. The castle was besieged by King John, by Simon de Montfort in the reign of Henry III., and by the followers of Wat Tyler. It was repaired by Edward IV., but soon afterwards fell into decay, although the massive keep still stands. This is the work of William de Corbeil, archbishop of Canterbury, to whom the castle was granted in 1126. It is a quadrangular four-storeyed structure, flanked by turrets, with a height of 120 feet. Remains of the 13th-century walls which once surrounded the city also exist. Gad's Hill, above Strood, to the north-west, was the residence of Charles Dickens.

At Borstal, south-west of Rochester, was a large convict prison where early experiments on the educational treatment of delinquent boys between the ages of 16 and 21 were carried out, which resulted in the Borstal System (*q.v.*).

Among the principal buildings in the city are the town hall (1687), the Richard Watt's almshouses (1579), and the almshouse of St. Catherine, which originated in 1316 as a leper's hospital. An Elizabethan mansion was acquired by the corporation for a museum as a memorial of Queen Victoria's diamond jubilee. The principal schools are the cathedral grammar school or King's school, founded in 1544, and the Williamson mathematical school (1704), formerly for sons of freemen but now open to all.

ROCHESTER, a city of south-eastern Minnesota, U.S.A., on the Zumbro river, at an altitude of 1,180 ft.; the county seat of Olmsted county and the seat of the Mayo Clinic. It is on Federal highways 14 and 55, and is served by the Chicago Great Western and the Chicago and North Western railways and by motor-bus lines in all directions. Pop. (1920) 13,722 (86% native white), in 1930, 20,621 by the Federal census. The transient population is estimated at 300,000 annually. Rochester is an attractive city amid picturesque surroundings, in one of the most prosperous agricultural counties in the United States. There are wholesale groceries and commission houses, creameries, flour mills, a camera factory, and several other manufacturing industries. The city owns and operates a hydro-electric plant, as well as the electric plant and the water system. Just east of the city is the Rochester State hospital for the insane, in a tract of 1,375 ac., with accommodation for 1,300 patients. On July 21, 1883, a severe tornado devastated the northern part of the city, killing 26 persons and injuring 41. A direct consequence of this disaster was the founding of St. Mary's hospital by the Sisters of Saint Francis, who had opened a convent here in 1877. The hospital was opened to patients in 1889, with Dr. W. W. Mayo as consulting surgeon, and his sons, Drs. William J. and Charles H. Mayo, as attending surgeons. Its capacity has grown to 600 beds. About 300 graduates of medical schools are studying in the hospital, under the Mayo Foundation for Medical Education and Research, incorporated in 1915 by the Mayos and endowed by them (through the University of Minnesota) with about $2,000,000.

The first settler in Rochester built his log cabin in 1854 and laid out the main street by dragging a log through the brush. He called it Rochester because the falls near by reminded him of those at Rochester, N.Y. By 1858 there was a population of 1,500 and the settlement was incorporated as a city.

ROCHESTER, a city of Strafford county, New Hampshire, U.S.A., on the Cochecho and the Salmon Falls rivers, 18 m. N.W. of Portsmouth. It is served by four lines of the Boston and Maine railroad. Pop. (1920) 9,673 (85% native white); 1930 by the Federal census it was 10,209. The town of Rochester (named for Lawrence Hyde, earl of Rochester) was incorporated by royal charter in 1722, but no settlement was made until 1728. It was chartered as a city in 1891.

ROCHESTER, a city of north-western New York, U.S.A., 70 m. E.N.E. of Buffalo, on the Genesee river, the State Barge canal and Lake Ontario; a port of entry and the county seat of Monroe county. It has a municipal airport and is served by the Buffalo, Rochester and Pittsburgh, the Erie, the Lehigh Valley, the New York Central, the Pennsylvania and the West Shore railways, inter-urban trolleys, motor-bus and truck lines, lake steamers and canal barges. Pop. (1920) 295,750 (24% foreign-born white); in 1930, 328,132.

The city occupies 34 sq.m. on a broad, level plateau, ranging from 500 to 697 ft. above sea-level. Through the centre runs the Genesee river, in a deep gorge with banks 50 to 200 ft. high, and within the city limits are its three cataracts, which have a combined fall of 261 feet. At the mouth of the river is the port of Rochester. The State Barge canal also crosses the city. In the abandoned bed of the Erie canal a subway has been constructed, to accommodate trackage for suburban trolley lines and for a belt-line connecting all the railways, with a boulevard (Broad street) for vehicular traffic at the street level above. The city's 1,300 streets have a total mileage of 500 (339 m. paved). Its park system, planned by Frederick Law Olmsted, embraces 5 large and 28 small parks, covering 1,777 ac., and provides generous facilities for outdoor play and recreation. Durand-Eastman park (484 ac.) has 4 m. of frontage on Lake Ontario, and Genesee Valley park (600 ac.) contains some of the most picturesque stretches of the river. A city-planning bureau has been in existence since 1917, and zoning ordinances are in effect. There are over 170 churches, many of which are architecturally noteworthy, including St. Patrick's cathedral (Roman Catholic) and the Baptist temple.

Rochester is an important educational centre, the seat of the University of Rochester (Baptist; 1850); Rochester Theological seminary (Baptist; 1850), not connected with the university; St. Bernard's Theological seminary (Roman Catholic; 1893); the Rochester School of Optometry; and the Athenaeum and Mechanics' institute, founded in 1885 by Henry Lomb, of the Bausch and Lomb Optical Company, in continuation of the Rochester Athenaeum (established 1829), and housed in a large building given by George Eastman. The University of Rochester (founded 1850) consists of a college of arts and sciences, the

Eastman school of music (established in 1918 by various gifts from George Eastman, aggregating $12,000,000 by 1928) and the school of medicine and dentistry (established in 1920 through gifts from George Eastman, the General Education Board and others). The total endowment of the university amounts to $24,500,000 (1928). The public-school system adopted by the people of the city (comprising 49 grammar, 4 junior high, 4 high, 2 continuation and 7 special schools in 1928) has led in developing the junior high school, in using the school buildings as community centres, and in various other improvements. There are about 40 parochial schools and 22 other schools under private auspices. The charitable organizations of the city are jointly financed through a community chest, which had its origin during the World War, and which raises annually about $1,500,000 contributed by over 90,000 citizens. The daily papers include the *Times-Union* (Independent; 1826), the *Democrat and Chronicle*, the *Herald* (Republican; 1832), the *Journal-American* (1922), and the German *Abendpost* (1851). Weeklies are published in Italian and Polish. Since Jan. 1, 1928, the city has operated under a commission-manager form of government. The assessed valuation for 1927 was $633,806,606.

The falls of the Genesee provide a vast water-power, which has been utilized for manufacturing throughout the city's history. There are some 1,700 manufacturing establishments, making 325 different commodities, most of which require mechanical skill. The aggregate factory output in 1927 was valued at $368,111,068. The leading products (measured by value) are men's clothing ($56,998,739 in 1927), electrical machinery, apparatus and supplies ($30,174,214), foundry and machine-shop products ($22,511,497) and boots and shoes, largely women's shoes ($20,045,252). There are more than a score of large nurseries in the city and around it, shipping seeds, bulbs and plants to all parts of the country. The city has an extensive wholesale and retail trade. The commerce of its port amounted in 1926 to 1,115,020 tons, valued at $9,671,626. Exports from the customs district in 1927 were valued at $8,345,237; imports at $8,248,605. Bank debits for the year aggregated $2,193,747,000.

When first visited by Europeans the region about Rochester was the home of the Seneca Indians. The Jesuit missionaries Chaumonot and Frémin worked among them in the 17th century. In 1687 the Marquis de Denonville fought a battle with the Iroquois near the falls, and there was a French post on Irondequoit bay in 1710. The district was included in the Phelps-Gorham purchase in 1788. In 1789 Ebenezer ("Indian") Allan built a saw-mill and a grist-mill at the falls; in 1802 the site of the present city passed into the hands of three men from Maryland, among them Nathaniel Rochester (1752–1831), who established a settlement, largely of New Englanders, at the falls in 1810–12; and in 1817 the village of Rochesterville was incorporated. During the early years it grew slowly, as it was not on the direct route from Albany to Buffalo and the region was malarial. There were only 1,502 inhabitants in 1820. Monroe county was erected in 1821, with Rochester as its judicial seat; the Rochester and Lockport section of the Erie Canal was opened in 1823; in the next two years the population doubled; and in 1834, with a population of 12,252, the village was chartered as a city. Rochester was the centre (1828–30) of the anti-Masonic political movement, and here Thurlow Weed published his *Anti-Masonic Enquirer*. Later it became an active abolitionist centre, and for many years before the Civil War was a busy station on the "underground railroad." Myron Holley began the publication of the *Freeman* here in 1839, and in 1847 Frederick Douglass established the *North Star*. It was the home of Susan B. Anthony after 1846, and a gathering-place for the advocates of women's rights. About 1850 it was the scene of the spiritualistic demonstrations (the "Rochester Rappings") of Margaret and Katharine Fox. Rochester has had a series of sobriquets. For many years, while the Genesee valley was the principal wheat field of the country, it was the leading flour-milling centre of the United States, and was known as "the Flour City." When the milling industry declined and the horticultural interests (introduced in 1840) assumed greater importance, "Flower" was substituted for "Flour"; later, with the development of the Eastman Kodak Company, it was called a Kodak City." The population of the city was 36,403 i 89,366 in 1880; 162,608 in 1900. In the first quarter of century the area of the city was doubled, registration in th schools increased about threefold, the assessed valuation erty was multiplied by four, and postal receipts by five.

ROCHESTER, a borough of Beaver county, Penns U.S.A., on the Ohio river, at the mouth of the Beaver, 25 of Pittsburgh; served by the Pennsylvania railroad. Pop 6,957 (89% native white). Rochester is a busy unit in the Valley industrial district. (*See* BEAVER FALLS.) The borc settled about 1799 and incorporated in 1849.

ROCHET, an ecclesiastical vestment proper to bis the Roman Catholic and Anglican churches. Though o alike, the Roman and Anglican rochets now differ greatly Both are made of fine white linen (lawn) or muslin, but the resemblance ceases. The Roman rochet reaches abou knee and is distinguished from the surplice by its narrow the lower edges of which are usually garnished with la with violet or red silk in the case of prelates, or—more with embroidered borders. The Anglican rochet kee closely to the mediaeval form, reaching nearly to the fe main modification has been in the sleeves. These were o narrow, but after the Reformation they tended to expar in the 18th century, they developed into the balloor "lawn-sleeves" characteristic of Anglican bishops.

ROCHFORD, a town in south-eastern Essex, Englan E. by N. from London by the Southend branch of the railway. Pop. (1921) 2,077. It lies on the small rive near the head of a long estuary. The town has a Perpe church (St. Andrew); a corn exchange and some agr trade. Rochford hall, a gabled mansion of various dates, once to the Boleyns; Anne Boleyn, the unfortunate queen VIII., was born here. Near Rochford is Ashingdon, t of the fight of Assandun in 1016 between Canute and Ironside, in which the English were defeated.

ROCK, in geology a mass of the mineral matter of w crust of the earth is composed (*see* PETROLOGY and G In more general usage a "rock" is a large mass of this matter, as distinguished from smaller pieces, "stones."

ROCKEFELLER, JOHN DAVISON (183 American capitalist, born at Richford, N.Y., July 8, 183 he was 14 years old the family moved to Cleveland, Ohi he attended the public school and then became an assista keeper (1855) in a commission house, earning $50.00 three months. Soon he was advanced to $25.00 per mc by 1858 he had saved enough to become a partner in a commission firm. In 1862 he and his partner had $4,000 together with Samuel Andrews, inventor of a more ec process for cleaning crude oil, in an infant business w beginning to be spoken of as "oil refining." In 1867 of Rockefeller and Andrews became Rockefeller, Andr Flagler, and by Jan., 1870, the partners did about one- refining business of Cleveland, then the chief oil refinin America. In that month, together with his brother Stephen V. Harkness and other associates, he organized came president of the Standard Oil Company. The capit was $1,000,000 in 10,000 shares of which John D. Rockef 2,667 and the firm of Rockefeller, Andrews and Flagl shares. This corporation under Rockefeller's leadership w ten years to establish itself as the most important fact petroleum industry in America.

When Rockefeller entered the oil industry it was in chaotic state, subject to ruthless competition between lo panies of small means, subject to disastrous fires, the unc of drilling, wildcat financing, and, finally, to a totally unsy control of production and distribution. To group all uni industry under one leadership and to use their combined and control to bring about economies and improver control supply and stabilize prices, was Rockefeller's dre success was to have far-reaching results, for the Stan Company was the first great American combination to

spicuously successful, and served by its example to further the trend toward consolidation and monopoly.

The spectacular advance of Standard Oil to supremacy was initiated with the aid of the South Improvement Company, an association of leading refiners, formed in 1872. These associates prevailed upon the Pennsylvania, Erie, and New York Central railways to grant 25–50% rebates on all oil shipped for members of the association, and, in addition, to give "drawbacks" on all oil transported for competitors. With this effective mechanism for suppressing competition the other refiners in Cleveland were approached and urged to sell, being offered in payment their choice of either cash or Standard Oil stock. Of the 26 companies in the city 21 accepted the offer. Although public opinion forced the railways to repudiate their agreement within three months, the important object was already obtained with the Standard in possession of the Cleveland refineries, and Rockefeller now master of about one-third of the refining business of the country. By 1875 the large refineries in New York, Philadelphia and Pittsburgh had likewise merged their identity with Standard Oil and by 1878 Rockefeller had control of over 90% of the refineries in the United States. He next concentrated on the marketing machinery, acquiring control of companies which were marketing oil, acquiring oil terminals in the chief cities, and gathering up, one after another, the pipe lines which were being laid down by competitors in the hope of defeating his hold on the railways.

The dissolution of the South Improvement Company in 1872, incident to a Congressional investigation and popular protest, necessitated a new form of organization to achieve unified control. The Central Association of Refiners was organized in 1875, but Rockefeller wanted a tighter form of organization for the sake of greater security. His form of organization was a mystery until revealed by an investigation of the New York State senate in 1888. The inquiry revealed that 39 corporations, with property in many different States, which had varying laws to curb corporations, had turned over their stock and the right to control it to an organization having no legal existence, a "trust," consisting of nine "trustees," who had united to do things no incorporated company could do. "This," wrote the committee, "is the original 'trust.'" The word had become common in 1882, about three years after the device had been adopted by the Standard Oil Company. When formed, the Standard Oil Trust was capitalized at $70,000,000, which was subsequently increased to $102,233,700. In 1892 the Ohio Supreme Court declared the Standard Oil Trust illegal, but it was not dissolved until 1899. The Standard interests were then reorganized as the Standard Oil Company of New Jersey, but in 1911 the U.S. Supreme Court declared this combination a violation of the Sherman Anti-trust Act and ordered its dissolution.

Mr. Rockefeller was president of the Standard Oil Company of New Jersey until Dec. 4, 1911, when he retired and turned the management of his business interests over to his son. The company dissolved and distributed to its stockholders the stock held in the 37 separate companies. Though a few men continued to control a majority interest in all of the separate companies, as time passed the consolidated interest weakened greatly. In 1892 Rockefeller had owned 256,854 shares of the 972,500 shares of the trust's capitalization. In 1928, together with his son, he owned but little in some of the companies. The average Rockefeller holding was about 15%. Before his retirement Rockefeller had become the wealthiest man in America, and perhaps the wealthiest in modern history, possessing a fortune estimated by some as high as one thousand million dollars. The proper disposal of these riches had become his chief problem. Rockefeller never made ostentatious show of his wealth. A large share of it went back into industry, more and more into fields not directly connected with oil. Iron ore lands in Minnesota, coal-lands in Colorado, and stocks in many railways formed a large part of his investments.

As early as 1890 Rockefeller began to organize a system of philanthropic giving as a means of securing the most efficient disposal of his vast fortune. As in business so in philanthropy he again became a pioneer, distributing the largest group of gifts that has ever been made for the promotion of the well-being of mankind throughout the world. The philanthropies are described in full in the article ROCKEFELLER BENEFACTIONS.

For the rise of his fortune *see* G. H. Montague, *Rise and Progress of the Standard Oil Company* (1903) and I. M. Tarbell, *History of the Standard Oil Company* (1904) containing opposing views of his methods, the former sympathetic, the latter hostile; also B. J. Hendrick, *The Age of Big Business* (1919); Mark Sullivan, *Our Times, America Finding Herself* (1927). For his philanthropies, *see* M. DeHowe, *Causes and Their Champions* (1926). *Also see* J. D. Rockefeller, *Random Reminiscences of Men and Events* (1909).

ROCKEFELLER, JOHN DAVISON, JR. (1874–), American capitalist, born in Cleveland, Ohio, Jan. 29, 1874, and educated at Brown university (A.B., 1897). After a few years of business experience in his father's offices he became his father's assistant in the management of the enterprises, especially those of a philanthropic nature, which the latter had developed. Upon the elder Rockefeller's retirement in 1911, John D. Rockefeller, Jr., succeeded to many of the directorates, and became ultimately the elder's plenary representative in the administration of the Rockefeller interests. A number of the business directorates were subsequently relinquished, and a larger proportion of the son's time was given to philanthropic and civic undertakings. He became associated with his father before the first benevolent corporation was chartered and participated in the development of all of them. He became chairman of the board of the Rockefeller Foundation, a trustee of the Rockefeller Institute, and a director of the General Education Board. The serious strike in the Colorado Fuel and Iron Company in 1912–13 drew his attention to industrial relations and he became much interested in industrial representation. He has interested himself in better housing conditions in New York city, and especially in the building of model apartments, both for white people and for the negro population. He has also financed the work of many separate scientific undertakings, notably the Byrd flight to the North Pole in 1926. In 1928 he offered $10,000,000 to Egypt to help establish a museum for her antiquities, which was declined.

For his other philanthropies *see* ROCKEFELLER BENEFACTIONS. Besides numerous articles, he published *The Colorado Industrial Plan* (1916) and *The Personal Relation in Industry* (1924).

ROCKEFELLER BENEFACTIONS. It was estimated that up to the end of 1927 John D. Rockefeller had given for philanthropic and charitable purposes more than $500,000,000—the largest group of charitable and educational gifts ever made. In this distribution he aimed at stimulating others to give in addition to securing the most effective utilization of the bulk of his own fortune. Nearly four-fifths of his donations went to the four great benevolent corporations which he created: the Rockefeller Foundation, the General Education Board, the Laura Spelman Rockefeller Memorial (united in 1929 with the Rockefeller Foundation. A new fund, the Spelman Fund of New York, was incorporated in 1928, *see* below), and the Rockefeller Institute for Medical Research. Quite as significant as the magnitude of these gifts was the fact that they were free from all restrictions, having been given outright for the purposes of the respective corporations, the trustees of which have power to dispose of the principal as well as the income. As the corporate purposes of these organizations are extremely broad, and the gifts free from restrictions, they will always be adaptable to the changing needs of future generations.

The Rockefeller Foundation was chartered in 1913 "to promote the well-being of mankind throughout the world." Its chief activities have been (1) co-operation with Governments in the control of hookworm disease, malaria and yellow fever, and in the development of general public health organization, and (2) aid in developing medical, public health and nursing education in various centres through appropriations toward buildings and endowments, and through fellowships, surveys and the dissemination of information on new administrative and teaching methods. On Jan. 3, 1929, the Rockefeller Foundation and the Laura Spelman Rockefeller Memorial were consolidated, the consolidated corporation retaining the name of the Rockefeller Foundation. The work of the new Rockefeller Foundation, which aims primarily at the advancement of knowledge, is administered under the president

(1) through an International Health Division, and (2) through four directors, one each for the natural sciences, medical sciences, social sciences and humanities. The combined book-value of capital funds of the Rockefeller Foundation when the above-mentioned consolidation took place was $203,298,503.34. With $35,000,000 deducted from principal to provide for outstanding obligations there remained a net capital fund of about $168,000,000, both the income and principal of which are available for appropriation. The foundation's resources and policies are controlled by a self-perpetuating board of unsalaried trustees. From the time of its organization in 1913 up to Dec. 31, 1928, the foundation has disbursed from income and principal slightly over $144,000,000. (G. E. V.)

The General Education Board.—To the next largest of his benevolences, Rockefeller had given, up to Dec. 1924, $130,898,119. Up to July 1928, the board had appropriated for "the promotion of education in the United States of America, without distinction of race, sex or creed," the sum of $176,689,425, of which $94,148,124 was from the principal. Most of this had been given toward endowments of colleges, excluding professional departments, the rule being to make gifts contingent upon the raising of additional sums by the beneficiaries. During 1924, the board discontinued this activity. The board co-operates with medical schools, colleges and universities with a view to developing teaching and research in the fundamental sciences, public education, industrial art and negro education. Of sums appropriated by the board, $60,883,362 have been in the field of medicine; $78,631,802 to colleges and universities for general endowment; for negro education $18,872,442; and for other educational purposes the sum of $18,301,819. (T. Ar.)

The Laura Spelman Rockefeller Memorial was founded in 1918 by John D. Rockefeller, in memory of his wife, Laura Spelman Rockefeller. The memorial was incorporated for the purpose of forwarding human welfare in all parts of the world. The principal of the fund (approximately $73,000,000), as well as the income, may be used by the trustees in their discretion. Aside from a number of miscellaneous appropriations which have been decreasing, the appropriations of the memorial fall into two general categories: (1) the field of child welfare, and (2) the field of the social sciences. In the field of child welfare the memorial has assisted in four general types of activity: scientific research, the preparation of teaching materials, the training of leaders for child study work, and experiments and demonstrations in the practical organization of parent and teacher groups for the study of child life and child welfare. In support of social science the appropriations of the memorial fall into three groups: (1) appropriations to universities and research institutions; (2) appropriations for fellowships; (3) appropriations to central bodies such as the Social Science Research Council, the National Research Council and the American Council of Learned Societies.

The Rockefeller Institute for Medical Research in New York was founded in 1901 "to conduct, assist and encourage investigations in the sciences and arts of hygiene, medicine and surgery, and allied subjects, in the nature and causes of disease and the methods of its prevention and treatment, and to make knowledge relating to these various subjects available for the protection of the health of the public and the improved treatment of disease and injury." The Rockefeller Institute is composed of three departments: the laboratories in New York city, in which biological, chemical and physical investigations are conducted; a hospital, in which diseases of man are treated and studied; and laboratories and animal quarters near Princeton, N.J., where corresponding investigations are carried out on diseases of animals.

In addition to the investigations conducted in its own laboratories and hospital, expeditions are sent out for the purpose of studying diseases of man or animals under the natural conditions of their prevalence, or in order to ameliorate their ravages through methods which have been discovered in the course of investigations. Since the discovery of the often obscure causes of disease or the means of amelioration must frequently follow from a knowledge of pure science gained for its own sake, the pursuit of pure science subjects in fields related to medicine is one of the major activities of the Rockefeller Institute.

The organization of the Rockefeller Institute is divisible into a corporation which has general oversight and control of its activities, and a scientific staff which is directly charged with the responsibility of carrying on the scientific investigations. The corporation in turn is made up of trustees who are charged with the maintenance and care of the endowment and property of the institute, and a board of scientific directors which appoints the scientific staff and approves the general policy of investigation pursued. The board of scientific directors is an external body, composed of medical and other scientific men, meeting quarterly, and informed of the character and progress of the various researches under way or to be undertaken. The completed researches of the institute are published in scientific journals or issued as monographs, and are periodically assembled into volumes of studies, which are issued to institutions of learning, libraries and scientific workers throughout the world. (S. F.)

The Spelman Fund of New York.—This fund was incorporated on Dec. 19, 1928, for charitable, educational and scientific purposes. The principal of the fund which amounts to $10,000,000 was appropriated by the trustees of the Laura Spelman Rockefeller Memorial at the time the memorial was consolidated with the Rockefeller Foundation. The trustees of the Spelman Fund have power to use the principal as well as the income to carry on its purposes. The charter of the fund provides that "the territory in which the operations of the Corporation are principally to be conducted is the United States of America, its possessions and dependencies, but the operations of the Corporation shall not be limited to such territory."

The charter states that the Spelman Fund "is formed for exclusively charitable, scientific and educational purposes, including the advancement and diffusion of knowledge concerning child life, the improvement of inter-racial relations, and co-operation with public agencies." (Ar. W.)

John D. Rockefeller, Jr.—In his public gifts—more than $60,000,000 up to 1929—John D. Rockefeller, Jr., has advanced his father's purpose to promote the well-being of mankind throughout the world. Notable among these gifts have been: to the Northern Baptist Convention, $2,300,000; Bureau of Social Hygiene, $2,850,000; Brown university, $500,000; Inter-Church World Movement, $1,500,000; International House, where hundreds of Columbia university students from many lands live harmoniously together, $2,360,000; New York Public library, $3,500,000; Cathedral of St. John the Divine, $500,000; Young Men's Christian Association International Committee, $1,500,000; Hampton Tuskegee Institute (for negroes), $2,500,000; Metropolitan Museum of Art, $2,000,000; toward restoration of gardens of Versailles and the Cathedral of Reims, $2,500,000; toward restoration of the Imperial university of Tokyo, Japan, 4,000,000 yen ($1,540,000); International Education Board, $21,000,000, to advance scientific research and education and to promote agricultural science and practice throughout the world; to the League of Nations library, $2,000,000; to erect and maintain an archaeological museum in Palestine, $2,000,000; to New York Botanical Gardens, $500,000; to colleges in the Near East, $450,000; to New York Zoological Society, $500,000; to aid the restoration and preservation of Williamsburg, Va., $5,000,000.

ROCKET AND ROCKET APPARATUS. The term rocket is now generally applied to the sky-rocket, which is fully described under Fireworks.

War Rockets.—Apart from its recreative use, the rocket has from the earliest times attracted the attention of the military engineer for warlike purposes, first in Asia and later in Europe. No great progress, however, was made until the experiments of William Congreve in continuation of those carried out by General Desaguliers when in charge of Woolwich Laboratory. He set himself the task of producing a rocket capable of carrying an incendiary, or explosive charge and having a range up to two miles. After some preliminary trials he obtained permission for the construction of rockets to his design in the Royal Laboratory. The results obtained were so promising that in 1805 Sir Sydney Smith's

expedition against Boulogne included a number of boats especially fitted for firing salvos of rockets. Rough weather prevented their use on that occasion, but the following year they were used against the same place and, although deflected by the wind from the fortifications, which were the real objectives of their employment, they are credited with having done on this occasion very considerable damage in the town itself.

In 1812 the Field Rocket Brigade was formed and was ordered a year later to join the Allies before Leipsic under the command of Captain Bogue of the Horse Artillery, being the only English present. The effect of the rockets on this occasion, the first time they had ever been used in European land warfare, was very marked. The Rocket Brigade also distinguished itself two years later at Waterloo.

For the greater part of the nineteenth century war rockets constituted an important part of artillery resources, although they did not come within measurable distance of superseding artillery, as Congreve in his enthusiasm had forecast. With the development of the rifled bore, breech loading, independent recoil and smokeless powder, the advantages claimed for the war rockets were discounted and at the end of the nineteenth century they had become obsolete.

During the Great War rockets were also designed for use against aircraft, but no marked success attended the use of any of the types employed.

Signal and Life-saving Rockets.—Many forms of signal rockets have been designed; they are generally similar to those used for displays, being constructed to give various effects, as coloured stars, flash and sound, or a light suspended from a parachute. Their sizes vary between ½lb. to 2lb. according to the use for which they are intended.

The life-saving or line-carrying rocket has rendered a great service to humanity; by its use a line is carried to establish communication between shore and a wrecked vessel. The French pyrotechnist, Ruggieri, writing in 1802, claims that his father suggested the principles of the line-carrying rocket. The credit of its application in Great Britain, however, must be conceded to Trengrouse of Helston, Cornwall, about 1807. The development of the idea was delayed for some years by the adoption of the Manby apparatus, which was designed to carry a line by means of a shot fired from a mortar, a system over which the rocket has the great advantage that it traces its flight at night and can be seen by both the firer (who can correct his aim in the event of a miss) and by those to whom it is directed.

In 1826 four rocket stations were established in the Isle of Wight by Dennet of Newport, but it was not until 1855, when Colonel Boxer of the Royal laboratory, produced a rocket of greater range by adopting Frezier's idea of joining two rockets so that when the first had burnt out the second came into action, that the rocket principle was adopted officially. Rocket Stations were established round the coast and manned by the Coast Guard and volunteer crews. These have rendered the most valuable service and since 1870 have been instrumental in saving between twelve and thirteen thousand lives.

A further development of the line-carrying rocket is a light, easily portable apparatus designed to be carried on ships, a system which has obvious advantages. As a wreck is usually driven on the lee shore, a rocket fired from the ship will travel with the wind; also, the land presents a much better target than does the ship if the rocket is fired from the shore, and further, a vessel so equipped has the means of establishing communication with another at sea. The Schermúly apparatus is designed for this purpose; the system consists of the ejection of a steel rocket from a pistol with an enlarged barrel, the flash of the cartridge igniting the rocket. This method combines the advantages of the rocket and gun, or mortar systems—the rocket is more easily aimed and is in flight immediately the pistol trigger is operated, the delayed action after ignition of the rocket being one of the greatest drawbacks of the older system, particularly if fired from a moving vessel. A six pound rocket will carry a ½" hemp line a distance of 350 yards. It seems certain that this apparatus will universally be adopted, vessels being compelled to carry it as is the case with wireless apparatus. (A. St. H. B.)

Rocket Propulsion.—The pioneer work on the use of the exhaust of a rocket to propel a body was done by Prof. R. H. Goddard of Clark University, Worcester, Mass., who has studied the problem since 1909. In 1928 experiments were carried out on a rocket intended to travel into the rarefied upper air so as to obtain data as to its composition and condition. In 1918 Prof. Goddard, under the auspices of the Smithsonian Institution, published data supporting the practicability of a rocket flight to the moon. In 1928, after mathematical studies by Prof. Max Vallier of Munich and Albert Mueller, a rocket automobile was tested at the racing track of the Fritz Opel motor car factory at Russelsheim near Frankfurt. From the rear of the car project twelve large tubes arranged in a rectangle. From these tubes the exploding gases emerge. Speeds of slightly over 60m. an hour were attained within eight seconds of starting.

The extension of this principle to aeroplanes has been investigated with promising results.

ROCKFORD, a city of northern Illinois, U.S.A., on the Rock river, 17 m. S. of the Wisconsin line and midway between the east and west boundaries of the State; the county seat of Winnebago county. It is on Federal highways 20 and 51, has a municipal airport, and is served by the Burlington Route, the Chicago and North Western, the Chicago, Milwaukee, St. Paul and Pacific, the Illinois Central and electric railways, and by motor-bus lines in all directions. Pop. (1920) 65,651 (26% foreign-born white, the majority from Sweden); and 85,864 in 1930 by the Federal census. The city occupies 11·5 sq.m. on both sides of the river, and has 691 ac. in parks and playgrounds. On a wooded bluff, in a beautiful campus of 10 ac., stands Rockford college, one of the oldest standard colleges for women in the United States, opened as a seminary in 1849. Enrolment is limited to about 650. The public schools (22 elementary, two junior high, one high, and one continuation) have an enrolment of over 13,000, and the parochial schools (five elementary and one high) of 2,000. There are 61 churches in the city, and a Roman Catholic pro-cathedral. Rockford has been an important manufacturing centre since its earliest days. Water-power is supplied by a dam 800 ft. long, built in 1844. There were 7 manufacturing establishments in 1927, with output for the year valued at $78,253,608. Bank deposits on July 1, 1928, totalled $38,775,000. The assessed valuation of property was $96,055,664. Rockford was founded by New Englanders in 1834 and was chartered as a city in 1852. In 1860 the population was 6,979, and it has doubled, or more than doubled, in each 20-year period since then. In Sept. 1928, a tornado struck the city, causing some loss of life and great destruction of property.

ROCKHAMPTON, a seaport on the east coast of Queensland, Australia, situated on both banks of the Fitzroy river at the head of ocean navigation 35–40 m. from the sea. The Fitzroy and its tributaries (Dawson, Mackenzie, etc.; max. length 520 m.) drain a basin of 50,000 sq.m. of great diversity and economic value. The hinterland of Rockhampton thus includes extensive high-class pastoral areas extending at least as far west as Longreach (428 m. by rail); rich agricultural and dairying lands which include the Dawson river irrigation area (total projected area: 200,000 ac.; 30,000 [1926–27] available), besides large mineral resources including coal-fields (*e.g.*, Blair Athol mines). Around Rockhampton itself is a fertile agricultural area producing tropical fruits, maize, and dairy products. The climate is hot and humid but not unhealthy (av. ann. temps.: 82–62 F; av. ann. rainfall 110 in. falling within some 44 days of the summer). The town itself (pop. 30,000) is well designed, has wide streets, many substantial buildings (including two cathedrals), and possesses good water, gas, electricity and tram services besides fine public parks and gardens. The harbour (wharfage 2,000 ft. with 8–20 ft. alongside) has been improved at considerable expense, and is kept open for vessels of 18–20 ft. draught by dredging. Difficulties are the shifting sand and mud banks due to severe floods which are liable to occur during summer. Rockhampton is the base of a branching inland railway system which taps the widely separated Longreach (428 m.), Welford

(520 m.), Blair Athol (240 m.), Springsure (206 m.), and other centres, and which is being continually extended and developed. Along the coast the Great Northern line links Rockhampton with other coastal towns, with Brisbane, with various seaside resorts (Emu Park, Yeppoon), and the ports of Gladstone (*c.* 80 m.) and nearer by Port Alma, to which ocean vessels often resort. Railway repairing works and other industries are carried on in the town and near by is one of the largest meat-preserving and freezing works in Australia. The total trade amounted (1925–26) to £1,860,000 (1926–27: overseas trade alone: £760,000), and the total shipping to 274,000 tons (1926–27: overseas and interstate alone, 17,000 tons). In respect of the value of its trade Rockhampton is the second port of Queensland.

ROCK HILL, a city of York county, South Carolina, U.S.A., 60 m. E. of Spartanburg, on Federal highway 21 and two lines of the Southern railway. Pop. 8,809 in 1920, 22% negroes; 11,322 in 1930 by the Federal census, with an additional 4,000 in the immediate suburbs. The city lies at an altitude of 670 ft. It has cotton-mills (about 133,000 spindles and 4,000 looms in 1928) and other important manufacturing plants, with an annual output valued at $10,000,000. Winthrop college for women (founded in 1886 by David Bancroft Johnson, who remained its president until his death in 1929, and chartered in 1891 as a State institution) has an enrolment of over 1,800 and a plant valued at $3,000,000. Rock Hill was incorporated as a village in 1870, as a city in 1892. It has a commission-manager form of government.

ROCKINGHAM, CHARLES WATSON WENTWORTH, 2ND MARQUESS OF (1730–1782), twice prime minister of England, was the son of Thomas Watson Wentworth (*c.* 1690–1750), who was created earl of Melton in 1733 and marquess of Rockingham in 1746.

Charles Watson Wentworth was educated at Westminster school and St. John's College, Cambridge. In 1751 he became lord-lieutenant of the North and East Ridings of Yorkshire and a lord of the bedchamber, and in 1760 was made a knight of the Garter. In May 1762 the king's favourite, the earl of Bute, became first lord of the treasury, and the marquess of Rockingham was amongst those who in the following year were dismissed from their lord-lieutenancies. In July 1765 Lord Rockingham formed his first administration with General Conway and the duke of Grafton as secretaries of state. The cabinet seemed stronger than it really was, for it was divided by intestine quarrels, and the earl of Chatham refused to have anything to do with it. In May 1766 the duke of Grafton, a far abler man than Rockingham, though neither so conciliatory in his manners nor so generally popular, seceded from the government, and in August 1766 he succeeded his former chief as first lord of the treasury and prime minister. Lord Rockingham again became prime minister in 1782, with Fox and Shelburne (afterwards marquess of Lansdowne) as secretaries of state. This time he enjoyed office for but a few weeks, for he died on July 1, 1782. He left no issue, and his titles became extinct.

See *Memoirs of the Marquis of Rockingham and his Contemporaries,* by George Thomas, earl of Albemarle (2 vols., 1852); Horace Walpole's *Memoirs* of the reign of George III., edited by G. F. R. Barker (1894); and the other letters, papers and diaries of the time.

ROCK ISLAND, a city of western Illinois, U.S.A., on the Mississippi river, 180 m. W. by S. of Chicago, adjoining Moline and opposite Davenport, Ia.; the county seat of Rock Island county. It is 2 m. above the mouth of the Rock river and the Hennepin canal (connecting the Mississippi and the Rock rivers with the Illinois), is on Federal highways 32 and 61, has air-mail service east, west and south, and is served by the Burlington Route, the Chicago, Milwaukee, St. Paul and Pacific, the Davenport, Rock Island and Northwestern, the Rock Island and the Rock Island Southern railways, and by river steamers and barges, ferries and motor-bus and truck lines. Pop. (1920) 35,177 (83% native white); 1930, 37,953 Federal census. The island from which the city takes its name, one of the largest (990 ac.) and most beautiful in the Mississippi, is owned by the U.S. Government, and occupied by an arsenal. Government bridges connect it with all three cities. Rock Island (the city) has an area of 10 sq.m. and an assessed valuation in 1926 of $12,056,116. It is the seat of Augustana college and Theological seminary (Evangelical Lutheran; 1860) and of the home offices of the Modern Woodmen of America and the Royal Neighbors of America (large fraternal orders). The manufacturing industries are important and diversified, employing 3,806 workers and producing goods valued at $22,780,589 in 1927. On the tree-covered site of Rock Island there were villages (dating from as early as 1730) of the Sauk and Fox Indians, who helped the British in the War of 1812. The island was fortified by the British, and engagements took place in the vicinity in July and Oct. 1814. In 1816 the United States built Ft. Armstrong (abandoned 1836) on the west end of the island. It became one of the important frontier military posts, and was the headquarters of operations in the Black Hawk War and the scene of the signing of the treaty on Sept. 21, 1832. Black Hawk was born in one of the villages on the Rock river, and a bluff near its mouth is called Black Hawk's Watch-tower. The first white settlement on the mainland was made in 1826. The town was incorporated in 1837 and was chartered as a city in 1849. The arsenal was established on Rock Island by act of Congress in 1862. During the Civil War 12,000 Confederate soldiers were confined on the island, of whom 2,000 died during imprisonment.

ROCKLAND, a city of Maine, U.S.A., the county seat of Knox county; on Penobscot bay, 86 m. E.N.E. of Portland. It is on the Atlantic highway, and is served by the Maine Central railroad and the Eastern Steamship lines. Pop. (1920) 8,109 (92% native white); 1930 Federal census, 9,075. Rockland is the gateway to the numerous summer resorts on the shores and islands of Penobscot bay. Lime-burning, cement-manufacturing, ship-building and deep-sea fisheries are the dominating industries. The city ships 15,000,000 lb. of fish annually and more lobsters than any other port in the country. Just outside the harbour is the trial course where the speed of Government boats is tested. Rockland was settled in 1769, and began to grow with the establishment of the lime industry in 1795. It was set off from Thomaston and incorporated as the town of East Thomaston in 1848; adopted its present name in 1850; and in 1852 was chartered as a city.

ROCKLAND, an inland town of Plymouth county, Massachusetts, U.S.A., with an area of 10 sq.m.; 20 m. S. by E. of Boston, on the New York, New Haven and Hartford railroad. Pop. (1920) 7,544; (1930) 7,524. The town was set off from Abington and incorporated in 1874.

ROCK SPRINGS, a city of Sweetwater county, Wyoming, U.S.A., in the south-western part of the State, on Bitter Creek, at an altitude of 6,256 feet. It is on the main line of the Union Pacific railroad, and is a station on the transcontinental air-mail route. Pop. (1930) 8,440. Rock Springs (named from a large saline spring issuing from the base of a bluff) is one of the most important coal-mining centres of the West and the trading point for a wide region covered with sheep ranches. The city was incorporated in 1888.

ROCKVILLE, a city of Tolland county, Connecticut, U.S.A., on the Hockanum river, 15 m. N.E. of Hartford. It is served by the New York, New Haven and Hartford railroad. Pop. (1920) 7,726; 1930 it was 7,445. At Rockville, in 1841, fancy cassimeres were first made in the United States, and in 1870 the Hockanum mills (established 1809) produced the first American-made worsted for men's clothing. Settlement here began about 1726, and Rockville was chartered as a city in 1889.

ROCKVILLE CENTER, a village of Nassau county, New York, U.S.A., on the southern shore of Long Island, 22 m. E. of Brooklyn; served by the Long Island railroad. Pop. (1930) 13,718 (Federal census). The village, settled about 1827, was incorporated in 1870.

ROCKY FORD, a city of Otero county, Colorado, U.S.A., on the Arkansas river, Federal highway 50, and the Santa Fe railway, in the south-eastern part of the State, at an altitude of 4,177 feet. The population was 3,746 in 1920, 94% native white, and was 3,426 in 1930. Rocky Ford produces the most delicious cantaloupes in the country, and is noted also for its honey-dews.

casabas, watermelons and Valencia onions. The first Thursday in September is Watermelon Day, when 25,000 melons are given to visitors. The cantaloupe industry had its origin here (about 1888). Over 3,500 carloads are shipped each season. The city was founded in 1883 and incorporated in 1887.

ROCKY MOUNT, a city of North Carolina, U.S.A., in Nash and Edgecombe counties; 47 m. E.N.E. of Raleigh, on the Tar river and Federal highway 17-1. It is served by the Atlantic Coast Line railroad. Pop. 12,472 in 1920, 36% negroes; and in 1930, 21,412 by Federal census. It is an important bright-leaf tobacco and cotton market, handling 37,500,000 lb. of the former and 10,000 bales of the latter in 1928. Rocky Mount has the oldest cotton-mill in the State (established in 1813, and operating 54,000 spindles in 1928), and various other manufacturing plants. The city operates under a council-manager form of government, and owns its power plant and gas plant. Rocky Mount was incorporated as a town in 1867 and as a city in 1907.

ROCKY MOUNTAIN GOAT (*Oreamnos montanus*), a North American hollow-horned ruminant of the family *Bovidae*, distinguished by its whiteness. It is the only ruminant, with the exception of the white Alaskan wild sheep, which is entirely white at all seasons of the year. In the winter coat, the hair is long and pendent, especially on the neck and chest, and elongated into a short beard on the sides of the lower jaw behind the chin; at the base of the long hair is a thick, woolly under-fur. In summer the coat becomes comparatively short. The muzzle is hairy, the ears are of moderate size, and the tail is short. There is a large globular gland at the base of each horn. The black horns, ringed in their basal portion, are comparatively short and not unlike those of the Asiatic serows (*q.v.*), in being subcylindrical and curving slightly backwards. The lateral hoofs are well developed. The cannon-bones are remarkably short and wide. The shape of the animal is ungainly, owing to a huge hump on the withers, at which point the height is about 3ft. The affinities of the white goat (which is really a member of a group intermediate between goats and antelopes) are probably with the Asiatic serows and takin.



BY COURTESY OF THE AMERICAN MUSEUM OF NATURAL HISTORY

ROCKY MOUNTAIN GOAT (OREAMNOS MONTANUS)

See Madison Grant, "The Rocky Mountain Goat," published in the 9th *Annual Report of the New York Zoological Society* (1905).

ROCKY MOUNTAINS, THE, are the principal division of that vast system of highlands occupying the western third of the United States and a narrower belt in western Canada. Standing between the great continental plains on the east and the region of elevated basins and plateaux stretching from Nevada to central British Columbia on the west, they constitute the backbone of the continent, as well as a major topographical feature of the entire globe.

At the south, the Rockies first become prominent in northern New Mexico where there are elevations above 13,000 feet. Thence they sweep for 2,200 m. through the United States and Canada to the Yukon. In Canada, for 450 m. they form the boundary between Alberta and British Columbia, where they are known as the "Canadian Rockies." Their greatest width and elevation are attained in Utah and Colorado. Here the system of ranges is 600 m. across. In Colorado there are 46 summits surpassing 14,000 ft., Mt. Elbert (14,419 ft.) being the highest of the system and the second highest peak in the United States. Colorado contains about 254 mountains between 13,000 and 14,000 feet. North-west of Colorado breadth and elevation diminish, until at the Canadian boundary the ranges are less than 100 m. wide, with few elevations exceeding 9,500 feet.

From Colorado almost to the Peace river in British Columbia, the Rockies carry the watershed of the continent—the continental divide. But this does not mean that they present a continuous chain of great peaks. On the contrary the zone of uplift is rather a vast complex of separate ranges, interrupted at places by wide gaps of lofty rolling plateaux.

In the United States, the crest-line of the Rocky Mountains definitely breaks down at two places—the plateaux of Yellowstone Park and Great Divide Basin in southern Wyoming (60 m. by 100 m.). The three divisions thus produced—north, central and southern—may be taken as a convenient basis of description. They correspond approximately with the States of Montana, Wyoming and Colorado (with which Utah is associated). The elevations of these major breaks or passes are as follows: in southern Arizona, 4,615 ft. (Southern Pac. R.R.); in New Mexico, Campbell's Pass, 7,250 ft. (Santa Fe R.R.); in Great Divide Basin, 7,102 ft. (at Creston, Union Pacific R.R.); in Yellowstone Park plateaux, about 8,300 ft.

The Southern Rockies.—The Rockies of Colorado are dealt with elsewhere. (*See* COLORADO and NATIONAL PARKS.) The most magnificent groups are probably the Sawatch range (80 m. by 20 m.) and the Sangre de Cristo range (40 m. by 10 m.) in the central part of the State. In the south-western corner the Elk, San Miguel (with the spectacular Lizard Head, 13,156 ft.), Needle and other groups, form an incredibly wild and rugged mass of peaks.

The Wasatch mountains of central Utah, overlooking the great basin for 100 m., present abrupt ranges, of which Mt. Delano (12,240 ft.) is the highest. Associated with the Wasatch mountains is the Uinta group (150 m. by 25 m.), of which Kings Peak (13,500 ft.) is loftiest. Five others exceed 13,000 feet.

The Central Rockies.—The ranges just mentioned connect with the main axis of elevation of the Rockies in the region of Yellowstone Park through a belt of rather indefinite uplands running north and south along the western boundary of Wyoming. Here are the Crawford mountains, the Wyoming Range, the Gros Ventre mountains, the Snake River Range and the Teton Range. The Teton Range presents perhaps the most splendid spectacle of all the Rocky Mountain ranges. It is 40 m. long and 10 m. wide, rugged and precipitous. Granite spires rise abruptly 6,000 to 7,000 ft. above the flats of Jackson's Hole. The principal peaks are the Three Tetons (Grand Teton, 13,747 ft.) and Mt. Moran (12,100 ft.) at the northerly extremity.

Reverting to the continental divide of the western part of Wyoming, the important uplift of the Wind River Range is next in order, north-west of Great Divide Basin. It is about 100 m. long, the core being upwards of 13,000 ft. in elevation and sending out long lateral ridges between which remarkable canyons occur. Its most prominent summits are Fremont Peak (13,720 ft.), ascended in 1842 by John C. Frémont; Gannett Peak (13,785 ft.), the highest in Wyoming, and Chimney Rock (13,340 ft.). Numerous small glaciers are on the north-east slopes. The largest, Dinwoody, covers several square miles. The scenery and mountains are distinctly alpine in character, with many fine waterfalls and lakes.

North-east of the Wind River Range, across the Big Horn Basin, lie the Big Horn mountains, a prodigious off-shoot of the main range towards the great plains, 120 m. long and 30 to 50 m. wide. The axis averages from 11,000 to 13,000 ft. in elevation, rising some 9,000 ft. above the neighbouring prairies. A few of the peaks surpass 13,000 ft. and bear small glaciers in their rugged amphitheatres. The highest summit is Cloud Peak (13,165 ft.).

The Northern Rockies.—Between the northern boundary of Yellowstone Park and the Yellowstone river, the Beartooth and neighbouring ranges display what are probably the principal mountain masses of this division. In the vicinity of Mt. Cowen (11,190 ft.) and Emigrant Peak (10,960 ft.) the relief becomes as great as 6,400 ft., and Granite Peak (12,850 ft.), the highest mountain in Montana, is situated here, as are Grasshopper Glacier and other small ice bodies. The Beartooth Range has a score of summits of 12,000 ft. or more.

The continental divide, however, leaves Yellowstone Park in a

north-westerly direction. At the 114th meridian it swings off abruptly to the north-east through the Butte and Helena districts. Beyond this swing, the western axis of elevation continues north-westward as the Bitterroot mountains to within 125 m. of the Canadian border. They form the boundary between Idaho and Montana, the average elevation being between 7,000 and 8,000 feet. The highest peaks occur on projecting lateral spurs—El Capitan (9,936 ft.) and St. Mary (9,333 ft.). This 125-m. interval is filled by the Coeur d'Alene (6,000 ft.) and Cabinet ranges, the latter boasting of a glacier on Bear Peak (about 9,000 ft.). West of the Bitterroots in central Idaho lies a labyrinth of peaks and ridges (11,000 to 12,000 ft.), Mt. Hyndman (12,078 ft.) being the highest in that State.

In the region of Butte and Helena, the continental divide is generally featureless, the passes around Butte averaging 6,000 ft. or less. Mullan Pass near Helena is 5,870 feet. The Anaconda range contains Mt. Haggin (10,598 ft.) and Mt. Evans (10,635 ft.). Beyond Helena, the divide veers to the north-north-west and follows the Lewis Range, which is so wild and rugged that no wagon roads cross it for 200 miles. Opposite to the Lewis Range, the westerly margin of the Rockies is defined by the White Fish Range (west of the north fork of Flathead river) and the Mission Range (60 m. long, south-east of Flathead lake). The latter culminates in the glacier-bearing Mt. MacDonald (9,800 ft.). Between the Mission and Lewis ranges is the Swan range (Mt. Holland, 10,400 ft.). The principal continental pass hereabouts is Marias Pass (5,213 ft.), crossed by the Great Northern Railroad.

The finest scenery in this quarter is within Glacier National park (*see* NATIONAL PARKS) with 20 peaks between 9,000 and 10,000 ft. and six between 10,000 and 10,438 feet. Mt. Cleveland is the loftiest summit. The park contains about 40 small glaciers and several large ones (from two to five sq.m. apiece), besides a myriad of attractive lakes.

The Canadian Rockies.—In Canada the axis of the Rockies is continuous for 1,000 miles. It is simpler, straighter and more sharply defined.

The Rockies proper, a belt averaging some 70 m. across, are here considered as dissociated from the adjoining groups of the Purcells, Selkirks, Columbia and Pacific coast mountains. Prominent passes of the divide are: Crows Nest Pass (C.P.R.R.), 4,453 ft.; Vermillion Pass (motor road), 5,376 ft.; Kicking Horse Pass (C.P.R.R.), 5,320 ft., and Yellowhead Pass (C.N.R.R.), 3,711 ft. Proceeding north-westerly from the U.S. boundary, there are no glaciers for 100 m., the peaks being mostly below 9,000 feet. A little farther on is Mt. Joffre (11,316 ft.), the first real glacier-hung peak. From here to beyond Mt. Robson (12,975 ft., the highest of all) the system is continuously alpine for about 275 miles. Two hundred miles from the boundary the Canadian Pacific railway crosses the chain near the famous Lake Louise. Halfway between this and Mt. Joffre stands the handsome Mt. Assiniboine (11,870 ft.). In the 150 m. gap between the C.P.R.R. and the Canadian National railway at Jasper, are situated Mt. Forbes (11,902 ft.) and Mt. Columbia (12,294 ft.), the fifth and second in rank in the Canadian Rockies respectively. In these mountains about 50 peaks surpass 11,000 feet. Glaciers and snowfields abound, and with the neighbouring groups just mentioned there is presented the best sweep of truly alpine territory to be found in America short of Alaska. The north-westerly 500 m. of the range are imperfectly known, although the mountains are lower. (*See* MOUNTAINEERING: section *United States.*)

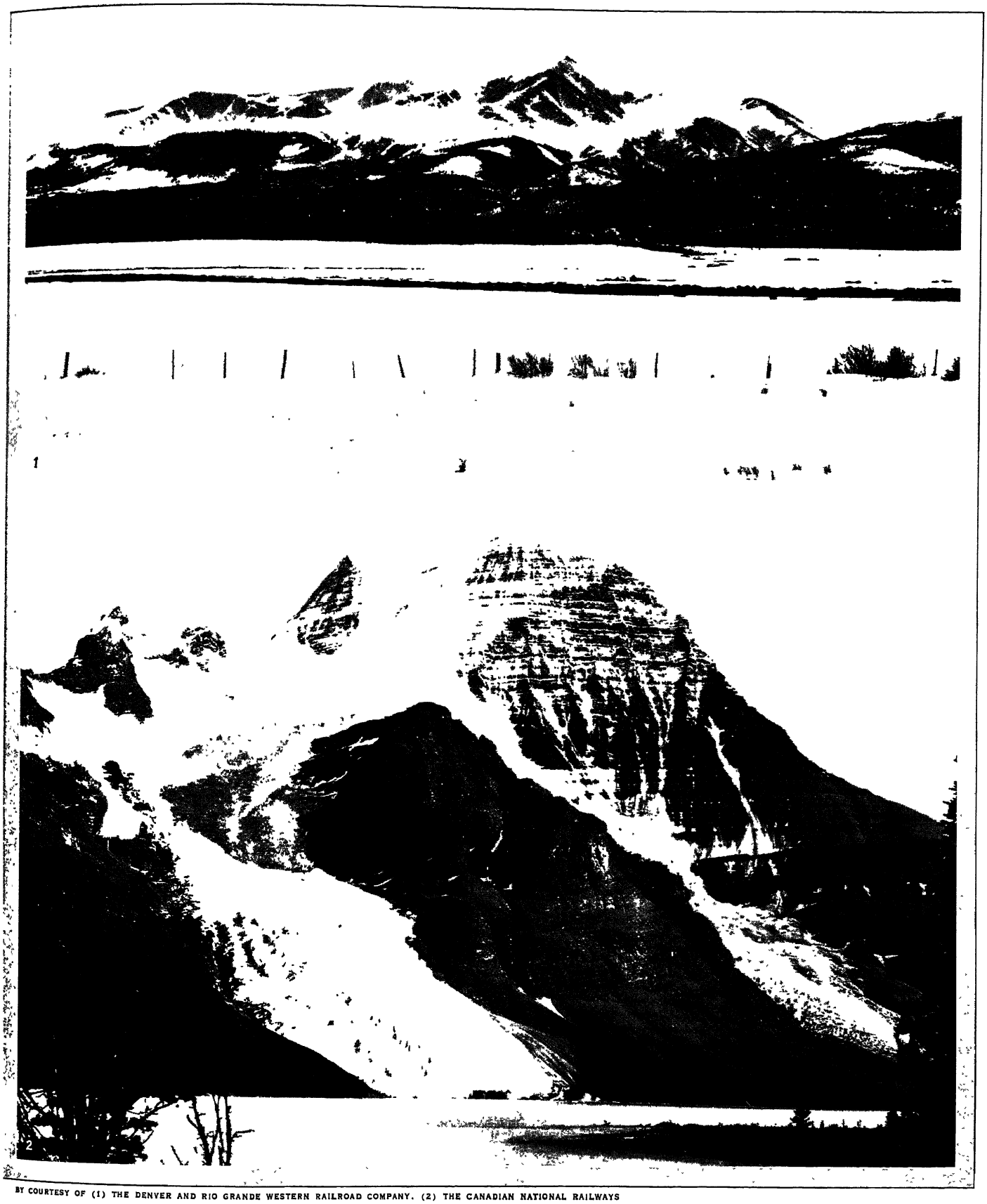
(H. PAL.)

ROCOCO, a term used to describe a phase of European art originating in France and commencing in the first quarter of the 18th century. Its name is derived from the French word *Rocailles* which was used to designate the artificial grottoes and fantastic arrangements of rocks in the gardens of Versailles; and it indicates one of the features of the rococo style in its typical form—its absolute freedom and irregularity of rhythm, the twisted curves of a shell being as it were the standard of the whole system of design. Historically, it was an extreme development of the ideas of individual imagination and love of broken curves which characterized baroque art (*q.v.*). For the grave and pompous dignity of the style of Louis XIV., the rococo substitutes playfulness and exquisite gracefulness and charm. Up to about the middle of the 18th century, rococo art remained gay and freakish and showed much exotic influence as, for instance, the influence of Chinese art. Then a renewal of interest in classical art and archaeology which had meanwhile taken place in Italy began to make itself felt in French art. During the later phase of the rococo, much of the playfulness disappeared, and a greater calm and balance were introduced into the style; but, nevertheless, it retained gracefulness and charm, till eventually, between 1780 and 1790, the severe neo-classical movement superseded it. This later phase of the rococo must in fact be regarded as a stage of transition from the rococo proper to the neo-classical art or Louis XVI. (*See* LOUIS STYLES.)

BIBLIOGRAPHY.—C. Gurlitt, *Geschichte des Barockstiles, des Rococo und des Klassicismus in Belgien, Holland, Frankreich, England* (Stuttgart, 1888); S. Sitwell, *Southern Baroque Art* (1924) and *German Baroque Art* (1927).

ROCROI, a town of northern France, in the department of Ardennes, 22 m. N.N.W. of Charleville by rail, and within 2 m. of the Belgian frontier. Pop. (1926) 968. The place, originally called Croix-de-Rau or Rau Croix, was fortified in the 16th century and besieged by the imperialists in 1555. Invested by the Spaniards in 1643, it was relieved by Louis II., the duke of Enghien (afterwards the Great Condé). Captured in 1658 by the same duke for Spain, it was not restored to France till the Treaty of the Pyrenees in 1659. In 1815 Rocroi was besieged by the allies. As a fortified place Rocroi commands the Ardennes plateau between the valley of the Meuse and the headwaters of the Oise. The present fortifications, constructed by Vauban, form a pentagon and entirely close in the town.

Battle of Rocroi.—In 1643 (*see* THIRTY YEARS' WAR) the Spaniards, under Melo, invading France through the Ardennes, laid siege to Rocroi. The town lay in a small plain, surrounded by woods and marshes, and could only be approached through a narrow defile. Contrary to the advice of his cautious lieutenant, Marshal de l'Hopital, the young duc d'Enghien, later known as prince de Condé (*q.v.*), though his army was inferior, decided to attack the Spaniards before the town. Either taken by surprise or deliberately courting battle, Melo omitted to block the defile and Enghien, covered by a vigorous display of cavalry under the dashing Gassion, led his army through it in safety and formed up on a low ridge facing the Spanish lines. His infantry, commanded by Espenan, was in the centre, cavalry under Gassion on the right, cavalry under la Ferté on the left, a small reserve under Sirot in rear—altogether 16,000 infantry and 7,000 cavalry, with 12 guns. The Spanish army, now concentrated on a parallel ridge facing the French, was similarly organized, 18,000 infantry in the centre under the veteran Fontaine, cavalry on the right under Isembourg, on the left under Albuquerque—27,000 men and 18 guns. Melo also expected a reinforcement of 6,000 men under Beck. Evening was approaching when la Ferté, wishing to outshine the more favoured Gassion, suddenly led his wing forward without orders, designing, perhaps, to throw a relief into Rocroi. Enghien instantly ordered him back, and Melo surprisingly allowed him to return untouched. Night fell without further action. On May 19 the French army stood to arms at 3 A.M., Enghien, like Henry of Navarre, donning a hat adorned with white plumes instead of an armoured helmet. A deserter had reported that a battalion of musketeers was in ambush in a wood on the French right. Enghien sent a regiment of infantry to dislodge them, while cavalry, moving round behind the wood, caught them as they retired and cut them to pieces. Relieved of this danger, Enghien set himself to his main task. He himself led eight squadrons against Albuquerque's front, while Gassion with a similar force attacked his left flank. Albuquerque's force melted away before the simultaneous onslaught, and Enghien, ordering Gassion to pursue, swung his own squadrons against the left of the Spanish infantry. Meanwhile la Ferté, though ordered not to commit himself till the right attack had developed favourably, had again disobeyed. He led a ragged attack against Isembourg, was completely defeated, himself and his guns captured, while his



BY COURTESY OF (1) THE DENVER AND RIO GRANDE WESTERN RAILROAD COMPANY. (2) THE CANADIAN NATIONAL RAILWAYS

THE ROCKIES IN THE UNITED STATES AND CANADA

1. The Rocky Mountains in the United States: view showing Mount Elbert near Leadville, Colorado, the second peak in the United States in height—Mt. Whitney in California being the highest. The altitude of Mount Elbert is 14,419 feet
2. The Rocky Mountains in Canada: Mount Robson, British Columbia, having an altitude of 12,975 feet .

men fled, hotly pursued by the Spaniards. Fortunately Sirot's reserve stood firm and threw off Isembourg's attack. Espenan also had advanced against the Spanish infantry, but seeing la Ferté's disaster, drew off. At this critical moment Enghien with his cavalry struck the second line of Spanish infantry in the rear and, dispersing them, swept on to attack Isembourg's victorious cavalry. Taken completely by surprise, Isembourg's men fled, leaving their own and la Ferté's captured guns in Enghien's hands. There now remained only the front line of the Spanish infantry, the famous *tercios viejos,* standing in square upon the ridge. Beck, however, was approaching and the battle might yet be lost; collecting horse and foot Enghien led them to the attack. The Spaniards stood motionless till the French were within 50 paces; then the front face of the square opened and 18 guns belched death at the oncoming French; crashing musketry joined their roar and the attackers fell back with terrible loss. Twice Enghien renewed the attack, only to be beaten off, but the Spanish ammunition was running low, their losses were heavy, the recaptured French guns were brought into action, Sirot came up with his reserve and Gassion from his pursuit. Realizing that further resistance was hopeless, the Spanish officers signalled their desire for quarter; Enghien stepped forward to receive their surrender, but the Spanish infantry, misunderstanding his intention, opened fire upon him. Infuriated at this apparent treachery, the French hurled themselves upon the square and, overwhelming it, massacred the gallant Spaniards almost to a man. Beck, warned of his danger, retreated and the victory was complete. The price of it was 2,000 Frenchmen killed and as many wounded, but 8,000 Spaniards lay dead upon the field, and 7,000 more, nearly all wounded, were prisoners in the hands of the French. Rocroi marked the beginning of the long period of French military glory which was ended only by Marlborough and Eugene.

ROD, EDOUARD (1857–1910), French-Swiss novelist, was born at Nyon, in Switzerland, on March 31, 1857. He studied at Lausanne and Berlin, and in 1878 found his way to Paris. In 1881 he dedicated his novel, *Palmyre Veulard,* to Zola, of whom he was at this period a disciple. A series of novels of similar tendency followed. In *La Course à la mort* (1885) he turned to the analysis of moral motives. He is at his best in presenting cases of conscience, the struggle between passion and duty, and the virtues of renunciation. *Le Sens de la vie* (1889), one of his most famous books, is in the nature of a complement to *La Course à la mort.* Of his many later works, *La Vie privée de Michel Teissier* (1893), translated as *The Private Life of an Eminent Politician* (1893) is justly famous. He was an ardent student of Rousseau, and his play *Le Réformateur* (1906), is based on an episode in Rousseau's life. He died in January 1910.

RODBERTUS, KARL JOHANN (1805–1875), German socialist, was born at Griefswald on Aug. 12, 1805, where his father was professor at the university. He studied law at Göttingen and Berlin, was employed in legal offices in Prussia, and, after travelling for some time, bought the estate of Jagetzow in Pomerania (whence his name of Rodbertus-Jagetzow), and settled there in 1836. Henceforward he devoted himself chiefly to economic studies and to local and provincial affairs. In 1847 he was elected a member of the provincial diet, and in the following year he supported German unity and advocated the independence of the popular assembly. As a member of the Prussian national assembly in 1848, he was made Minister of public worship and education, and he sat for Berlin in the second chamber of 1849. He died on Dec. 8, 1875.

The general position of Rodbertus was "social, monarchical and national." He held the purely economic part of the creed of the German social-democratic party, but disagreed with their methods, and with those of the Arbeiterverein which he refused to join. While regarding the establishment of a socialist state as eventually possible, he accepted existing institutions as the result of past development and looked to the ruler of a united Germany to solve all social problems. The basis of the economic teaching of Rodbertus is the principle laid down by Adam Smith and Ricardo, and insisted on by all the later socialists, that labour is the source and measure of value. In connection with this he developed the position that rent, profit and wages are all parts of a national income produced by the united organic labour of the workers of the community. Consequently wages of labour cannot be paid out of capital; for they are only that part of the national income which is received by the workmen, of a national income which they have themselves produced.

Among his works are: *Die Forderungen der arbeitenden Klassen* (1831); *Zur Erkenntniss unserer staatswirtschaftlichen Zustände* (1842); *Creditnot des Grundbesitzes* (2nd ed., 1876). *See* E. C. Gonner, *Social Philosophy of Rodbertus* (1899); G. Mayer, *Rodbertus und Lassalle* (1924); H. Sultan, *Rodbertus und der agrarische Social Konservatismus* (1927).

RODENT, a member of the order of gnawing mammals (Rodentia), which have incisor teeth of great strength and sharpness, as squirrels, rats, porcupines and beavers. The rodents form the largest order of mammals, embracing some 3,000 species, very widely distributed throughout the world. In size they range from pygmy mice, ranking among the smallest of mammals, to the capybara, which attains a length of four feet. While the rodents are mostly terrestrial and include numerous burrowers, many are tree-dwellers and some are semi-aquatic. In their relationships the rodents fall into four groups exemplified by (1) the squirrels, (2) mice and rats, (3) porcupines, and (4) hares and rabbits. Among the squirrel-like rodents are the chipmunks, gophers, marmots, prairie-dogs and beavers. Representative of the mice, rats and their allies are the field-, jumping-, harvest-, and pocket-mice, the water-, bamboo-, wood-, and kangaroo-rats, the pocket-gophers, hamsters, voles, jerboas and lemmings. To the group allied to the porcupines belong the agouti, chinchilla and guinea-pig. The important hare-rabbit group includes also the picas, or tailless hares. Various rodents are prized for food, as rabbits, hares, squirrels; some species, as the beaver, chinchilla and muskrat, are valued for their fur. Numerous rodents, as rats and mice, are troublesome pests; others as rats, rabbits and squirrels, are disseminators of diseases, as rats, the bubonic plague (*q.v.*).

See RODENTIA and other articles on the various animals mentioned.

RODENTIA, an order of placental mammals characterised by their peculiar front or incisor teeth, which are reduced to a single functional chisel-like pair in each jaw, specially adapted for gnawing, and growing throughout life. Rodents may be characterised as terrestrial, or in some cases arboreal or aquatic, placental mammals of small or medium size, with a milk and a permanent series of teeth, plantigrade or partially plantigrade, and generally five-toed, clawed (rarely nailed or semi-hoofed) feet, clavicles or collar-bones (occasionally imperfect or rudimentary), no canine teeth, and a single pair of lower incisors, opposed by only one similar and functional pair in the upper jaw. *See* TEETH.

In all rodents the upper incisors resemble the lower ones in growing uninterruptedly from persistent pulps, and (except in the hare group, Duplicidentata) agree with them in number. The premolars and molars may be rooted or rootless, with tuberculated or laminated crowns, and are arranged in an unbroken series. The orbits are always open behind, never being surrounded by bone. All rodents are vegetable feeders.

Anatomy.—The skull is characterised by large premaxillae, completely separating the nasals from the maxillae; by the presence of zygomatic arches; by the wide space between incisors and cheek-teeth; and (except in Duplicidentata) by the antero-posteriorly elongated glenoid vacuity for the articulation of the lower jaw. The orbit is more or less completely continuous with the temporal fossa. The palate is narrow from before backwards, this being specially the case in the hares, where it is reduced to a mere bridge between the premolars. Tympanic bullae are always present and generally large; in the gerbils and jerboas there are supplemental mastoid bullae which form great hemispherical bony swellings at the back of the skull, in these genera and the hares the auditory meatus being tubular. The lower jaw is characterised by its abruptly narrowed and rounded front part supporting the pair of large incisors, by the small coronoid process, and the great development of the lower hind, or angular, portion. The cheek-teeth may be either rooted or rootless, and either cusped or formed

of parallel plates. When there are more than three cheek-teeth, those which precede the last three have succeeded milk-teeth, and are premolars. *See* TEETH: *Mammalia; Dental Formulae.*

Classification.—Some diversity of view obtains among naturalists with regard to the classification of the order; the scheme here followed being the one adopted (with some modifications of nomenclature) by Mr. Oldfield Thomas. All authorities agree in dividing rodents into two great sub-orders, the one, *Duplicidentata,* comprising only the hares, rabbits and picas, and the other, *Simplicidentata,* all the rest. In the latter there is only one pair of upper incisors, the enamel is on the front surface only.

SUBORDER SIMPLICIDENTATA

Section SCIUROMORPHA.—In this section the zygomatic arch, which is slender, is chiefly formed by the jugal; the angular part of the mandible arises from the inferior surface of the socket of the lower incisor. Collar bones well developed; tibia and fibula distinct. This section may be divided into 5 families:—(I.) *Anomaluridae:* arboreal rodents without postorbital processes; dentition i. $\frac{1}{1}$, p. $\frac{1}{1}$, m. $\frac{3}{3}$, and auditory bullae large. Near the root of the tail, on its underside, are a series of imbricated scales, which may be large and pointed (*Anomalurus*), or small and ridge-like (*Idiurus* and *Zenkerella*). A cutaneous parachute-like expansion, supported by a cartilaginous spur from the elbow, connects the limbs and tail in genera *Anomalurus* and *Idiurus;* it is absent in *Zenkerella.* This family is entirely confined to Africa where the various species are distributed over the greater part of Equatorial Africa from Liberia to Kenya Colony, as far south as Northern Rhodesia. The genus *Anomalurus,* the large Scaly-tailed Flying Squirrels, contains a large number of handsomely coloured species. The genus *Idiurus* contains the Pigmy Scaly-tails which are much smaller than the species of *Anomalurus,* with less bushy tails and brownish grey in colour; the three known species are found in West and Central Africa, from the Cameroons to the Ituri Forest, E. Congo. The Flightless Scaly-tail (*Z. insignis*) hails from the Cameroons.

(II.) **Sciuridae,** arboreal or terrestrial forms with distinct post-orbital processes and without caudal scales; dentition, i.$\frac{1}{1}$, p. $\frac{2}{1}$, m. $\frac{3}{3}$; this family is widely distributed in both Old and New Worlds. **Sciurinae:** this subfamily includes the typical squirrels, long-tailed and slender-bodied. Most of the species are arboreal, with compressed incisors. In Africa there are 13 different genera of *Sciurinae:* (1) *Aethosciurus* a genus allied to the typical one but distinguished by the baculum being simple; from the following genus it differs in the possession of two upper premolars. (2) *Heliosciurus,* East, West and Central Africa as far south as N. Rhodesia; cheek teeth $\frac{4}{4}$; species numerous, usually greyish above, white or orange-coloured below. (3) *Myrsilus,* one species, *M. aubinii,* the West African Giant Squirrel (length of body 9 inches). Cheek teeth $\frac{5}{4}$. (4) *Funisciuris,* the Side-striped Squirrels, distinguished by their more elongated skulls, teeth highly specialized, cheek teeth $\frac{5}{4}$; confined to the West African Forest Zone. (5) *Paraxerus,* closely allied to *Funisciurus,* skull less elongated, teeth less specialized; confined to the Ethiopian Region. (6) *Tamiscus,* closely related to *Paraxerus,* distinguished by the presence of two or four black stripes running down the back, with light coloured lines between them. These Dwarf Striped Squirrels occur in the East Congo, Uganda, and the Sudan. (7) *Myosciurus,* a genus containing one very small species *M. minutus* (head and body 60 mm.) not any larger than the Common Mouse; found only in the Cameroons and Gaboon. (8) *Protoxerus,* African Giant Squirrels, found in Fernando Po, the Gold Coast eastwards through the Congo to Kenya Colony, being more or less equatorial in distribution. These squirrels are very large (head and body 11 inches) and heavily built. (9) *Epixerus,* the Red-faced Giant Squirrels, of the Gaboon west to Ashanti; like *Protoxerus* but with the skull elongated. (10) *Atlantoxerus,* the N. African Ground Squirrel, *A. getulus,* is a large form (head and body 8 inches) with a broad, depressed skull; cheek-teeth $\frac{5}{4}$, molars simple in structure. Hair, as in all ground squirrels, harsh and scanty; back brownish with four dark stripes. (11) *Xerus,* the East African Ground Squirrels, reddish coloured species with unstriped bodies; skull with convex profile, and cheek-teeth $\frac{4}{4}$; found in Abyssinia, Somaliland, and Kenya Colony. (12) *Geosciurus,* contains but a single species, *G. capensis,* the South African Ground Squirrel, rather larger than the East African species, with a well-marked light flank-stripe. (13) *Euxerus,* the Equatorial Ground Squirrels, differ from the other members of the group in having long narrow skulls and narrow zygomata; cheek-teeth $\frac{4}{3}$. The species are found throughout the West African Forest region and spread eastward to the Sudan and East Africa.

The European, American and Asiatic *Sciurinae* are equally numerous, a large number of genera being now recognised. The typical genus, *Sciurus,* together with a number of New World genera, is distinguished by the large size of the baculum, which has a compressed terminal blade hollowed on the right side which carries below a downwardly directed process. The genera which have been grouped with the typical genus are *Tenes,* and all the American forms, except *Tamiasciurus,* the genus of Chickarees, or North American Red Squirrels, which on account of the suppression of the baculum is considered to represent a different group.

The North American Squirrels are a very numerous group, widely distributed across the continent, and in addition to those which belong to the typical subgenus, such as *Sciurus* (*Sciurus*) *aureogaster* from California, and *S.* (*S.*) *poliopus* from Mexico, and the genus *Tamiasciurus,* or Red Squirrels, referred to above, a large number of species and sub-species are placed in the genera *Guerlinguetus* and *Baiosciurus.*

The small American Squirrels, the Pigmy Tree Squirrels, from Central and South America may be regarded as represented by a distinct genus *Microsciurus;* the bodily size is much smaller than in the other American forms.

The remainder of the South American Squirrels may be included in 9 genera; *Syntheosciurus,* containing one species, *S. brochus,* from Panama; a small form with a narrow skull and long rostrum; premolars $\frac{2}{1}$, mammae 6. *Leptosciurus,* a series of forms with short tails, from Colombia, Peru and Bolivia. *Notiosciurus,* a single small species, *N. rhoadsi,* is included in this genus; it comes from Ecuador, and possesses a narrow, short-nosed skull, and has the naked area on the hind feet much reduced. *Mesosciurus,* a large genus containing a number of different forms from the northern part of South and Central America; the skull has a longer rostrum than in *Guerlinguetus;* p. $\frac{1}{1}$, mammae 6. In *Hadriosciurus* (p. $\frac{1}{1}$, mammae 8) the size is large and tail long and heavier than in *Urosciurus. Urosciurus,* the Giant South American Squirrels, contains a number of large species (head and body 350 mm.; tail 320 mm.), with long, broad tails; the coat is short and harsh, and the skull long and narrow. The species, which come from the Amazon basin, are highly coloured, being a mixture of orange and black. *Simosciurus,* from Ecuador and Peru, is similar in size to *Urosciurus* but the tail is not so bushy or broad, and the pelage is longer and softer.

The Great-eared Squirrel of Borneo, *Reithrosciurus macrotis,* appears to be allied to the typical group; it is over two feet in length, half the length being occupied by a very large and bushy tail; the black ear-tufts are two inches long. The Giant Squirrels of Asia are grouped together in the genus *Ratufa,* the species being very numerous and some of them very strikingly coloured; they are found in India, Ceylon, Assam, Burma, Siam, Malay Peninsula, Sumatra, Java, Borneo, the Rhio Archipelago, eastward to the Natuna Islands and Celebes. A great variety of smaller forms is also found in Asia representing a number of different genera. *Dremomys* is a genus that contains some of the long-nosed Asiatic squirrels, inhabiting S. China and Formosa, Himalayas, Burma, Malay Peninsula and Borneo. A closely allied genus, also possessing a long snout, is *Menetes,* from Burma, Siam and the Malay Peninsula, distinguished by its well-marked flank-stripes; species *M. berdmorei.* Allied to *Menetes* and the following genus is the Chinese *Rupestes* (*R. forresti*), a long-nosed genus with no small anterior premolar. In the Chinese *Sciurotamias* the skull closely resembles that of Rupestes, but the colouring is quite different, being yellowish-brown above and yellowish-grey below, without the pale flank-stripe.

Lariscus is another genus belonging to this group; about seven or eight different forms have been described from Borneo, Singapore, Java, Sumatra, and the Malay Peninsula; distinguished by their shorter tails and by the presence of three dark dorsal stripes. *Tomeutes* is a widely distributed genus probably allied to *Callosciurus;* a large number of species has been described, the best known of which is *T. hippurus* from the Malay Peninsula. The genus spreads from Nepal into China and east to Celebes and the Philippines. The genus *Funambulus* includes the well-known Palm-Squirrels of India, which are confined to the Indian Peninsula and Ceylon; it is of interest to note that excluding the giant squirrels and flying squirrels no other form of squirrel occurs in the Peninsula.

The genus *Tamiops* is a group allied to the Palm Squirrels but distinguished by the dorsal stripes being black in colour and 1 or 3 in number; they are found in Assam, Manipur, Tenasserim, Yunnan and Siam. *Nanosciurus,* the Oriental Pigmy Squirrels, are very similar to the West African Pigmy Squirrels, but have larger molars and $\frac{5}{5}$ cheek-teeth instead of $\frac{4}{4}$; seven different forms have been described from Malacca, Sumatra, Borneo, and the Philippines. *N. samaricus,* from Samar, has the following dimensions:—head and body 88 mm.; tail 69 mm.; hindfoot 25 mm. A group of small squirrels from the Guianas has been placed in the genus *Sciurillus* (p. $\frac{2}{1}$, mammae 6); in general dimensions rather larger than Nanosciurus.

The Chipmunks, *Eutamias* and *Tamias,* are small, striped squirrels which may be regarded as a connecting link between the true squirrels and the Marmots, Prairie-dogs, *Spermophiles,* and Antelope Squirrels. The group is found in North America and Eastern Asia.

Marmotinae.—The Prairie-dogs (*Cynomys*) are entirely confined to the New World, and are distinguished by their very short tails, rudimentary ears, and large teeth; postorbital processes well developed, and palate contracted posteriorly. About 9 forms are recognised, divided into two subgenera, the typical one, and *Leucocrossuromys.* The genus *Citellus,* including the Spermophiles, Pouched Marmots, American Ground Squirrels or Souslik, is found throughout a large area of the Northern Hemisphere, from Hungary eastward through Asia and North America to the central United States. Like the Prairie-dogs the members of this genus are strictly terrestrial, with a short flattened tail. General size medium (head and body 195–220 mm.; tail 60–75 mm.). *Ammospermophilus* (Antelope-squirrels), *Callospermophilus,* and *Otospermophilus* are closely allied genera inhabiting the New World. The Marmots (*Marmota*) have a similar distribution, being found from the Alps eastward through Asia and North America. These animals are more badger-like in form than Sciurine, the body being massive and the tail short and bushy; unlike the two preceding genera cheek-pouches are either absent or but little developed. Dimensions of *M. marmota* (Alps):—head and body 550 mm.; tail 150 mm.

(III.) **Petauristidae.**—Flying Squirrels of the Northern Hemisphere, extending from Scandinavia and northern Russia eastward throughout the greater part of Asia to the southern United States; in general appearance squirrel-like, but having the fore and hind limbs connected by a parachute-like fold of skin, supported by a cartilaginous spur arising from the wrist. Eleven genera are known, the most important of which are the following:—*Eupetaurus,* a large flying squirrel (head and body 515–610 mm.; tail 380–480 mm.; hindfoot 86 mm.) with hypsodont or tall-crowned cheek-teeth, in this respect differing from all the other *Petauristidae. E. cinereus* is dark grey in colour and has been recorded only from Astor and Gilgit. Another genus of large Asiatic Flying Squirrels is *Petaurista,* which includes some very brightly coloured forms; teeth normal, brachyodont. These squirrels are found over a large part of Asia, extending from the Indian Peninsula and Ceylon, through Nepal, Bengal and Burma into China, Siam, the Malay Peninsula and Islands as far east as Japan. Among the smaller flying squirrels the following may be noted: *Petromyscus,* with brachyodont teeth, and small ears; found in Malacca and Borneo; and *Sciuropterus,* with the molar ridges well developed, found in Scandinavia, Russia and eastward to Japan.

(IV.) **Aplodontidae** or American Sewellels, distinguished from the *Sciuridae* by the absence of postorbital processes and the cheek-teeth being rootless; premolars $\frac{2}{1}$. The Sewellels are medium-sized terrestrial rodents with short tails and very small eyes.

(V.) **Castoridae** or Beavers, found both in the Old and the New World, confined to the forested portions of the Northern Hemisphere south to the Mediterranean region and southern United States. The skull lacks the postorbital process and the cheek-teeth are rootless, premolars $\frac{1}{1}$; size of body large, tail flat and broad, hindfeet webbed, and habits aquatic. Two species are recognized, *C. fiber* from Scandinavia and a few of the larger European rivers; and *C. canadensis* from North America.

Section MYOMORPHA.—The jugal seldom extends far forward, the zygomatic arch being supported by the zygomatic process of the maxilla; tibia and fibula united; postorbital processes absent, and angle of mandible usually arising as in the Sciuromorpha.

Muscardinidae or Dormice, widely distributed over the Old World, from England to Japan; and south as far as Cape Colony; usually the members of this family are of small size with large rather bushy tails and large ears. There is no caecum and the premolars are $\frac{1}{1}$. The typical genus *Muscardinus,* extends from England into Asia Minor, and south to the Mediterranean. The Common British Dormouse, *M. avellanarius,* is the smallest member of the family. Three other genera of this family are found in Europe: (i.) *Eliomys,* which extends eastward into Asia Minor and south to Northern Africa; (ii.) *Dyromys,* which occurs in Hungary and Switzerland, spreading eastward to Central Asia through Asia Minor; and (iii.) *Glis,* found in Central and Southern Europe extending east to Asia Minor and south to Sardinia and Spain. The latter genus contains the Edible Dormouse, a large grey-coloured form (head and body about 170 mm.); easily distinguished from the other European species by its large size and squirrel-like appearance. In Africa the family is well represented from south of the Sahara to Cape Colony; *Graphiurus ocularis* being a large grey-coloured form from Cape Colony, Namaqualand and Damaraland. The other African genus is *Claviglis,* containing a large number of small and medium sized species.

The group is represented in India by the Spiny Dormouse *Platacanthomys lasiurus,* with a spiny coat; and in China by the genus *Typhlomys,* with one species *T. cinereus,* a slate-grey coloured animal with a plumed tail.

Muridae.—The next family is the *Muridae,* the largest mammalian family; its typical members are mice of the House Mouse variety. The most important of the groups are the following:—**Hydromyinae** which contains the Australian Water Rats and various genera from the Philippines and New Guinea. *Hydromys,* the Australian and New Guinea Water Rats, has soft, thick fur and large laterally compressed tail. *Chrotomys* is an allied genus from Luzon, Philippines, which has the back prominently striped; size of body about that of a common rat (head and body 196 mm.; tail 110 mm.). *Crunomys,* probably an aquatic form related to the foregoing genus, and *Celaenomys,* which looks like *Chrotomys* without the stripes, are too closely allied genera also from Luzon.

Rhynchomyinae, a subfamily created to receive an extraordinary Philippine rat with very reduced teeth; general form rather shrew-like, muzzle elongate.

Gerbillinae.—A large subfamily is the *Gerbillinae,* with a number of genera, spread over a considerable portion of Africa and Asia. Of the African genera *Gerbillus, Dipodillus* and *Meriones* extend into Asia. The majority of these animals have long, hairy tails and long feet; others such as *Microdillus, Desmodillus, Desmodilliscus,* and *Pachyuromys,* have short and fleshy tails. In most species the colour is bright buffy-brown or orange above, white below. *Taterona* is found over the whole of Africa south of the Sahara; the closely allied Asiatic genus, *Tatera,* inhabits Peninsular India and Ceylon. *Taterillus* extends across Equatorial Africa from Nigeria to Kenya Colony and the Sudan. The genus *Gerbillus* is found in south and northern Africa and India, and *Dipodillus* extends from West Africa to Kenya Colony and North Africa and India. *Ammodillus* and *Microdillus* are two dwarf forms from Somaliland. *Desmodilliscus* is a pigmy group

from the Sudan and Northern Nigeria, and *Desmodillus* is the fat-tailed gerbil of South Africa; and *Pachyuromys* is a similar animal from North Africa. *Psammomys* is found in Northern Africa and Palestine, and *Rhombomys*, which resembles the foregoing genus, comes from Russia, Siberia and Central Asia.

Otomyinae, a subfamily which contains the Swamp Rats of Africa. The members of this group are all heavily built animals with long, soft fur and tails of medium length. The African Tree Mice and Rats and Fat Mice form another natural group, the *Dendromyinae*, which contains the Pigmy Tree Mice (*Dendromus*) and the West African Bush Mouse (*Prionomys batesi*); both genera are remarkable for their semi-prehensile tails and long hind-feet; some of the Tree Mice have dark stripes on the back, whereas *Prionomys* is pale chocolate in colour. The Spiny Tree Rats (*Deomys*) from West and Central Africa are remarkable for their long tails and spiny coats. The short-tailed members of this subfamily are the Fat Mice (*Steatomys*) from South and West Africa, and the Mouse Gerbilles of Cape Colony.

Murinae.—By far the largest subfamily is the typical one, the *Murinae*, which contains a great number of genera, only a few of which it will be possible to deal with in this review.

The Genus Mus.—The typical genus *Mus* is represented by the House Mouse and a few other species such as *M. bactrianus* from Northern India and *M. muralis* from St. Kildar; about nine species of this genus are found in Europe; it was originally confined to the Old World but has been introduced into nearly every part of the world. Closely allied is the genus *Rattus*, containing the well-known Black and Brown Rats and over a hundred other forms. Much larger species are found in the allied genera *Bandicota, Gunomys* and *Nesokia*, the Bandicoot Rats which are found in India, Arabia and Northern Africa. In Africa there is a genus of Giant Rats known as *Cricetomys*, which measure about 2 ft. 6 in. in total length; the tail is very long and has a white tip. One of the most remarkable genera is *Acomys*, which contains the Spiny Mice, distributed over the greater part of Africa, south-western Asia, Cyprus and Crete; these Mice are almost as spiny as hedgehogs and vary in colour from uniform slaty-grey to bright red with white underparts. The Field Rats of Africa are included in three genera, *Arvicanthis*, uniformly coloured rats; *Lemniscomys*, rats with one or many stripes; and *Rhabdomys*, the four striped rats. Among the Australasian members of the subfamily mention may be made of the following:—*Mastacomys fuscus*, resembles a common rat but with larger ears and broader molars. *Capromys*, a genus of naked-tailed, woolly rats with short, rounded ears; two species are known, both from the Solomon Islands. *Anisomys imitator*, a coarse-haired rat with 6 mammae and only the basal part of the tail dark, the remainder yellowish-white (head and body 300 mm.; tail 320 mm.). *Mallomys*, very large rats (head and body 470 mm.; tail 400 mm.); fur very long with a number of white tipped hairs interspersed; the species are found in New Guinea. *Hyomys meeki* similar to *Mallomys* but rather smaller in size (head and body 390 mm.). The Australian Mice are numerous, the chief genus being *Pseudomys*. The Jerboa-Rats are included in the genus *Conilurus*, distinguished by their elongated hind-limbs and tufted tails; these rats are confined to North Australia. A nearly allied genus is *Mesembriomys* from the Northern Territory; large rats with long jerboa-like tails.

The subfamily *Murinae*, which contains more than fifty genera, is characterised by the molars being tuberculate, brachyodont, and rooted; the tubercles of the cheek-teeth being arranged in three longitudinal rows. In addition to the genera already mentioned as occurring in Europe, the forms *Epimys, Apodemus*, and *Micromys* are also found in Europe; the latter genus contains the well-known Harvest Mice, small reddish-orange coloured mice with semi-prehensile tails. The forms of *Apodemus*, the Field Mice, are widely distributed from Ireland to Japan. One of the most curious subfamilies of the *Muridae* is the *Lophiomyinae*, sometimes reckoned to be of family rank. It contains but a single genus, *Lophiomys*, the members of which are confined to East Africa; they differ from the typical *Muridae* in having the temporal fossa roofed over with bone; the hair on the back forms a well marked crest. These animals are of considerable size, the head and body measuring 270 mm. in length.

The subfamilies *Cricetinae* and *Microtinae* contain the Hamsters and Voles respectively; the former group which has a Murine dentition, the molars being rooted, is found over America, S.E. and Central Europe, Central Asia and Southern Africa; the African representative is the genus *Mystromys*. The typical genus *Cricetus*, contains the well-known Hamster of Europe and Asia Minor. A large number of American genera is included in this subfamily. The members of the *Microtinae*, which contains the Lemmings and Voles, are distinguished by their prismatic, hypsodont or rootless, flat-crowned molars; a numerous group distributed over both hemispheres.

Spalacidae, mole-like animals, modified for a subterranean life; found over South Eastern Europe, Asia and Africa. The typical genus, *Spalax*, contains the Blind Moles of Europe, which extend into Egypt and western Asia. The Bamboo Rats of India, etc., fall into three genera, *Nyctocleptes* and *Rhizomys*, being very large (head and body 386 mm.) forms, and *Cannomys*, a smaller group from Siam, Burma and Bhutan. In Africa there is the closely allied genus *Tachyoryctes*, medium-sized moles with very soft, usually rufous-coloured fur. The American Pocket-Gophers (*Geomys* and *Thomomys*) form the family *Geomyidae*. The Kangaroo-Rats of the New World, *Dipodomys, Perodipus* and *Microdipodops*, form with the genus *Heteromys*, from Colombia and Venezuela, the family *Heteromyidae*. Another group of burrowing mole-like rodents is the *Bathyergidae* which is confined to Africa; including *Heterocephalus*, the naked moles of East Africa; and the genus *Cryptomys* which is found over a great part of the continent. The *Jaculidae* have the body modified for jumping, the tail being long and plumed and the hind-feet large; the fore-limbs are usually much reduced in size. This family contains three subfamilies:—(1) *Sicistinae*, found in the eastern hemisphere, west as far as Norway; small mouse-like animals, with long tails and feet, and a black dorsal stripe. (2) *Jaculinae*, the Jerboas, confined to the Palaearctic and Ethiopian Regions, distinguished by their very elongated hind-feet; several genera can be distinguished; *Jaculus* includes the 3-toed forms, the majority of the forms coming from Northern Africa; *Alactaga* is a closely allied genus which spreads as far north as Southern Russia. (3) *Zapodinae*, in which the American members of this family are grouped.

Section HYSTRICOMORPHA.—In this section the zygomatic arch is massive, and the jugal is not supported by the maxillary zygomatic process; mandible with the angular portion arising from the outer side of the lower incisor-socket. One premolar in each jaw, and fibula distinct.

Family *Pedetidae*, the Jumping Hares of Africa. This group is very difficult to classify, but on the whole it seems best to place it in the present section rather than with the Myormorpha. The molars are rootless and the hind-limbs elongated. The general dimensions are large, the body being about the size of a hare's. The next family, the *Ctenodactylidae*, includes four curious genera:—*Ctenodactylus*, the Gundis of Algeria and Tunis, small, thickset animals with very short tails and pale buff in colour; *Massoutiera*, the long-tailed Gundis of N.W. Africa; *Pectinator*, a very similar animal but with a longer, more bushy tail, from Somaliland; and *Petromys*, the Rock Rat, of S.W. Africa. The *Capromyidae* contains the African Cane-Rats (*Thryonomys*) and the West Indian genus of arboreal forms known as *Capromys*. The South American Coypu (*Myocastor*) is also sometimes placed in this family, sometimes in a separate group altogether. In this genus the incisors are very large, the tail fairly long and naked, and the hind feet webbed. In the true Porcupines (*Hystricidae*) the skull is greatly inflated and the tail short; the typical genus *Hystrix* inhabits the greater part of Africa and the Mediterranean region of Europe. The Indian and other Asiatic porcupines related to *Hystrix* are now considered to represent a distinct genus, *Acanthion*. The Brush-tailed Porcupines of the genus *Atherurus*, are common to both West Africa and Asia; these porcupines are at once distinguished from the typical ones by the much longer, scaly tail which terminates in a brush of bristles. The porcupines of America are grouped together in the family *Erithizontidae*. The typical genus is represented by the Canadian Porcupine (*E.*

dorsalis) in which the tail is short, and the spines of the body are nearly hidden by a growth of long hair. *Synetheres,* from South and Central America, is a long and prehensile-tailed genus of Tree Porcupines.

In the South American family *Chinchillidae* there are two or three genera of terrestrial rodents with elongated hind-limbs, very soft fur, and bushy tails. The typical genus, *Chinchilla,* contains one species, *C. lanigera,* which provides the well-known Chinchilla fur; it is found only in the Peruvian and Chilian Andes. Almost equally soft is the fur of the much larger Viscachas (*Viscaccia*), animals about the size of a large rabbit, with long hind-feet, long, bushy tails, and bearing a median dark dorsal stripe down the back. The Paca (*Coelogenys*) and the Agoutis, of Central and South America, form another family, the *Dasyproctidae;* these animals are of large size with short or obsolete tails, and hoof-like claws. The Agoutis have slender limbs, with three hind toes, whereas the Paca has five hind toes and an enormously developed zygomatic region; the latter species is about two feet in length. The family *Dinomyidae,* represented by a single species from Peru, *D. branicki,* differs in having a long, bushy tail, cleft upper lip, and four digits on each foot. The family *Caviidae* is the last of the *Simplicidentata* and contains about 7 different genera, one of them, *Hydrochaerus,* containing the largest existing rodent. This animal, the Capybara (*H. capybara*) is massively built and is about the size of a medium-sized pig (length of body 4 ft.). The body is covered in long, coarse hair, the feet are fully webbed, and the molars complex; the Capybara occurs only in South America. The Patagonian Cavy, *Dolichotis patachonica* is rather larger than a big rabbit, having very large ears and a short tail; in general colour usually rufous. This beast inhabits the arid plains of Patagonia and La Plata. Lastly, the true Cavies (*Cavia*) are small tailless animals with short limbs and reduced ears; they are entirely neotropical.

SUBORDER DUPLICIDENTATA

Two pairs of upper incisors always present, with enamel extending round to their posterior surfaces. The suborder includes the Picas, Hares and Rabbits.

The family *Ochotonidae* includes the Picas or Tailless Hares, which, in addition to the absence of a tail, are further distinguished from the hares and rabbits by the much smaller ears and smaller size of the body; the number of different forms is very great, the Picas being widely distributed over the mountainous parts of Central Asia and extending into South-eastern Europe and North America.

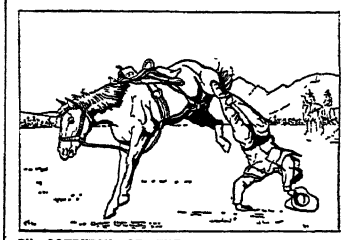
The family *Leporidae* contains the hares and rabbits, in which the hind-limbs are elongated, the tail short and recurved, and the ears long. Premolars $\frac{3}{2}$. The typical genus, *Lepus,* occurs in Europe, Asia, North America and Africa. The species and races are very numerous, some 19 different forms being found in Europe alone. In N. India there is a hare which is considered to represent a distinct genus *Caprolagus; C. hispidus* differs from all true *Lepus* in having an entirely brown-coloured tail and the ears being shorter than the head; in *Lepus* the ears are at least as long as the head, and the tail white beneath. The genera *Nesolagus* and *Pentolagus* are nearly allied to *Caprolagus.* The "Cotton-tails" of North and South America belong to the genus *Sylvilagus.* The Red Hares of South and South-east Africa, *Pronolagus,* more resemble rabbits in form, and usually have bright red tails. The Common Rabbit belongs to the genus *Oryctolagus,* distributed originally over North Africa and Southern and Central Europe; distinguished from *Lepus* by its shorter ears and hind limbs, and the fact that the young are born blind.

BIBLIOGRAPHY.—C. J. Forsyth-Major, "On Some Miocene Squirrels, with Remarks on the Dentition and Classification of the Sciuridae," *Proc. Zool. Soc.,* London (1893); O. Thomas, "On the Genera of Rodents," *Proc. Zool. Soc.,* London (1896); "Mammals of Western Europe," *Brit. Mus. Cat.* (1912), G. S. Miller; "Monograph of the Voles and Lemmings," *Brit. Mus. Cat.* (1927), M. A. C. Hinton; and numerous papers by O. Thomas; R. C. Wroughton; G. Dollman, in the *Annals* and *Magazine of Natural History* and *Proceedings* of the Zoological Society, and several American naturalists in transatlantic zoological serials.

(J. G. D.)

RODEO, a series of contests in sports associated with, or suggested by, the routine of the American cowboy. It is an outdoor exhibition, customarily given annually, and in Western towns supplanting the county fair and carnival characteristic of agricultural districts in the Middle West.

A *rodeo,* in the jargon of Mexican cattle-herders, is a gathering together ("round-up") of cattle, or the enclosure of a herd. *Rodeo* and several like Spanish words have filtered, by way of the cowboys of the South-west, into the common vocabulary of the Western States. In the "classic" era of the American cowboy (1867–84), when the cattle of several variously-owned herds roamed over the same unfenced range, the stock was assembled semi-annually at a round-up, at which the cowboys of the several ranches incidentally entertained themselves with feats of skill and informal contests, as well as with progressive poker and the drooling of ballads. From these beginnings developed rodeo, the name alike with the entertainment. The first well-advertised, well-organized cowboy contest was held in Denver, Colo., in 1896. The first of the Cheyenne, Wyo., "Frontier Days" annual celebrations was held in 1897.

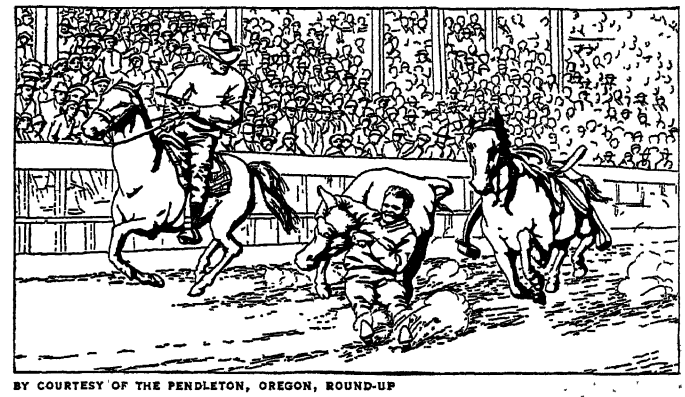


BY COURTESY OF THE PEREIRA-SCHOETTNER STUDIES

A BRONCO THROWING ITS RIDER

The Cheyenne rodeo, the Pendleton, Ore., round-up and the Calgary, Alberta, stampede are traditionally the three greatest of the annual rodeos. Victory in the more spectacular contests brings impressive trophies and cash prizes, and may secure the respectful attention of the motion-picture magnates. Belle Fourche, S.D., Las Vegas, N.M., Prescott, Ariz., Tucson, Ariz., Monte Vista, Colo., and Sumas, Wash., are among the Western towns annually staging rodeos which draw many professional rodeo-contestants as well as actual cowboys from the nearby ranches. From 1926 rodeos styled "World Series Rodeo" have been presented in New York.

The Cheyenne Frontier Days celebration of July 26–30, 1927, which may be taken as typical of the best-organized rodeos, included in its contests a bucking-bronco riding contest, a cowgirls' relay race, a two-steer roping contest, a wild horse or wild mule race, a wild-cow milking contest, a two-steer bull-dogging contest and "trick and fancy riding" contests. The bucking-horse contest (always the most important) offered the highest purse,



BY COURTESY OF THE PENDLETON, OREGON, ROUND-UP

A COWBOY THROWING A STEER AT A WESTERN RODEO

$2,100. The Roosevelt hotel trophy, valued at $1,000, for the "world's champion all-around cowboy," must be competed for both at Cheyenne and Calgary, and is the award of greatest prestige in rodeo. A "bull-dogging contest" is more informatively called a steer-wrestling contest. The "World Series" rules are: "Wrestler and hazer will be allowed to leave the chute with steer, and wrestler's mount and steer may be Lap-and-Tap when crossing dead line, but wrestler must not have hand on steer or leap before crossing dead line. Penalty 15 seconds. . . . This is a twist-down contest—wrestler must stop steer and knock him down. If steer is knocked down, he must be let up on all four feet and thrown

again, and should steer start running after once being stopped and then be thrown against the ground, the steer must be let up again and twisted down. Ten seconds fine will be added to steer wrestler's time, for knocking down steer either accidentally or purposely"—or, as the Cheyenne rules more compactly put it, "if contestant hooligans steer, any question as to cleanness of throw and fall will be left entirely to the judges." Incidentally, "bull-dogging" was literally performed at the Cheyenne rodeo of 1904, when a negro from Texas sank his teeth into the steer's upper lip, and, without using his hands, twisted the steer to the ground.



BY COURTESY OF THE PENDLETON, OREGON, ROUND-UP

RIDING A BRONCO AT THE PENDLETON ROUND-UP.

Charles B. Cochran, the London theatrical producer, hired 150 American cowboys to compete with others from Canada, the Argentine and Australia in an international rodeo at the British Empire exhibition of 1924. Most unfortunately, a steer's leg was broken in the course of the first evening's performance. Many of the audience of 40,000 hissed and booed, and the Royal Society for the Prevention of Cruelty to Animals initiated legal processes. When the defendants appeared before the magistrate in Hendon, they wore their full ornate regalia, each man "packing" a gun. The summonses were dismissed; but the prince of Wales was deterred from accepting the gift of a cow-pony, and the impression that rodeos involved cruelty to the cattle and horses has not been wholly dissipated. It is comparatively untrue and is a very small handicap to a sport firmly rooted in the American West. (E. D. Br.)

RODERICK or RUADRI (d. 1198), king of Connaught and high king of Ireland, was the son of Turlough (Tordelbach) O'Connor, king of Connaught, who had obtained the overkingship in 1151, but had lost it again in 1154 through the rise of Muirchertach O'Lochlainn in Ulster. Roderick succeeded to Connaught in 1156, and after ten years' fighting won back the title of high king. His ill-advised persecution of Dermot (Diarmait MacMurchada), king of Leinster, furnished the pretext for the Anglo-Norman invasion of Ireland. Roderick endeavoured to expel the invaders, but was driven behind the Shannon. He delayed his submission to Henry II. until 1175, when a treaty was concluded at Windsor. Roderick, under this agreement, held Connaught as the vassal of England, and exercised lordship over all the native kings and chiefs of Ireland; in return he undertook to pay an annual tribute. The treaty did not put an end to the wars of the Norman adventurers against Connaught and Roderick's dependants. He held out till 1191; but then, weary of strife, retired to the cloister. He died in 1198, the last of the high kings of Ireland.

See Giraldus Cambrensis, *Opera*, vol. v. (Rolls Series); G. Orpen's *Song of Dermot and the Earl* (1892); W. Stubbs's edition of *Benedictus Abbas* (Rolls Series); Miss K. Norgate's *England under the Angevin Kings*, vol. ii. (1887).

RODEZ, a town of southern France, capital of the department of Aveyron, 51 m. N.N.E. of Albi by rail. Pop. (1926) 10,693. Rodez, *Segodunum* under the Gauls, *Ruthena* under the Romans, was the capital of the *Rutheni*, a tribe allied to the Arverni, and was afterwards the chief town in the district of Rouergue. In the 4th century it became Christian, and St. Amans, its first bishop, was elected in 401. In the middle ages the bishops held temporal power in the "cité," and the counts in the "bourg." The Albigenses were defeated near Rodez in 1210. The countship of Rodez, detached from that of Rouergue at the end of the 11th century, belonged first to the viscounts of Carlat, and from the early 14th century to the counts of Armagnac. From 1360 to 1368 the Eng[illegible]h held the town. After the confiscation of the estates of the Armagnacs in 1475 the countship passed to the dukes of Alençon and then to the D'Albrets. Henry IV. finally annexed it to the Crown of France.

Rodez is situated on the southern border of the Causse of Rodez, on an isolated plateau bordered on the east and south by the river Aveyron. The cathedral (1277–1535) has a great Flamboyant rose-window in the principal façade, which is flanked by two square towers and has no portal. Each transept has a fine Gothic doorway. On the north side of the building rises a 16th century tower. The episcopal palace (17th and 19th centuries), is flanked by a massive tower, relic of an older palace.

The town is the seat of a bishop, a prefect and a court of assizes, and has tribunals of first instance and commerce, and a chamber of commerce. The industries include wool-spinning and the weaving of woollen goods.

RODGERS, JOHN (1771–1838), American sailor, was born in Harford county, Md., on July 11, 1771. He entered the U.S. navy when it was organized in 1798. He was second in command to Commodore James Barron (1769–1851) in the expedition against the Barbary pirates, and succeeded him in the command in 1805. In this year he brought both Tunis and Tripoli to terms, and then returned to America. In 1811 he was in command as commodore of the U.S. frigate "President" off Annapolis when he heard that an American seaman had been "pressed" by a British frigate off Sandy Hook. Commodore Rodgers was ordered to sea "to protect American commerce." On May 16, 1811, he sighted and followed the British sloop "Little Belt," and after some hailing and counter-hailing, of which very different versions are given on either side, a gun was fired, each side accusing the other of the aggression, and an action ensued in which the "Little Belt" was cut to pieces. The incident, which was represented as an accident by the Americans, and believed to be a deliberate aggression by the British navy, had a share in bringing on the War of 1812. When hostilities broke out Rodgers commanded a squadron, and was wounded by the bursting of one of his guns while pursuing the British frigate "Belvedere." He was subsequently president of the Board of navy commissioners in 1815–24 and in 1827–37. He died in Philadelphia on Aug. 1, 1838.

RODIN, AUGUSTE (1840–1917), French sculptor, was born in 1840 in Paris. He began by attending Barye's classes, but did not yield too completely to his influence. From 1864 to 1870, under pressure of necessity, he was employed in the studio of Carrier-Belleuse, where he learnt to deal with the mechanical difficulties of a sculptor. Even so early as 1864 his individuality was manifested in his "Man with a Broken Nose." After the war of 1870 finding nothing to do in Paris, Rodin went to Brussels, where from 1871 to 1877 he worked, as the colleague of the Belgian artist Van Rasbourg, on the sculpture for the outside and the caryatids for the interior of the Bourse, besides exhibiting in 1875 a "Portrait of Garnier." In 1877 he contributed to the Salon "The Bronze Age," which was cast in bronze for the Salon of 1880 and is now in the Luxembourg. Between 1882 and 1885 he sent to the Salons busts of "Jean-Paul Laurens" and "Carrier-Belleuse" (1882), "Victor Hugo" and "Dalou" (1884), and "Antonin Proust" (1885).

From about this time he chiefly devoted himself to a great decorative composition, six metres high, which was not finished for twenty years. This is the "Portal of Hell," the most elaborate perhaps of all Rodin's works, executed to order for the Musée des arts décoratifs. It is inspired mainly by Dante's *Inferno*, the poet himself being seated at the top, while at his feet, in undercut relief, we see the writhing crowd of the damned, torn by the frenzy of passion and the anguish of despair. The lower part consists of two bas-reliefs, in their midst two masks of tormented faces. Round these run figures of women and centaurs. Above the door three men cling to one another in an attitude of despair. After beginning this titanic undertaking, and while continuing to work on it, Rodin executed for the town of Damvillers a statue of "Bastien-Lepage"; for Nancy a "Monument to Claude de Lorrain," representing the Chariot of the Sun drawn by horses; and for Calais "The Burgesses of Calais" surrendering the keys of the town and imploring mercy. In this, Rodin, throwing over all

school tradition, represents the citizens not as grouped on a square or circular plinth, but walking in file. This work was exhibited at the Petit Gallery in 1889. A replica of it is now placed on the embankment at Westminster.

At the time of the secession of the National Society of Fine Arts, or New Salon, in 1890, Rodin withdrew from the old Society of French Artists, and exhibited in the New Salon the bust of his friend "Puvis de Chavannes" (1892), "Contemplation" and a "Caryatid," both in marble, and the "Monument to Victor Hugo" (1897), intended for the gardens of the Luxembourg. In this the poet is represented nude, as a powerful old man extending his right arm with a sovereign gesture, the Muses standing behind him. In 1898 Rodin exhibited two very dissimilar works, "The Kiss," exhibited again in 1900, a marble group representing Paolo Malatesta and Francesca da Rimini, and the sketch in plaster for a "Statue of Balzac." This statue, a commission from the Society of Men of Letters, had long been expected, and was received with vehement dissensions. The society who had ordered it "refused to recognize Rodin's rough sketch as a statue of Balzac," and withdrew the commission, giving it to the sculptor Falguière. Falguière exhibited his model in 1899. In the same Salon, Rodin, to prove that the conduct of the society had made no change in his friendship with Falguière, exhibited a bust in bronze of his rival, as well as one of "Henri Rochefort."

In 1900, the city of Paris, to do honour to Rodin, erected at its own expense a building close to one of the entrances to the Great Exhibition, in which almost all of the works of the artist were to be seen, more especially the great "Portal of Hell," still quite incomplete, the "Balzac," and a host of other works, many of them unfinished or mere rough sketches. Here, too, were to be seen some of Rodin's designs, studies and water-colour drawings. He has also executed a great many etchings and *sgraffiti* on porcelain for the manufactory at Sèvres. His best-known etching is the portrait of Victor Hugo. Rodin's "Hand of God" was exhibited in the New Gallery, London, in 1905. In 1904 Mr. Ernest Beckett (Lord Grimthorpe) presented the British nation with the sculptor's "Le Penseur." In the same year Rodin became president of the International Society of Sculptors, Painters and Engravers, in succession to James McNeill Whistler.

He died on Nov. 17, 1917, and was buried at Meudon.

Many of Rodin's works are in private collections. At the Luxembourg he is represented by a "Danaïd" (marble), "Saint Jean" (bronze, 1880), "She who made the helmet" (bronze statuette), busts of "J. P. Laurens," and "A Lady." A statue of Victor Hugo is in the Musée Galliera. The fine collection of Rodin's sculpture at South Kensington, a gift by the artist, includes "St. John the Baptist," "Age of Bronze," "L'Enfant prodigue," "Cybele," "The Muse," "Fallen Angel" (group), "Torso of Woman," "France" (head), "Figure of Woman," "Head," "Balzac" (bust), busts of Mlle. C. C., Miss E. Fairfax, la duchesse de C. C. (two), George Wyndham, Mr. Ryan (all the above in bronze); "Cupid and Psyche" (marble group); "Dante" (mask, terra-cotta). The Metropolitan Museum, New York, has several sculptures and drawings. A Rodin Museum was opened in Philadelphia in 1929.

See SCULPTURE: *Modern French;* also Geffroy, *La Vie artistique* (Paris, 1892, 1893, 1899, 1900); L. Maillard, *Rodin* (Paris, 1899); *La Plume, Rodin et son oeuvre* (Paris, 1900); Alexandre, *Le Balzac de Rodin* (Paris, 1898); H. Boutet, *Dix dessins choisis de Auguste Rodin* (1904); R. Dircks, *Auguste Rodin* (1904); H. Duhem, *Auguste Rodin* (1903); C. Black, *Auguste Rodin: the Man, his Ideas and his Works* (1905); J. Cladel, *Auguste Rodin, l'oeuvre et l'homme* (1908; Eng. trans., 1917); Gustave Kahn, *Rodin* (illustr., 1909); G. Coquid, *Le vrai Rodin* (illustr., 1913); H. Lechat, *Sculptures de Rodin* (1919); C. J. Burckhardt, *Rodin und das plastische Problem* (1921); *Siva: Sculptures Civaïstes de l'Inde,* by A. Rodin, A. Coomaraswamy, E. B. Hawell and V. Goloubew (1921); *L'Art: entretiens réunis par Paul Gsell* (Paris, 1919); M. Tirel, *Rodin intime* (1923, Eng. trans. "Last years of Rodin" 1925); A. M. Ludovici, *Personal reminiscences of Rodin* (1926); L. Benedite, *Rodin* (illustr., 1926).

RODNEY, GEORGE BRYDGES RODNEY, BARON (1718–1792), English admiral, second son of Henry Rodney of Walton-on-Thames, was born in February 1718. George was sent to Harrow, being appointed, on leaving, by warrant dated June 21, 1732, a volunteer on board the "Sunderland." While serving on the Mediterranean station he was made lieutenant (1739) on the "Dolphin." In 1742 he attained the rank of post-captain, having been appointed to the "Plymouth." After serving in home waters, he obtained command of the "Eagle" (60), and in this ship took part in Hawke's victory off Ushant (Oct. 14, 1747) over the French fleet. On that day Rodney gained his first laurels for gallantry, under a chief to whom he was in a measure indebted for subsequent success. In 1749 he was appointed governor and commander-in-chief of Newfoundland, with the rank of commodore, it being usual at that time to appoint a naval officer, chiefly on account of the fishery interests. He was elected M.P. for Saltash in 1751, and married his first wife, Jane Compton (1730–1757), sister of the 7th earl of Northampton, in 1753. During the Seven Years' War Rodney rendered important services. In 1757 he had a share in the expedition against Rochefort, commanding the "Dublin" (74). Next year, in the same ship, he served under Boscawen at the taking of Louisburg (Cape Breton). In 1759 and again in 1760 he inflicted great loss on the French transports collected on the Normandy coast for an attack on Great Britain. Elected M.P. for Penryn in 1761, he was in October of that year appointed commander-in-chief of the Leeward Islands station, and within the first three months of 1762 had reduced the important island of Martinique, while both St. Lucia and Grenada had surrendered to his squadron. At the peace of 1763 Admiral Rodney returned home, having been during his absence made vice-admiral of the Blue and having received the thanks of both houses of parliament.

In 1764 Rodney was created a baronet, and the same year he married Henrietta, daughter of John Clies of Lisbon. From 1765 to 1770 he was governor of Greenwich Hospital. In 1771 he was appointed rear-admiral of Great Britain, and in 1778 admiral of the White. From 1771 to 1774 he held the Jamaica command, and during a period of quiet was active in improving the naval yards on his station. Election expenses and losses at play in fashionable circles had shattered his fortune; he could not secure payment of the salary as rear-admiral of Great Britain; and he lived for some time in Paris until the generosity of a friend enabled him to meet his debts.

Sir George was appointed once more commander-in-chief of the Leeward Islands late in 1779. His orders were to relieve Gibraltar on his way to the West Indies. He captured a Spanish convoy off Cape Finisterre on Jan. 8, 1780, and eight days later defeated the Spanish admiral Don Juan de Langara off Cape St. Vincent, taking or destroying seven ships. On April 17 an action, which, owing to the carelessness of some of Rodney's captains, was indecisive, was fought off Martinique with the French admiral Guichen. Rodney, acting under orders, captured the valuable Dutch island of St. Eustatius on Feb. 3, 1781. It had been a great *entrepôt* of neutral trade, and was full of booty, which Rodney confiscated. As large quantities belonged to English merchants, he was entangled in a series of costly lawsuits.

After a few months in England, recruiting his health and defending himself in parliament, Rodney returned to his command in Feb. 1782, and a running engagement with the French fleet on April 9 led up to his crowning victory off Dominica, when with thirty-five sail of the line he defeated the comte de Grasse, who had thirty-three sail (April 12). The French inferiority in numbers was more than counterbalanced by the greater size and superior sailing qualities of their ships, yet five were taken and one sunk, after eleven hours' fighting. This important battle saved Jamaica and ruined French naval prestige, while it enabled Rodney to write: "Within two little years I have taken two Spanish, one French and one Dutch admiral."

On his return to England Rodney received a barony and a pension of £2,000 a year. From this time he led a quiet country life till his death (May 24, 1792), in London.

Rodney was unquestionably a most able officer, but he was also vain, selfish and unscrupulous, both in seeking prize money, and in using his position to push the fortunes of his family. He made his son a post-captain at fifteen. He was accused by his second-in-command, Hood, of sacrificing the interest of the service to his own profit, and of showing want of energy in pursuit of the French on April 12, 1782. It must be remembered that he was then prematurely old and racked by disease.

See General Mundy, *Life and Correspondence of Admiral Lord*

Rodney (2 vols., 1830); David Hannay, *Life of Rodney;* Rodney letters in 9th *Report* of Hist. mss. Com., pt. iii.; "Memoirs," in *Naval Chronicle*, i. 353–393; and Charnock, *Biographia Navalis*, v. 204–228. Lord Rodney published in his lifetime (probably 1789) *Letters to His Majesty's Ministers, etc., relative to St. Eustatius, etc.*, of which there is a copy in the British Museum. Most of these letters are printed in Mundy's *Life*, vol. ii., though with many variant readings.

RODÓ, JOSÉ ENRIQUE (1872–1917), Uruguayan philosopher, author and politician, was born in Montevideo on July 15, 1872. He was educated in a free lay school and at the University of Montevideo, where he showed extraordinary aptitude for history, literature and philosophy. In 1895 he was one of the founders of the *National Review of Literature and Social Sciences*, in which, in the following year he published an essay on literary criticism, "El que vendrá," which brought him immediate recognition as a writer and critic. In 1898 he was made professor of literature in the university, and two years later was appointed director of the National library, but in 1901 he gave up both positions to enter congress, to which he was elected in 1902 and 1908 and where he took an earnest part in initiating social legislation; he was not, however, a radical, and in a pamphlet, *Liberalismo y jacobismo* (1907), he strenuously opposed government anti-church legislation. In 1910 he represented Uruguay at the centenary of Chilean independence. Rodó's influence, however, as a rallying point of Latin-American youth was due to his authority as exponent of optimism, as stylist and as advocate of unity in Spanish-American literature and culture. His first important philosophical work, *Ariel*, based on Renan's eclecticism, appeared in 1900 in defence of Latin-American culture against the utilitarianism of the United States. In 1909 he published *Motivos de Proteo*, an assertion of the inevitability of change and the possibility of self-improvement, which represents Rodó's highest attainment as thinker and master of the Spanish language, and caused him to be hailed by Spanish-Americans as their philosopher *par excellence*. His essays on Rubén Darío (1899), Bolívar and Montalvo won him a similarly unique place in Spanish-American letters, to which, in those on Bolívar and Montalvo, included in *El Mirador de Próspero* (1913), he gave models of historical and critical essays. He died at Palermo in May 1917.

See H. D. Barbagelata, Introduction to *Cinco Ensayos* (Madrid, 1915); M. H. Ureña, "José Enrique Rodó," *Cuba Contemporánea* (Aug. 1918); Andrés González-Blanco, *Escritores representativos de América* (Madrid, 1917); V. G. Calderón, *Semblanzas de América* (Madrid, 1919); I. Goldberg, *Studies in Spanish-American Literature* (New York, 1920). (W. B. P.)

RODOSTO, a town of European Turkey, in the vilayet of Rodosto, on the coast of the Sea of Marmora, 78 m. west of Constantinople. Pop., vilayet (1924), 95,753. The Bay of Rodosto is enclosed by the great promontory of Combos, a spur about 2,000 ft. in height from the hilly plateau to the north. The church of Panagia Rheumatocratissa contains the graves, with long Latin inscriptions, of the Hungarians who were banished from their country in 1686 by the imperialist captors of Buda. Rodosto was long a great depot for the produce of the Adrianople district, but its trade suffered when Dédéagatch became the terminus of the railway up the Maritsa, and the town is now dependent on its maritime trade, especially its exports to Constantinople. It is the administrative centre of a district (*sanjak*) producing and exporting barley, oats, spelt and canary seed, and largely planted with mulberry trees, on which silkworms are fed. White cocoons are exported to western Europe, silkworms' eggs to Russia and Persia.

Rodosto is the ancient *Rhaedestus* or *Bisanthe*, said to have been founded by Samians. From 1920 to 1922 it was in Greek territory but was restored to Turkey by the Treaty of Lausanne.

RODRIGUEZ (officially RODRIGUES), an island in the Indian ocean in 19° 41′ S., 63° 23′ E.; a dependency of the British colony of Mauritius, from which it is 400 m. distant. It is a station on the "all-British" cable route between South Africa and Australia. With a length from east to west of 13 m. it is from 3 to 6 m. wide. It is surrounded by a fringing reef of coral, studded with islets. This reef, only 100 yd. wide on the east, extends 3 m. west, and both north and south forms a flat area partly dry at low water. Two passages through the reef are available for large vessels—these passages leading respectively to Port Mathurin on the north coast and to Port South-East.

The island is a mass of volcanic rock, mainly a doleritic lava, rich in olivine. The land is hilly and the main ridge rises abruptly on the east, but more gradually on the west, where there is a wide plain of coral limestone, studded with caves. Of several peaks on the main ridge the highest is Mt. Limon (1,300 ft.). The ridge is deeply cut by ravines, the upper parts of which show successive belts of lava separated by thin beds of ashes, agglomerate and ochre-coloured clays. In places the cliffs rise 300 ft. and exhibit 12 distinct lava flows. The climate is like that of Mauritius, but Rodriguez is more subject than Mauritius to hurricanes during the north-west monsoon (November to April).

Flora and Fauna.—When discovered, Rodriguez was clothed with fine timber trees; but goats, cattle and bush-fires have combined to destroy the greater bulk, and the indigenous plants have in many cases been ousted by intrusive foreigners. Parts are still well wooded, and elsewhere there is excellent pasturage. The sweet potato, manioc, maize, millet, the sugar-cane, cotton, coffee, rice and tobacco are cultivated. Wheat is seldom seen, but beans (*Phaseolus lunatus*), lentils, gram (*Cicer arietinum*), dholl (*Cajanus indicus*) and ground-nuts are all grown. Mangoes, bananas, guavas, pineapples, custard-apples, and especially oranges, citrons and limes flourish.

At present the only indigenous mammal is a species of fruit-eating bat (*Pteropus rodericensis*), and the introduced species are familiar creatures as deer, pig, rabbit, rat, mouse, etc., but until recently there occurred a very large land-tortoise (*Testudo vosmaeri*), and its limestone caves have yielded a large number of skeletons of the now extinct bird, the solitaire (q.v., *Pezophaps solitarius*). Of indigenous birds 13 species have been registered. The guinea-fowl (introduced) has become exceedingly abundant, partly owing to a protective game-law; and a francolin (*Francolinus ponticerianus*), is also common. The marine fish-fauna does not differ from that of Mauritius, and the fresh-water species, with the exception of *Mugil rodericensis* and *Myxus caeculicus*, are common to all the Mascarenes. The insects comprise at least 60 species of Coleoptera, 15 Hymenoptera, 21 Lepidoptera, 15 Orthoptera, and 20 Hemiptera. Forty-nine species of coral have been collected, showing a close affinity to those of Mauritius, Madagascar and the Seychelles.

History.—Rodriguez or Diego Ruy's island was discovered by the Portuguese in 1645. In 1690 Duquesne prevailed on the Dutch Government to send a body of French Huguenots to the Island of Bourbon, at that time, he believed, abandoned by the French authorities. The refugees, however, found the French in possession and therefore proceeded to Rodriguez where eight of their number were landed on April 30, 1691, with a promise that they should be visited by their compatriots within two years. The two years were spent without misadventure but, instead of waiting for the arrival of their friends, the colonists left the island on May 8, 1693, and made their way to Mauritius, where they were treated with great cruelty by the governor. From the Dutch the island passed to the French, who colonized it from Mauritius. Large estates were cultivated, and the islanders enjoyed considerable prosperity. In 1809–10 Rodriguez was seized by the British, in whose possession it has since remained. The abolition of slavery proved disastrous to the prosperity of the island, and in 1843 the population had sunk to about 250. Since that time there has been a gradual recovery in the economic condition and a steady increase in population. The inhabitants are mainly of African origin, being descendants of slaves introduced by the French, and negro immigrants direct from Africa. There are a few families of European descent (besides the comparatively large staff maintained by the Eastern Telegraph Company) and a small colony of Indians and Chinese. The bulk of the people are French-speaking and Roman Catholics. There are two small settlements, Port Mathurin, the capital, and Gabriel, in the centre of the island. The island is administered by a magistrate appointed by the governor of Mauritius, and the laws are regulations issued by the governor in executive council.

See F. Leguat, *Voyages et aventures* (1708), edit. by Capt. P. Oliver, in vols. lxxxii. and lxxxiii. of the Hakluyt Soc. publications (1891). *See also* C. Grant, *Hist. of Mauritius and the Neighbouring Islands* (1801); Higgin, in *Journ. R.G. Soc.* (1849); the *Reports* of the Transit of Venus Expedition, 1874–75, published as an extra volume of the *Philosophical Transactions,* clxviii. (Botany, by I. B. Balfour; Petrology, by N. S. Maskelyne, etc. 1879); Behm, in *Petermann's Mittheilungen* (1880); A. J. Bertuchi, *The Island of Rodriguez* (1923); and the annual reports on Mauritius.

RODZIANKO, MIKHAIL VLADIMIROVITCH (1859–1923), Russian politician, was born in 1859, of a family of great landowners. In 1906 and '07 he was a member of the Council of the Empire for the Zemstvo of the Province of Ekaterinoslav. He was a member of the 3rd and 4th Duma. He joined the right wing of the Octobrist (moderate liberal party) and with the support of the conservatives was elected president of the third Duma. As president of the fourth Duma he took part in the struggle for constitutional changes in the government opposing the reactionary policy of the government and defending the rights of the Duma. During the World War he took an important part in the unifying of the Russian industries. As president of the provisional committee of the state Duma, at the moment of the revolution, he sent a telegram to the Tsar, pointing out the necessity of his abdication. After the revolution he took part in the civil war as one of the managers of the Russian Red Cross and was forced to emigrate to Jugoslavia where he died January 24, 1923.

ROE, SIR ALLIOTT VERDON (1877–), British aeronautic engineer and inventor of the Avro biplane. He made his first flight on June 8, 1908, and in 1909 flew in an aeroplane with an engine of only 9–10 h.p.

ROE, HUMPHREY VERDON (1878–), British aeronautic engineer, was born on April 18, 1878. He served in the South African War, and joined the Royal Air Force during the World War (1917), being wounded in France in 1918. In the same year he married Dr. Marie Carmichael Stopes and with her founded at Holloway the first birth control clinic (1921).

ROE (or ROW), SIR THOMAS (*c.* 1581–1644), English diplomatist, born at Low Leyton, Essex, was educated at Magdalen college, Oxford. He was made esquire of the body to Queen Elizabeth, was knighted in 1605, and in 1610 was sent by Henry, prince of Wales, to the West Indies and South America to discover gold. Elected M.P. for Tamworth (1614) and Cirencester (1621), his reputation was secured by his successful mission to the court of the great Mogul, Jahāngīr, at Agra, where he obtained protection for an English factory at Surat. Appointed ambassador to the Porte in 1621, Roe secured further privileges for English merchants, concluded a treaty with Algiers in 1624, and gained the support of the Transylvanian prince, Bethlen Gabor, for the European Protestant alliance and the cause of the Palatinate.

Through his friendship with the patriarch of the Greek Church the Codex Alexandrinus was presented to James I., and Roe himself collected several valuable mss., which he gave to the Bodleian library. In 1629, he mediated successfully between the kings of Sweden and Poland; in 1630 he negotiated treaties with Danzig and Denmark, and in 1637 was appointed chancellor of the Order of the Garter. Subsequently he took part in the peace conferences at Hamburg, Regensburg and Vienna; in June 1640 he was made a privy councillor, and in October he became member of parliament for the University of Oxford. He died on Nov. 6, 1644.

His *Journal* of the mission to the Mogul, several times printed, has been re-edited, with an introduction by W. Foster, for the Hakluyt Society (1899). Of his correspondence, *Negotiations in his Embassy to the Ottoman Porte, 1621–28,* vol. i., was published in 1740, but the work was not continued. Other correspondence, consisting of letters relating to his mission to Gustavus Adolphus, was edited by S. R. Gardiner for the Camden Society Miscellany (1875), vol. vii., and his correspondence with Lord Carew in 1615 and 1617 by Sir F. Maclean for the same society in 1860. Several of his mss. are in the British Museum collections. Roe published a *True and Faithful Relation . . . concerning the Death of Sultan Osman . . . 1622;* a translation from Sarpi, *Discourse upon the Resolution taken in the Valteline* (1628); and in 1613 Dr. T. Wright published *Quatuor Colloquia,* consisting of theological disputations between himself and Roe; a poem by Roe is printed in *Notes and Queries* iv. Ser. v. 9. *The Swedish Intelligencer* (1632–33), including an account of the career of Gustavus Adolphus and of the Diet of Ratisbon (Regensburg) is attributed to Roe in the catalogue of the British Museum. Several of his speeches, chiefly on currency and financial questions, were also published. Two other works in mss. are mentioned by Wood: *Compendious Relation of the Proceedings . . . of the Imperial Diet at Ratisbon* and *Journal of Several Proceedings of the Order of the Garter.*

ROEBLING, JOHN AUGUSTUS (1806–1869), American civil engineer, was born at Mühlhausen, Prussia, on July 12, 1806. Soon after his graduation from the polytechnic school at Berlin he removed to the United States, and in 1831 entered on the practice of his profession in Western Pennsylvania. He established at Pittsburgh a wire rope factory, and in May 1845 completed his first important structure, a suspended aqueduct across the Allegheny river. This was followed by the Monongahela suspension bridge at Pittsburgh and several suspended aqueducts on the Delaware and Hudson canal. Removing his wire factory to Trenton (N.J.), he began, in 1851, the erection at Niagara Falls of a long-span wire suspension bridge with double roadway, for railway and vehicular use (*see* BRIDGE), which was completed in 1855. Owing to the novelty of its design, the most eminent engineers regarded this bridge as foredoomed to failure; but, with its complete success, demonstrated by long use, the number of suspension bridges rapidly multiplied, the use of wire ropes instead of chain cables becoming all but universal. The completion, in 1867, of the still more remarkable suspension bridge over the Ohio river at Cincinnati, with a clear span of 1,057ft., added to Roebling's reputation, and his design for the great bridge spanning the East river between Manhattan and Brooklyn, New York city, was accepted. While personally engaged in laying out the towers for the bridge, Roebling received an accidental injury, which resulted in his death, at Brooklyn, from tetanus, on July 22, 1869. The bridge was completed under the direction of his son, Washington Augustus Roebling (b. 1837).

ROEBOURNE, a settlement of the North-west Division of Western Australia, 8 m. from the N.W. coast, about lat. 20° 40′ S., long. 117° E., 920 m. direct N. of Perth. It is a centre of a rich and varied mineral district; gold, silver, tin, lead, copper, diamonds and other precious stones are found. There are extensive pearl fisheries off its port at Cossack Bay.

ROEBUCK, JOHN (1718–1794), English inventor, was born in 1718 at Sheffield; after attending the grammar school there and Doddridge's academy at Northampton, he studied medicine at Edinburgh, where he was imbued with a taste for chemistry by W. Cullen and J. Black, and he finally graduated M.D. at Leyden in 1742. He started practice at Birmingham, but devoted much of his time to chemistry, especially in its practical applications. Among the most important of his early achievements in this field was the introduction, in 1746, of leaden condensing chambers for use in the manufacture of sulphuric acid. Together with Samuel Garbett he erected a factory at Prestonpans, near Edinburgh, for the production of the acid in 1749, and for some years enjoyed a monopoly. He engaged next in the manufacture of iron and in 1760 established ironworks at Carron, in Stirlingshire. There he introduced various improvements in the methods of production, including the conversion (patented in 1762) of cast iron into malleable iron "by the action of a hollow pit-coal fire" urged by a powerful artificial blast. He became interested in James Watt's engine and in return for a two-thirds share in the invention assisted in perfecting its details, but financial troubles caused him to part with his share to Matthew Boulton in return for the cancellation of a debt of £1,200. He died on July 17, 1794.

ROEBUCK, JOHN ARTHUR (1801–1879), British politician, was born at Madras on Dec. 28, 1801, and brought up in Canada. He was called to the English bar in 1824, and became M.P. for Bath in 1832. In 1838 he appeared at the bar of the Commons to protest, in the name of the Canadian Assembly, against the suspension of the Canadian constitution. In 1855, having overthrown Lord Aberdeen's ministry by carrying a resolution for the appointment of a committee of inquiry into the mismanagement in the Crimean War, he presided over the proceedings of the committee. For nearly 30 years he was M.P. for Sheffield. He died on Nov. 30, 1879, in London.

ROEBUCK, the smallest European deer (a full-grown buck standing 27 in. at the shoulder), the typical representative of a genus (*Capreolus*) in which the antlers lack a brow-tine and belong to the forked type, while the tail is rudimentary (*see* DEER). The antlers are short, upright, and deeply furrowed, the beam forking at about two-thirds of its length and the upper prong again dividing, thus making three points. The coat in summer is foxy red above and white below; in winter this changes to a greyish fawn, with a white rump-patch. The roebuck or roedeer (*C. capreolus*) inhabits southern and temperate Europe as far east as the Caucasus, where, as in Syria, it is represented by another species. It frequents woods, preferring such as have underwood and are in the neighbourhood of cultivated ground. The latter it visits in the evening in search of food. Before pairing, the bucks pursue the does round specially trodden circular or octagonal runs. Pairing takes place in August, but the fawns are not born till the following May. Roe were formerly abundant in all the wooded parts of Great Britain, but are now restricted to the Highlands of Scotland and a few localities farther south. They take readily to water. The Siberian roe (*C. pygargus*), common in the Altai, is larger and paler, with shorter and more hairy ears and small irregular snags on the inner border of the antlers. The Manchurian roe (*Capreolus manchuricus*) is about the size of the European species, with antlers of the type of those of the Siberian roe, but more slender.

ROEDERER, PIERRE LOUIS, COMTE (1754–1835), French politician and economist, was born at Metz on Feb. 15, 1754, the son of a magistrate. He became councillor at the parlement of Metz, and was commissioned in 1787 to draw up a list of remonstrances. His work advocating the suppression of internal customs houses (*Suppression des douanes intérieures,* 1787) is a treatise on the laws of commerce and on the theory of customs imposts. In the Constituent assembly he was a member of the committee of taxes, prepared a new system of taxation, drew up a law on patents, occupied himself with the laws relating to stamps and *assignats,* and successfully opposed the introduction of an income tax. After the close of the Constituent assembly he was elected, on Nov. 11, 1791, *procureur général syndic* of the department of Paris. When he saw the perilous drift of things, he had tried to get into touch with the king; and it was on his advice that Louis, on the fatal 10th, took refuge in the Assembly. Roederer was in hiding until after Robespierre's fall. Under the Empire, Roederer, whose public influence was considerable, was Joseph Bonaparte's minister of finance at Naples (1806), administrator of the grand duchy of Berg (1810), and imperial commissary in the south of France. During the Hundred Days he was created a peer of France. The Restoration government stripped him of his offices and dignities, but he recovered the title of peer of France in 1832. He died on Dec. 17, 1835.

His writings include: *Louis XII.* (1820); *François I.* (1825); *Comédies historiques* (1827–30); *L'Esprit de la révolution de 1789* (1831); *La Première et la deuxième année du consulat de Bonaparte* (1802); *Chronique des cinquante jours* (1832); *Mémoire pour servir à l'histoire de la société polie en France* (1835).

See his *Oeuvres,* edited by his son (1853 *seq.*); Sainte-Beuve, *Causeries du lundi,* vol. viii.; M. Mignet, *Notices historiques* (1853).

ROEMER, FRIEDRICH ADOLPH (1809–1869), German geologist, was born at Hildesheim, in Prussia, on April 14, 1809. In 1845 he became professor of mineralogy and geology at Clausthal, and in 1862 director of the School of Mines. He first described the Cretaceous and Jurassic strata of Germany in *Die Versteinerungen des Norddeutschen Oolithen-gebirges* (1836–39), *Die Versteinerungen des Norddeutschen Kreidegebirges* (1840–41) and *Die Versteinerungen des Harzgebirges* (1843). He died at Clausthal on Nov. 25, 1869.

His brother, CARL FERDINAND VON ROEMER (1818–1891), educated for the legal profession at Göttingen, also became interested in geology, and abandoning law in 1840, studied science at the University of Berlin. Two years later he published his first work, *Das Rheinische Übergangsgebirge* (1844), in which he dealt with the older rocks and fossils. In 1845 he visited America, the results of his work being published in *Texas* (1849), and *Die Kreidebildungen von Texas und ihre organischen Einschlüsse* (1852). From 1847 to 1855 *privatdozent* at Bonn, he was then appointed professor of geology, palaeontology and mineralogy in the University of Breslau, a post which he held until his death on Dec. 14, 1891.

He prepared, with H. G. Bronn, the third edition of *Lethaea geognostica,* and later published one section, *Lethaea palaeozoica,* of an enlarged and revised edition. In 1862 he superintended the preparation of a geological map of upper Silesia, and the results of his researches were embodied in his *Geologie von Oberschlesien.*

ROEMER, OLE (Latinized OLAUS) (1644–1710), Danish astronomer, was born at Aarhuus, Jutland, on Sept. 25, 1644. He became in 1662 the pupil and amanuensis of Erasmus Bartholinus at Copenhagen. In 1671 he assisted J. Picard to determine the position of Tycho Brahe's observatory (Uraniborg, on the island of Hveen). In 1672 he went to Paris with Picard, and spent nine years on observations at the new royal observatory and hydraulic works at Versailles and Marly. After a scientific mission to England (1679), on which he met Newton, Halley and Flamsteed, he returned to Copenhagen in 1681 as royal mathematician and professor of astronomy in the university. He also held several public offices, including that of mayor (1705). He died at Copenhagen on Sept. 23, 1710.

Roemer is remembered as the discoverer of the finite velocity of light, which was suggested to him by his observations on the eclipses of Jupiter's moons. The first noteworthy transit instrument was in 1690 erected at his house. He also set up at the university observatory an instrument with altitude and azimuth circles, and an equatorial telescope. He also built and equipped the "Tusculan" observatory at Vridlösemagle, near Copenhagen. His observations perished in the great fire of Oct. 21, 1728, except those discussed by J. G. Galle in *O. Roemeri triduum observationum astronomicarum a. 1706 institutarum* (Berlin, 1845).

See E. Philipsen, *Nordisk Universities Tidskrift,* v. 11 (1860); P. Horrebrow, *Basis Astronomiae* (Copenhagen, 1735); J. B. J. Delambre, *Hist. de l'astr. moderne,* ii. 632; J. F. Montucla, *Hist. des mathématiques,* ii. 487, 579; R. Grant, *Hist. of Phys. Astronomy,* p. 461; R. Wolf, *Gesch. der Astronomie,* pp. 452, 489, 576; J. F. Weidler, *Historia Astronomiae,* p. 538; W. Doberck, *Nature,* xvii. 105; C. Huygens, *Oeuvres complètes,* t. viii. pp. 30–58; L. Ambronn, *Handbuch der astr. Instrumentenkunde,* ii. 552, 966; T. J. J. See, *Pop. Astronomy,* No. 105, May 1903.

ROERICH, NICOLAS CONSTANTINOVICH (1874–), Russian painter of Scandinavian origin, established his reputation by painting pictures of Russian prehistoric life and the wanderings of Vikings. After beginning with realistic pictures, his manner evolved under the influence of the Byzantine Icon and of Oriental art, towards a purely decorative and monumental style. Roerich studied the technique of ancient Russian frescoes and his wall paintings for the Kazan railway station at Moscow, representing combats between Russians and Tatars, are considered his most important work. He executed a number of works for the theatre: for the Russian ballet he painted the scenery in *Prince Igor;* for Stanislavsky the setting of *Peer Gynt.* He wrote the libretto for and also designed the scenery and the costumes of *The Rite of Spring,* for which Stravinsky composed the music. After the Russian revolution of 1917 he settled in America, and his art grew more and more abstract, tending towards occult mysticism. In 1924 he undertook a journey to India which gave him new inspiration for his later work.

ROERMOND, a town in the province of Limburg, Holland, on the right bank of the Maas at the confluence of the Roer, and a junction station 28 m. by rail N.N.E. of Maastricht. Pop. (1927), 16,630. The old fortifications have been dismantled and partly converted into fine promenades. A bridge across the Roer, dating from 1771, connects Roermond with the suburb of St. Jacob. Roermond is the seat of a Roman Catholic episcopal see. The finest building in the town is the Romanesque minster church of the first quarter of the 13th century. In the middle of the nave is the tomb of Gerhard III., count of Gelderland, and his wife Margaret of Brabant. It was formerly the church of a Cistercian nunnery, and in modern times has been elaborately restored. The cathedral of St. Christopher is also of note; on the top of the tower (246 ft.) is a copper statue of the saint, and

the interior is adorned with paintings by Rubens, Jacob de Wit (1695–1754) and others. The old bishop's palace is now the courthouse, and the old Jesuits' monastery with its fine gardens a higher-burgher school. Woollen, cotton, silk and mixed stuffs, paper, flour and beer are manufactured at Roermond.

ROGATION DAYS, in the Calendar of the Christian Church, the three days before Ascension Day. Their observance, by fasting and chanting litanies in procession, was introduced by St. Mamertus, bishop of Vienne (d. *c.* 475), and was ordered throughout France by the first Council of Orleans in 511. Leo III. (pope 795–816) introduced rogation days, but without fasting, at Rome. The custom had spread earlier into the English Church, where it was confirmed in 747 by the Council of Clovesho. After the Reformation the processions gradually ceased to be ecclesiastical in England, and now survive only in the perambulation of the parish boundaries on or about Ascension Day.

See also PROCESSION and LITANY.

ROGER (d. 1181), archbishop of York, known as Roger of Pont l'Evêque, was a member of the household of Theobald, archbishop of Canterbury, where he quarrelled violently with another future archbishop, Thomas Becket. In 1148 he was appointed archdeacon of Canterbury, and soon afterwards chaplain to King Stephen, who sent him on an errand to Rome in 1152; then in Oct. 1154 he was consecrated archbishop of York in Westminster abbey. When Henry II. entered upon his struggle with Becket he secured the support of Roger, and having been appointed papal legate in England, the archbishop visited Pope Alexander III. and the French king, Louis VII., in his master's interests. In June 1170 he crowned the king's son Henry, in spite of prohibitions from the pope and from Becket, and for this act he was suspended. He quarrelled with Richard, the new archbishop of Canterbury, about the respective rights of the two archiepiscopal sees, until 1176, when the king arranged a truce; and he was constantly endeavouring to assert his supremacy over the Scottish church. He died at York on Nov. 21, 1181.

ROGER (d. 1139), bishop of Salisbury, was originally priest of a small chapel near Caen. The future King Henry I., who happened to hear mass there one day, was impressed by the speed with which Roger read the service, and enrolled him in his own service. Roger, though uneducated, showed great talent for business, and Henry, on coming to the throne, almost immediately made him chancellor (1101). Soon after Roger received the bishopric of Salisbury. In the Investitures controversy he skilfully managed to keep the favour of both the king and Anselm. Roger devoted himself to administrative business, and remodelled it completely. He created the exchequer system, which was managed by him and his family for more than a century, and he used his position to heap up power and riches. He became the first man in England after the king, and was in office, if not in title, justiciar. He ruled England, while Henry was in Normandy, and succeeded in obtaining the see of Canterbury for his nominee, William of Corbeil. Duke Robert seems to have been put into his custody after Tinchebrai. Though Roger had sworn allegiance to Matilda, he disliked the Angevin connection, and went over to Stephen, carrying with him the royal treasure and administrative system (1135). Stephen placed great reliance on him, on his nephews, both bishops and on his son Roger, who was treasurer.

Roger himself had built at Devizes a splendid castle. He and his nephews seem to have secured a number of castles outside their own dioceses, and the old bishop behaved as if he were an equal of the king. At a council held in June 1139, Stephen found a pretext for demanding a surrender of their castles, and on their refusal they were arrested. After a short struggle all Roger's great castles were sequestrated. This quarrel with the church, which immediately preceded the landing of the empress, had a serious effect on Stephen's fortunes. Roger died at Salisbury in December 1139. He was a great bureaucrat, and a builder whose taste was in advance of his age. But his contemporaries were probably justified in regarding him as worldly, ambitious, avaricious, unfettered by any high standard of personal morality.

See Sir J. Ramsay's *Foundations of England,* vol. ii., and J. H. Round's *Geoffrey de Mandeville.*

ROGER I. (1031–1101), ruler of Sicily, was the youngest son of Tancred of Hauteville. Arriving in Southern Italy soon after 1057, he shared with Robert Guiscard the conquest of Calabria, and in a treaty of 1062 the brothers apparently made a kind of "condominium" by which each was to have half of every castle and town in Calabria. Robert now commissioned Roger to reduce Sicily, which contained, besides the Muslims, numerous Greek Christians subject to Arab princes who had become all but independent of the sultan of Tunis. In May 1061 the brothers crossed from Reggio and captured Messina. After Palermo had been taken in January 1072 Robert Guiscard, as suzerain, invested Roger as count of Sicily, but retained Palermo, half of Messina and the north-east portion of the island. Not till 1085, however, was Roger able to undertake a systematic crusade. In March 1086 Syracuse surrendered, and when in February 1091 Noto yielded the conquest was complete. Much of Robert's success had been due to Roger's support. Similarly the latter supported Duke Roger, his nephew, against Bohemund and other rebels, in return for which the duke surrendered to his uncle in 1085 his share in the castles of Calabria, and in 1091 the half of Palermo.

At the enfeoffments of 1072 and 1092 no great undivided fiefs were created, and the mixed Norman, French and Italian vassals owed their benefices to the count. No feudal revolt of importance therefore troubled Roger. Politically supreme, the count became master of the insular Church. While he gave full toleration to the Greek Churches, he created new Latin bishoprics at Syracuse and Girgenti and elsewhere, nominating the bishops personally, while he turned the archbishopric of Palermo into a Catholic see. The Papacy granted to him and his heirs in 1098 the Apostolic Legateship in the island. Roger was tolerant towards Arabs and Greeks, allowing to each race the expansion of its own civilization. In the cities the Muslims, who had generally secured such terms of surrender, retained their mosques, their kadis, and freedom of trade; in the country, however, they became serfs. He drew from the Muslims the mass of his infantry, but the Latin element began to prevail with the Lombards and other Italians who flocked into the island in the wake of the conquest, and the conquest of Sicily was decisive in the steady decline of Mohammedan power in the western Mediterranean. Roger, the "Great Count of Sicily," died on June 22, 1101, and was buried in S. Trinità of Mileto. His third wife, Adelaide, niece of Boniface, lord of Savona, gave him two sons, Simon and Roger, of whom the latter succeeded him.

See E. Caspar, *Roger II. und die Grundung der normannisch-sicilischen Monarchie* (Innsbruck, 1904). (E. Cu.)

ROGER II. (1093–1154), king of Sicily, son of the preceding, began to rule as count in 1112, and from the first aimed at uniting the whole of the Norman conquests in Italy. In 1127, Roger claimed the Hauteville possessions, and the overlordship of Capua, for which Richard II. in 1098 had sworn homage to Duke Roger, in virtue of a promise made by William, the late duke of Apulia. The union of Sicily and Apulia, however, was resisted by the subjects of the duchy itself, and by the pope at Capua (Dec. 1127) who preached a crusade against the claimant, setting against him Robert II. of Capua and Ranulf of Alife, or Avellino, brother-in-law of Roger. The coalition, however, failed, and in August 1128 Honorius invested Roger at Benevento as duke of Apulia. The baronial resistance, backed by Naples, Bari, Salerno and other cities, whose aim was civic freedom, also gave way, and at Melfi (Sept. 1129) Roger was recognized as duke by Naples, Capua and the rest. He at once began to enforce order in the Hauteville possessions, where the ducal power had long been falling to pieces. For the binding together of his states the royal name seemed essential, and the death of Honorius in February 1130, followed by a double election, seemed the decisive moment. While Innocent II. fled to France, Roger supported Anacletus II. The price was a crown, and on Sept. 27, 1130, a bull of Anacletus made Roger king of Sicily. He was crowned in Palermo on Dec. 25, 1130.

This plunged Roger into a ten years' war. Bernard of Clairvaux, Innocent's champion, built up against Anacletus and his

"half heathen king," a coalition joined by Louis VI. of France, Henry I. of England and the emperor Lothar. Meanwhile the forces of revolt in South Italy drew to a head again, and on June 24, 1132, the king was defeated at Nocera by Ranulf. Nevertheless, by July 1134, he forced Ranulf, Sergius, duke of Naples, and the rebels to submit, while Robert was expelled from Capua. Meanwhile Lothar's contemplated attack upon Roger had gained the backing of Pisa, Genoa and the Greek emperor, all of whom feared the growth of a powerful Norman kingdom. In February 1137 Lothar moved south and was joined by Ranulf and the rebels; in June he besieged and took Bari. At San Severino, after a victorious campaign, he and the pope jointly invested Ranulf as duke of Apulia (Aug. 1137), and the emperor then retired to Germany. Roger, freed from the utmost danger, recovered ground, sacked Capua and forced Sergius to acknowledge him as overlord of Naples. At Rignano the indomitable Ranulf again utterly defeated the king, but died in April 1139, leaving none to oppose Roger, who subdued the rebels pitilessly.

The death of Anacletus (Jan. 25, 1138) determined Roger to seek the confirmation of his title from Innocent. The latter, invading the kingdom with a large army, was skilfully ambushed at Galuccio on the Garigliano (July 22, 1139), and on July 25 the pope invested him as "Rex Siciliae ducatus Apuliae et principatus Capuae."

Roger, now become one of the greatest kings in Europe, made Sicily the leading maritime power in the Mediterranean. A powerful fleet was built up under several "admirals," or "emirs," of whom the greatest was George of Antioch, formerly in the service of the Muslim prince of El Mehdia. Mainly by him a series of conquests were made on the African coast (1135–53) which reached from Tripoli to Cape Bona. The second crusade (1147–48) gave Roger an opportunity to revive Robert Guiscard's designs on the Greek Empire. George was sent to Corinth at the end of 1147 and despatched an army inland which plundered Thebes. In June 1149 the admiral appeared before Constantinople and defied the Basileus by firing arrows against the palace windows. The attack on the empire had, however, no abiding results. The king died at Palermo on Feb. 26, 1154, and was succeeded by his fourth son William.

Personally Roger was of tall and powerful body, with long fair hair and full beard. With little of Robert Guiscard's personal valour, he yet showed to the full his uncle's audacity, diplomatic skill and determination. It is Roger II.'s distinction to have united all the Norman conquests into one kingdom and to have subjected them to a government scientific, personal and centralized. The principles of this are found in the Assizes of the kingdom of Sicily, promulgated at Ariano in 1140, which enforced an almost absolute royal power. At Palermo Roger drew round him distinguished men of various races, such as the famous Arab geographer Idrisi and the historian Nilus Doxopatrius. He maintained a complete toleration for the several creeds, races and languages of his realm; he was served by men of the most diverse nationalities.

Contemporary authors are: Falco of Benevento, Alexander of Telese, Romuald of Salerno and Hugo Falcandus, all in the *Scrittori e cronisti napoletani*, ed. Del Re, vol. i. *See* also E. Caspar, *Roger II. und die Gründung der normannisch-sicilischen Monarchie* (Innsbruck, 1904). (E. Cu.; X.)

ROGER OF HOVEDEN or HOWDEN (*fl.* 1174–1201), English chronicler, was, to judge from his name and the internal evidence of his work, a native of Howden in the East Riding of Yorkshire. But nothing is known of him before the year 1174. He was then in attendance upon Henry II., by whom he was sent from France on a secret misson to the lords of Galloway. In 1175 he again appears as a negotiator between the king and a number of English religious houses. In 1189, he was a justice of the forests in the shires of Yorkshire, Cumberland and Northumberland. About the year 1192 he began to compile his *Chronica*, a general history of England from 732 to his own time. Up to the year 1192 his narrative adds little to our knowledge. From that time, however, Hoveden is an independent and copious authority. Both on foreign affairs and on questions of domestic policy he is unusually well informed. He is particularly useful on points of constitutional history. His work breaks off abruptly in 1201. Probably his death should be placed in that year.

See W. Stubbs's edition of the *Chronica* (Rolls Series) and the introductions to vols. i. and iv. This edition supersedes that of Sir H. Savile in his *Scriptores post Bedam* (1596).

ROGER OF WENDOVER (d. 1236), English chronicler, was probably a native of Wendover in Buckinghamshire. At some uncertain date he became a monk of St. Albans; afterwards he was appointed prior of the cell of Belvoir, but he forfeited this dignity in the early years of Henry III., having been found guilty of wasting the endowments. His latter years were passed at St. Albans, where he died on May 6, 1236. He is the first of the important chroniclers who worked in the scriptorium of this house. His great work, the *Flores Historiarum*, begins at the creation and extends to 1235. It is of original value from 1202. Some critics have supposed, but on inconclusive evidence, that Wendover copied, up to 1189, an earlier compilation, the work of John de Cella, the twenty-first abbot of St. Albans (1195–1214).

A 13th-century manuscript is in the Bodleian library (Douce mss. 207), a mutilated 14th-century copy in the British Museum (Cotton ms. Otho B. v.). Matthew Paris prepared an edition which forms the first part of that writer's *Chronica Majora* (ed. H. R. Luard, Rolls Series, 7 vols.). The best edition of Wendover is that of H. O. Coxe (4 vols., 1841–42); there is another (from 1154) in the Rolls Series by H. G. Hewlett (3 vols., 1886–89). *See* Luard's prefaces to vols. i., ii., iii. and vii. of the *Chronica Majora;* and the *Monumenta Germaniae Historica, Scriptores,* Band xxviii., pp. 3–20.

ROGERS, HENRY DARWIN (1808–1866), American geologist, was born at Philadelphia on Aug. 1, 1808. At the age of 21 he was chosen professor of chemistry and natural philosophy at Dickinson college, Pennsylvania. After holding this post for three years, he went to Europe and took up the study of geology. Subsequently he was engaged for 22 years in the State surveys of Pennsylvania and New Jersey, his reports on which were published during the years 1836–41. In 1842 he and his brother WILLIAM BARTON ROGERS (1805–82), who had been similarly occupied in Virginia, brought before the Association of American Geologists and Naturalists their conclusions on the physical structure of the Appalachian chains, and on the elevation of great mountain chains. The researches of H. D. Rogers were elaborated in his final *Report on Pennsylvania* (1858), in which he included a general account of the geology of the United States and of the coal-fields of North America and Great Britain. In 1857 he was appointed professor of natural history and geology at Glasgow. One of his later essays (1861) was on the parallel roads of Lochaber (Glen Roy), the origin of which he attributed to a vast inundation. He died at Glasgow on May 29, 1866.

ROGERS, JAMES EDWIN THOROLD (1823–1890), English economist, was born at West Meon, Hampshire, in 1823, and educated at King's college, London, and Magdalen Hall, Oxford. After taking a first-class degree in 1846, he was ordained and was for a few years a curate in Oxford. Subsequently he resigned his orders. He was a good classical scholar and published in 1865 an edition of Aristotle's *Ethics;* but his friendship with Cobden led him to study economics, with the result that in 1859 he was appointed professor of statistics and economic science at King's college, London, a post which he filled till his death. From 1862 he was also Drummond professor of political economy at Oxford. During that period he published (in 1866) the first two volumes of his *History of Agriculture and Prices in England*, dealing with the period 1259–1400, a masterly record upon which his reputation mainly rests. Two more volumes (1401–1582) were published in 1882, a fifth and sixth (1583–1702) in 1887, and he left behind him at his death copious materials for a seventh and eighth. An acquaintance with Cobden and John Bright led Rogers to take an active part in politics: he represented Southwark in parliament from 1880 to 1885, and Bermondsey in 1885–86, as an advanced Liberal. In 1888, on the death of Prof. Bonamy Price, who had succeeded him at Oxford as professor of political economy, he was re-elected to the post. Previously (in 1883) he had been appointed lecturer in political economy at Worcester college, Oxford. His latter years were mainly spent at Oxford, where he died on Oct. 12, 1890. Thorold Rogers did

much to promote the historical study of economics to which he made a solid contribution in his *Six Centuries of Work and Wages* (1885).

His most important publications are:—*Manual of Political Economy* (1868); an edition of Adam Smith's *Wealth of Nations* (1869); *Cobden and Public Opinion* (1873); *The Speeches of J. Bright* (edited) (1868); and *The First Nine Years of the Bank of England* (1887).

See also W. J. Ashley, in *The Political Science Quarterly* (1889); and E. Castelot, in *Nouveau Dictionnaire d'Economie Politique*, supplément.

ROGERS, JOHN (*c.* 1500–1555), English Protestant martyr, born at Aston, near Birmingham, was educated at Pembroke Hall, Cambridge, where he graduated B.A. in 1526. Six years later he was rector of Holy Trinity, Queenhithe, London, and in 1534 went to Antwerp as chaplain to the English merchants. Here he met William Tyndale, under whose influence he abandoned the Roman Catholic faith, and married an Antwerp lady. After Tyndale's death Rogers pushed on with his predecessor's English version of the Old Testament, which he used as far as 2 Chronicles, employing Coverdale's translation (1535) for the remainder and for the Apocrypha. Tyndale's New Testament had been published in 1526. The complete Bible was put out under the pseudonym of Thomas Matthew in 1537; it was printed in Antwerp, and Richard Grafton published the sheets and got leave to sell the edition (1,500 copies) in England. Rogers had little to do with the translation, but he contributed some valuable prefaces and marginal notes. His work was largely used by those who prepared the Great Bible (1539–40), out of which in turn came the Bishop's Bible (1568) and the Authorized Version of 1611. After taking charge of a Protestant congregation in Wittenberg for some years, Rogers returned to England in 1548, where he published a translation of Melanchthon's *Considerations of the Augsburg Interim*. In 1550 he was presented to the crown livings of St. Margaret Moyses and St. Sepulchre in London, and in 1551 was made a prebendary of St. Paul's, where the dean and chapter soon appointed him divinity lecturer.

On the accession of Mary, Rogers preached at Paul's Cross commending the "true doctrine taught in King Edward's days," and warning his hearers against "pestilent Popery, idolatry and superstition." Ten days after (16th August 1553), he was summoned before the council and bidden to keep within his own house. In January 1554 Bonner, the new bishop of London, sent him to Newgate, where he lay with John Hooper, Laurence Saunders, John Bradford and others for a year. On January 22, 1555, Rogers with ten others came before the council at Gardiner's house in Southwark, and held his own in the examination that took place. On the 28th and 29th he came before the commission appointed by Cardinal Pole, and was sentenced to death by Gardiner for heretically denying the Christian character of the Church of Rome and the real presence in the sacrament. He met his death on the 4th of February 1555 at Smithfield. He was the first Protestant martyr of Mary's reign, and his friend Bradford wrote that "he broke the ice valiantly."

ROGERS, JOHN (1627–1665?), English preacher, a Fifth Monarchy man, second son of Nehemiah Rogers, a royalist and Anglican clergyman, was born at Messing, Essex; he studied medicine at King's college, Cambridge. In the quarrel between the army and the parliament Rogers sided with the army, and he was one of the first to join the Fifth Monarchy movement. He approved of the expulsion of the Long Parliament, but the establishment of the Protectorate at once threw the Fifth Monarchy men into antagonism. Rogers addressed a warning letter to Cromwell, and attacked him from the pulpit on Jan. 9, 1654. His house was searched and his papers seized, and Rogers then issued another denunciation against Cromwell, *Mene, Tekel, Perez: a Letter lamenting over Oliver Lord Cromwell*. On March 28, on which day he had proclaimed a fast for the sins of the rulers, he preached a violent sermon against the protector. He was arrested in July. He confronted Cromwell with great courage when brought before him on Feb. 5, 1655, and was imprisoned successively at Windsor and in the Isle of Wight, being released in Jan. 1657. He returned to London, and, being suspected of conspiracy, was again imprisoned by Cromwell in the Tower (Feb. 3–April 16, 1658). On the protector's death and the downfall of Richard Cromwell, the ideals of the Fifth Monarchy men seemed nearer realization, but Rogers was engaged in political controversy with Prynne and became a source of embarrassment to his own faction, which endeavoured to get rid of him by appointing him "to preach the gospel" in Ireland. On the outbreak of Sir George Booth's royalist insurrection, however, he became chaplain in Charles Fairfax's regiment, and served throughout the campaign. He was imprisoned in Dublin in Jan. 1660 by order of the army faction and released subsequently by the parliament. At the Restoration he withdrew to Holland, studied medicine at Leyden and Utrecht, where he obtained his M.D. in 1662. He was admitted to the degree of M.D. at Oxford in 1664, and is supposed to have died soon afterwards.

Besides the above pamphlet, Rogers wrote in 1653 *Ohel or Beth-shemesh, a Tabernacle for the Sun*, in which he attacked the Presbyterians; *Sagrir, or Doomesday drawing nigh*, from his new standpoint as a Fifth Monarchy man, *Challah, the Heavenly Nymph* (1653); *Dod, or Chathan; the Beloved or the Bridegroom going forth for his Bride* . . . (1653); *Prison-born Morning Beams* (1654); *Jegar Sahadutha* . . . (1657); *Mr. Prynne's Good Old Cause stated and stunted 10 Year ago* . . . (1609); Διατολιτεία *a Christian Concertation* (1659); *Mr. Harrington's Parallel Unparalleled* (1659); *A Vindication of Sir H. Vane* (1659); *Disputatio Medica Inauguralis* (1662).

AUTHORITIES.—Ed. Rogers, *Life and Opinions of a Fifth Monarchy Man* (1867), compiled from Rogers's own works; Wood, *Athenae Oxonienses and Fasti; Calendars of State Papers (Domestic)*. *See* also "English Ancestry of Washington," *Harper's Magazine*, xxi. (1891); "John Rogers of Purleigh," *The Nation*, vol. 53 (1891).

ROGERS, JOHN (1829–1904), American sculptor, was born at Salem, Mass., on Oct. 30, 1829. He wanted to become a sculptor, and spent eight months in study at Rome and Paris in 1858–59. Becoming discouraged, he returned to America and obtained employment as a draughtsman in the office of the city surveyor of Chicago; but soon afterwards, owing to the favourable reception of his group of small figures, "The Checker Players," he resumed sculptural work, confining himself to these small figures, known as "Rogers Groups," which had an enormous popular success and were extensively reproduced. In 1863 he became a National Academician. He died at New Haven, Conn., on July 27, 1904.

ROGERS, ROBERT (1727–1795), American frontier soldier, was born at Methuen, Mass., and in 1739 removed to Starktown (now Dunbarton), N.H. During the Seven Years' War he raised and commanded a force of militia, known as Rogers's Rangers, which won wide reputation for its courage and endurance in the campaigns about Lake George. He took part in Wolfe's expedition against Quebec and in the Montreal campaign of 1760. Afterwards he was sent by Gen. Amherst to take possession of the north-western posts, including Detroit. He was again in the West in 1763 during the Pontiac uprising, accompanying Dalyell's expedition and participating in the battle of Bloody Bridge. Soon after he went to England and in 1765 published in London a *Concise Account of North America* and his *Journals* of service in the Seven Years' War. In 1766 was published *Ponteach: A Tragedy*, one of the first American dramas, supposedly also written by Rogers. He further laid before the king a memorial proposing to lead an overland expedition from the Mississippi river to the Pacific ocean. This was refused him but instead he was given command of the north-west post of Michilimackinac. From here in 1766 he sent out on his own initiative, under Captains Tute and Carver, the first English expedition to explore the upper Mississippi and Great Lakes region, but it failed to penetrate to the Pacific as intended. Rogers's ambitions caused him to be tried for treason but he was acquitted. He again went to England to retrieve his fortune but was unsuccessful. During the Revolutionary War he came to America but was regarded as a loyalist spy. He then openly joined the British and organized and commanded the Queen's Rangers which saw service in operations around New York city. Later he organized the King's Rangers, but the command was taken by his brother, James Rogers, and Robert Rogers returned to England, where he lived in obscurity until his death in 1795.

There is a scholarly biography by Allan Nevins of 172 pages in the Caxton Club edition of *Ponteach* (Chicago, 1914). *See* also F. Parkman, *Montcalm and Wolfe* (Boston, 1884).

ROGERS, SAMUEL (1763–1855), English poet, was born at Newington Green, London, on July 30, 1763. His father, Thomas Rogers, was the son of a Stourbridge glass manufacturer, who was also a merchant in Cheapside. Thomas Rogers had a place in the London business, and married Mary Radford, daughter of his father's partner, becoming himself a partner shortly afterwards. On his mother's side Samuel Rogers was connected with the Noncomformist divines Philip and Matthew Henry, and it was in Nonconformist circles at Stoke Newington that he was brought up. He was educated at private schools at Hackney and Stoke Newington. Samuel Rogers entered the banking business in Cornhill, but his delicate health necessitated long holidays, during which he met the literary society of the day in Edinburgh as well as in London. He had already published a volume of verse when his *Pleasures of Memory* was printed in 1792. This poem may be regarded as the last embodiment of the poetic diction of the 18th century. Here is carried to the extremest pitch the theory of elevating and refining familiar themes by abstract treatment and lofty imagery.

In 1793 his father's death gave Rogers the principal share in the banking house in Cornhill, and a considerable income. He left Newington Green in the same year and established himself in chambers in the Temple. In his circle of friends at this time were "Conversation" Sharp and the artists Flaxman, Opie, Martin Shee and Fuseli. He also made the acquaintance of Charles James Fox, with whom he visited the galleries in Paris in 1802, and whose friendship introduced him to Holland House. In 1803 he moved to 22 St. James's Place, where for 50 years he entertained all the celebrities of London. Flaxman and Stothard had a share in the decorations of the house, which Rogers had almost rebuilt, and now proceeded to fill with pictures and other works of art. His collections at his death realized £50,000. An invitation to one of Rogers's breakfasts was a formal entry into literary society, and his dinners were even more select. His social success was due less to his literary position than to his powers as a conversationalist, his educated taste in all matters of art, and no doubt to his sarcastic and bitter wit, for which he excused himself by saying that he had such a small voice that no one listened if he said pleasant things. Above all, he seems to have had a genius for benevolence. "He certainly had the kindest heart and unkindest tongue of any one I ever knew," said Fanny Kemble. He helped the poet Robert Bloomfield, he reconciled Moore with Jeffrey and with Byron, and he relieved Sheridan's difficulties in the last days of his life. Moore, who refused help from all his friends, and would only be under obligations to his publishers, found it possible to accept assistance from Rogers. He procured a pension for H. F. Cary, the translator of Dante, and obtained for Wordsworth his sinecure as distributor of stamps.

Rogers played the part of literary dictator in England over a long period. He made his reputation by *The Pleasures of Memory* when Cowper's fame was still in the making. He became the friend of Wordsworth, Scott and Byron, and lived long enough to give an opinion as to the fitness of Alfred Tennyson for the post of poet laureate. Alexander Dyce, from the time of his first introduction to Rogers, was in the habit of writing down the anecdotes with which his conversation abounded. From the mass of material thus accumulated he made a selection which he arranged under various headings and published in 1856 as *Recollections of the Table-Talk of Samuel Rogers, to which is added Porsoniana.* Rogers himself kept a notebook, in which he entered impressions of the conversation of many of his friends—Charles James Fox, Edmund Burke, Henry Grattan, Richard Porson, John Horne Tooke, Talleyrand, Lord Erskine, Sir Walter Scott, Lord Grenville and the duke of Wellington. They were published by his nephew William Sharpe in 1859 as *Recollections by Samuel Rogers;* and *Reminiscences and Table-Talk of Samuel Rogers, Banker, Poet, and Patron of the Arts, 1763–1855* (1903), by G. H. Powell, is an amalgamation of these two authorities. Rogers held various honorary positions: he was one of the trustees of the National Gallery; and he served on a commission to inquire into the management of the British Museum, and on another for the rebuilding of the houses of parliament.

Rogers's later works are *An Epistle to a Friend* (Richard Sharp) (1798); *The Voyage of Columbus* (1810); *Jacqueline* (1814), a narrative poem, written in the four-accent measure of the newer writers; the reflective poem on *Human Life* (1819) and *Italy* (1822–28). Rogers was in Italy in 1814 and again in 1820, when he visited Byron and Shelley at Pisa. The 1828 edition of *Italy* was not a great success. He enlarged and revised the poem, and commissioned illustrations from J. M. Turner, Thomas Stothard and Samuel Prout. These were engraved on steel in the sumptuous edition of 1830. Rogers followed it up with an equally sumptuous edition of his *Poems* (1838). In 1850, on Wordsworth's death, Rogers was asked to succeed him as poet laureate, but declined the honour. He died in London on Dec. 18, 1855.

See P. W. Clayden, *The Early Life of Samuel Rogers* (1887) and *Rogers and his Contemporaries* (2 vols., 1889); Dyce, *Reminiscences and Table-talk of Samuel Rogers* (1856, ed. Powell, 1903); Roberts, *Samuel Rogers and his Circle* (1910). One of the best accounts of Rogers, containing many examples of his caustic wit, is by Abraham Hayward in the *Edinburgh Review* for July 1856. *See* also the Aldine edition (1857) of his *Poetical Works,* and the *Journals* of Byron and of Moore.

ROGERS, WILLIAM (1819–1896), English clergyman and educational reformer, was born in London on Nov. 24, 1819, and died there on Jan. 19, 1896. Educated at Eton and at Balliol college, Oxford, he entered Durham university in 1842, to study theology, and was ordained in 1843. In 1845 he was appointed to St. Thomas Charterhouse, where he remained for 18 years, throwing himself passionately into the work of education of his poor, degraded and often criminal parishioners. He began by establishing a school for ragamuffins in a blacksmith's abandoned shed, and he gradually extended its scope until schools were provided throughout the parish. In 1863 he became rector of St. Botolph Bishopsgate, a prebendary of St. Paul's, and in 1857 chaplain in ordinary to the Queen. At Bishopsgate Rogers tackled the middle-class schools. He believed in secular education, leaving doctrinal training to parents and clergy. To the cry against "godless education," Rogers replied, "Hang theology; let us begin"; and his nickname of "Hang-theology Rogers" stuck to him for the rest of his life. Rogers reconstructed Edward Alleyn's charity at Dulwich. He founded the Bishopsgate Institute.

ROGIER, CHARLES LATOUR (1800–1885), Belgian statesman, descended from a Belgian family settled in the department of the Nord in France, was born at St. Quentin on Aug. 17, 1800. His father, an officer in the French army, perished in the Russian campaign of 1812; and the family moved to Liége, where the eldest son, Firmin, held a professorship. Charles, after being called to the bar, founded, in collaboration with his lifelong friends, Paul Devaux and Joseph Lebeau, the journal *Mathieu Laensberg* (afterwards *Le Politique*), which by its ardent patriotism and its attacks on the Dutch administration soon acquired a widespread influence. When the insurrection of 1830 broke out at Brussels, Rogier put himself at the head of 150 Liégeois, and inscribing on his banner the motto, "Vaincre ou mourir pour Bruxelles," he obtained arms from a local factory, and marched upon the capital. Here he took his place at once among the leaders of the revolutionary party. His influence saved the town hall from pillage on Sept. 19.

On the 24th a *commission administrative* was formed, of which Rogier became president. The energetic measures of this body and of its successor, the *gouvernement provisoire,* soon freed the greater part of the country from the Dutch troops. Rogier was sent in October to suppress an outbreak among the colliers of Hainaut, and then as delegate of the provisional government to Antwerp, where the citadel still held out for Holland. He arranged an armistice, and reorganized the entire administration of the city. He sat for Liége in the National Congress, voted for the establishment of an hereditary monarchy, and induced the congress to adopt the principle of an elective second chamber. In the long-drawn debates on the bestowal of the crown he ranged himself on the side of Louis Philippe: but when Louis Philippe de-

clined the crown on behalf of his son, Rogier voted with the majority for Leopold of Saxe-Coburg.

In June 1831 he was appointed governor of the province of Antwerp, a post rendered exceptionally difficult by the continued presence of Dutch troops in the citadel. In October 1832 he was made minister of the interior in the Goblet-Devaux cabinet. During his office he carried, in the teeth of opposition, a law that established in Belgium the first railways on the continent of Europe, and thus laid the foundation of her industrial development. Owing to dissensions in the cabinet, he retired in 1834, together with Lebeau, and resumed the governorship of Antwerp. On Lebeau's return to power in 1840, Rogier became minister of public works and education. His education proposals were defeated by the Clerical party, and on the resignation of the ministry in 1841, Rogier gave his support to a compromise measure, which passed into law in 1842. He led the Liberal party in Opposition till 1847, when he formed a cabinet in which he held the ministry of the interior. He carried out a liberal policy which enabled Belgium to escape the general revolutionary movement of 1848.

Rogier retired in Oct. 1852, but was brought back into office by the liberal reaction of 1857. He again became president of the council and minister of the interior in a cabinet of which Frère-Orban was the most conspicuous member. The first important measure passed by the ministry was one for the fortification of Antwerp. In 1860 the fear of French designs on the independence of Belgium led to a movement of reconciliation with Holland, and inspired Rogier to write his poem "La Nouvelle Brabançonne." In 1861 Rogier exchanged the ministry of the interior for that of foreign affairs. He achieved a diplomatic triumph in freeing the navigation of the Scheldt, and thus enabling Antwerp to become the second port on the mainland of Europe. Defeated at Dinant, he sat for Tournai from 1863 till his death. In 1868 Rogier finally retired from power. He continued, however, to take part in public life, and was elected president of the extraordinary session of the chamber of representatives in 1878. From this time his age, his devoted patriotism and the unassuming simplicity of his life made him the idol of all classes. He died at Brussels on May 27, 1885, and was accorded a public funeral.

See T. Juste, *Charles Rogier, 1800–1885, d'après des documents inédits* (Verviers, 1885).

ROHAN, the name of one of the most illustrious of the feudal families of France, derived from that of a small town in Morbihan, Brittany, and claimed connection with the ancient sovereigns of Brittany. Hercule de Rohan, duc de Montbazon (1568–1654) served Henry III. and Henry IV. against the League, and was made by Henry IV. governor of Paris and the Isle of France, and master of the hounds. His grandson, Louis de Rohan-Guéménée, the chevalier de Rohan, conspired with the Dutch against Louis XIV. and was beheaded in Paris in 1674. In the 18th century the Soubise branch of the family furnished several prelates, cardinals and bishops of Strasbourg, among others the famous cardinal de Rohan, the hero of the affair of the diamond necklace. René de Rohan, seigneur of Pontivy and Frontenay, of the Gié branch, commanded the Calvinist army in 1570, and defended Lusignan with great valour when it was besieged by the Catholics (1574–75). His son Henry, the first duke of Rohan (*q.v.*), had an only child, Marguerite de Rohan, married in 1645 to Henri Chabot. The property and titles of Henry de Rohan thus passed to the Chabot family, which under the name of Rohan-Chabot produced some distinguished soldiers and a cardinal archbishop of Besançon.

ROHAN, HENRI, Duc de (1579–1638), French soldier, writer and leader of the Huguenots, was born at the château of Blain, in Brittany, in 1579. His father was René II., count of Rohan (1550–86). Henri appeared at court and in the army at the age of sixteen, and was a special favourite with Henry IV., after whom, failing the house of Condé, he might be said to be the natural chief of the French Protestants. Having served till the peace of Vervins, he travelled for some time. On his return to France he was made duke and peer at the age of twenty-four, and two years later (1603) married Marguerite de Béthune, the duc de Sully's daughter. He fought from time to time in the royal army, and it was not till the decree for the restitution of church property in the south threw the Bearnese and Gascons into open revolt that Rohan appeared as a rebel. His ability and constancy contributed to the happy issue of the war for the Huguenots, and brought about the treaty of Montpellier (1623). Rohan renewed the war when the compact of Montpellier was broken. Again a hollow peace was patched up, but it lasted but a short time, and Rohan undertook a third war (1627–29), the first events of which are recounted in his celebrated *Memoirs.* After the peace he made his way to Venice, where his hosts wished to make him their general-in-chief, a design not executed owing to the peace of Cherasco (1631). At Venice he wrote his *Memoirs;* at Padua, *Le Parfait Capitaine.* Rohan returned to the French service, and was entrusted with the war in the Valtelline (1633). But Rohan was still considered dangerous to France, and was soon again in retirement. At this time he wrote his *Traité du gouvernement des treize cantons.* Rohan fought another Valtelline campaign, but without the success of the first, for the motives of France were now held in suspicion. The unfortunate commander retired to Geneva and thence went to the army of Bernhard of Saxe-Weimar. He received a mortal wound at the battle of Rheinfelden on Feb. 28, 1638, and died at the abbey of Königsfeld, canton Berne, on April 13.

Rohan's *Mémoires sur les choses qui se sont passées en France,* etc., rank amongst the best memoirs of the 16th and 17th centuries. The first three books which deal with the civil wars appeared in 1644; the fourth, containing the narrative of the Valtelline campaigns, not till 1758. His famous book on the history and art of war, *Le Parfait Capitaine,* appeared in 1631 and subsequently in 1637 and 1693 (*see* also Quincy, *Art de la guerre,* Paris, 1741). The *Memoirs* may be conveniently found in the collection of Michaud and Poujoulat, vol. 19.

See Fauvelet de Foix, *Histoire du Duc Henri de Rohan* (1667); Schybergson, *Le Duc de Rohan et la charte du parti protestant en France* (1880); Bühring, *Venedig, Gustaf Adolf, und Rohan* (Halle, 1885); Laugel, *Henri de Rohan, son rôle politique et militaire* (1889); Veraguth, *Herzog Rohan und seine Mission in Graubünden* (Berne, 1894); and Shadwell, *Mountain Warfare.*

ROHAN, LOUIS RENÉ EDOUARD, Cardinal de (1734–1803), prince de Rohan-Guéménée, archbishop of Strasbourg, a cadet of the great family of Rohan, was born at Paris on Sept. 25, 1734. After taking orders, in 1760, he was nominated coadjutor to his uncle, Constantine de Rohan-Rochefort, archbishop of Strasbourg, and he was also consecrated bishop of Canopus. But he preferred the gaiety of Paris to his clerical duties, and had political ambitions. He joined the party opposed to the Austrian alliance, which had been cemented by the marriage of the archduchess Marie Antoinette to the dauphin. This party was headed by the duc d'Aiguillon, who in 1771 sent Prince Louis on a special embassy to Vienna to find out what was being done there with regard to the partition of Poland. Rohan arrived at Vienna in Jan. 1772, and made a great noise with his lavish fêtes. But the empress Maria Theresa was implacably hostile to him; not only did he attempt to thwart her policy, but he spread scandals about her daughter Marie Antoinette, laughed at Theresa, and shocked her ideas of propriety. On the death of Louis XV. in 1774, Rohan was recalled from Vienna, and coldly received at Paris; but in 1777 he was made grand almoner, and in 1778 abbot of St. Vaast. In 1778 he was made a cardinal on the nomination of Stanislaus Poniatowski, king of Poland, and in the following year succeeded his uncle as archbishop of Strasbourg and became abbot of Noirmoutiers and Chaise-Dieu.

In an attempt to procure his reinstatement at court he fell into the hands of the comtesse de Lamotte, the notorious Cagliostro and others, whose actions form part of the "affair of the diamond necklace" (*see* Diamond Necklace). Rohan certainly was led to believe that his attentions to the queen were welcomed, and that his arrangement by which she received the famous necklace was approved. He was the dupe of others, and at the trial in 1786 his acquittal was received with universal enthusiasm, and regarded as a victory over the court and the queen. He was deprived, however, of his office as grand almoner and exiled to his abbey of Chaise-Dieu. He was soon allowed to

return to Strasbourg, and was elected to the states-general. As a prince of the church in Jan. 1791 he refused to take the oath to the constitution, and went to Ettenheim, in the German part of his diocese. He spent what wealth remained to him in providing for the poor clergy of his diocese who had been obliged to leave France; and in 1801 he resigned his nominal rank as archbishop of Strasbourg. On Feb. 17, 1803, he died at Ettenheim.

See the *Mémoires* of his secretary, the abbé Georgel, of the baroness d'Oberkirch, of Beugnot, and of Madame Campan; also J. Munier-Jolain, *Le Cardinal Collier; lettres à . . . de Marie Thérèse* (1918), and other works cited under DIAMOND NECKLACE.

ROHILKHAND, a tract in the United Provinces of India. The name is associated with the Rohilla tribe, but in its historical significance it covers an area almost coincident with the modern division of Bareilly, for which it is a common alternative title. This division has an area of 10,828 sq.m., and comprises the districts of Bareilly, Bijnor, Budaun, Moradabad, Shahjahanpur and Pilibhit. Pop. (1921) 5,198,773. Political control over the State of Rampur is exercised by the commissioner for the division.

The Rohillas trace their ancestry to Sardar Daud Khan, an Afghan adventurer, whose adopted son annexed a large area north of the Ganges and was created a Nawab by the Delhi emperor. He died in 1749, and the family split up into a number of petty chiefs. In 1774 (*see* BIJNOR) the Rohilla power was broken by the confederacy of the British and the nawab of Oudh. The State of Rampur, almost in its present dimensions, was left under the sovereignty of Nawab Faizullah Khan, and the rest of Rohilkhand was annexed to Oudh. The present division was ceded to the Company in 1801.

ROHILLA, a Pushtu word for "mountaineer" applied to a tribe of Afghan marauders, who, towards the beginning of the 18th century, conquered a district of Hindustan, giving it the name of Rohilkhand (Bareilly in the United Provinces). They are chiefly notable for their association with Warren Hastings (*q.v.*) who assisted the Wazir of Oudh in the annexation of their territory in the Rohilla War.

See Charles Hamilton, *History of the Rohilla Afghans* (1787); and Sir J. Strachey, *Hastings and the Rohilla War* (Oxford, 1892).

ROHTAK, a town and district of British India, in the Punjab. The town, which is of great antiquity, became the headquarters of a British district in 1824. Viewed from the sandhills to the south, Rohtak, with its white mosque in the centre, a fort standing out boldly to the east, is striking and picturesque. It has a station on the Southern Punjab railway, 44 m. N.W. of Delhi. Pop. (1921) 25,240. It is an important trade centre, with factories for ginning and pressing cotton, and a speciality in muslin turbans.

The district of Rohtak has an area of 1,797 sq.m. It is situated in the midst of the level tableland between the Jumna and the Sutlej, the northern portions are watered by the Rohtak and Butana branches of the Western Jumna canal; but the greater portion of the central plain is entirely dependent upon the uncertain rainfall. The population in 1921 was 772,272.

ROKITANSKY, CARL (1804–1878), the founder of the Vienna school of pathological anatomy, was born on Feb. 19, 1804, at Königgrätz, Bohemia. He studied medicine at Prague and at Vienna, where he was made professor of pathological anatomy in 1834. In 1847 he became medico-legal anatomist to the city, and from 1863 he advised the ministry of education on all routine matters of medical teaching. He became president of the Imperial Academy of Sciences in 1869. He died in Vienna on July 23, 1878.

Carl Rokitansky's *Handbuch der pathologischen Anatomie* (1842–46, Eng. trans. 1849–52) is said to have been based on 30,000 post-mortem examinations. Four important memoirs (on the anatomy of goitre, cysts, diseases of arteries and defects in the septum of the heart) appeared in the *Denkschriften* of the Vienna Academy of Sciences. Among his remaining papers are three philosophical essays: "Freedom of Inquiry" (1862), "The Independent Value of Knowledge" (1867) and "Solidarity of Animal Life" (1869).

ROLAND [ROLAND DE LA PLATIÈRE], **JEAN MARIE** (1734–1793), French statesman, was born at Thizy on Feb. 18, 1734. Intending to seek his fortune abroad, he went on foot to Nantes, but illness obliged him to give up his project. After working as a clerk, he joined a relative who was inspector of manufactures at Amiens, and himself rose to the position of inspector.

In 1780 he married Manon Jeanne Phlipon (1754–1793), famous in history as Madame Roland. She was the daughter of Gratien Phlipon, a Paris engraver. About the year 1785 the Rolands moved to Lyons. A correspondence sprang up with Brissot and other friends of the Revolution in Paris, and in 1791 the Rolands settled there.

Jean Roland became a member of the Jacobin Club. Madame Roland's salon soon became the rendezvous of Brissot, Pétion, Robespierre and other leaders of the popular movement, above all of Buzot, whom she loved with platonic enthusiasm. In person Madame Roland was attractive though not beautiful; her ideas were clear and far-reaching, her manner calm, and her power of observation extremely acute.

On March 23, 1792, Roland was appointed minister of the interior. As a minister of the crown Roland exhibited a bourgeois brusqueness of manner and a remarkable combination of political prejudice with administrative ability. The decrees against the emigrants and the non-juring clergy still remained under the veto of the king. A letter was penned by Madame Roland and addressed by her husband to Louis. It remained unanswered. Thereupon, in full council and in the king's presence, Roland read his letter aloud. It contained many and terrible truths as to the royal refusal to sanction the decrees and as to the king's position in the State; but it was inconsistent with a minister's position, disrespectful if not insolent in tone. Roland's dismissal followed. He then read the letter to the Assembly; it was ordered to be printed, became the manifesto of disaffection, and was circulated everywhere.

After the insurrection of Aug. 10, Roland was recalled to power, one of his colleagues being Danton, but he was dismayed by the progress of the Revolution. He was above all a provincial, and was soon in opposition to the party of the Mountain. He was hostile to the insurrectional commune of Paris, and proposed transferring the Government to Blois; he attacked Robespierre and his friends. His neglect to seal the iron chest discovered in the Tuileries, which contained the proofs of Louis XVI.'s relations with the enemies of France, led to the accusation that he had destroyed a part of these documents. Finally, in the trial of the king he demanded, with the Girondists, that the sentence should be pronounced by a vote of the whole people, and not simply by the Convention. He resigned office on Jan. 23, 1793, two days after the king's execution.

The Rolands remained in Paris. Once Madame Roland appeared personally in the Assembly to repel the falsehoods of an accuser, and secured acquittal. But violence succeeded violence, and early on the morning of June 1, she was arrested and imprisoned in the Abbaye. Roland himself escaped secretly to Rouen. Released for an hour from the Abbaye, Madame Roland was again arrested and thrown among the horrors of Sainte-Pélagie. Finally, she was transferred to the Conciergerie. In prison she won the affections of the guards, and was allowed the privilege of writing materials and the occasional visits of devoted friends. She there wrote her *Appel à l'impartiale postérité,* those memoirs which display a strange alternation between self-laudation and patriotism, between the trivial and the sublime. On Nov. 8, 1793, she was guillotined. Before her execution, she bowed before the clay statue of Liberty erected in the Place de la Révolution, uttering her famous apostrophe—"O Liberty! what crimes are committed in thy name!" When Roland heard of his wife's condemnation, he wandered some miles from his refuge in Rouen; maddened by despair and grief, he wrote a few words expressive of his horror at those massacres which could only be inspired by the enemies of France, protesting that "from the moment when I learned that they had murdered my wife I would no longer remain in a world stained with enemies." He affixed the paper to his breast, and unsheathing a sword-stick fell upon the weapon, which pierced his heart, on Nov. 10, 1793.

Madame Roland's *Mémoires,* first printed in 1820, have been edited

among others by P. Faugère (1864), by C. A. Dauban (1864), by J. Claretie (1884), and by C. Perroud (1905). Some of her *Lettres inédites* have been published by C. A. Dauban (1867); C. Perroud published a critical edition of her *Lettres* (1900–02), and a new series (1767–80) in 1913–15. *See* also C. A. Dauban, *Étude sur Madame Roland et son temps* (1864); V. Lamy, *Deux femmes célèbres, Madame Roland et Charlotte Corday* (1884); C. Bader, *Madame Roland, d'après des lettres et des manuscrits inédits* (1892); A. J. Lambert, *Le mariage de Madame Roland, trois années de correspondance amoureuse* (1896); Austin Dobson, *Four Frenchwomen* (1890); articles by C. Perroud in the review *La Révolution française* (1896–99); U. Birch, *Madame Roland, a Study in Revolution* (1917).

ROLAND, LEGEND OF. The legend of the French epic hero Roland (transferred to Italian romance as Orlando) is based on authentic history. Charlemagne invaded Spain in 778, and had captured Pamplona, but failed before Saragossa, when the news of a Saxon revolt recalled him to the banks of the Rhine. On his retreat to France through the defiles of the Pyrenees, part of his army was cut off from the main body by the Basques and entirely destroyed. The incident is related in Einhard's *Vita Karoli* (cap. ix.; Pertz. ii. 448), where the names of the leaders are given. "In this battle were slain Eggihard *praepositus* of the royal table; Anselm, count of the palace; and Hruodland, praefect of the Breton march. . . ." The scene of the disaster is fixed by tradition at Roncevaux, on the road from Pamplona to St. Jean Pied de Port. The fiction of the 12 peers may possibly arise from a still earlier tradition. In 636–637, according to the *Chronicles* of Fredegarius (ed. Krusch, p. 159), 12 chiefs, whose names are given, were sent by Dagobert against the Basques. The expedition was successful, but in the valley of Subola, identified with Mauléon, near Roncevaux, the Duke Harembert, with other Frankish chiefs, was slain. Later fights in the same neighbourhood and under similar circumstances are related in 813 (*Vita Hludowici;* Pertz ii. 616), and especially in 824 (Einhard's *Annales;* Pertz. i. 213). These incidents no doubt served to strengthen the tradition of the disaster to Charlemagne's rearguard in 778, the importance of which was certainly magnified in popular story.

The choice of Roland or Hruodland as the hero probably points to the borders of French Brittany as the home of the legend. The exaggeration of a rear-guard action into a national defeat; the substitution of a vast army of Saracens for the border tribe mentioned by Einhard; and the vengeance inflicted by Charlemagne, where in fact the enemy escaped with complete impunity—all are in keeping with the general laws of romance. Charlemagne himself appears as the ancient epic monarch, not as the young man he really was in 778. There is evidence of a continuous tradition dating from the original event and, as Roncevaux lay on the route to Compostella, the many pilgrims who must have passed the site, from the middle of the 9th century onwards, may have helped to spread the story. Whether the actual *cantilena Rollandi* chanted by Taillefer at the battle of Hastings (William of Malmesbury, *De gestis regum angl.* iii. 242, and Wace, *Brut.* ii. 11, 8035 *seq.*) was any part of the existing *Chanson de Roland* cannot be stated, but the choice of the legend on this occasion by the trouvère is proof of its popularity.

The oldest extant forms of the legend are: (*a*) chapters xix.–xxx. of the Latin chronicle, known as the *Pseudo-Turpin,* which purports to be the work of Turpin, archbishop of Reims, who died about 800, but probably dates from the 12th century; (*b*) *Carmen de proditione Guenonis,* a poem in Latin distichs; and (*c*) the *Chanson de Roland,* a French *chanson de geste* of about 4,000 lines, the oldest recension of which is in the Bodleian library, Oxford (ms. Digby, 23). It is in assonanced *tirades,* of unequal length, many of them terminated with the refrain *Aoi.* This ms. was written by an Anglo-Norman scribe about the end of the 12th century, and is a corrupt copy of a text by a French trouvère of the middle of the 11th century. The poem, which was first printed by Francisque Michel (Oxford, 1837) is the finest monument of the heroic age of French epic.

The *Pseudo-Turpin* represents a different recension of the story and is throughout clerical in tone. It was the trouvère of the *Chanson de Roland* who developed the characters into epic types; he invented the heroic friendship of Roland and Oliver, the motives of Ganelon's treachery, and many other details. The famous fight between Roland and the giant Ferragus appears in the *Pseudo-Turpin* (ch. xviii.), but not in the poem. The *Chanson de Roland* contains allusions to many events outside the narrative, some of which refer to *chansons* which are lost. Roland was variously represented by the romancers as the son of Charlemagne's sister Gilles or Berte and the knight Milon d'Anglers. The romantic episode of the reconciliation of the pair with Charlemagne through Roland's childish prattle (*Berte et Milon*) is probably foreign to the original legend. His *enfances,* or youthful exploits, were, according to *Aspremont,* performed in Italy against the giant Eaumont, but in *Girais de Viane* his first taste of battle is under the walls of Vienne, where Oliver, at first his adversary, becomes his brother-in-arms.

In the 12th century the *Chanson de Roland* was modernized by replacing the assonance by rhyme. Several mss. of this rhymed recension, sometimes known as *Roncevaux,* are preserved. The English romances of Charlemagne (*q.v.*) are mostly derived from late and inferior sources. It was in Italy that the Roland legend had its greatest fortune; Charlemagne and Roland appear in the *Paradiso* (canto xviii.) of Dante; the statues of Roland and Oliver appear on the doorway of the cathedral of Verona; and the French *chansons de geste* regularly appeared in a corrupt Italianized French.

BIBLIOGRAPHY.—For a complete bibliography of the editions of the various mss. of the *Chanson de Roland,* of the foreign versions, and of the enormous literature of the subject, *see* Léon Gautier, *Les Epopées françaises* (2nd vol. iii. 1880) and the same author's *Bibliographie des chansons de geste* (1897). *See* also P. Boissonade, *Du Nouveau sur le Chanson de Roland* (1923). Among critical editions of the *Chanson* are those by Wendelin Foerster in the *Altfranz. Bibliotek,* vols. vi. and vii. (Heilbronn, 1883–86), and by E. Stengel *Das altfranzosische Rolandslied* (Leipzig, 1900, etc.). The most popular edition is *La Chanson de Roland* (Tours, 1872, and numerous subsequent editions), by Léon Gautier. L. Petit de Julleville published in 1878 an edition with the old French text, and a modern French translation in assonanced verse. There are English translations in prose by I. Butler (Boston, Mass., 1904); in verse by A. Way and F. Spencer (1895); and "in the original measure" by C. S. Moncrieff (1919). Consult further G. Paris, *Hist. poét. de Charlemagne* (reprint, 1905), and *De Pseudo Turpino* (Paris, 1865); P. Rajna, *Le Origini dell 'epopea francese* (Florence, 1884) and *Le Fonti dell' Orlando Furioso* (2nd ed. Florence, 1900); F. Picco, *Rolando nella storia e nella poesia* (Turin, 1901); G. Paris, "Roncevaux," in *Légendes du moyen âge* (1903), on the topography of the battlefield.

ROLANDSECK, a village in the Prussian Rhine province, situated on the left bank of the Rhine, 8 m. above Bonn, with a station on the railway Cologne-Coblenz. The place consists almost entirely of villas and is a favourite summer resort. Behind it lie the ruins of the castle.

ROLL, something rolled or wound up in a cylindrical form on an axis, or something that moves or is moved along a surface by a turning motion (Lat. *rotulus,* dim. of *rota,* wheel).

Primarily the word is used of a piece of writing material, such as parchment or paper, which is rolled up for the purpose of convenient storage or handling. It was thus the name for any document kept in this form as an official record, and hence for any register, record, catalogue or official list. "The Rolls" was the name of the building where the records of the chancery court, a division of the English High Court of Justice, were kept, the keeper of which was the Master (*q.v.*) of the Rolls, now the title of the third member of the English Supreme Court of Judicature. The word is used in this sense for the list of those admitted as qualified solicitors, whence the phrase "to strike off the rolls" of removal by the court of a solicitor for offences or delinquencies.

In architecture (*q.v.*) a "roll" or "scroll" moulding is one resembling a section of a roll or scroll of parchment with the end overlapping; a "roll and fillet" moulding is a section of a cylindrical moulding with a square fillet running along the centre of the face (*see* LABEL).

ROLLAND, JOHN (*fl.* 1560), Scottish poet, appears to have been a priest of the diocese of Glasgow, and to have been known in Dalkeith in 1555. He is the author of two poems, the *Court of Venus* and a translation of the *Seven Sages.* The former, which was printed by John Ros in 1575, may have been written before 1560. The latter was translated from a Scots prose version.

The *Court of Venus* was edited by Walter Gregor (1884). The *Seven*

Sages was printed in 1578, and reprinted by David Laing (1837).

ROLLAND, ROMAIN (1866–), French man of letters, was born at Clamecy, Nièvre, on Jan. 29, 1866. He was educated at Clamecy, and later in Paris, where he had a distinguished academic career. From 1889–91 he was a member of the French School in Rome, and in 1895 became professor of art history at the Ecole Normale Supérieure. Later he was appointed professor at the Sorbonne, where he introduced the study of the history of music. He produced many critical and historical works, among them *Les origines du théâtre lyrique moderne, Histoire de l'opéra en Europe avant Lulli et Scarlatti* (1895); *Des causes de la décadence de la peinture italienne* (1895); *Le théâtre du peuple* (1901); besides studies on *Millet* (1902); *Beethoven* (1903) and *Michel-Ange* (1906), *Les Tragédies de la foi, Saint Louis, Aërt, Le Triomphe de la raison* (1913). His most famous work, however, is the romance of *Jean-Christophe* (1904–12), the biography of a German musician. It is in three series, *Jean-Christophe, Jean-Christophe à Paris* and *La Fin du Voyage*, and appeared in 10 volumes, the first *L'aube*, in 1904, and the last *La Nouvelle Journée*, in 1912.

When the World War broke out Rolland was in Switzerland, and although his open letter to Hauptmann expressed his horror of the burning of Louvain, he became extremely unpopular in France owing to a series of articles published in the *Journal de Genève* during Sept. and Oct. 1914. These articles were subsequently published in book form under the title *Au-dessus de la mêlée*, of which the ninth edition appeared in 1915. Although his reputation in France suffered from his political views, it increased abroad, and the performances of *Danton* and *Le 14 juillet*, which with *Les Loups* and *Le Jeu de l'amour et de la mort* belong to his *Théâtre de la Revolution* (1909), caused a furore in Berlin. His work *Mahatma Gandhi* (1924) is an impassioned defence of the Indian leader. His later works include: *Colas Breugnon* (1918); *Les précurseurs* (1919); *Clerambault, Pierre et Luce* (1919); *Voyage musical aux pays du passé* (1919); *Liluli* (1919). In 1922 appeared the first volume of a series entitled *L'Ame Enchantée*. To this series belong *Annette et Sylvie* (1922), *L'Été* (1924), *Mère et Fils* (1927), *Beethoven the Creator* (1929). Rolland received the Nobel prize for literature in 1915.

See Jan Romein, *Romain Rolland* (1918); I. Debran, *M. R. Rolland, initiateur de défaitisme* (1918); W. Kuechler, *Romain Rolland* (1919).

ROLLE DE HAMPOLE, RICHARD (d. 1349), English hermit and author, was born near the end of the 13th century, at Thornton (now Thornton Dale), near Pickering, Yorkshire. His father, William Rolle, was perhaps a dependant of the Neville family. Richard was sent to Oxford at the expense of Thomas de Neville, afterwards archdeacon of Durham. At Oxford he gave himself to the study of religion rather than to the subtleties of scholastic philosophy, for which he professed a strong distaste. At the age of 19 he returned to his father's house, and, making a rough attempt at a hermit's dress, he ran away to follow the religious vocation. At Dalton, near Rotherham, he was recognized by John de Dalton, who had been at Oxford with him. After satisfying himself of Rolle's sanity, Dalton's father provided him with food and shelter and a hermit's dress. Rolle then entered on the contemplative life, passing through the preliminary stages of purification and illumination, which lasted for nearly three years, and then entering the stage of sight, the full revelation of the divine vision. He is very exact in his dates, and attained, he says, the highest stage of his ecstasy four years and three months after the beginning of his conversion.

Richard belonged to no order, though he seems to have desired to form a rule of hermits, but met with much opposition. He finally contented himself with advising those who sought him out. He began also to write the songs and treatises by which he was to exert his widest influence. He settled in Richmondshire, 12 miles from the recluse Margaret Kirkby, whom he had cured of a violent seizure. To her some of his works are dedicated. Finally he removed to Hampole, near Doncaster, where he died on Sept. 29, 1349.

Richard Rolle had a great influence on his own and the next generation. In his exaltation of the spiritual side of religion over its forms, his enthusiastic celebration of the love of Christ, and his assertion of the individualist principle, he represented the best side of the influences that led to the Lollard movement. He was himself a faithful son of the church, and the political activity of the Lollards was quite foreign to his teaching. The popularity of his devotional writings is attested by the numerous existing editions and by the many close imitations of them.

A very full list of his Latin and English works is given (pp. 36–43) in Dr. Carl Horstmann's edition (1895–96) of his works in the Library of Early English Writers.

Richard Rolle's Latin treatises, *De emendatione vitae* and *De incendio amoris*, the latter one of the most interesting of his works, because it is obviously largely autobiographical, were translated (1434–35) by Richard Misyn (ed. R. Harvey, Early English Text Soc., 1896 and by F. M. M. Comper in 1914). The *De emendatione de vitae* was also edited with an introduction, by D. Harford (1913). The *Pricke of Conscience* was edited (1863) by Richard Morris for the Philological Society. His *Commentary on the Psalms* was edited by the Rev. H. R. Bramley (Oxford, 1884). Ten prose treatises by Richard Rolle were edited by G. Perry for the Early English Text Society in 1866, rev. ed. 1921. Partial ed. of his Latin works are Paris (1510), Antwerp (1533), Cologne (1535–36), Paris (1618); and in vol. xxvi. of the "Bibliotheca Patrum Maxima" (Lyons, 1677). The office, which forms the chief authority for Rolle's life, was printed in the *York Breviary*, vol. ii. (Surtees Soc., 1882), and in Canon Perry's edition referred to above. *The Meditatis de passione Domini* was edited in 1917, with introduction, by H. Lindkvist, and the *Officium et Miracula* by R. M. Woolley in 1919. See *Richard Rolle's Version of the Penitential Psalms, with his Commentary* (1928); *The Mirror of Gifts: from the works of Richard Rolle* (ed. H. R. Cross, 1928).

See also Percy Andreae, who collated 18 mss. in the British Museum in his *Handschriften des Pricke of Conscience* (Berlin, 1888); *Studien über Richard Rolle von Hampole unter besonderer Berücksichtigung seiner Psalmencommentare*, by H. Middendorff (Magdeburg, 1888), with a list of mss., sources, etc.; J. Zupitza in *Englische Studien* (Heilbronn, vols. vii. and xii.); A. Hahn, *Quellenuntersuchungen zu Richard Rolle's englischen Schriften* (Halle, 1900); and for his prosody, G. Saintsbury, *Hist. of English Prosody*, vol. i.

ROLLER, one of several birds, especially the common roller (*Coracias garrulus*), so called from its way of occasionally rolling in its flight, after the fashion of a tumbler pigeon. It is widely though not numerously spread over Europe and western Asia in summer, breeding as far N. as the middle of Sweden, but retiring to winter in Africa. It occurs almost every year as a straggler in the British islands. Except the back, scapulars and tertials, which are bright reddish-brown, the plumage of both sexes is blue (of various shades, from pale turquoise to dark ultramarine) tinted in parts with green. The bird is purely insectivorous. *Coracias* forms the type of the family *Coraciidae*, allied to the bee-eaters (*Meropidae*) and king-fishers (*Alcedinidae*) (q.v.). A number of other species exist in Asia and Africa.

ROLLER: *see* CULTIVATING MACHINERY.

ROLLER-SKATING, a pastime which, by the use of small wheels instead of a blade on the skate, has provided some of the pleasures of skating on ice without having ice as the surface (*see* SKATING). Wheeled skates were used on the roads of Holland as far back as the 18th century, but it was the invention of the four-wheeled skate, working on rubber pads, by J. L. Plimpton of New York, in 1863, that made the amusement popular. Still greater advance was made by the Raymond skate with ball and cone bearings. The wheels of rollers were first of turned boxwood, but the wearing of the edges was a fault which has been surmounted by making them of a hard composition or of steel. The floor of the rink on which the skating takes place is either of asphalt or of wood; the latter is nearly always used in newly made rinks. The best floors are of long narrow strips of maple. Roller skating races were popular in some American cities until about 1910, when the motorcycle and the automobile displaced them.

ROLLESTON, THOMAS WILLIAM HAZEN (1857–1920), Irish scholar and author, was born in King's Co., Ireland, in 1857, and died at Hampstead in 1920. He was educated at St. Columba's college and at Trinity college, Dublin. He founded the *Dublin University Review* (1885–86). His works include a *Life of Lessing* (1889); *Lessing and Modern German Literature*

(1900); *Sea Spray,* a book of verse (Dublin, 1909); *Parallel Paths, a study in biology ethics and art* (1908); and two books on Gaelic literature, *The High Deeds of Finn* (1910) and *Myths and Legends of Celtic Race* (1911).

ROLLING MILL, an establishment where metal, especially iron and steel is rolled into plates and bars of various sections. (*See* IRON AND STEEL, *Rolling Mill;* SHEET STEEL; TIN AND TERNE PLATE.)

ROLLOCK, ROBERT (*c.* 1555–1599), the first principal of the university of Edinburgh, son of David Rollock of Powis, near Stirling, received his early education at the school of Stirling from Thomas Buchanan, a nephew of George Buchanan, and, after graduating at St. Andrews, became a regent there in 1580. In 1583 he was appointed by the Edinburgh town council sole regent of the "town's college" ("Academia Jacobi Sexti," afterwards the University of Edinburgh). In 1598 he was translated to the parish church of the Upper Tolbooth, Edinburgh, and then to that of the Grey Friars (then known as the Magdalen Church). He died at Edinburgh on Feb. 8, 1599.

His *Select Works* were edited by W. Gunn for the Wodrow Society (1844–1849).

A *Life* by George Robertson and Henry Charteris was reprinted by the Bannatyne Club in 1826. *See* also the introduction to the *Select Works,* and Sir Alexander Grant's *History of the University of Edinburgh.*

ROLLS-ROYCE LIMITED, a firm of motor-car manufacturers. A car designed by Mr. F. Henry Royce of the Manchester firm of Royce Ltd., was brought to the notice of the late Hon. C. S. Rolls of C. S. Rolls & Co., London, in the latter half of 1903. The success of this car led, in March 1906, to the merging of the Rolls and Royce interests into one company and, in December 1906, a public company was floated with £200,000 capital, under the style of Rolls-Royce Ltd. In this year Mr. Royce designed the 40–50 h.p. side-valve engined chassis—known as the "Silver Ghost"—which was developed from that day until May 1925, when the "Phantom" overhead-valve engined type was introduced. The Manchester works proving too small, the building of new works planned by Mr. Royce was begun at Derby in 1907. These works were opened by Lord Montagu of Beaulieu, and the manufacturing activities transferred thereto in 1908. Meanwhile Mr. Royce devoted himself to aero-engine design, and produced three types of engine, known as the "Hawk," "Falcon" and "Eagle." At the end of the World War, there were Rolls-Royce aero engines in service of an aggregate of over 2,000,000 horse-power. Some of the outstanding events in Rolls-Royce post-war history were Sir John Alcock's non-stop trans-Atlantic flight in a 360 h.p. Rolls-Royce "Eagle VII." engined Vickers "Vimy" bomber in June 1919 (this was the first direct flight across the Atlantic), the introduction in October 1922 of the Rolls-Royce 20 h.p., and the appearance in 1925 of the "Phantom" type 40–50 h.p. chassis. (M. BU.)

ROMA, a town (pop. 4,000) in the south-east of Queensland, Australia, situated on the main Western railway line 318 m. W. of Brisbane. The town's water-supplies are drawn from artesian wells (depth 1,300 ft., yield *c.* 200,000 gal. daily).

ROMAINS, JULES (1885–), French poet and novelist, was born on Aug. 26, 1885, at St.-Julien-Chapteuil in the Ardèche. He went early to Paris and spent his childhood and adolescence in Montmartre. He entered the École Normale Supérieure in 1906, and graduated in philosophy in 1909. For ten years he taught philosophy in Paris and in the provinces, notably at Nice. His claim to fame is principally based on his position as one of the heads of the unanimist school of writers (Arcos, Vildrac, Duhamel, Chennevière and others).

Jules Romains' work falls into three categories: poems, novels and plays. The most important of his books of verse, *La Vie Unanime* (1908), deals with what may be called the spiritual life inherent in the various groups of humanity. *The Odes et Prières* (1913) and *L'Ode Gênoise* (1925) should also be mentioned. Some of his novels, such as *Les Copains* (1913), owe their merit to a sort of Rabelaisian verve and truculent jollity. Others are in a loftier style. *Mort de Quelqu'un* (1910) traces the brief survival of a dead man in the society in which he had lived, and how he gradually fades out of memory. The dramatic works of Jules Romains include farces, the best of which is undoubtedly *Knock* (1925), and also dramatic prose poems, such as *L'Armée dans la Ville* (1911) and *Cromedeyre-le-Vieil* (1920), which give full expression to unanimist doctrines. He has also written two tragedies, *Le Dictateur* (1926) and *Jean le Maufranc* (1927), in which he attempts a dramatic embodiment of the antinomies of modern social consciousness. (G. ML.)

ROMAN, capital of the department of Roman, Rumania, on the main line from Czernowitz to Galatz, and on the left bank of the river Moldava, 2¼ m. W. of its junction with the Sereth. Pop. (1928) 25,000, about one-third being Jews. Roman has been the seat of a bishop since 1401. Its seminary dates from 1402. There are ancient churches, including a cathedral, built in 1541.

ROMAN ARCHITECTURE. Like the rest of Roman civilization, Roman architecture is a manifestation of the essentially direct and practical Roman mind. It is concerned not with the search for any ideal of beauty but with the solution of everyday problems. Consequently while the elements of Roman architecture are derivative, being Greek, and Etruscan or rather Italic in origin, they are adapted and transformed by the Roman genius in the light of increased technical knowledge to fit altered conditions of life. The influence exerted on Roman architectural forms by the materials and methods of construction used, cannot be overestimated, and the enduring stability of Roman buildings may legitimately be held to be due to the presence of good and durable building material. The discovery of concrete in particular gave to the Roman builders an almost imperishable material which could be moulded into a homogeneous mass exerting no thrust when set, and which thus enabled them to attack and to solve entirely new problems in spatial planning.

Building Materials.—The material employed by the Romans in their earliest buildings was *tufa,* a volcanic rock of varying hardness, some soft enough to be worked with bronze tools. Later other harder volcanic stones were used, *e.g.,* peperino, and the stone from the Alban hills. Under the later republic and the empire the most important stone for building was *travertine* which was quarried mainly at Tibur (Tivoli). This becomes very hard after exposure to air and weathers to a rich golden tone. An example of the use of travertine is the exterior of the Colosseum.

For their concrete the Romans used *pozzolana* of which there are extensive beds at Pozzuoli, near Naples, and also round Rome. This is a fine chocolate red volcanic earth, which when mixed with lime forms an excellent natural hydraulic cement which will set well even under water. With this cement was mixed an aggregate of broken tufa, travertine, brick or even marble, pumice stone being used in vaults after the 1st century A.D. to lighten the weight. Besides its extreme durability this concrete is practically indestructible by fire. It is used in all the great imperial buildings, *e.g.,* Pantheon, baths of Caracalla and basilica of Maxentius. The new forms of architecture which were developed by the use of this material spread all over the Roman empire.

Unburnt bricks faced with stucco were used especially for private houses under the republic. It is to these bricks that reference is made in Augustus' famous saying "that he found Rome of brick and left it of marble." Of these, naturally, very few remain. Under the empire *kiln-baked bricks and tiles* were the most common facing for concrete. They are never used to build a whole wall in the modern manner but merely as a protective skin. These bricks or tiles are almost always used in triangular shapes. Large tiles about 2 ft. square called *bipedales* were employed as bonding courses.

The use made by the Romans of *marble* was mainly decorative. It was applied in slabs to brick and concrete walls, and set in cement. It was used for pavements either in slabs cut and arranged in patterns, or as mosaic. Under the empire a great demand arose for coloured marbles and such stones as porphyry, granite and alabaster, which were imported from various parts of the empire. The abundant use of these marbles is well illustrated by the remains of the Flavian palace on the Palatine and of

Hadrian's villa at Tivoli.

The use of *stucco* over unbaked brick and over coarse stone was prevalent from the earliest times in Greece, Sicily and Italy. It served as a protection from the weather and also as a finish. Later it was used over brick and concrete. It was made of lime, sand and fine marble dust and would take a high polish. Thus it became the usual ground for decoration especially in the interiors of houses. Examples of its use abound at Pompeii, and in Rome in the House of Livia, in Nero's Golden House, etc. Another material the use of which was mainly decorative is *bronze*. Doors, grills, panels of ceilings, etc., were made of it.

Construction.—Walls were built in two ways, either of ordinary masonry or of concrete (faced or unfaced). While there are several examples of early stone walling without courses (cyclopean and polygonal) especially in some of the towns, *e.g.*, Norba, Praeneste, near Rome, most of the stone walls existing are built of squared blocks laid in regular courses as headers and stretchers (*opus quadratum*). The earliest of these walls are of tufa. Later come those of peperino and travertine. The blocks of stone in these walls are fairly large, 2 ft. x 4 ft. or more, and were often held together by iron cramps fixed in lead.

Concrete walls, except below ground, were always faced. They are divided into types according to the kind of facing used. (a) *Opus quadratum, i.e.*, ordinary stone walling, is used as a facing for concrete, especially for important public buildings under the earlier empire, *e.g.*, exterior of the Colosseum. (b) *Opus incertum* is the most common facing for ordinary concrete walls of the 2nd and 1st centuries B.C. The face of the concrete is studded with 3 in. to 4 in. irregularly shaped pieces of stone, usually tufa. (c) *Opus reticulatum* came into vogue in the 1st century B.C. and remained in use until the time of Hadrian. The construction is like that of *opus incertum* but the pieces of stone were pyramid shaped with square bases set diagonally and wedged into the concrete wall. Quoins 9 in. x 3 in. of the same material or of brick were used at the angles. (d) Brick and tile faced concrete (so called *opus testaceum*) is by far the most common material for walling under the empire. Triangular tiles were used with their points turned into the concrete and their long sides showing, thus giving the appearance of a wall built of thin bricks. Bonding courses of *bipedales* were employed at intervals of 2 or 3 feet. (e) Mixed brick and stone facing (so called *opus mixtum*) was popular under the later empire and especially under Diocletian.

The stone arch occurs frequently in Italy from the middle of the 2nd century B.C. onwards, usually in city gates, bridges and aqueducts. The discovery of concrete, however, enormously facilitated the spread of arch construction. Concrete arches were faced with stone or tile voussoirs, and with the latter *bipedales* were used at every 6th or 7th voussoir.

The vaults used by the Romans were simpler geometrical forms, *i.e.*, the barrel vault, the intersecting (groined) barrel vault and the segmental vault. By the 1st century B.C. quite extensive systems of barrel vaulting were employed as in the substructions of the Tabularium in Rome, the temple of Hercules at Tivoli, etc. The later vaults were built up on brick rings about 2 in. apart, joined by brick bonders, forming rectangular compartments which were filled with concrete. Additional layers of concrete were laid above. When set the concrete vault exerted no thrust. The surfaces of the vaults were tile faced or covered with stucco. A fine example of Roman vaulting is the basilica of Maxentius.

The construction of domes naturally follows that of vaults. Here again the fact that the concrete dome was a dead weight without thrust was of the greatest importance in simplifying the problem. Tie ribs of brick were used and sometimes relieving arches as in the case of the Pantheon where the facing bricks are laid horizontally. At the crown of the dome was a brick ring.

The Orders.—There are five Orders of Roman Architecture, Tuscan, Doric, Ionic, Corinthian and Composite, Tuscan and Composite being modifications of Doric and Corinthian respectively. The rules followed by the Roman builders were elastic; few examples are of the same proportion and there was much licence allowed in execution. It has, however, been usually supposed that some system in which form and detail were definitely standardized was essential for the construction of Roman buildings, built as they were at a high speed by ordinary workmen. Marcus Vitruvius Pollio, the Roman writer on architecture, would at any rate have us believe that imperial architecture was brought under some such rules. But the greater part of Roman architecture is later than Vitruvius, an architect and engineer who lived, and wrote in the time of Augustus. His book (*De Architectura*) is our great authority for the earlier Roman building and construction, but was primarily a handbook for architects and is based for the most part on the works of Greeks of the late 4th century B.C. and the Hellenistic period. The Renaissance exalted Vitruvius to the supreme authority on classical building; but it is none the less certain that there were no hard and fast rules, certain general proportions only being observed. It would be impossible here to treat of the details of the Roman Orders (*see* ORDER). In general the proportion is slenderer than that of the corresponding Greek Order, and there is a tendency towards greater elaboration combined with a decline in the quality of the execution. Columns are often unfluted, but the faces of the entablature left plain in Greek work are covered with decoration.

The Doric Order has almost invariably a base moulding probably taken from the Etruscan Doric or Tuscan column. Examples of Roman Doric are to be found in the Tabularium (78 B.C.) and in the lowest order of the Colosseum (A.D. 79) where it is used in conjunction with the arch. The temple of Hercules at Cori (*c.* 80 B.C.) is the only known Roman Doric temple.

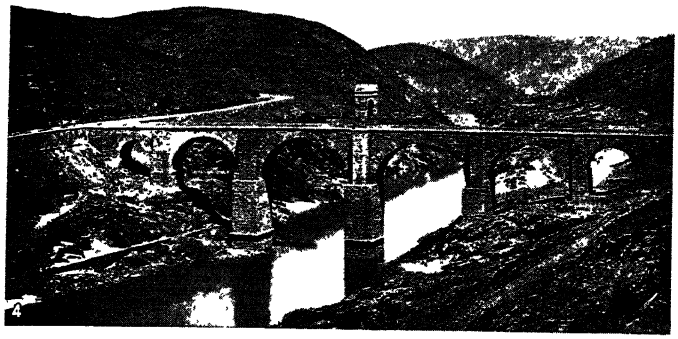
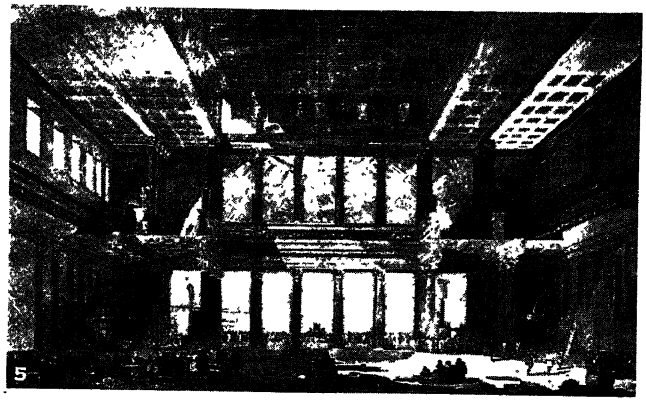
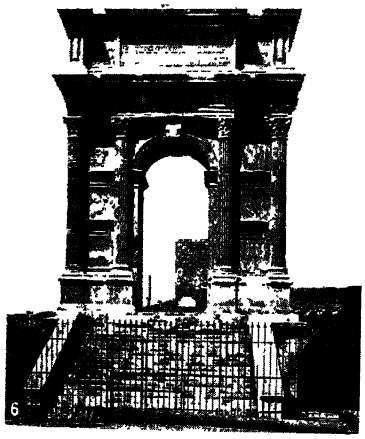
The Ionic Order is used to a limited extent in temples and public buildings, though the number of isolated capitals found suggests that it had a certain vogue in private houses. The Romans seldom used the canted angle volute though in the temple of Saturn the capitals have four canted volutes. Other examples of this Order are the temple of Fortuna Virilis, the second orders of the theatre of Marcellus and the Colosseum, Trajan's forum at Rome and various buildings at Pompeii.

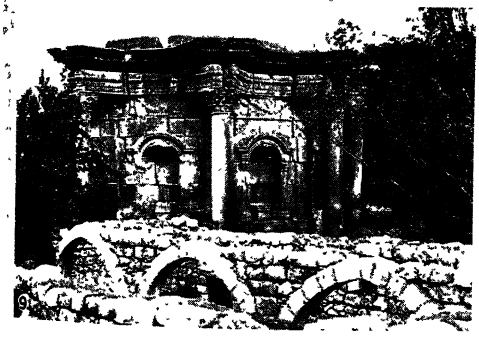
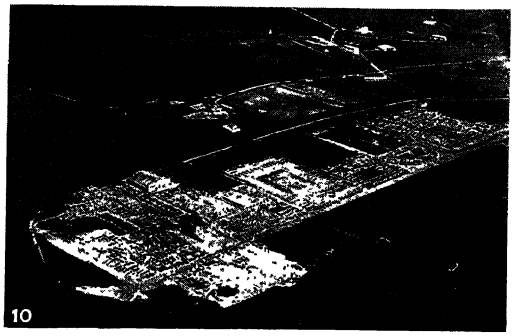
The Corinthian Order was by far the most popular with the Roman builder. It attracted by its richness and by the ease with which it could be used in any position owing to the identity of the four faces of the capital. The columns removed (by Sulla) from the temple of Zeus Olympios at Athens became the model, but the whole Order shows a progressive elaboration in detail with an elimination of plain surfaces combined with inferior workmanship. Examples of this Order are the temples of Mars Ultor and of Castor and Pollux (the latter one of the most beautiful examples in Roman architecture) in Rome, the temple of Vesta at Tivoli, Agrippa's portico to the Pantheon, etc.

The Composite capital is really a Corinthian capital with the tendril at the corner replaced by an Ionic volute. Alternatively it may be regarded as a four-voluted Ionic capital enriched with an acanthus necking. Examples of this capital are to be found on the triumphal arches of Titus and Septimius Severus, the baths of Diocletian, etc.

While the Romans did not abandon the original structural use of the column, its employment as a purely decorative feature became common. It was used in conjunction with the arch; and the skilful combination of these two opposing elements not only exerted a great influence on subsequent architecture but remains the great contribution of Rome to the history of architectural design. The Roman architects themselves never abandoned the traditional idea of supremacy of the Order but its use in the simpler manner of the Greek façade was insufficient to meet the demands of Roman buildings. With the help of the arch the spacing of columns was no longer governed by the load to be carried. This opened up new possibilities in design, and all over Italy and the provinces we see the monumental use of column and arch for triumphal arches from the time of Augustus to that of Constantine, as well as in such buildings as the baths of Caracalla and Diocletian, and the basilica of Maxentius. This naturally led to the development of new details in the shape of pedestals, niches, keystones, etc. Eventually we find arcaded walls without piers, the arch being taken direct on to the column and the entablature run over the arch as an archivolt. Examples of this are in the great Propylaea at Baalbek and in the palace of Diocle-



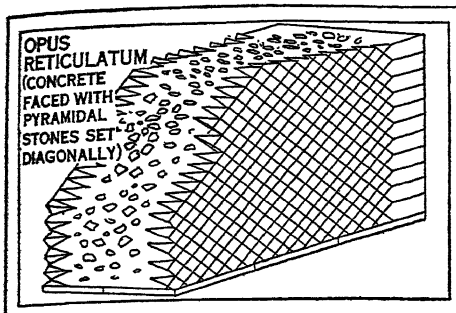





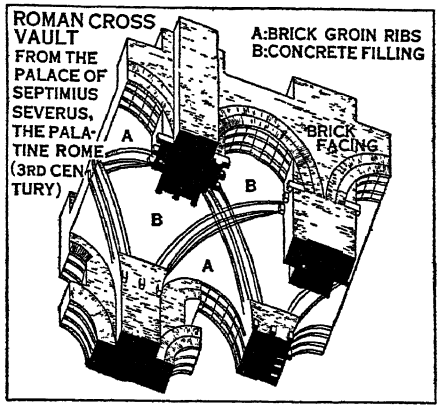




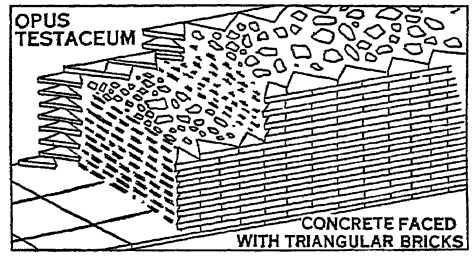

BY COURTESY OF (10, 11) PROFESSORS CALZA AND GISMONDI; PHOTOGRAPHS, (1, 2) ANDERSON, (4) VERNACCI, (5) THE ROYAL ACADEMY OF ARTS, (6) ALINARI, (7, 9) EWING GALLOWAY

ARCHITECTURE OF ANCIENT ROME

1. View of the Roman Forum, looking toward the Capitol. At the upper right is the Arch of Septimius Severus; to its left, at a right angle are the remaining columns of the Temple of Saturn and in front of this the ruins of the Basilica Iulia, built by Julius Caesar, of which only the column bases remain. Three columns of the Temple of Castor and Pollux remain standing near the centre of the Forum, and in front of these are the ruins of the House of the Vestals. At the left of the picture is a part of the Palatine Hill with remains of buildings of Imperial Rome. 2. The so-called Temple of Fortuna Virilis, in the ancient Forum Boarium, Rome (end of 2nd century B.C.). 3. Drawing attributed to Piranesi of a detail of the interior of the Pantheon, originally built by Agrippa in A.D. 27 and re-erected under Hadrian, 120–124. 4. Roman bridge across the Tagus at Alcántara, Spain. 5. Restoration of the interior of a Roman Basilica by C. R. Cockerell (1788–1863), in the Royal Academy of Arts. 6. Arch of Trajan at Ancona. 7. Interior of the Baths of Caracalla, Rome. 8. Restoration of the interior of the Baths of Caracalla (*see* fig. 7), by William Walcot. 9. Roman Temple of Venus at Baalbek, Syria. 10. View of Ostia, the commercial port of ancient Rome. At the lower left are ruins of the ancient Forum and commercial buildings (*horrea*), and beyond these, with a curved wall, the theatre. 11. A street in Ostia

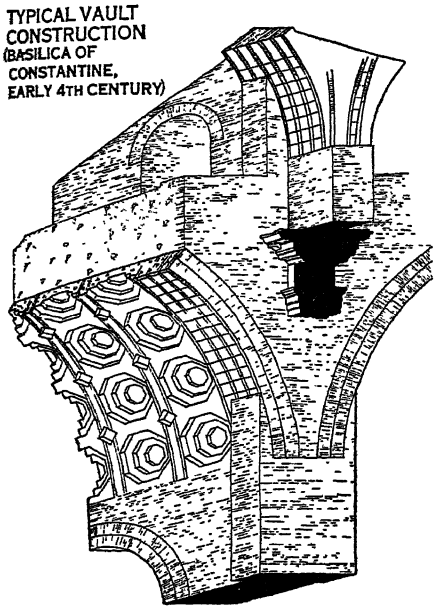


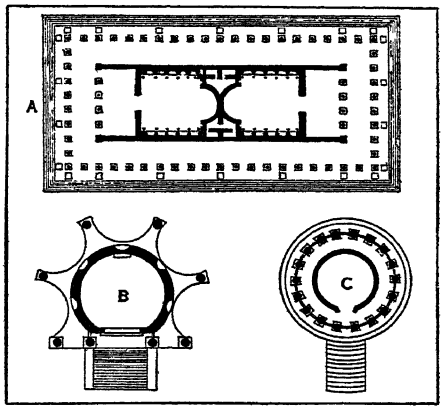




THE IMPERIAL FORA AT ROME

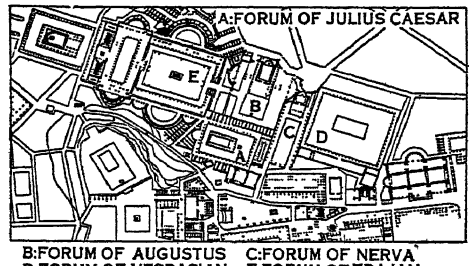
TYPICAL VAULT CONSTRUCTION (BASILICA OF CONSTANTINE, EARLY 4TH CENTURY)

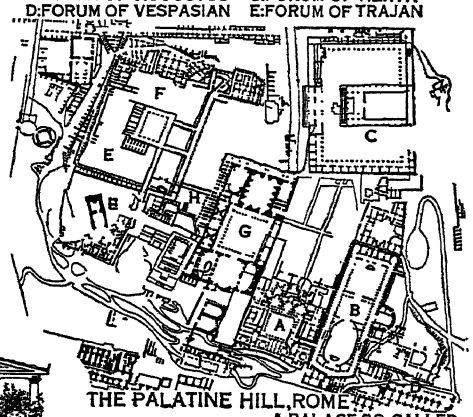




TYPICAL ROMAN TEMPLE PLANS

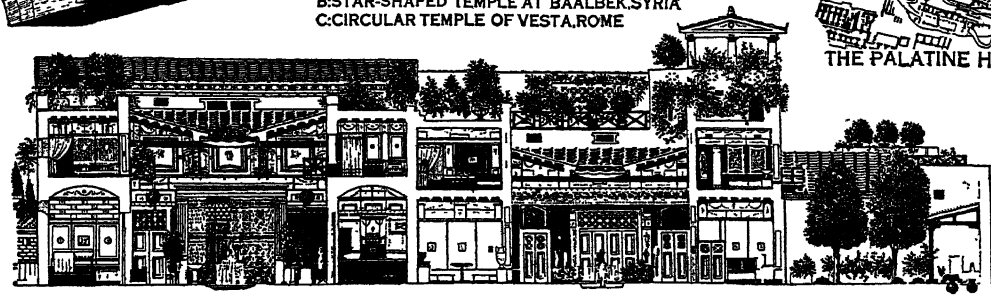
A:DOUBLE TEMPLE OF VENUS AND ROME
B:STAR-SHAPED TEMPLE AT BAALBEK,SYRIA
C:CIRCULAR TEMPLE OF VESTA,ROME





THE PALATINE HILL, ROME

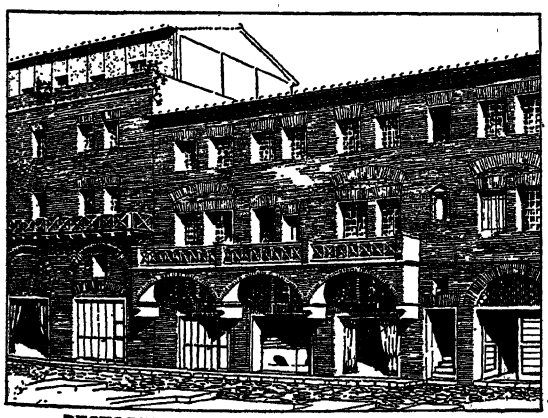
RESTORED SECTION THROUGH THE SO-CALLED HOUSE OF THE CENTENARY, POMPEII



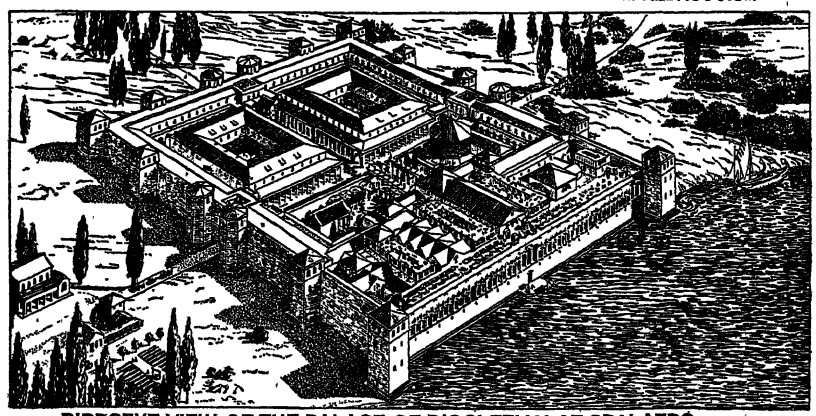
ATRIUM WITH TABLINUM BEHIND

SMALL ATRIUM

GARDEN



RESTORED VIEW OF A STREET OF SHOPS AND TENEMENTS IN OSTIA



BIRDSEYE VIEW OF THE PALACE OF DIOCLETIAN AT SPALATRO (SERVICE PORTIONS AT LEFT AND TOP, THE PALACE PROPER BELOW AND TO THE RIGHT FACING THE ADRIATIC)

(CROSS VAULT; VAULT CONSTRUCTION) FROM CHOISY "L'ART DE BÂTIR CHEZ LES ROMAINS" (LIBRAIRIE GÉNÉRALE D'ARCHITECTURE. COPR. H. BONNAIRE); (TYPICAL TEMPLE PLANS) FROM "HANDBUCH DER ARCHITEKTUR" (I. M. GERHARDT, LEIPZIG); (IMPERIAL FORA) BY COURTESY OF H. CHALTON BRADSHAW; (PALATINE HILL) FROM "CENTRAL ITALY AND ROME" BY COURTESY OF MESSRS. BAEDEKER; (HOUSE OF CENTENARY) FROM D'ESPOUY "FRAGMENTS D'ARCHITECTURE ANTIQUE" COPR. H. BONNAIRE; (STREET IN OSTIA) BY COURTESY OF PROFESSORS CALZA AND GISMONDI; (PALACE OF DIOCLETIAN) FROM HÉBRARD & ZEILLER "SPALATO" (MESSRS. MARSIN. COPR. H. BONNAIRE)

ROMAN INGENUITY IN THE USE OF LOCAL MATERIALS IS SHOWN BY VARIOUS WAYS OF FACING ROUGH WALLS OF RUBBLE FACED WITH STONE OR BRICK. CONCRETE, BRICK AND TILE WERE SKILLFULLY COMBINED IN VAULTING. THE IMPERIAL FORA, THE PALATINE HILL AND THE PALACE OF DIOCLETIAN ARE INGENIOUSLY COMPOSED. HOUSES AT POMPEII AND TENEMENTS AT OSTIA SHOW THE ADVANCED LIVING CONDITIONS

tian at Spalato.

For buildings of more than one storey the Romans regularly used the Orders above one another. There were four storeys on the Colosseum and seven (we are told) on the Septizonium of Septimius Severus on the Palatine.

Temples and Basilicas.—The Roman temples differed in many important respects from those of the Greeks. For the comparatively low stylobate with its three steps all round, the Romans substituted a high platform or podium with a flight of steps on the entrance façade. Again while Greek temples are isolated from other buildings and almost always face east and west, those of the Romans usually face the forum or are placed at the end of a street to close a vista, and are turned to all points of the compass, their orientation being governed by their relation to other buildings. This results in an increased emphasis on the entrance façade with an increased depth to the portico. The *cella* is wider and the colonnade which surrounds the Greek temple is often reduced to a row of engaged columns or pilasters along the cella walls except on the entrance front. In some cases the cella was vaulted in concrete and might have an apsidal end, *e.g.*, the so called baths of Diana at Nîmes and especially the double temple of Venus in Rome. The best preserved example of a Roman temple now existing is that known as the Maison Carrée at Nîmes. In Rome the most important temples of which remains exist are those of Fortuna Virilis, Mars Ultor, Castor and Pollux, Concord and Antoninus and Faustina. Besides these there are in Italy the temple of Minerva at Assisi and the temples at Pompeii, and in Syria the temples of Bacchus at Baalbek and of the Sun at Palmyra, etc.

The most important circular temples are those of Vesta in the Forum, of Mater Matuta and the Pantheon in Rome, the temple of Vesta at Tivoli and those of Jupiter at Spalato, Rome and Augustus on the Acropolis at Athens, and Venus at Baalbek, which has detached Corinthian columns joined to the cella walls by a segmental architrave. The greatest circular temple and in many respects the most important Roman building is the Pantheon (*q.v.*). This consists of a rotunda 142 ft. 6 in. in diameter surrounded by concrete walls 20 ft. thick, in which are alternate circular and rectangular niches. Light is admitted through a central opening 28 ft. across, at the crown of the dome. In front is a portico which originally belonged to the temple built by Agrippa and was altered from decastyle (ten columns) to octastyle (eight columns) and re-erected when the rotunda was built under Hadrian, A.D. 120–124. The construction of the rotunda and dome is one of the finest examples of Roman concrete work, the whole being strengthened by immense relieving arches and piers of brick set above one another in the thickness of the walls. The interior was lined with precious marbles, the coffers of the dome were decorated with bronze rosettes and the dome itself covered externally with bronze plates. (*See* TEMPLE.)

The Roman basilicas were large covered halls facing the forum, affording protection from the weather and giving space for the holding of courts of justice and for banking and other commercial transactions—all of which activities had in earlier days been carried on in the open market-place. On the forum in Rome are the Basilica Julia on the south side and the Basilica Aemilia on the north side—both of which had a central hall and side aisles. The Basilica Ulpia in Trajan's forum was similar in plan, but had at either end semicircular halls which served as law courts. The fourth and greatest of the basilicas is that begun by Maxentius and finished by Constantine, A.D. 306–310. This huge building covered 7,000 sq.yd. and followed in construction and plan the great hall of the Roman baths. The vaults over the bays on the north side are still to be seen overhanging without support, a striking testimony to the marvellous cohesion and enduring strength of Roman concrete. The basilica at Pompeii is an example of the simpler type general in the provinces.

Theatres and Amphitheatres.—The Roman theatres differed in several respects from the Greek. The auditorium was not excavated and the walls surrounding stage and seating were continuous, the entrance to the orchestra being by vaulted passages. As the chorus played no part in the Roman theatre the orchestra or dancing space was not required and became part of the auditorium. The only theatre in Rome of which any remains exist is that of Marcellus built by Augustus (13 B.C.) but there are numerous examples throughout the Roman empire especially in Asia Minor. The theatre at Orange, France, is the best preserved example. Others of importance are the theatre at Taormina, Sicily, two theatres at Pompeii, the theatre at Ostia, the Odeon of Herodes Atticus at Athens, theatres at Telmessus, Alinde, Aizani, Aspendus in Asia Minor, etc.

The Roman amphitheatre (*q.v.*) is in origin, as its name implies, a double theatre. The largest and most important of all the Roman amphitheatres is the Colosseum (*q.v.*) built by the Emperors Vespasian, Titus and Domitian in A.D. 72–80 on the site of Nero's lake. It is a huge ellipse 62 ft. × 513 ft. covering six acres and shows remarkable skill in planning. It had seating accommodation for about 45,000 spectators, and its 80 entrances were so arranged that the whole building could be cleared in an incredibly short time. The whole is built of concrete, the exterior being faced with travertine and the interior with precious marbles that have long since disappeared. Other important amphitheatres are those at Capua, Pompeii, Pozzuoli, Verona, Pola, Arles, Nîmes, etc.

Baths.—By the end of the republic, baths (*balneae*) had become a recognized feature of Roman life. Under the empire their numbers increased until at the beginning of the 4th century A.D. they numbered 1,000 in Rome alone. They were of the type of the Turkish bath with rooms at different temperatures. Remains of these ordinary establishments are common throughout the empire. The Stabian baths at Pompeii are the best preserved.

The imperial *thermae* were more than baths. They were immense establishments of great magnificence with facilities for every gymnastic exercise, with halls to which resorted philosophers, poets and rhetoricians and those who wished to hear them. The earliest of these *thermae* were those built by Agrippa in 21 B.C. Others were built by Nero, Titus, Trajan, Caracalla, Diocletian and Constantine. The best preserved are the baths of Caracalla, which covered an area of 110 yd. square, and those of Diocletian with accommodation for 3,200 bathers. Parts of the latter are now occupied by the church of S. Maria degli Angeli and by the Museo delle Terme. The remains of these two great establishments with their massive walls and great vaults are among the most impressive examples of Roman concrete construction. The planning of the *thermae* is governed by two main principles, that of axial planning, a distinctive feature in all Roman work, and the grouping of all subsidiary halls and rooms round a great central hall. (*See* BATHS.)

Triumphal Arches and Gateways.—More usual than the triumphal column, as exemplified by those of Trajan and Marcus Aurelius, is the triumphal arch commemorating some important event or campaign. This is most commonly an isolated monument not necessarily spanning a roadway; *e.g.*, the triumphal arches of Septimius Severus at Rome and of Trajan at Ancona are accessible only by flights of steps, while the archway itself is too narrow for ordinary use. The triumphal arch was usually decorated with columns and bas-reliefs of the chief events it commemorated and was frequently surmounted by a group of sculpture. The most important of these arches are the arch of Titus (A.D. 82) commemorating the capture of Jerusalem, the arches of Septimius Severus and Constantine in Rome, and Trajan's arches at Beneventum and Ancona. There are several other triumphal arches in the provinces, notably those of Tiberius at Orange, of Augustus at Susa and Caracalla at Tebesa. Others exist at Rheims, Pola, Timgad, Maktar, etc.

The monumental city gate while sometimes serving a commemorative purpose differs from the arch in being part of the defences of the city and meant to be used. Of these one of the most famous and best preserved is the Porta Nigra at Trèves.

Bridges and Aqueducts.—The bridges and aqueducts of the Romans may be treated as monumental works in spite of their utilitarian character. The most famous examples of Roman aqueducts are the Pont du Gard, Nîmes, and the aqueducts at Tarragona and Segovia in Spain. Those which crossed the Campagna

bringing water to Rome from the hills are also well known and impressive in their decay.

There are not many of the larger Roman bridges now remaining. The best preserved is that built by Augustus and Tiberius at Rimini. The finest is that across the Tagus at Alcantara in Spain.

Tombs.—The larger Roman tombs consisted of an earth mound or tumulus surrounded by a ring of masonry rising usually to a considerable height. Few of these now exist, the most notable being the tomb of Cecilia Metella on the Via Appia and the mausoleum of Hadrian, now the castle of St. Angelo. The smaller tombs, in particular those known as *columbaria* (*q.v.*), are usually underground, though there is sometimes an upper storey, often in the shape of a small temple *in antis*, built of cut brick from which steps lead down to the tomb proper. There is a line of such tombs just outside Rome along the Via Appia and also along the Via Latina. Examples of Roman funeral monuments of various kinds exist along the Street of Tombs at Pompeii and in the provinces, in Syria at Palmyra, Jerusalem and Petra.

Palaces.—By the end of the republican period the Palatine (*q.v.*) hill had become by far the most desirable residential quarter of Rome. It was therefore natural that the Roman emperors from Augustus onwards should choose to live on it, gradually acquiring further property until the whole hill, except that part hallowed by tradition or by the presence of temples, became the imperial residence. Augustus himself bought and enlarged the house known as the House of Livia which still exists. Tiberius built a palace on the north-west side of the hill. Another palace was built on the south-east corner of the hill by Claudius or more probably by Nero. Some rooms of this palace have recently been discovered, though both it and the palace of Tiberius were partially destroyed by fire. The central space was covered by the palace of the Flavians, Domitian with his architect Rabirius being responsible for a magnificent suite of State apartments and for the sunken garden called the *hippodromus*. Hadrian extended the palace towards the forum and the House of the Vestals and finally Septimius Severus raised a huge structure overlooking the Circus Maximus, partly on the top of Hadrian's work and partly on an artificial platform supported on arches and finishing with his Septizonium. Remains of these buildings, often one above the other, cover the Palatine.

Of the famous Golden House of Nero on the site now covered by the baths of Titus, the Colosseum and the basilica of Maxentius, very little remains.

The Villa of Hadrian (*q.v.*) at Tivoli, begun about A.D. 123, was another sumptuous imperial residence with parks and gardens on a large scale. There are remains of great brick and concrete structures and the unevenness of the site necessitated large terraces and flights of steps. All the buildings are Roman in style and method of construction, though with Greek names.

The palace of Diocletian at Spalato (Split), to which he retired on his abdication in A.D. 305, combines a palace with a fortress. It consists of an immense rectangle surrounded by walls guarded by towers on three sides and on the fourth to the south protected by the sea. The palace itself is on the south side with a great gallery 520 ft. long with 51 windows overlooking the sea. (*See* PALACE.)

Private Houses.—In the Roman world there were two types of houses, the *domus* and the *insula*. The word *villa* is used to describe an estate complete with house, grounds and subsidiary buildings. Of Roman villas there are very few remains and our chief authority is Pliny who gives a detailed description of his Laurentine villa. Hadrian's villa at Tivoli, an imperial residence, cannot be treated as typical. The *domus* type of house as exemplified at Pompeii (*q.v.*) has long been regarded as the typical Roman house, though in Rome itself very few remains of the *domus* have come to light, the chief examples being the House of the Vestal Virgins on the forum and that of Livia on the Palatine. The *domus* consisted of suites of rooms grouped round a central hall or *atrium*, to which were often added further suites behind grouped round a colonnaded court or *peristyle*. There are few windows on the street, light being obtained from the *atrium* or *peristyle*. The amount of ground required for such a house, while perfectly feasible in a country town such as Pompeii, would have made them beyond the means of all but the richest in a crowded city like Rome. From Latin writers we have long known that there were in Rome great blocks of flats or tenements to which the term *insulae* was applied. Recent excavations at Ostia (*q.v.*) have now revealed the design of these blocks. Planned on three or four floors with strict regard to economy of space they depended for light from the exterior, unlike the *domus* with its central court. Independent apartments had separate entrances with direct access to the street. Since Ostia is a typical town of the 1st and 2nd centuries A.D. and is almost a suburb of Rome itself, it is natural to suppose that *insulae* at Rome would present similar features. (*See* HOUSE.)

Town Planning.—While the Romans have become justly famous for the skilful planning of their towns all over the empire, Rome itself presents a strong contrast with its complete lack of any systematic scheme. For this the natural topography of the site is mainly responsible together with the conditions under which Rome grew into a great city.

The Forum (*q.v.*), the original market place, remained always irregular in plan and was soon far too small for the amount of business transacted in it. The congestion was to some extent relieved by the forums built by Julius Caesar, Augustus, Nero, Vespasian and Trajan. These were all planned on axial lines. Attempts were made to improve the street communications, the most notable being Julius Caesar's widening of the Via Lata, and colonnades and porticoes were built to protect passers-by from the sun and rain. Various emperors also laid down regulations governing the construction and height of buildings. None the less the planning of Rome was a series of expedients without any system, and after each of the fires which successively devastated great parts of the city, Rome grew up again on its old lines, and the evils of its narrow streets, poor drainage and general overcrowding became increasingly difficult to remedy.

The Roman town in the provinces on the other hand is normally planned round a central forum, close to, but separated from, the crossing of the two main roads which ran usually east to west and north to south. Less important roads run at right angles to the main roads. The forum itself is surrounded by a colonnade and facing it are the principal buildings, temples, basilica, senate-house and covered market. The whole is planned in a logical way. The forum at Pompeii may be taken as a typical example.

The layout of a whole town can be most easily seen in some of the towns in north Africa, *e.g.*, Timgad, Tebesa, Thuburbo, where there has been little or no subsequent building to modify the original lines of the plan. (*See* TOWN AND CITY PLANNING. *See* also ARCHITECTURE; PERIODS OF ART.)

BIBLIOGRAPHY.—A. Désgodetz, *Les Édifices antiques de Rome* (1682; new enlarged ed., 1843); J. Fergusson, *A History of Architecture* (3 vols., 1865—2nd and 3rd ed., by R. P. Spiers, 1893); A. Choisy, *L'Art de bâtir chez les Romains* (1873), and *Histoire de l'Architecture* (2 vols., 1899); Sir B. Fletcher, *A History of Architecture on the Comparative Method* (1896; 8th ed., rev. and enlarged, 1928); J. Durm, *Die Baukunst der Etrusker und der Römer* (Stuttgart, 1905); F. Noack, *Die Baukunst des Altertums* (1910; 2nd ed., 1912); F. Kimball and G. H. Edgell, *A History of Architecture* (with a bibl., 1917); G. T. Rivoira, *Architettura romana* (Milan, 1917; Eng. trans. by G. McN. Rushforth, 1925); W. J. Anderson and R. P. Spiers, *The Architecture of Ancient Rome* (with a valuable bibl., 1927). (H. C. BR.; M. BRA.)

ROMAN ARMY. In the long life of the ancient Roman army, the most effective and long-lived military institution known to history, we may distinguish four principal stages. (1) In the earliest age of Rome the army was a national or citizen levy such as we find in the beginnings of all states. (2) This grew into the Republican army of conquest, which gradually subdued Italy and the Mediterranean world. A citizen army of infantry, varying in size with the needs of each year, it eventually developed into a mercenary force with long service and professional organization. This became (3) the Imperial army of defence, which developed from a strictly citizen army into one which represented the provinces as well as Italy, and was a garrison rather than a field army. Lastly, (4) the assaults of the Barbarian horsemen compelled both the creation of a field force distinct from the frontier garrisons and

the inclusion of a large mounted element, which soon counted for much more than the infantry. The Roman army had been one of foot soldiers; in its latest phase it was marked by that predominance of the horseman which characterized the earlier centuries of the middle ages.

So far as we can follow this long development in its details, it was continuous. So unbroken, indeed, is the growth that many of the military technical terms survived in use from epoch to epoch, unchanged in form though deeply modified in meaning, and ordinary readers often miss the diversity which underlies this seemingly unchanged system. The term *legio,* for example, occurs in all the four stages above outlined. But in each its significance varies. Throughout, it denoted citizen-soldiers; throughout, it denoted also a force which was chiefly, if not wholly, heavy infantry. But the setting of these two constant features varies from age to age. In the first period *legio* was the "levy," the whole host summoned to take the field. In the second period it was not the whole levy, but one of the principal units into which developing organization had divided that levy; the "legion" was now a body of some 5,000 men—the number of "legions" varied with the circumstances, and the army included other troops besides citizens, though they were for the most part unimportant. In the third or Imperial age there were many legions (indeed, a fixed number) quartered in fixed fortresses; there were also other troops, numerous and important, if not yet so formidable as the legionaries. Finally, the legions became smaller units, and the other troops of the army, notably the cavalry, became the real fighting-line of Rome. (*See* LEGION.)

First Stage.—The history of the earliest Roman army is, as one might expect, both ill-recorded and contaminated with much legend and legal fiction. We read of a primitive force of 300 riders and 3,000 foot soldiers, in which the horseman counted for almost everything. But the numbers are clearly artificial and invented, while the pre-eminence accorded to the cavalry has no sequel in later Roman history. We reach firmer ground with the organization ascribed to Servius Tullius. In this system the army included all citizens from 17 to 60 years of age, those under 47 for service in the field, the older men for garrison duty in Rome. The soldiers were grouped at first by their wealth—that is, their ability to provide their own horses, armour, etc.—into cavalry, heavy infantry, a remainder which it would be polite to call light infantry, and some artificers. The heavy infantry counted for most. Armed with long spears and divided into the three orders of *hastati, principes* and *triarii* (the origins and real senses of these names are lost), they formed a phalanx, and charged in a mass, while the cavalry protected the wings. The men were enrolled for a year—that is, for the summer campaign; in the autumn, like all primitive armies, they went home.

Second Stage.—From this Servian army a series of changes which we cannot trace in detail produced the Republican army of conquest. Our ancient authorities ascribe the chief reforms to the half-legendary Camillus (*q.v.*), who introduced the beginnings of pay and long service, improved the armour and weapons, abolished the phalanx and substituted for it an open order based on small subdivisions (maniples), each containing two centuries.

Whatever the truth about Camillus, some such reforms must at some time have been carried through, to convert the Servian system into the army which was engaged for nearly three centuries (from 350 B.C.) in conquering Italy and the world. This army broke in succession the stout native soldiers of Italy and the mountaineers of Spain and overthrew the trained Macedonian phalanx. Once only did it fail—against Hannibal. (*See* PUNIC WARS.) But not even Hannibal could oust it from entrenchments, and not even his victories could permanently break its *moral.* Much of its strength lay in the same qualities which made the Puritan soldiers of Cromwell terrible—the excellent character of the common soldiers, the rigid discipline, the high training. Credit, too, must be given to the genius of Scipio Africanus and to the more commonplace capacities of many fairly able generals. But the organism itself deserves attention, and, as it chances, we know much about it, mainly from Polybius. Its elements were three:—

(A) The principal unit was the legion, generally a division of 4,500 men—3,000 heavy infantry, 1,200 lighter-armed (*velites*), 300 horse—though sometimes including as many as 6,000 men. The heavy infantry were the backbone of the legion. They were levied from the whole body of Roman citizens who had some private means and who had not already served 16 campaigns, and in effect formed a yeoman force. For battle they were divided into 1,200 *hastati,* 1,200 *principes* and 600 *triarii:* all had a large shield, metal helmet, leather cuirass, short Spanish thrusting and cutting sword, and in addition the *hastati* and *principes* each carried two short heavy throwing spears (*pila*), while the *triarii* had ordinary long spears. They were drawn up in three lines: (1) *hastati,* (2) *principes,* (3) *triarii;* the first two were divided into ten maniples each (of 120 men, when the legion only counted 4,500), the third into ten maniples of half the strength. According to the ordinary interpretation of our ancient authorities, the maniples were arranged in a chess-board fashion (*quincunx*), the idea being that the front row of maniples could retire through the intervals in the second row without disordering it, and the second row could similarly advance. The procedure in fighting seems to have been simple: the front line discharged a volley of *pila* and rushed in with the short sword—a sequence much like the volley and bayonet charge of the 18th century—and if this failed, the second line went in turn through the same process; the third line of *triarii,* armed with spear instead of *pilum,* formed a reserve. The *velites,* armed with javelins, came to be used as skirmishers. The cavalry seem to have been of little account—a natural result if, as we have reason to think, the horses were small and stirrups were not used. Scipio Africanus alone developed his cavalry into a decisive instrument.

The officers of the legion consisted of: (*a*) Six tribunes, in part elected by the comitia, in part appointed by the consuls, and holding command in rotation. They were either veteran officers, sometimes even ex-magistrates, or young noblemen beginning their career. (*b*) Sixty centurions, each commanding one century, or, rather, a pair commanding each maniple. They were chosen by the tribunes from among the veteran soldiers serving at the time and were arranged in a complicated hierarchy, by means of which a centurion might move upwards till he became *primus pilus,* senior centurion of the first maniple of *triarii,* the chief officer of that rank in the legion. (*c*) There were also standard-bearers and other under-officers, for whom reference must be made to specialist publications.

(B) Besides the legions, composed of citizens, the Roman army included contingents from the Italian "allies" (*socii*), subjects of Rome. These contingents appear to have been large; in many armies we find as many *socii* as legionaries, but we are ignorant of details. The men were armed and drilled like the legionaries, but they served not in legions but in cohorts, smaller units of 400–500 men, and their conventional positions seem to have been on the wings of the legions. They were principally infantry, but included also a fairly large proportion of cavalry.

(C) Besides legionaries and *socii,* the Roman army included non-Italian troops of special kinds, Balearic slingers, Numidian horsemen, Rhodians, Celtiberians and others: at Trasimene, for example (217 B.C.), the Roman army included 600 Cretan archers. The numbers of these *auxilia* varied; probably they were not numerous till the later days of the Republic.

Composition and Size of Armies in the Second Stage.—According to the general practice, each of the two consuls, if he took the field alone, commanded an army of two legions with appropriate *socii.* If the two consuls combined their forces, commanding the joint force in rotation (as often occurred), the total would be—according to our authorities—four legions, each of 4,200 infantry, the same number of "allied" infantry (in all 33,600 infantry), 1,200 legionary cavalry and about 3,600 "allied" cavalry = 38,400 men. Such, for example, was the Roman army at Trebia (218 B.C.), where (says Polybius) there fought 16,000 legionaries and 20,000 allied infantry. The total number of men in the field could be increased; we even hear of 23 legions serving at one time in the Second Punic War. Just before this war, in 225 B.C., the total man-power of Rome was reckoned at three-quarters of a million of which about 65,000 were in the field and 55,000 were in a re-

serve at Rome; of the total, 325,000 were Roman citizens and 443,000 (apparently a rough estimate) were allies. The battle order in normal circumstances was simple. In the centre stood the legionary infantry: on each side of that was the allied infantry: on the wings the cavalry. But sometimes the legions were held in reserve and the brunt (and honour) of the fight was left to the allies. Frequently the attack was begun by one wing, as by Caesar at Pharsalus. At Ilipa in Spain Scipio surprised his enemy by a last hour variation of the accustomed order. Putting his Spanish auxiliaries in the centre, his Roman troops on the wings, he "re-fused" his centre and attacked with both wings.

Development from the Second Stage to the Third.—Towards the end of the Republic many changes began to work themselves out in the Roman army. If Camillus began the system of pay and long service, it was effectually developed by long foreign wars in Spain and in the East. Moreover, the growth of Rome as a wealthy state tended to wreck the old theory that every citizen was a soldier, and favoured a division of labour between, *e.g.*, the merchant and the military, while the increasing complexity of war required a longer training and a more professional soldier. In consequence, the old restriction of legionary service to men with some sort of private property was abolished by Marius about 104 B.C. and the legionaries now became wholly proletariate and professionals. By a second change, also connected with the name of Marius, the legion was reorganized as a body of 6,000 men in 60 centuries, divided into ten cohorts instead of (as hitherto) into 30 maniples; the unit of tactical action thus became a body of 600 instead of 120. This was probably an adaptation within the legion of the system of cohorts already in use for the contingents of the *socii*. Soon after, the extension of the Roman franchise to all Italians converted allies and subjects into citizens, and the *socii* into legionaries. A fourth change abolished the legionary cavalry and greatly increased the *auxilia* (C., p. 396).

Third Stage.—*The Imperial Army of Defence.*—The evils of the Civil Wars (49–31 B.C.) furnished the first emperor, Augustus with both the opportunity and the necessity for reforming the army. Disorganization had reigned for 20 years. It was needful to restore loyalty and system alike. Augustus did this, as he did all his work, by adapting the past: yet there is some truth in the view that his army reforms were his greatest and most original work. The main lines of his work are simple. The Imperial army consisted henceforward of two classes or grades of troops, about equal in numbers if unequal in importance. The first grade was the legions, recruited from Roman citizens, whether resident in Italy or in the provinces. The second grade was formed by the *auxilia*, recruited from the subjects (not the citizens) of the Empire in the provinces, organized in cohorts and *alae* and corresponding somewhat to both the *socii* and the auxiliaries (B, C, above) of the Republican army. There were also in Rome special "household" troops (*see* PRAETORIANS), and a large body of *vigiles* who were both fire brigade and police.

Details of Troops.—(A) The legion of the Empire was what Marius had left it—6,000 heavy infantry divided into ten cohorts: Augustus added only 120 horsemen to serve as despatch-riders and the like. The supreme command was no longer in the hands of the six tribunes. According to a practice which had sprung up in the latest Republic it was in the hands of a *legatus legionis*, deputy of the general (now of the emperor, commander-in-chief of the whole army) and a man usually of senatorial rank and position. The six tribunes assisted him in theory; in practice they were now little more than young men of good birth learning their business or wasting their time. The real officers of the legion were the 60 centurions, men who (at least in the early Empire) generally rose from the ranks, and who knew their work. The senior centurion, *primus pilus*, was an especially important officer, and on retirement frequently became *praefectus castrorum*, "camp adjutant," or obtained other promotion. Below the centurions were under-officers, standard-bearers, *optiones*, clerks and the like. The men themselves were recruited from the body of Roman citizens (though we may believe that birth-certificates were not always demanded). During the 1st century Italy, and particularly north Italy, provided the bulk of the recruits. After A.D. 70, recruiting in Italy for the legions practically ceased and men were drawn from the Romanized towns of the provinces. After Hadrian, each province seems to have supplied most of the men for the legion (if any) stationed in it, and so many sons of soldiers born during service (*castrenses*) flocked to the army that a military caste almost grew up. The term of service was, in full, 20 years, at least in theory, but recruiting was voluntary and when men were short discharges were often withheld. On discharge the ex-legionary received a bounty or land: many *coloniae* (municipalities) were established in the provinces by certain emperors for the special purpose of taking discharged veterans—according to a custom of which the first instances occur in the late Republican age. On the whole, the legionary was still the typical "Roman" soldier. If he was no longer Italian, he was generally of citizen birth, and always of citizen rank, and his connection with the Empire and the Government was real. Each legion bore a number and a title (*e.g.*, II. Augusta, III. Gallica). The custom of using such titles and numbers can be detected sporadically in the late Republic, and many titles and numbers then borne by legions passed on into the Empire with the legions themselves. As Augustus gradually became master of the world, he found himself with three armies, his own and those of Lepidus and Antony; from the three he chose certain legions to form his new standing army, and he left these with the titles and numbers which they had previously borne, although that concession resulted in three legions numbered III. and two numbered IV., V., VI. and X. respectively. Similar titles and numbers were given to legions raised afterwards either to fill up gaps caused by disaster or to increase the army.

(B) Besides the legions Augustus developed a new order of *auxilia*. Auxiliaries (as is said above) had served occasionally in the Republican armies since about 250 B.C., and in the later Republic large bodies of them had been enlisted in the armies of contending generals. Thus Caesar in Gaul enrolled a division of native Gauls, free men but not citizens of Rome, which ranked from the first in all but legal status as a legion, the "Alaudae," and in due course was formally admitted to the legionary list (legio V.). But this use of non-citizens had been limited in extent and confined in normal circumstances to special troops such as slingers or bowmen. This casual practice Augustus reduced, or rather extended, to system, following in many details the scheme of the Republican *socii* and veiling the novelty under old titles. Henceforward, regiments of infantry (*cohortes*) or cavalry (*alae*), 500 or 1,000 strong, were regularly raised (apparently, by voluntary recruiting) from the non-citizen populations of the provinces and formed a force almost equal in numbers (and ultimately much more than equal) to the legions. The men who served in these units were less well paid and served longer than the legionaries; on their discharge they received a bounty and the Roman franchise for themselves, their wives and children. They were commanded by Roman *praefecti* or *tribuni*, and were no doubt required to understand Roman orders; they must have generally become Romanized and fit for the citizenship, but they were occasionally (at least in the 1st century A.D.) permitted to retain tribal weapons and methods of fighting and to serve under the command of tribal leaders, who were at once their chiefs and Roman officers. These auxiliaries provided both the whole of the archers, etc., and nearly the whole of the cavalry of the army; they also included many foot regiments. A peculiar arrangement (to which no exact parallel seems to occur in any other army) was that a cohort of 500 men might include 380 foot and 120 horse and a cohort of 1,000 men or 760 foot and 240 horse (*cohors equitata*), and an *ala* might similarly include a proportion of foot (*ala peditata*). Each regiment bore a number and a title, the latter often derived from the officer who had raised the corps (*ala Indiana*, raised by one Julius Indus), or, still more often, from the tribe which supplied the first recruits (*cohors VII. Gallorum, cohors II. Hispanorum* and the like). To what extent recruiting remained territorial is uncertain: after the 1st century, probably, the territorial names meant in most cases very little.

Composition of Armies and Distribution of Troops in the Third Stage.—If the system of legions and *auxilia* in the early Empire was novel, the use made of them was no less so. The later Repub-

lic offers to the student the spectacle of large field armies, and though it also reveals a counter tendency to assign special legions to special provinces, that tendency is very feeble. Augustus ended the era of large field armies: he could not afford to leave such weapons for future pretenders to the throne. By keeping the Empire within set frontiers, he developed the counter tendency. That policy exactly suited the military position in his time. The early Roman empire had not to face—like modern empires—the danger of a war with an equal enemy, needing the mobilization of all its national forces. From Augustus till A.D. 250 Rome had no conterminous foe from whom to fear invasion. Parthia, her one and dangerous equal, was far away in the East and little able to strike home. Elsewhere, her frontiers bordered more or less wild barbarians, who might often harass, but could not do serious harm. To meet this there was need, not of a strong army concentrated in one or two cantonments, but of many small garrisons scattered along each frontier, with a few stronger fortresses to act as military centres adjacent to these garrisons.

Accordingly, a system grew up under Augustus and his immediate successors whereby the whole army was distributed along the frontiers or in specially disorderly districts (such as northwest Spain) in permanent garrisons. On the actual frontiers and on the chief roads leading to them were numerous cohorts and *alae* of auxiliaries, garrisoning each its own *castellum* of 3–7 acres in extent. Close behind the frontiers, or even on them, were the 25 legions, each (with a few exceptions of early date) holding its own fortress (*castra stativa* or *hiberna*) of 50–60 acres. Details varied at different times. Sometimes, where no Rhine or Danube helped, and where outside enemies were many, the frontier was further fortified by a continuous wall of wooden palisades (as in part of Germany; *see* LIMES) or of earth or stone (as in Britain, *see* BRITAIN: *Roman*), or the boundary might be guarded by a road patrolled from forts planted along it (as in part of Roman Africa). The result was a long frontier guard covering Britain and Europe from the German ocean to the Black sea, and the upper Euphrates valley, and the edge of the Sahara south of Tunis and Algeria and Morocco, while the wide Empire within saw little of its soldiers.

The following table shows the disposition of the legions about A.D. 120 and for many decades subsequently. It would be impossible, even if space allowed, to add the auxiliaries, as the details of their distribution are too little known. But as the number of auxiliaries in any province was probably rather greater than the number of legionaries, the sizes of the various provincial armies can be calculated roughly. Thus Britain was held probably by 35,000–40,000 men. Each provincial army was commanded either by the governor of the province or (in a few exceptional cases) by the senior *legatus* of the legions stationed there:—

Britain	II.	Augusta (*Isca Silurum*, now Caerleon).
„	VI.	Victrix (*Eburacum*, York).
„	XX.	Valeria Victrix (*Deva*, Chester).
Lower Germany (=lower Rhine)	I.	Minervia (*Bonna*, Bonn).
„ „	XXX.	Ulpia Victrix (*Vetera*, Xanten).
Upper Germany	XXII.	Primigenia (*Moguntiăcum*, Mainz).
„ „	VIII.	Augusta (*Argentorate*, Strassburg).
Pannonia (Danube to Semlin)	X.	Gemina (*Vindobona*, Vienna).
„ „	XIV.	Gemina (*Carnuntum*, Petronell).
„ „	I.	Adiutrix (*Brigetio*, near Komorn).
„ „	II.	Adiutrix (*Aquincum*, near Budapest).
Upper Moesia (Middle Danube)	IV.	Flavia (*Singidūnum*, Belgrade).
„ „	VII.	Claudia (*Viminacium*, Kostolac).
Dacia (now Transylvania)	XIII.	Gemina (*Apulum*, Karlsburg).
Lower Moesia (Lower Danube)	I.	Italica (*Novae*, Sistov).
„ „	XI.	Claudia (*Durostorum*, Silistria).
„ „	V.	Macedonica (*Troesmis*, Iglitza).
Asia Minor (Cappadocia)	XV.	Apollinaris (*Satala*, Armenian frontier).
„ „	XII.	Fulminata (*Melitene*, on upper Euphrates).
Syria	XVI.	Flavia (*Samosata*, on upper Euphrates).
Syria	IV.	Scythica }
„	VI.	Ferrata } near Antioch (?).
„	III.	Gallica }
Judaea	X.	Fretensis (Jerusalem).
Arabia	III.	Cyrenaica (*Bostra*).
Egypt	II.	Trajana (near Alexandria—a disorderly city).
Africa	III.	Augusta (*Lambaesis*).
Spain	VII.	Gemina (*Legio*, Leon, in northwest Spain).

The total of legionaries may be put at about 180,000 men, the auxiliaries at about 200,000. If we exclude the "household" troops at Rome, the police fleets on the Mediterranean and the local militia in some districts, we may put the regular army of the Empire at about 400,000 men. This army, as will be plain, was framed on much the same ideas as the British army of the 19th century. It was meant not to fight against a first-class foreign power, but to keep the peace and guard the frontiers of dominions threatened by scattered barbarian raids and risings. Field army there was none, nor any need. If special danger threatened or some special area was to be conquered—such as southern Britain (A.D. 43)—detachments (*vexillationes*) were sent by legions and sometimes also by auxiliaries in adjacent provinces, and a field force was formed sufficient for the moment and the work.

Change from the Third Period to the Fourth.—Two principal causes brought gradual change to the Augustan army. In the first place, the *pax Romana* brought such prosperity to many districts that they ceased to provide sufficient recruits. The Romans, like the British in India, had more and more to look to uncivilized regions and even beyond their borders. Hence comes, in the 2nd century and after, a new class of *numeri* or *cunei* or *vexillationes*, who used (like the earlier auxiliaries) their national arms and tactics and imported into the army a more and more non-Roman element. This tendency became very marked in the 3rd century and bore serious fruit at its close. And, secondly, the old days of mere frontier defence were over. The barbarians began to beat on the walls of the Empire as early as A.D. 160: about A.D. 250 they here and there got through, and they came henceforward in ever growing numbers. Moreover, they came on horseback, bringing new tactics for the Roman infantry to face, and they came in masses. We may doubt if any military system could have permanently stayed this series of human tides. But the Empire did what it could. It enlisted barbarians to fight barbarians, and added freely to the non-Roman elements of the army. It increased the relative strength of its cavalry and began to organize a distinct field force.

Fourth Period.—The results are seen in the reforms of Diocletian and Constantine the Great (A.D. 284–*circa* 320). New frontier guards, styled *limitanei* or *riparienses*, were established and the old army was reorganized in field forces which accompanied or might accompany the emperors in war (*comitatenses palatini*). The importance of the legions dwindled; the chief soldiers were the mercenaries, mostly Germans, enlisted from among the barbarians. New titles now appear, and it becomes plain that in many points the new order is not the old. The details of the system are as complicated as all the administrative machinery of that age. Here it is enough to point out that the significance of such officers and titles as the *dux* and the *comes* (duke, count) lies ahead in the history of the middle ages, and not in the past, the history of the Roman army itself.

War Office, General Staff.—Under the Republic we do not find, and indeed should not expect to find, any central body which was especially entrusted with the development of the army system or military finance or military policy in wars. Even under the Empire, however, there was no such organization. The emperor, as commander-in-chief, and his more or less unofficial advisers doubtless decided questions of policy. But the army was so much a group of provincial armies that much was left to the chief officers in each province. Here, as elsewhere in the Empire, we trace a love if not for Home Rule, as least for Devolution. There was, however, a central finance office in Rome for the special purpose of meeting the bounties (or equivalent) due to discharged soldiers. This was established by Augustus in A.D. 6 with the title *aerarium*

militare, and had, for receipts, the yield of two taxes, a 5% legacy duty and a 1% on sales (or perhaps only on auction-sales). The legacy duty did not touch legacies to near relations or legacies of small amount.

BIBLIOGRAPHY.—Liebenam, "Exercitus," in Pauly-Wissowa, *Realencyklopädie;* Domaszewski, in Mommsen-Marquardt's *Handbuch der römischen Altertümer* (2nd ed., Leipzig, 1884), vol. v., pp. 319–612; H. Delbrück, *Geschichte der Kriegskunst*, vol. i., 2nd ed. (Berlin, 1907); E. Lammert, "Die Entwicklung der römischen Taktik," in *Neue Jahrbücher für das klassische Altertum*, ix. 100–128, 169–187; Cagnat's article "Legio" in Daremberg and Saglio, *Dictionnaire des antiquités grecques et romaines;* E. G. Hardy, *Studies in Roman History* (London, 1906–09); Th. Mommsen, "Das römische Militärwesen seit Diocletian," in *Hermes*, xxiv. 195–279; P. Coussin, *Les Armes Romaines* (Paris, 1926); the articles "Legio" and "Exercitus" in Pauly-Wissowa, *Realencyklopädie;* Macartney's article "The Military Indebtedness of Ancient Rome to Etruria" in *Memoirs of the American Academy in Rome* i., 121 (1917). (F. J. H.)

ROMAN ART. Modern archaeology has fully vindicated the significance of the Roman output in the field of art; yet the Romans do not, at the outset, present themselves as belonging to that small group of peoples endowed, as it were, with a spontaneous capacity for art, and the impulse to artistic creation latent in their character hardly began to develop before the 4th century B.C. Up to that time such works of art as were produced in, or imported into, Rome were apparently in the main Etruscan or Graeco-Etruscan; and in Rome, as in Latium, Etruscan artists were commissioned to decorate the temples of wood and terra-cotta which preceded the more sumptuous marble structures of the late republic and the empire. The discovery at Veii in 1917 of a magnificent Apollo in terra-cotta (*see* ETRURIA) of early 5th century style, satisfactorily confirms the tradition that Volca, an artist from Veii, made the cultus statue of the god for the temple of Jupiter Capitolinus and executed statuary for other Roman temples as well, while from considerations of style and technique the celebrated Capitoline Wolf is now assigned to the same cycle of Veientine art. Etruscan art, though originally dependent for many of its motives and for its technique on Greek models, developed an art of portraiture in which we can from the first trace that naturalism and close attention to detail which afterwards blossomed into the realism characteristic of Rome. The same desire for making permanent the memory of their dead, which led the Etruscans to decorate their funeral urns with a lid in the form of the human head, prompted the Romans to produce waxen masks, or *imagines*, which were preserved in the houses of the Roman aristocracy and were carried in funeral processions of members of the family. The Barberini statue illustrates the custom.

In architecture, too, Roman builders learnt much from their Etruscan neighbours, from whom they borrowed the characteristic form of their temples, and perhaps also the prominent use of the arch and vault. But the stream of Etruscan influence was met by a counter-current from the south, where the Greek colonies in Campania provided a natural channel by which Hellenic ideas reached the Latin race, and, at an early date, Roman architects modified the purely Etruscan type of temple under the influence of western Greek models. Greek modellers in terra-cotta came to Rome (first in 496 B.C., to decorate the temple of Ceres Liber and Libera) and worked by the side of the Etruscans. The conquests of the later republic, however, brought the Romans into more direct contact with the art of Greece proper; victorious generals adorned their triumphs with masterpieces of Greek art, and, when Philhellenism became the ruling fashion at Rome, wealthy connoisseurs formed private collections drawn from the Greek provinces, while Greek craftsmen were employed in the decoration of the palaces of the Roman nobles and capitalists. Every empire-builder—Sulla, Pompey, Caesar—dreamed in turn of modelling Rome on the plan of an Hellenistic city. Even portraiture borrowed an Hellenic character in the time of Caesar and Cicero. Yet this period also saw the beginning of the historical, or, more properly, the commemorative method to whose development the empire gave so powerful an impulse. An early example is afforded by the reliefs representing a Roman sacrifice and other episodes from the life of the army, which adorn the front face of an altar believed to have been set up by Cn. Domitius Ahenobarbus shortly before 30 B.C. (Plate II., fig. 11).

Augustus enlisted art, as he did literature, in the service of the new order. The technical dexterity which characterizes all forms of art in this period—silver plate and stucco decoration, as well as sculpture in the round or in relief—is largely due to Greek influence; but the form is filled with a new content, the result of a determination on the part of Augustus to shift the centre of artistic activity from Greece to Rome by associating it with new religious and political ideals. But the Roman spirit, after producing in harmony with that of Greece such brilliant results, triumphed once more under Trajan in that novel "epic in stone" with which the column that bears his name is adorned. Along the path thus marked out, Roman art continued to progress, scarcely disturbed by a brief renaissance of classicism under Hadrian. The historical reliefs which survive from the Antonine period, and more especially the sarcophagi, show that the new leaven was at work, though it soon mingled with new influences which brought about radical changes in the whole domain of plastic art. Colour, rather than form, began to take the highest place in the gamut of artistic values. Painting, as recent discoveries show, continued to be practised with conspicuous success; the sister art of mosaic was carried to a high degree of technical perfection; and in sculpture new conventions, such as the plastic rendering of the iris and pupil of the eye, were dictated by the ever-growing need for contrasts of light and shadow. By the close of the 3rd century a further transformation had taken place, which coincided with the political revolution whereby the absolute monarchy of Diocletian succeeded the principate of Augustus. The portraits of Constantine and his house have dropped all traces of naturalism; they are monumental, both in scale and in conception, and their rigid "frontality" carries us back to the primitive art of the East.

Architecture.—For this branch of the subject *see* ARCHITECTURE; CAPITAL; COLUMN; ORDER; TRIUMPHAL ARCH; here it suffices to note traits which persisted in later Western art. The Etruscans, by modifying the type of the Greek temple, profoundly influenced Roman construction; the Etrusco-Roman temple was not, like the Greek, approached on all sides by a low flight of steps, but raised on a high platform (*podium*) with a staircase in the front; in many instances the cella was square in order to house the divine Etruscan triads (Jupiter, Juno, Minerva; Ceres, Liber, Libera, etc.); and this cella was faced by a deep portico, which often occupied half the platform and thus restored to the outer structure the canonical length of the classic temple. This high *podium* is a first step in the development of building in a vertical direction, whereby, as H. B. Walters remarks, the Romans "paved the way for mediaeval and more particularly Gothic architecture."

The round temple, which originated in the primitive Latin hut, was adopted for the house of the king and for the ancient cults of Vesta and of Hercules. The theme was repeated, with many variations, from the circular temple by the Tiber to those fantastic structures at Baalbek and at Petra which anticipate the innovations of Borromini and the Baroque. For the irregular temple-precincts of the Greeks, the Roman substituted the colonnaded courts, in which—as in the Imperial Fora—the temple was often set against the rear wall (Fora of Augustus, Nerva, Trajan, etc.). This type of enclosure was imitated throughout the Graeco-Roman world—Baalbek (*q.v.*) is a well known instance; from it are derived the forecourts of Christian churches and basilicas, and its inspiration is visible in Bernini's colonnade at St. Peter's.

Another specific achievement of the Roman architect was the application of the arch, the vault and the dome. The rectilinear buildings of the Greeks, with their direct vertical supports, gave place to vaulted structures in which lateral thrust was called into play, a constructional device which was a paramount influence in the Roman architecture of the 17th century. The aesthetic effect of curves was well understood by the Romans; and they were the inventors of those decorative combinations of the Greek orders with the arcade, of which the more famous—the Triumphal Arch and the Arcade order (*see* ORDER) had a far-reaching influence. It is impossible, as Rushforth points out, to overlook the analogy between the Arch of Constantine (to take a typical example) and the decorative portals of mediaeval cathedrals, while, at a later

date, the triumphal arch influenced Baroque façades (fountains of Moses and of Trevi) besides being directly imitated in more modern times. Likewise, the superposed arcades adorned with columns or pilasters of a different order on each tier, formed a system of façade decoration which became almost as popular in the Renaissance as it had been in antiquity.

Republican Sculpture.—The art of the republican period may best be studied in its portraiture, where the simple naturalism of the Etruscans gradually makes way for the careful if uncompromising realism of the Romans. Of republican portraiture we have many fine examples, such as the magnificent head—probably of Brutus—which competent authorities now date back to the 4th century, an early date which would account for its partially Etruscan character (Plate I., fig. 1). Somewhat later are the statue of an orator (*Arringatore*) in Florence, in which the Etruscan manner is beginning to yield to the Roman, and the lovely head of a young man wearing the athlete's cap, in the British Museum (Plate I., fig. 9). The bronze bust of the actor, Norbanus Sorix, in Naples, is an example of the first quality attributable to the age of the dictator Sulla. Numerous examples in stone or marble are provided by the funeral *stelae*, within which busts, clearly imitated from the wax *imagines*, are stiffly aligned (Plate II., fig. 3); while the more purely Hellenic manner fashionable in the 1st century B.C. may be studied in the well known heads of Pompey and of Cicero. Apart from portraiture, examples of republican sculpture, both in the round and in relief, are now slowly emerging from oblivion; we may quote the sepulchral urn, lately acquired by the British Museum, showing a company of knights, preceded by musicians, riding towards a small temple, in front of which a boy leads a sheep to sacrifice (Plate II., fig. 2). Though the relief retains something of the Etruscan style, subject and spirit are distinctly Roman. The fragment at Ny Carlsberg (Plate I., fig. 10), with a group of women looking on at a mule-race, is still more highly Romanized—a crowd being suggested by three or four figures, as in Julio-Claudian art. The well-known slab, in the Museo Mussolini, of Mettius Curtius leaping into the chasm, is presumably copied from an original of republican date, and akin to it is the fine fragment in Munich, recently claimed as republican by C. Weickert, which represents a group of trumpeters and gladiators, one of whom is shown, fallen and crouching, in three-quarters view from the back (Plate I., fig. 11). Again, a circular altar in the Villa Borghese, representing a Roman sacrifice in presence of Hercules and of Venus Genetrix—ancestress of the Julian house—is, according to the same authority, of republican date and commemorates the *ludi Caesaris* of the year 46 B.C. Another notable example of a Roman altar is the altar of Domitius Ahenobarbus, already referred to (Plate II., fig. 11), in which the historical scene of one face is naïvely juxtaposed with the "marriage-procession of Poseidon and Amphitrite" represented on the sides; we thus have here the actual event with all its accessories, told in Roman style, while the naval victories and triumphs of the donor are given in the allegorical Greek manner. The same blend of realism and allegory recurs under Augustus in the *Ara Pacis Augustae*, executed between 13 and 9 B.C. in commemoration of the emperor's pacification of the West. This altar stood in a walled enclosure with two entrances, measuring 11½ by 10½ metres. The walls, with their plinth, were about 6 metres in height, and were decorated internally with a frieze of garlands and bucrania, treated with the utmost truth to nature, and externally with two bands of relief, the lower consisting of scrolls of acanthus varied with other floral motives, the upper showing processions passing across the field from east to west; on the south wall Augustus himself with the great officers of State, the flamens and the imperial family; on the north the senators and a crowd of citizens with their children. On the western face, towards which the processions are directed, the "Sacrifice of Aeneas on his arrival in Latium" (Plate II., fig. 9) symbolizes the link between Rome and the ancient Troy. To the east front (apparently) belongs the beautiful group of the earth goddess (Tellus) and the spirits of air and water, allegorical of prosperity and of the fertility of nature under the new rule. The babes that cling to the Earth Mother and the children that accompany their elders in the processional friezes introduce a human note which enhances the imperial beneficence. The glorification of empire is the keynote of all Augustan decoration.

Imperial Sculpture.—In the portraiture of Augustus and his successors the Hellenistic manner of the late republic is modified by a return to Etruscan naturalism. This portraiture is well represented by the Prima Porta statue of Augustus, in which he is shown in the attitude of a general addressing his army. Here again we find that the ideal mingles with the real; the emperor is not only bareheaded but barefoot, and the decoration on his corselet symbolizes what his rule has done for Rome and the world, while the tiny Cupid at his side, riding a dolphin, indicates the descent of the Julian house from Venus. The colossal bronze head in the British Museum (Plate I., fig. 3), found in 1911 at Meroe, in the Sudan, belongs doubtless to another notable presentment of the emperor in armour, though we have no clue as to the style of the statue. The Augustus of Via Labicana, on the other hand, discovered in 1909, represents the emperor as pontifex maximus heavily draped, with head veiled, and in the act of sacrificing. The head (Plate I., fig. 2) has a poetic quality which we also find in certain portraits of women, as in the admirable head at Ny Carlsberg (Plate I., fig. 4), but which was unknown to earlier art. The portraiture of private individuals also had interesting developments, and not less so that of women; the charming statue from Ostia of a young girl represented as Artemis, is a good example (Plate II., fig. 4).

The art of the Julio-Claudian period, like that of the republic, is slowly emerging into the light. Among notable Julio-Claudian fragments are the relief from Nola, at Budapest, showing a trumpeter giving the signal for a naval attack (Actium?); certain processional and sacrificial scenes in the Villa Medici, of similar character to those of the Ara Pacis, but later in style, and two reliefs discovered in the Corso only three years ago and removed to the new Museo Mussolini, which are attributed to the arch erected to commemorate the conquest of Britain by Claudius in A.D. 44. The more organic relation now attempted between the scenes represented and the background, leads gradually to that pictorial Flavian style best exemplified in the reliefs of the Arch of Titus, which represent the triumph of Titus and the spoils of Jerusalem (Plate III., fig. 2). These are eminently pictorial compositions in respect of depth of focus, and, so far as relief is concerned, the problem of representing form bathed in air and light is here solved. The same effects may be noted in Flavian ornament, as for example in the pilaster from the monument of the Haterii upon which is carved a tall vase, twined with roses that seem swayed by a light breeze. The delicate transitions and the subtle play of light bestow upon the best Flavian portraits the same "illusionistic" quality. New and notable effects were attained by the formal wire-mounted *toupets* of the ladies; these were used to set off the face, which appears as within a niche—a characteristically Roman effect (Plate I., fig. 6).

But even in the Flavian period we find by the side of the pictorial a more architectonic style, as in the friezes of the Flavian Forum Transitorium, which forms, as it were, the link between Flavian and Trajanic art. To the principate of Trajan belong, it is thought, four slabs of a long battle-scene, later walled into the Arch of Constantine (central passage and shorter sides of attics). The composition is fine, the heads of the barbarians full of character, but the atmospheric effects sought by the Flavians are abandoned in these crowded scenes (Plate II., fig. 8). The various episodes were linked together to suggest a continuous whole, a method of composition of which the reliefs of the spiral column put up in Trajan's Forum offer another example. These reliefs, which enfold the column like a strip of embroidery, tell the story of both of Trajan's wars with the Dacians, a formal division between the two narratives being made by a figure of Victory setting up a trophy. Uniform excellence cannot be claimed for the reliefs, yet, considering that the column contains 2,500 figures (arranged, it is said, on 400 slabs), the high level maintained is amazing (Plate III., fig. 4). The sacrificial pageants; Trajan's reception of troops; the opening of the bridge over the Danube; the dramatic scene of "the last water ration within the



BY COURTESY OF (3, 5, 9) THE TRUSTEES OF THE BRITISH MUSEUM; PHOTOGRAPH, (1) ALINARI

ANCIENT ROMAN PORTRAIT SCULPTURE

1. Bronze head of Brutus. An example of the sculpture of the Republican period, dating probably from the 4th century, B.C. In the museum of the Palazzo dei Conservatori, Rome
2. Head of the statue of Augustus found in the Via Labicana, Rome, representing the Emperor Augustus as *pontifex maximus*. In the Museo delle Terme, Rome
3. Colossal bronze head of the Emperor Augustus found in 1911 at Meroe in the Sudan. In the British Museum
4. Sculpture of a lady of the Julio-Claudian period. At Ny Carlsberg, Copenhagen
5. Bronze figure of Hadrian found in the Thames. In the British Museum
6. Lady with a high coiffure, characteristic of portraits of women in the Flavian period (latter half of 1st century A.D.). In the Capitoline Museum, Rome
7. Head of Septimius Severus. In the Stettiner Collection, Rome
8. Head of a statue in armour at Barletta. It has been called a portrait of Theodosius, and also of Heraclius, but is more probably that of Valentinian I. (latter half, 4th century)
9. Head of a young man wearing the athlete's cap. Republican period. In the British Museum
10. Fragment of a Roman-Etruscan relief, representing a group of women looking on at a horse-race. At Ny Carlsberg, Copenhagen
11. Relief representing a group of trumpeters and gladiators. Attributed to the Republican period. In the Glyptothek, Munich
12. Head of Constantine the Great. In the museum of the Palazzo dei Conservatori, Rome

ROMAN ART























BY COURTESY OF (1, 2, 3) THE TRUSTEES OF THE BRITISH MUSEUM; PHOTOGRAPHS, (6, 8, 9, 10, 11) ALINARI

ANCIENT ROMAN RELIEFS AND OTHER SCULPTURES

1. Tombstone of late republican date. In the British Museum. 2. Relief from a sepulchral urn, showing a company of knights preceded by musicians, riding toward a small temple. Republican period. In the British Museum. 3. Funeral stele of the republican period. In the British Museum. 4. Statue from Ostia of a young girl represented as Artemis. Imperial period. In the Museo delle Terme, Rome. 5. Mourning woman, a tomb statue of the Antonine period. In the Museo delle Terme, Rome. 6. Roman carrying his ancestral busts. In the Palazzo Barberini, Rome. 7. Antinous as Silvanus. Period of Hadrian (A.D. 117–38). In the Villa Albani, Rome. 8. Relief representing a battle scene, from the Arch of Constantine, Rome; thought to have belonged to the principate of Trajan and later walled into the arch. 9. Relief from the *Ara Pacis Augustae* (altar of peace) erected by the senate 13–9 B.C. in commemoration of the pacification of the West by Augustus. In the Museo delle Terme, Rome. 10. Relief, probably of the period of Trajan, from one of the balustrades. In the Roman Forum. 11. Relief from an altar believed to have been set up by the Consul Domitius Ahenobarbus (about 30 B.C.). In the Louvre

walls of the enemy's capital, Sarmizegetusa," are spirited compositions by a great imaginative artist. The principal character is always the Roman army, and the artist's first intention is to extol its warlike prowess, its courage, its endurance. But the figure of the emperor stands out from the whole and controls the action throughout, thus making manifest in the chief, as in his army, the right of the Roman people.

In the Trajan Column pictorial relief received its death blow; on a carved spiral that mounts in 21 windings up a column of 100 ft. high, precision of outline was imperative and perspectival or atmospheric effects out of the question. We may, however, suppose that the whole was coloured in local tints (brown for the earth, green for the trees, etc.) and that details of armour and horse trappings were added in metal. The column was dedicated in A.D. 113. On the top was a statue of the emperor in gilt bronze, and within the high pedestal, were deposited the golden urns containing Trajan's ashes and those of his consort, Plotina.

In striking contrast to the continuous spiral of the column are the fine reliefs of the arch put up at Benevento (*see* TRIUMPHAL ARCH), in honour of Trajan. The inscription bears the date A.D. 114, but the prominence given in the attica to Hadrian, as well as Hellenizing traits in certain of the sculptures, have led to the supposition that the arch was not finished till after Hadrian's accession. The arrangement of the panels, which summarize Trajan's achievements at home and abroad, is carefully calculated; on the side facing the city the subjects refer to Trajan's policy in Rome; on the side facing the country, to his settlement of the empire. In significance, this arch is the most important monument of Roman commemorative art; each scene, though rounded off and complete in itself, contributing to one dominating idea—the apotheosis of empire. This is consistently worked out from the picturesque relief of the passage way where the beneficent emperor is seen in the midst of grateful citizens, many of whom carry their children shoulder-high, to the grandiose panel of the attica facing towards Rome, where Jupiter offers the thunder-bolt to Trajan as supreme symbol of power, acclaiming him by this act as the *princeps optimus* of the inscription.

With the accession of Hadrian—the "Greekling," as he was called by writers hostile to his policy—a short-lived renaissance of classicism set in, restricted, however, to certain eclectic modifications of Greek statuary which do not fall within our province, and to a change in the relation of background to figures in relief-sculpture. The return to a background, either neutral or with the character of a drop-scene that has no organic connection with the figures, was doubtless responsible for the fact that the historical monuments of this and the following reign often lack the pregnancy of meaning, and vigour of execution, which distinguish those of the Flavio-Trajanic period; mention may be made of three reliefs in the Palazzo dei Conservatori, one of which represents the apotheosis of an empress.

On the other hand, the famous hunting medallions, which were later transferred to the Arch of Constantine are vigorous and interesting compositions, full of the rich and varied incident characteristic of Rome. In portraiture the most important work of this period was the idealized type of Antinous, here represented by the most exquisite of his effigies, which shows him as Silvanus (Plate II., fig. 7) and thus invests the favourite of Hadrian with a divinity expressed in the terms of Roman art, as well as a pathos which belongs to his own time. The inscription on the altar gives us the name of Antonianus of Aphrodisias in Caria, one of a family of sculptors domiciled in Rome since the time of Trajan.

The Antonine Period.—This produced in the Marcus Aurelius of the Capitol a type of equestrian statue which has served as model for all subsequent figures of the kind. The poise must have been more perfect in antiquity before the loss of the barbarian that crouched under the horse's right fore-hoof. Here we may note the different manner in which the Trajanic age and that of Hadrian, and his successor, Antoninus Pius, conceived the figures symbolic of the subject-peoples of the empire. Under Trajan, Roman sculptors had produced the finely realistic statues of Dacian captives which now adorn the Arch of Constantine, while to the period of Antoninus Pius belong the idealized figures, classical in pose and motive, which adorn the Hadrianeum or temple of the deified Hadrian, and of which several are in the Palazzo dei Conservatori.

Under Marcus Aurelius and Commodus, Roman art underwent further transformation. The earliest monument of the time is the base (in the Vatican) of the column (now destroyed) erected in honour of Antoninus Pius and Faustina. The contrast is remarkable between the classicistic representation of the apotheosis of the imperial pair, witnessed by the ideal figures of Roma and the Campus Martius (holding an obelisk), and the vigorous realism of the *decursio*, a ceremony performed by detachments of the praetorian guard on horse and foot, in which, with total disregard of perspective as tending only to obscure the action, the artist brings all the figures into the same plane and disposes them on a few projecting ledges of equal size, a device that reappears on the column of Marcus Aurelius. The reliefs of the Aurelian column hardly suffer by comparison with the column of Trajan. We cannot, it is true, trace, as in the earlier instance, the march of events towards a dramatic climax, nor does the artist attempt to produce an impression of a chronological series of happenings. The figures are smaller and more crowded than those of the earlier column, and there is even less regard for perspective than in Trajanic art. Yet a deeper psychology informs the whole; the note of *humanitas* rings clear in the groups of barbarians with their women and children; or in those scenes which centre in the person of the good and philosophic emperor; the monotony of incident is relieved by the sculptor's power of repeating the same idea in a surprising variety of ways. Many episodes are vividly treated, *e.g.*, the famous scene of the fall of rain, ascribed in Christian tradition to the prayers of the "Thundering" Legion. the strong realism of which is in contrast to the idealism of the Hellenistic Jupiter Pluvius in a scene of the Trajan Column.

Contemporary portraiture also shows the invasion of new principles and a tendency to emphasize the contrast between hair and flesh, the face often showing signs of high polish. In the latter half of the 2nd century the contrast is heightened by a new method of treating the hair, which is rendered as a mass of curls deeply undercut and honey-combed with drill-holes; a fine example is the Commodus of the Palazzo dei Conservatori. The aim of the sculptor is to obtain an ornamental effect by the violent contrast of light and dark. This pictorial influence may be seen at work in all branches of sculpture. The sarcophagi of the Antonine and later periods, with their crowded compositions and deep shadows, attain the same effect. A tendency to isolate figures and groups also makes its appearance in Antonine relief, and is strikingly exemplified in the famous *sarcofagi a colonette*, found both in Italy and in Asia Minor, and decorated with figures placed like statues within niches between columns. We may quote as conspicuous examples the sarcophagus of "Homer and the Muses" at Constantinople (from Sidamaria); the fragment of a similar example in the British Museum (Cat. 3,312); the marriage sarcophagus at Florence in the Riccardi Palace, and the grand sarcophagus at Melfi in Apulia. The Melfi example is adorned by figures symbolic of the soul's ultra-mundane destiny and has a full-length portrait of the deceased girl on the lid (Plate III., fig. 5). Many of the statues inserted into the niches of these sarcophagi are considerable works of art and exhibit the same quality of pathos that informs the remarkable tomb-statue, also of the Antonine period, recently discovered near Rome (Plate II., fig. 5). It represents a mourning woman, closely draped and veiled, with strongly individualized features; the splendid movement of the drapery, with the broken rhythm between the hands, preannounces Gothic sculpture and has little or nothing in common with its Greek prototypes.

Later Sculpture.—Under Septimius Severus and his successors, Roman art drifts steadily in its new direction. The reliefs of his arch at the entrance to the Forum represent the emperor's campaigns in the East in a compromise between bird's-eye perspective and the "continuous" style, which, though in sharp opposition to plastic and perspectival laws, has the magnificently decorative effect of Flemish tapestry. Other examples of the art of the period are the reliefs of the little gateway of the

Argentarii in the Velabrum (Plate III., fig. 8) and the relief now in the Palazzo Sacchetti, on which is carved the presentation of Caracalla to the senate as the destined successor of his father.

The political troubles of the 3rd century, the threatened inroads of barbarism, the imminence of economic ruin did not affect the production of art as seriously as might be supposed, nor did they check the continued "progress along the ascending line" of certain of its manifestations. In the portraiture we first become aware of two different currents: the naturalistic in most imperial effigies, *e.g.*, the bronze statue of Severus in Brussels, and the more monumental which invests with a new spiritual dignity the masterly portrait in the Stettiner collection (Plate I., fig. 7). It is conceived in accordance with the laws of frontality, which are still more operative in the grandiose head of an imperial personage (unidentified) from the middle of the 3rd century, found at Ostia (Terme). If we turn to technical methods, we note that the busts of the second quarter of the 3rd century A.D. are distinguished by the treatment of the hair and beard, which seem to have been closely clipped, and are indicated by a multitude of fine chisel strokes on a roughened surface, a technique practised with wonderful effect in the heads of Maximinus the Thracian (A.D. 235–238) in Berlin; of the emperors Pupienus (A.D. 238) and Philip the Arabian (A.D. 244–249) both in the Vatican; in the remarkable bronze, Balbinus (A.D. 238) of the Vatican library; and in a head of the Capitol (Strong, *Rom. Sc.*, Pl. 127). In these heads the expressiveness is astonishing, the Capitoline head being justly noted for its sly look of craft and cunning. Under Gallienus (A.D. 253–268) there is a momentary return to a greater naturalism, evident in the treatment of hair and beard, and in the emotional look; but in the so-called Probus (A.D. 276–282) of the Capitol, and the Carinus (A.D. 283–285) of the Palazzo dei Conservatori, frontality gets the better of naturalism till it prevails in the portraiture of Constantine (Plate I., fig. 12) and his successors. Organic has been transformed into architectonic structure; the bust (or statue) is no longer a true portrait—a block of marble made to pulsate with the life of the subject represented—but a monument.

In the togate statues of the Constantinian and later period, the deep cutting of the rigid folds contributes to the monumental effect of the figure. Among the finer examples are the two celebrated statues of consuls, in the Conservatori, attributable to the 5th century. By the side of these togate examples a place must be accorded to the statue in armour at Barletta (it has also been called Theodosius and Heraclius, but is more probably Valentinian I.), whose powerful head (Plate I., fig. 8) and splendidly poised body show post-Constantinian art at its best. The narrow bands of relief on the Arch of Constantine, some of which may even date back to the reign of Diocletian, partake of the same monumental character as the single statues of the time. Where the subject permits, as in the reliefs showing Constantine in the Forum and Constantine distributing a dole, the frontality of the central figure and the strict symmetry of the grouping, which imparts an almost geometrical regularity to the main lines of the composition, show that Constantinian reliefs, like the portraits, are calculated for architectonic rather than for plastic effect.

Roman Painting.—The arts whose proper medium is colour enjoyed a popularity with the ancients—Romans and Greeks alike—at least as great as that of sculpture, though, owing to the perishable nature of the material, the record is even more fragmentary. Etruscan painting in Italy reflected, throughout its early history, the phases through which the art passed in Greece. Thus the frescoes which adorn the walls of Etruscan chamber-tombs show an unmistakable analogy with Attic vase-paintings in their neutral background, in the use of conventional flesh-tones, and in the predominant interest shown in line as opposed to colour. This probably was the style of those early wall-paintings at Ardea and Lanuvium, which existed "before the foundation of Rome" (Pliny, *N.H.*, xxxv. 18). It is probably also to an early date that we should refer those wall-paintings "in famous temples," of which Quintilian copied the archaic inscriptions, but the first definite mention of painting in Rome is from the close of the 4th century B.C., when we hear of one Fabius Pictor, who earned his cognomen by decorating the temple of Salus on the Quirinal (302 B.C.). The chief works of specifically Roman painting in republican times (other than the frescoes which adorned the walls of temples) were those exhibited by successful generals on the occasion of a triumph; some idea of these paintings is afforded by the fragment of a fresco in the Museo dei Conservatori, discovered in a sepulchral vault on the Esquiline in 1889, which appears to date from the 3rd century B.C. It represents scenes from a war between the Romans and an enemy who may almost certainly (from their equipment) be identified as Samnites.

We pass from the meagre remains of early Roman painting to the decorative frescoes of Rome, Herculaneum and Pompeii, which introduce us to an art influenced like the contemporary sculpture by Hellenistic models. The scheme of colour is no longer conventional but naturalistic; the picture is concentrated in space, *i.e.*, figures are no longer isolated on a neutral background; difficult effects of linear and aerial perspective are attempted and the modelling of figures is often excellent. It must be premised that this style of wall-decoration was a new thing in the Augustan period. In the Hellenistic age the walls of palaces were veneered with slabs of many-coloured marble (*crustae*); and in humbler dwellings these were imitated in fresco. This "incrustation" style is found in a few houses at Pompeii, such as the Casa di Sallustio, built in the 2nd century B.C.; but before the fall of the republic it had given place to what is known as the "architectural" style, in which columns and other architectural features are introduced in order to give the illusion of outer space, and this illusion is heightened by the landscape backgrounds, which are often enlivened by figures. An example of such decoration is afforded by the "Odyssey landscapes," discovered on the Esquiline in 1849, amongst the remains of a large private house, attributable at the latest to the period of Claudius. The walls of one room were decorated in their upper portion by pilasters treated in perspective, through which the spectator appears to look out on a continuous background of land and sea, diversified by scenes from the voyage of Odysseus. The artist, it appears, has been mainly interested in the landscape which is sketched with great freedom, but he shows no scientific knowledge of perspective, and commits the natural error of placing the horizon too high. It is clearly to such works as these that Vitruvius refers (vii. 5) when describing paintings which "unfold mythical tales in due order, as well as the battles of Troy or the wanderings of Odysseus through landscapes (*topia*)." We should doubtless reckon within the same class those "small scenes from the Homeric cycle within a framework in which blue and gold are predominant" in a room of the beautiful house on the Palatine, identified by Ashby as the *domus transitoria* of Nero, and the numerous examples from the Homeric cycle at Pompeii (*cf.* especially the series in the "House of the Cryptoporticus" in Insula 6, near the newly-explored Via dell' Abbondanza).

The use of landscape in decoration is stated by Pliny (*N.H.*, xxxv., 116) to have become fashionable in Rome in the time of Augustus. He attributes this to a painter named Studius, who decorated walls with "villas, harbours, landscape gardens, groves, woods, hills, fishponds, canals, rivers, shores," and so forth, diversified with figures of "persons on foot or in boats, approaching the villas by land on donkeys or in carriages, as well as fishers and fowlers, hunters and even vintagers," a description which exactly fits the continuous landscape of the yellow frieze in one room of the house of Augustus (the so-called "house of Livia") on the Palatine. Vitruvius, too, in the passage above quoted, speaks of "harbours, capes, shores, springs, straits, temples, groves, mountains, cattle and herdsmen. . . ." Existing paintings—those, for instance, of a columbarium in Villa Doria-Pamfili, recently transferred to the Terme—fully confirm the statements of ancient writers. In the villa of Livia at Prima Porta the walls of a room are painted in imitation of a park; from the villa of Fannius Synistor at Boscoreale we have a variety of landscapes and perspectives; and in the house discovered at Rome in the grounds of the Villa Farnesina by the Tiber—the paintings of which are in the Museo delle Terme—we find a room decorated

with black panels, upon which landscapes are sketched in with brush-strokes of white.

Figure Painting.—In the architectural style figure-painting on a large scale makes a first appearance. Occasionally it forms an integral part of the design. In the larger "Triclinium" at Boscoreale, for instance, groups and single figures—possibly family portraits—are painted in the wall-spaces between pilasters and columns, while in one room of the "Villa of the Mysteries" at Pompeii, a continuous figure-composition is painted against a panelled background. This wall-painting, which represents a Dionysiac initiation, was discovered in 1911, and may be said to surpass in beauty of colouring and composition anything previously known (Plate III., fig. 7). But figures so arranged as to appear to be moving within the room tend to confine the space. This is contrary to the principles of Roman and Pompeian wall-painting, and a commoner method, therefore, is to concentrate the figure-subject, which is usually of a mythological character, into a central panel clearly marked off from the rest of the wall and intended to be seen as through an opening in the wall. In the architectural style these subjects are usually framed in a species of pavilion or *aedicula*, sometimes painted in perspective, which allows a vista of the landscape beyond (Plate III., fig. 6, from the house of the Farnesina in Rome), but this motive gradually loses its importance in the third style and becomes a purely conventional scheme of decoration, though in the fourth or intricate style, which again reverts to true architectural forms, however fantastic and bewildering in their complexity, the figure subjects are plainly conceived as pictures and framed with a simple band of colour. In the later styles figure-subjects without landscape are extremely common, but it has been shown that, *e.g.*, in the triclinium of the Casa dei Vettii, which is decorated with a cycle of mythological paintings, the lighting is carefully calculated with regard to local conditions, so that the conception of an outlook into external space is not given up. Among Pompeian paintings effects of lighting are at times attempted with great success; for instance the groups of a striking composition —a ceremony of benediction—are executed in bold dashes of colour, especially white, according to the principles of modern impressionism. The subjects of these Pompeian frescoes are for the most part taken from Greek mythology, but this only proves that that source of inspiration was as freely drawn upon in the art as in the literature of imperial Rome. Owing to the total loss of Greek originals, the question how far these were imitated in Pompeii (or Rome) is difficult to determine. The well known Medea, possibly influenced by the painting of Timomachus, may equally well be the contemporary version of an older theme. It would probably be correct to say of such a figure, as of the mourning woman (Plate II., fig. 5), that if the framework is still Greek the spirit is Roman. Figure-subjects are also introduced within frames, directly imitated from actual pictures, and placed on stands, or shuttered like triptychs as in the houses of Livia and of the Farnesina at Rome, and in Pompeii.

Examples of ancient painting in Rome are still scarce, partly because much that has been discovered of late years still awaits publication. But the magnificent series of paintings from the house of the Farnesina, which may be as early as Caesar, since they were found on or near the site of his gardens; the paintings of the house of Livia (architectural style); the famous scene of a ritual marriage known, from its former possessor, as the "Nozze Aldobrandini" (library of Vatican); the decorative ceiling panels from the newly-excavated parts of the Golden House; the lovely head of a shepherd piping, in the British Museum (Plate IV., fig. 6), found, it is said, in a tomb near Rome, show that the art of the capital equalled, or even surpassed that of the buried Campanian cities.

Mention must also be made of the combination of ornamental work in plaster with painting which is found at Pompeii and at Rome, and is a feature of tombs of the 2nd century A.D. In the Augustan period we find exquisitely modelled stucco, used to ornament vaulted ceilings in the "Farnesina" house. An example of Julio-Claudian date is provided by the famous hypogeum of a Pythagorean cult, discovered outside the Porta Maggiore in 1917, the ceilings and wall of which are entirely covered with reliefs in stucco; and from the principate of Domitian we have the fine stucco work in the cryptoporticus of this emperor's villa at Castel Gandolfo. Painter and modeller also worked in conjunction, with admirable effect; the results are best seen in the tombs on the Latin Way (Plate IV., fig. 2).

Painting continued to flourish under the later emperors. In a room of the Roman house, under the church of SS. John and Paul, may still be seen what is the largest and best preserved ancient painting so far found in Rome (Plate IV., fig. 10); the picture—remarkable for the freshness of colouring, and the beauty of the flesh-tints—can scarcely be later than the period of Marcus Aurelius. The subject is the meeting of the two divinities (Dionysos and Thetis?) on a sea-girt rock amid a joyous escort of tiny love gods, who guide their light craft over sunlit waters. Another room of the same house has decorative paintings of a mystical and religious character. To the period of the Severi may be referred the paintings, discovered near the Monte Mario, in the tomb of the little girl, Otacilia, which represent a "children's paradise," and those wall-paintings in the hypogeum of the Aurelii, discovered in 1919 near the new Viale Manzoni, which apparently reflect the tenets of an heretical Christian sect. Among the Viale Manzoni pictures the one of a farmhouse and its dependencies (Plate III., fig. 9) shows the persistence of the Roman landscape style; that of the Good Shepherd (Plate IV., fig. 9) and the 12 sheep (symbolic of the Sermon on the Mount) is a pastoral in Virgilian vein, while the heads of the 12 figures identified as the Apostles, recall heads on the column of Marcus Aurelius. Sound Roman traditions were still operative under Aurelian, as we see from the tomb of Trebius Justus, with its picture of the building of a city-wall, and the portraits of the occupant of the tomb and his family, treated in a style of art which persists in the Christian catacombs. The fact that painting was still vigorous in Rome under Constantine is evident from the magnificent figure of Roma found on the site of the old Lateran palace and assigned by Wilpert to a group of the imperial family attended by allegorical figures and divinities.

Portrait Painting.—From the few examples still extant we may assume that portrait-painting was of the same excellence as portrait-sculpture: the group of Terentius Neo (long mistaken for Paquius Proculus) and his wife at Naples, from Pompeii, is characteristic of the Augustan period, to which we may doubtless likewise refer the original of the fine mosaic representing the poet Virgil between two muses. Portraits of poets were a common feature of book-illustration, and the poet Martial (XIV. 186) mentions a portrait of Virgil prefixed to an edition of the *Aeneid*. The celebrated portraits in "encaustic" from the Fayum, give us a series of examples from the Flavian period to the 3rd century. These paintings were executed in wax—the usual technique of portrait painting, in which the colours were mixed with liquefied wax and fixed by heat, whether in a molten state or not is uncertain, though it seems more likely that the pigments were laid on cold and a hot instrument used afterwards. These tablets have been found exclusively in Egypt, where they were inserted into the mummy-case in place of the older plastic masks. Excellent examples of portrait-painting are provided by the medallions on gold glass, which have something of the value of our modern miniatures. One of the finest is in the Museum of Arezzo; it may be attributed to the period of Marcus Aurelius, and represents a bearded man whose delicate features are drawn with the utmost subtlety on a blue ground (flesh on gold, with details in black, drapery silver with violet streaks). Another little masterpiece, later inserted as centrepiece of a cross now at Brescia (Plate IV., fig. 4) represents two ladies and a boy, now identified as Alexander Severus, in the year of his accession (A.D. 221) when he was only 16, with his mother, Mammaea, and his grandmother, Naesa.

Roman Book-illustration.—*See* ILLUMINATED MANUSCRIPTS. This was a highly-developed branch of art in Rome, as appears from the description of Varro's 15 books of *Imagines*, illustrated with 700 pictures, and from the passage in Martial already referred to. The extant material, however, is mostly later than the period

we are concerned with. But the famous illustrations to a 4th century codex of the *Iliad*, in the Ambrosiana at Milan, reflect, according to Wickhoff, the Romano-Pompeian style, while the illustrations of the Vatican Virgil, No. 3,235, seem to be 4th century copies of pictures of Augustan date. On the other hand, the pictures in the 4th century Virgil (Vat. 3,867), notably the "Assembly of the Gods," are in the contemporary "frontal" style here illustrated by the Junius Bassus panel in *opus sectile* (Plate IV., fig. 11). Roman influence inspires the celebrated Dioscorides of Vienna of the year 512, the style of which is closely akin to that of the Vienna Genesis, and is still vital in the 10th century in the Joshua rotulus of the Vatican, many of whose pictures clearly depend upon Roman historic relief.

MOSAIC

The gaps in the available knowledge of Roman painting can be filled up to a certain extent by what we learn from the remains of the sister art of mosaic, which, being less easily destroyed, have survived in thousands to the present day (*see* MOSAIC). The Roman artists were, generally speaking, alive to the essential differences of principle between the arts, and did not seek to produce the impression of painting, executed with a liquid medium, by the use of solid materials. Amongst the mosaics of Roman date which employ a large number of exceedingly minute cubes, an illusion akin to that of painting seems, it is true, to be the aim, though even here the Roman mosaicist never entirely transcends the limits imposed by his material. The most conspicuous examples of this more naturalistic manner are the pavement in the Lateran museum signed by the Greek Heraclitus, which appears to reproduce the "unswept hall" of Sosos of Pergamum (*see* MOSAIC), and the mosaic of the doves from Hadrian's villa, preserved in the Capitoline museum, inspired by the "Drinking Dove" of the same artist. The former of these contains about 120, the latter as many as 160 cubes to the square inch.

A distinction must be drawn between *opus tessellatum*, consisting of cubes regularly disposed in geometrical patterns, and *opus vermiculatum* in which a picture is produced by means of cubes irregularly placed. The two methods were commonly used in conjunction by the Romans, who recognized that a pavement should emphasize the form of the room to which it belonged by means of a geometrical border, while figure-subjects should be reserved for the central space. The celebrated pavement at Palestrina (Plate IV., fig. 7), with an extensive view of the Nile and its surroundings, is possibly the earliest known Roman picture in mosaic. Though it can scarcely be dated to Sulla's restoration of the Praenestine temple, it cannot be later than the second half of the 1st century, and seems early Augustan both in its Egyptianizing subject and in its landscape motives. Small mosaic-pictures isolated in geometrical pavements were called *emblemata*, and were often transported from the great centres of production to distant provinces, where pavements were prepared for their reception. The subjects of these *emblemata*, like those of the wall-paintings of Pompeii, were taken frequently from Greek mythology, and it is not easy to determine what degree of originality is to be assigned to Roman artists. We note a certain interest in the great figures of literature and philosophy. A subject commonly known as "The Academy of Plato" shows us a group of Greek philosophers engaged in discussion. In provincial pavements it is not uncommon to find portraits of poets or philosophers used to fill ornamental schemes of decoration, as in the famous mosaic at Trier signed by Monnus. The portrait mosaic of Virgil, mentioned on p. 401 discovered in a villa at Sousse in Tunisia (ancient Hadrumetum) shows a marked new interest in Roman literature, while it has also been shown that the mythological scenes depicted by the mosaic-workers of the later imperial period are frequently inspired, not by Greek poetry or even Greek artistic tradition, but by the works of Ovid; and the popularity of the legend of Cupid and Psyche is, doubtless, to be traced to its literary treatment by Apuleius. Besides a well-chosen repertory of geometrical patterns, the mosaic-workers make use of vegetable motives taken from the vine, the olive, the acanthus or the ivy, as well as traditional figures, such as the seasons, the winds, the months and allegorical figures of all kinds, forming elements in a scheme of decoration which, though often of great richness, is never lacking in symmetry and sobriety. Mosaic pavements were a common luxury in the provinces, those of Gaul and of Roman Africa being specially celebrated; and there are fine examples from both Africa and Roman Britain in the British Museum.

Wall and ceiling mosaics from the classical period are rare. What appears to be the earliest example in Italy was identified in 1928 by G. Lugli at the villa of Hadrian. It is a floral-geometric design in black on a white ground of marble tesserae veined with a vitreous blue paste, which adorned the vaulted ceiling of a house of republican date, afterwards transformed by Hadrian into the imperial residence. Another example of the 2nd century A.D., first noted by Ashby (*P.B.S.R.*, iii., 1906, p. 104) is afforded by a circular domed nymphaeum near the Via Tiburtina, which is entirely covered with a mosaic of plain white tesserae. But the destruction, partial or complete, of the imperial thermae and palaces has deprived us of the more elaborate means of passing judgment on the systems of *opus musivum* proper (*see* MOSAIC), *i.e.*, the decoration of vaults and wall-surfaces with mosaics in glass, enamel or precious materials. We can, however, form some idea of these from the decoration of fountains at Pompeii and elsewhere, as well as from the compositions which adorn the walls and apses of early Christian basilicas. The mosaic on blue ground of the god Silvanus, on a fountain niche from Ostia at the Lateran (Plate IV., fig. 8), shows a type of decoration whence derive the apsidal compositions of S. Pudenziana or of SS. Cosma and Damiano. On the other hand, the celebrated groups of Justinian and Theodora with their courts, in S. Vitale at Ravenna, continue the series of those imperial groups of which the families of Maximian and of Constantine Chlorus, painted in a hall of the palace of Aquileia, afforded a noted and celebrated example. The "Roma Barberini" comes, as we have seen, from a similar group in Rome, and the Theodosius, with his sons and officers of State, on the silver plate in Madrid probably reproduced yet another. Further fine and instructive examples of *opus musivum* may be studied at S. Costanza in Rome, built by Constantine early in the 4th century A.D. The mosaics of the cupola were destroyed in the 16th century, but those of the annular vault which surrounds the baptistry, though much restored, show that the decorative schemes of Erotes, vine-patterns, medallions, etc., commonly found in pavements were also used by the *musivarii*.

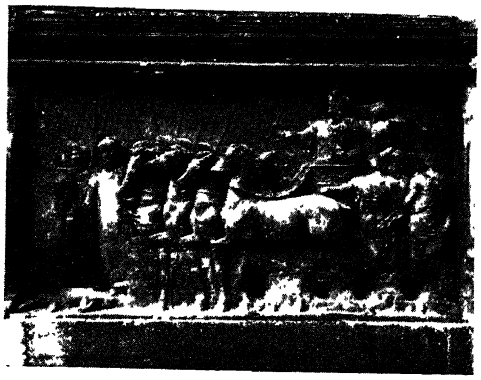
When employed in the service of Christianity the old pagan themes were invested with a new spiritual meaning, and mosaic became the chief channel through which motives invented by paganism were transmitted to Christian art. The acanthus decoration in green and gold on blue ground in the baptistry of S. John Lateran continues the floral arabesques of the Ara Pacis, and similar scrolls form the background of the *arbor vitae* at St. Clemente (time of Pope Paschal II., 1099–1118), and frame the central group of the apse mosaic at S. Maria Maggiore (time of Nicholas IV., 1288–92). In other mosaics we find the pagan river motive, with pleasure boats floating down stream and boys angling from the bank, to symbolize the river Jordan or the rivers of paradise.

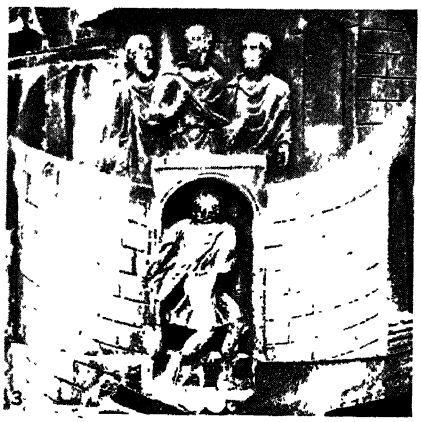
Opus sectile, a marble intarsia of various colours, also deserves to be noted. An interesting example in Palazzo Colonna, possibly as early as the 1st century, represents the "Infancy of Romulus and Remus"; another, attributable to the 4th century, is provided by the magnificent, though sadly scattered remains of the revetments in marble and mosaic of the basilica of Junius Bassus (consul, A.D. 331) on the Esquiline. They are remarkable for brilliancy of colouring and for the magnificent frontal composition of certain of the panels; the one chosen for illustration (Plate IV., fig. 11), which represents the consul himself riding into the circus surrounded by mounted attendants, has the same pictorial quality (the same absence, for instance, of ground line), as the Ravenna mosaics of Justinian and Theodora.

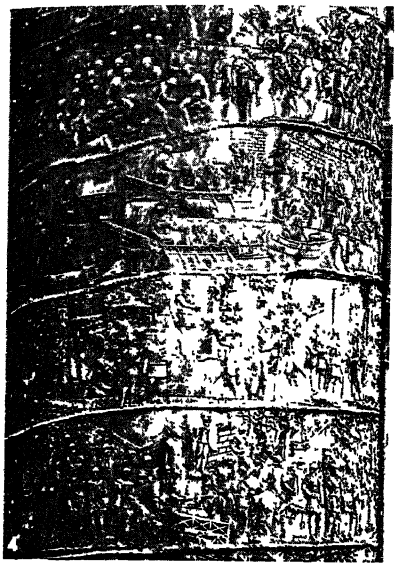
PRECIOUS METALS AND BRONZE FURNITURE

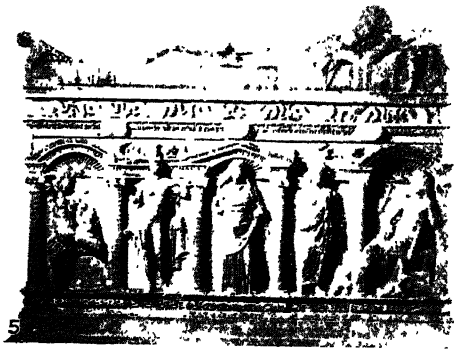
For the history of plate *see* PLATE. Pliny's lament (*N.H.* xxxiii., 154 *sqq.*) that silver chasing was, in his time, a lost art, is mere rhetoric and is amply disposed of by the list he gives in an









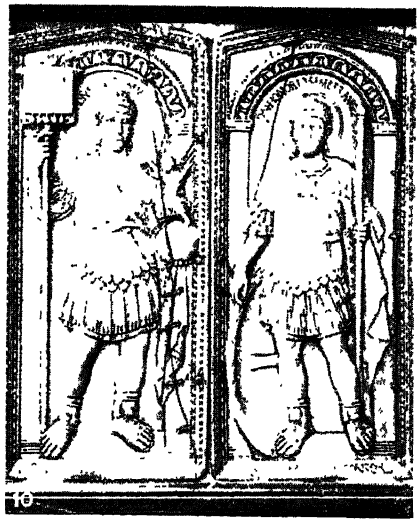












BY COURTESY OF (9) LIBRERIA SPITHOEVER FROM "NUOVO BULLETTINO DI ARCHEOLOGIA CRISTIANA", PHOTOGRAPHS, (1, 2, 4, 7, 8, 10) ALINARI, (3, 6) ANDERSON

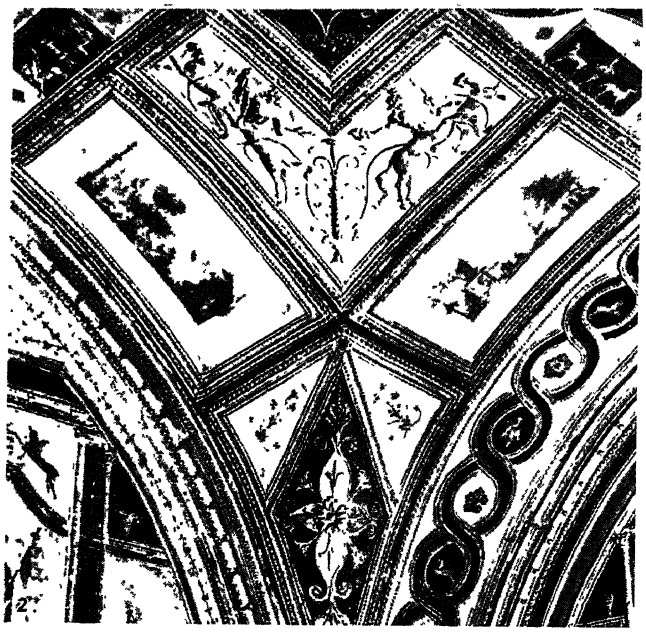
ROMAN FRESCOES AND RELIEFS

1. Relief representing an augur taking the auspices. Detail from a frieze
2. Detail of a relief from the Arch of Titus, in the Roman Forum, showing the emperor in the triumphal car returning from Jerusalem
3. Detail of the column of Marcus Aurelius, Rome
4. Detail from the column of Trajan, Rome, dedicated in A.D. 113. The various episodes in the emperor's life are linked together in a spiral of 22 turns, to represent a continuous whole
5. Sarcophagus at Melfi, in Apulia, Antonine period (2nd century A.D.). A full-length portrait of the deceased girl is on the lid, and the sides are ornamented with figures symbolic of the soul's destiny
6. Wall-painting from the Roman house discovered in the grounds of the Villa Farnesina, Rome; thought to be possibly as early as the middle of the 1st century B.C. In the Museo delle Terme, Rome
7. Fresco from the series representing a Dionysiac initiation, discovered in 1911 in the so-called "Villa of the Mysteries" at Pompeii
8. Septimius Severus and Julia Domna sacrificing. Relief from the gateway of the Silversmiths (Argentarii), Rome
9. Fresco painting of a farm scene; period of the Severi (about A.D. 200). From the Hypogeum (underground chamber) of the Aurelii discovered in 1919 near the Viale Manzoni, Rome
10. Ivory diptych with double portrait of Honorius, about A.D. 406. In the Treasury of the Cathedral, Aosta

ROMAN ART



1



2



3



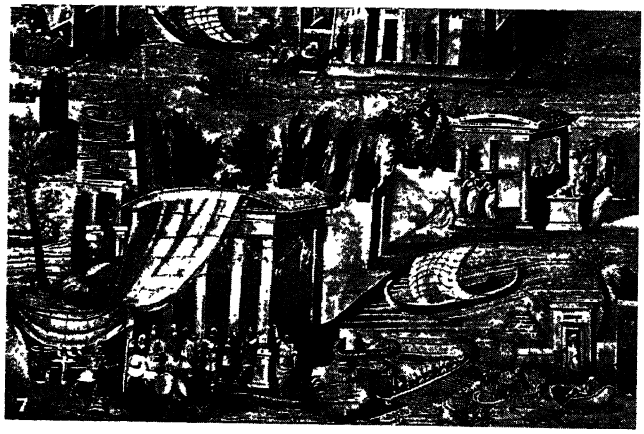
4



5



6



7



8



9



10



11

BY COURTESY OF (5) WM. HEINEMANN LTD., (6) THE TRUSTEES OF THE BRITISH MUSEUM, (11) THE DIRECTOR OF THE VICTORIA AND ALBERT MUSEUM; PHOTOGRAPHS, (2, 8) ANDERSON, (4) ALINARI, (7) BROGI

MINOR ARTS OF ANCIENT ROME

1 and 3. Two silver goblets found in 1922 near Copenhagen, probably the work of the 1st century. They are ornamented with scenes from the Homeric cycle. In Copenhagen

2. Stucco reliefs combined with paintings, from one of the tombs on the Latin Way, Rome. From the 1st or 2nd century

4. Portrait medallion on glass, representing two ladies and a boy, now identified as Alexander Severus at the age of 16 (A.D. 221), with his mother and his grandmother. The medallion was later inserted as the centrepiece of a cross. Now at Brescia

5. Cameo of Claudius. In the Royal Collection at Windsor Castle

6. Fresco of the head of a shepherd piping, said to have been found in a tomb near Rome. In the British Museum

7. Detail of a large mosaic pavement, showing a view of the Nile and its surroundings; perhaps of the 1st century B.C. In the Palazzo Barberini, Palestrina

8. Mosaic of Silvanus, of a fountain niche at Ostia. In the Lateran Museum, Rome

9. The Good Shepherd; fresco of the period of the Severi. From the Hypogeum of the Viale Manzoni, Rome (Plate III., fig. 9)

10. Wall-painting in a room of the Roman house discovered under the Church of SS. John and Paul, Rome. The subject is the meeting of two divinities (Dionysos and Thetis?) on a sea-girt rock, surrounded by tiny love-gods. One of the largest and best preserved ancient paintings so far discovered in Rome, probably not later than the period of Marcus Aurelius (A.D. 161–180)

11. An example of *opus sectile*, a marble intarsia of various colours, from the basilica of the Consul Junius Bassus, Rome. The subject is the consul riding into the circus surrounded by mounted attendants. About A.D. 331

earlier chapter (xxxiii. 139) of the principal ateliers in which such work was produced in his time, as well as by the numerous surviving examples of Roman plate. Of the utmost significance is the famous treasury discovered at Boscoreale (now in the Louvre), which contains pieces ranging from the age of Caesar to that of the Flavians. Many of the subjects are specifically Roman, like those of the pair of cups representing the triumphs of Augustus and Tiberius. A Julio-Claudian cup in Vienna, from Aquileia, shows in the same way as the corselet of the Augustus of Prima Porta, the benefits ensuing from the imperial rule. Other notable 1st century examples may be seen in Naples. Roman plate travelled far and wide over the empire, and excellent examples have been found at Berthouville in Normandy, at Hildesheim in Germany, and even in Denmark. The two goblets found as recently as 1922 near Copenhagen (Plate IV., figs. 1 and 3), reproduce scenes from the Homeric cycle (ransoming of Hector and myth of Philoctetes) so popular among the Romans. The artist, who signs himself Cheirisophos, was probably a Campanian Greek in the service of Roman employers. The gold patera with Dionysiac subjects (from Rennes, in the Cabinet des Médailles) shows the vitality of the art under Septimius Severus, and that it continued to flourish long after is attested by the silver disc of Theodosius at Madrid, and of Valentinian at Geneva.

Bronze furniture, too, was often of great beauty, and among pieces that deserve at least a mention are the *lectica* or litter of Augustan date in the Museo dei Conservatori; the couch with silver inlay in the same collection; the graceful tripod-stand at Naples, the tray of which is wrought with garlands in the style of the Ara Pacis; while the so-called Tensa Capitolina, with its rich bands of decoration and portrait medallions, is a notable example from the 3rd century A.D.

ENGRAVING AND MINOR ARTS

By far the greater part of the ancient gems which exist in the modern collections belong to the Roman period, and the great popularity of gem-engraving amongst the Romans is shown by the enormous number of imitative works, cast in coloured glass paste, which reproduce the subjects represented in more precious materials. In the Roman *intagli* we can trace the various phases of Roman plastic art. A black agate in the Hague museum (Furtwangler, *Die Antiken Gemmen*, pl. xlvii. 13), supplies a characteristic portrait of the Ciceronian age. The splendid cornelian which has passed from the Tyszkiewicz collection at Boston (inscribed ΠΟΠΠΙΑ [for Popilius], ΑΛΒΑΝ [for Albanius], the names of two Roman families), which portrays Augustus, in the guise of Poseidon, in a chariot drawn by four hippocamps, should, doubtless, be referred to the victory of Actium. A sardonyx in Florence (Furtwangler, *op. cit.*, pl. lix. 11) portrays an empress of the Julio-Claudian line as Hera. Flavian portraiture is seen at its best in the aquamarine in the Cabinet des Médailles signed by Euhodos, which represents Julia, the daughter of Titus. Amongst later gems one of the finest is the "Hunt of Commodus" in the Cabinet des Médailles, engraved in a stone popular with Roman artists—the "nicolo," a sardonyx with a bluish-grey upper layer used as background, and a dark brown under layer in which the design is cut. But the masterpieces of Roman gem-cutting are to be found in the great cameos, cut in various materials, including single coloured stones such as amethyst or chalcedony, though the stone most fitted by nature for this branch of art was the sardonyx in its two chief varieties—the Indian, distinguished by the warmth and lustre of its tones, and the Arabian, with a more subdued scale of colour. Two masterpieces survive in the "Grand Camée de France" (cab. des Antiques, Paris), a magnificent Indian sardonyx in five layers representing the apotheosis of the Julio-Claudian house, and the "Gemma Augustea," an Arabian sardonyx which shows Augustus and Roma enthroned, receiving a victorious prince, while in a lower zone are groups of captives and Roman soldiers. Other examples of the first order are the cameo of Augustus from the Strozzi and Blacas collections, now in the British Museum, the cameo of Claudius in the collection at Windsor (Plate IV., fig. 5); the busts of the same emperor and of three members of his family set on cornucopiae, at Vienna.

Engraved gems are not the only examples of Roman work in precious metals. Amongst the portraits of the first dynasty none are finer than the small head of Agrippina the younger in the British Museum in *plasma* (root-of-emerald), and the lovely head of Tiberius in turquoise, acquired by the British Museum during the World War, from a soldier, who found it in Egypt. Vases, again, were carved in precious stones, such as the famous onyx vase at Brunswick (Fürtwangler, *op. cit.*, figs. 185–88) with reliefs relating to the mysteries of Eleusis, and the smaller, but finer, onyx vase in the Berlin museum (Fürtwangler, *op. cit.*, figs. 183–184), representing the lustration or baptism of a prince of the Julian line—a rock surmounted by a small temple recalls one slab of the Ara Pacis, and the work seems of Augustan date.

As mentioned before, coloured glass was used as a substitute for gems, and it is to the school which produced the cameos of the early empire that we owe the vases in white and blue glass of which the Portland vase in the British Museum is a famous example. Pompeii furnishes a second in the amphora, decorated with vintage scenes, in the Naples museum.

We must also class amongst the fine arts that of the die-sinker. Not only are the imperial portraits found on coins worthy of a place beside the works of the sculptor, but in the medallions of the 2nd century A.D. we find figure-subjects, often recalling those of contemporary reliefs, treated with the utmost delicacy and finish. Later lead medals often reproduce landscape motives and actual views; *e.g.*, medal of Diocletian, in Paris, with view of a city, its river and bridge; medal of Constantius Chlorus, found in 1922 near Arras, with the Thames and the port of London; medal of Constantine with the famous gate of Trier. The fine bronze medallion of Valens and Valentinian, enthroned side by side in frontal pose, shows that the art of the medallist was still vital in the 4th century A.D.

Ivory was a favourite material with the Romans, as it had been with the Etruscans. It was worked both in the round and in relief and often used for the adornment of furniture. A head of 1st century date—probably Augustus—in the Stroganoff collection, and another representing a personage of mid 3rd century date, in the British Museum, rank with the best Roman portraiture. The series of consular and other diptychs are discussed in a special article (DIPTYCHS). Among them are masterpieces like the magnificent Symmachorum-Nicomachorum diptych, one leaf of which is in the Victoria and Albert Museum and the other in the Cluny Museum at Paris. Diptychs also largely helped to keep portraiture alive; fine examples of this type are the diptych of Probus at Aosta with the double portrait of Honorius (Plate III., fig. 10); that of Felix, of the year A.D. 428, in Paris and that of Boethius, consul in A.D. 487, in the museum of Brescia.

Of the purely industrial arts it is unnecessary to speak at length. In the last century of the republic a flourishing manufacture of red-glazed pottery was established, with its chief centre at Arretium (Arezzo); the signatures of the vases enable us to distinguish a number of workshops owned by Romans who employed Greek or oriental workmen. The repertory of decorative types reflects the cross-currents of classicism and naturalism which were contending in later Hellenistic art. In the 1st century A.D. the Italian fabrics were gradually driven out of the market by those of Gaul, where the industry took root in the Cevennes and the valleys of the Rhône and the Allier; and before long north-eastern Gaul and the Rhineland became centres of production in the various minor arts, which continued to flourish until the breakdown of the imperial system in the 3rd and 4th centuries A.D. Glass, though made in quantities for the Roman market, was usually of foreign manufacture, probably Syrian. The subject is fully treated in Kisa, *Das Glas im Altertum*.

With only limited space at our disposal, we have confined ourselves in the above section to monuments in Rome, only going outside the capital for examples of exceptional importance. The products of local or provincial art and the special problems which they raise cannot be treated here, though some clue to the literature of the subject will be found in the bibliography. The Museo del Impero Romano affords a well-arranged survey of Roman provincial art; it contains, along with much that is new, most of

the objects from the Exhibition of the Roman Provinces held in the Baths of Diocletian in 1911, an account of which by E. Strong appeared in the 1st volume of the *Journal of Roman Studies*.

SUMMARY

It may be said that as the establishment of the Roman empire gave a political unity to the ancient world, and acceptance of Christianity by its rulers assured the triumph of a universal religion, so the growth of a Graeco-Roman nationality, due to the freedom of intercourse between the subjects of the emperors, led to a unity of culture which found expression in the art of the time. Yet no sooner was the fusion of the elements which contributed to the new culture complete than the process of disruption began, which issued in the final separation of the Eastern from the Western empire. In the first, the oriental factors, which produced a gradual transformation in Graeco-Roman art, definitely triumphed; and the result is seen in Byzantine art. But in the West it was otherwise. The realism native to Italy remained alive in spite of the conventions imposed upon it; the human interest asserted itself against the decorative. Therefore, the Christian art of the West is the true heir of the Roman, and, through the Roman, of the classical tradition. As we have seen, Roman art in its specific aspect was an historical art; and it was for this reason eminently fitted for the service of an historical religion. The earliest Christian art whose remains are preserved is that of the catacombs; but though not devoid of technical merit (on this point *see* A. della Seta, *Religion and Art*, p. 331 *seq.*) this art is dominated by the single idea of deliverance from the grave and its terrors, whether this be conveyed by scriptural types or by representations of paradise and its dwellers. Not until the Church's triumph was complete could she command the services of the highest art and unfold her sacred story on the walls of her basilicas; but, when the time came, the monumental art created by the demands of imperial majesty was ready to pass into the service of Christianity.

It remains to note that the scientific study of ancient Roman art dates from a comparatively recent period. The great artists of the Renaissance, headed by Raphael and Michelangelo, showed no lack of appreciation for such models as the reliefs of Trajan's Column; and Mantegna's "Triumph of Caesar" vividly suggests how great was the influence exerted by Roman historical sculpture upon their choice and treatment of monumental subjects; but their eyes were already fixed on the Greek ideal, however imperfectly represented by the monuments then available. In the 18th century the supremacy of this standard seemed established beyond challenge, and even the vision of the *Magnificenza Romana*, evoked by Piranesi, failed to arouse any response in Winckelmann and the apologists of Greece. The Greek antique, till then only dimly divined behind the copies that filled the palaces and galleries of Italy, was soon to be made more vivid by the recovery of the buried treasures of Herculaneum and Pompeii and the systematic excavation of the extant remains of Hellenic art, which began early in the 19th century and still continues, not unnaturally absorbed the attention of the majority of classical archaeologists. Nevertheless, towards the close of the 19th century, when the main lines of Greek artistic development had been traced and interest aroused in its later offshoots, critics were led to examine more closely the products of the Roman period. In 1893, Alois Riegl entered the lists on behalf of Roman Art with his *Stilfragen*, a series of essays on the history of ornament, in one of which he expressed the opinion that "there was in the antique art of the Roman empire a development along the ascending line and not merely a decadence, as is universally believed." This thesis was taken up two years later by Franz Wickhoff in a preface to the reproduction in facsimile of the illustrated ms. of Genesis in the imperial library at Vienna.

In the year following the English translation (by E. Strong) of Wickhoff's work, Riegl published the first (which, by reason of his untimely death, remained the only) volume of his *Late Roman Industrial Art* (new ed., 1927) in which he endeavoured to show that the later transformations of Roman art in the 2nd and succeeding centuries after Christ continue to mark a definite advance. The fecundity of the leading ideas put forward by Wickhoff and Riegl remains unimpaired, as Koch points out, in spite of the attacks of Josef Strzygowski, who for 30 years and more has never ceased to dispute the originality of Roman art and to insist that Roman artistic achievement, whether of the imperial or early Christian period, was at all times dependant on the Hellenistic East. By thus shifting the ground of controversy from the Mediterranean to the oriental area, Strzygowski, again to quote Koch, has immeasurably broadened the archaeological horizon; but the net result of the long conflict, so far as our enquiry is concerned, has been to bring out more clearly the essential characteristics of Roman art in the pre-Christian period, and its high significance in the formation of the art of the Christian West. The case for Roman art is stated anew by G. McN. Rushforth in the chapter "Roman Art and Architecture," contributed to the *Legacy of Rome* (1923) and by Herbert Koch in the admirable monograph, *Römische Kunst* (1925), already quoted. It will be seen from what has been said above that there is a new and growing interest in the post-Constantinian periods of Roman art, down to Justinian and later. Of this we have the proof, not only in Riegl's book quoted above, but also in Delbrueck's magnificent publication of late Roman monuments—done by care of the German Institute—and in all the newer histories of ancient art—Rodenwaldt's for instance.

BIBLIOGRAPHY.—I. General: F. Wickhoff, *Roman Art* (trans. E. Strong, 1900); P. Gusman, *L'art décoratif de Rome* (1908); A. Michaelis, *A Century of Archaeological Discovery* (1908); H. B. Walters, *The Art of the Romans* (1911); H. Stuart Jones, *Companion to Roman History* (1912); E. Baumgarten, F. Poland and R. Wagner, *Hellenistisch-Römische Kultur* (1913); A. della Seta, *Religion and Art* (trans. 1914, *Etruria and Rome*, pp. 245–291), *Italia Antica* (2nd ed., 1928), *I Monumenti dell' antichità classica* (1926; *Italia*, p. 17 *seq.* and 123, etc.); E. Strong, *Apotheosis and After Life* (1915), for the religious element in later Roman Art; R. Cagnat and V. Chapot, *Manuel d'archéologie romaine* (2 vols., 1916, 1920); H. Koch, *Römische Kunst* (1923); A. Springer, *Die Kunst des Altertums* (12th ed., 1923); A. Riegl, *Die Spätrömische Kunstindustrie* (new ed., 1927); G. Rodenwaldt, *Die Kunst der Antike* (*Hellas und Rom*) (1927).

II. Architecture: A. Choisy, *L'art de bâtir chez les Romains* (1876), *Histoire de l'architecture*, vol. i. (1899); H. Wölfflin, "Die antiken Triumphbogen in Italien" in *Repertorium f. Kunstwissenschaft* (1893); J. Durm, *Die Baukunst der Etrusker u. Römer* (2nd ed., 1905); F. Haverfield, *Ancient Town Planning* (1913); K. Swoboda, *Römische u. romanische Paläste* (1919); F. Toebelmann, *Römische Gebälke*, vol. i. (1923); G. Giovannoni, "Building and Engineering," in *Legacy of Rome* (1923); A. von Gerkan, *Antiker Städtebau* (1924); F. Noack, *Die Baukunst des Altertums* (Berlin), *Triumph und Triumphbogen* (1925–26); G. T. Rivoira, *Roman Architecture* (1926).

III. Sculpture: W. Froehner, *La Colonne Trajane* (1872–74); C. Roberts, *Die Antiken Sarkophagreliefs* (1890–1904); T. Schreiber, *Hellenistische Reliefbilder* (1894), for Roman reliefs; E. Petersen, *Die Marcussäule* (1896); C. Cichorius, *Die Relief der Trajanssäule* (1890); E. Corbaud, *Le bas-relief romain à représentations historiques* (1899); E. Petersen, *Ara Pacis Augustae* (1902), *Trajan's Dakische Kriege* (1899–1903); W. Amelung, *Die Sculpturen der Vaticanischen Museen* (2 vols., 1903 and 1908); W. Altmann, *Die römischen Grabaltäre der Kaiserzeit* (1905); E. Ferrero, *L'Arc d'Auguste à Suse* (1910); F. Studniczka, *Zur Ara Pacis* (1909); British School at Rome, ed. H. S. Jones, *Catalogue of Sculptures in the Museo Capitolino* (1912), *Sculptures in the Museo dei Conservatori* (1926); E. Schmidt, *Archäistische Kunst in Griechenland und Rom* (1922); G. Lippold, *Kopien u. Umbildungen griechischer Statuen* (1923); K. Lehmann-Hartleben, *Die Trajanssäule* (2 vols., 1925), *Grossbronzen der römischer Kaiserzeit* (3 vols., 1927); E. Strong, *Roman Sculpture from Augustus to Constantine* (1907), Italian trans. *Scultura Romana* (2 vols., 1923 and 1926); J. Sieveking, "Das römische Relief," in *P. Arndt Festschrift* (1925); C. Weickert, "Gladiatoren-Relief der Münchner Glyptothek" in *Münchner Jahrbuch* (2nd series, 1925), *Römisches Relief der Zeit Caesars* in *P. Arndt Festschrift* (1925); R. Delbrueck, *Deukmäler der spätantiker Kunst* (1927).

IV. Portraiture: J. Bernoulli, *Römische Ikonographie* (4 vols., 1882–94); H. Brunn and F. Bruckmann, *Denkmäler griechisch-römischer Skulptur* (1888–1906); P. Arndt and F. Bruckmann, *Griechische und römische Porträts* (1891, etc.); A. Hekler, *Greek and Roman Portraits* (1912); R. Delbrueck, *Antike Porträts* (1912), *Bildnisse römischer Kaiser* (1914); C. Albizzatti, *Rassegna d'arte* (1918), for late portraiture; G. Kaschnitz-Weinberg in *Römische Mitteilungen* (1926), for Etrusco-Roman portraiture and in *Die Antike*, vol. ii. (1926) for Constantine portraiture.

V. Painting and Stuccoes: D. Raoul-Rochette, *Peintures antiques médites* (1836); W. Helbig, *Campaniens Wandgemälde* (1868),

Untersuchungen über die campanische Wandmalerei (1873); K. Woermann, *Die Landschaft in der Kunst der alten Völker* (1876); A. Soglian, *Le pitture murali campane* (1879); A. Mau, *Geschichte der Wandmalerei in Pompeii* (1882); W. F. Petrie, *Hawara* (1889), chap. vii., for Fayoum portraits; G. Ebers, *Antike Porträts* (1893), for Fayoum portraits; B. Nogara, *Le Nozze Aldobrandine* (1907), for ancient pictures in Vatican; P. Hermann ed. F. Bruckmann, *Denkmäler der Malerei des Altertums* (1907); G. Rodenwaldt, *Die Komposition der pompejanischen Wandgemälde* (1909); M. Rostovtzeff, *Die hellenistisch-römische Architekturlandschaft* (1911); *Mystic Italy* (1927); P. Buberl, *Die griechisch-ägyptischen Mumienbildnisse der Sammlung Th. Graf* (1922); E. Pfuhl, *Malerei u. Zeichnung der Griechen* (3 vols., 1923); E. Strong and N. Jolliffe, "Basilica of Porta Maggiore" in *Journal of Hellenic Studies* (1924); C. Cecchelli in *Roma* (1926), for hypogeum of Viale Manzoni; V. Macchioro, *La Villa dei Misteri* (trans. H. Bosco, 1926); A. Eibner, *Entwicklung und Werkstoffe der Wandmalerei* (1926); J. Carcopino, *Basilique Pythagoricienne de la Porte Majeure* (1926); G. Bendinelli, in *Monumenti dei Lincei* (1927), for basilica of Porta Maggiore.

VI. Minor Arts: P. Gauckler, "Musivum opus," in Saglio and Pottier, *Dictionnaire des antiquités* (1877–1919); A. Furtwängler, *Die antiken Gemmen* (3 vols., 1900); H. Graeven, *Elfenbeinwerke aus Sammlungen in Italien* (1900); J. G. de Pachtère and P. Gauckler, *Inventaire des mosaïques de Gaule et d'Afrique* (1909–11); W. R. Lethaby, "Late Ivories," in *Proc. Soc. Antiquaries* (1912); C. Albizzatti in *Römische Mitteilungen* (1914), for glass medallions; K. Regling, *Die Antike Münze als Kunstwerk* (1924); M. Bernhardt, *Handbuch zur Münzkunde der Römischer Kaiserzeit* (1926); H. Mattingly and E. Sydenham, *Roman Imperial Coinage* (2 vols., 1926); R. Delbrueck, *Antike Elfenbein-Reliefs*, part i. (1927); Hayford Peirce on medallion of Brescia in *Aréthuse* (No. 14, Jan. 1927).

VII. Provinces: G. Q. Giglioli, *Catalogo del Museo dell' Impero Romano* (1927), (*a*) Britain: R. G. Collingwood, *Roman Britain* (1923); F. Haverfield, *Romanization of Britain* (4th ed., 1924). (*b*) Gaul and Belgium: J. Déchelette, *Les Vases ornés de la Gaule romaine* (1904); E. Espérandieu, *Recueil général des bas-reliefs de la Gaule romaine* (1907–25); F. Cumont, *Comment la Belgique fut romanisée* (2nd ed., 1918); C. Jullian, *Histoire de la Gaule* (8 vols., 1928). (*c*) Germany: F. Koepp, *Die Römer in Deutschland* (2nd ed., 1912); H. Dragendorff, *Westdeutschland zur Römerzeit* (2nd ed., 1919); K. Schumacher, *Siedelungs- und Kulturgeschichte der Rheinlande* (1923); J. Colin, *Les Antiquités romaines de la Rhénanie* (1927). (*d*) Spain: E. S. Bouchier, *Spain under the Roman Empire* (1914); A. Schulten, *Hispania* (1921). (*e*) Italy and Eastern Europe: F. Studniczka, *Tropaeum Trajani* (Leipzig, 1904); E. Majonica, *Führer durch das Staatsmuseum von Aquileia* (1911); E. Hébard and J. Zeiller, *Spalato, le palais de Dioclétien* (1912); J. Weiss, *Die Dobrudscha im Altertum* (1912); C. Diehl, *Salonique* (1920); V. Parvan, "I primordi della civiltà romana alle foci del Danubio," in *Ausonia* (vol. x., 1921); C. Patsch, *Die Herzegowina ein und jetzt* (1922); E. Nischer, *Die Römer im Gebiete des ehemal Oesterreich-Ungarn* (1923). (*f*) Asia: V. Chapot, *La province romaine d'Asie* (1904); W. Libbey, *The Jordan Valley and Petra* (1905); G. Dalman, *Petra* (1908); A. Jaussen and R. Savignac, *Mission archéologique en Arabie* (1908); T. Wiegand, *Baalbek* (2 vols., 1921–25); Honigmann, "Baalbek" (1924) in Pauly-Wissowa's *Realenzyklopädie* (*g*) Africa: A. Schulten, *Das römische Afrika* (1899); G. Boissier, *L'Afrique romaine* (1901). (*h*) Egypt: C. Edgar, *Catalogue des antiquités du musée du Caire* (1903–11); E. Breccia, *Alexandrea ad Aegyptum* (Eng. ed., 1922); Société Archéologique d'Alexandrie, *Monuments de l'Égypte gréco-romaine* (1926). (*i*) Italian Africa: R. M. Smith and E. A. Porcher, *History of Recent Discoveries in Cyrenaica* (1864); E. Michon, *Statues antiques de la Cyrénaïque* (1915); *Notiziario Archeologico del Ministero delle Colonie* (1915, etc.); "Libya," *Rivista della Tripolitania* (1924); P. Romanelli, *Leptis Magna* (1925); S. Aurigenma, *Tripoli e le sue opere d'arte* (Milan, n.d.), *I Mosaici di Zliten* (1926); R. Bartocini, *Le antichità della Tripolitania* (1926), *Guida di Leptis* (Leptis Magna) (1927); *Africa italiana* (1927, etc.). (*j*) French Africa and Morocco: R. Cagnat and A. Ballu, *Timgad* (1892–1905); G. Boissier, *Monographies des musées et collections d'Algérie et de Tunisie* (1896); J. Toutain, *Les cités romaines de la Tunisie* (1896); S. Gsell, *Les monuments antiques d'Algérie* (1901); H. Ballu, *Guide illustré de Timgad* (1903), *Les Ruines de Djemila* (1921); R. Cagnat, *Carthage, Timgad, Tebessa* (1909); *Bulletin de la Commission des travaux historiques archéologique de l'Afrique du Nord; Revue Africaine* (1856, etc.).

Important papers treating the subject of Roman art may be found in the *Journal of Roman Studies* (founded in 1911 in response to the new interest in Roman subjects); the *Papers of the British School at Rome* (1902, etc.); *the American Journal of Archaeology* (1856, etc.); the *Revue Archéologique* (1844, etc.); *the Bollettino della Commissione Archeologica di Roma* (1872, etc.); *the Bollettino d'Arte del Ministero della Pubblica Istruzione* (1907, etc.); *Dedalo* (1920, etc.); *Jahrbuch des Archäolog. Instituts* (with its *Denkmäler*). (H. S. J.; E. Sg.)

ROMAN CATHOLIC CHURCH. The word *church* has etymologically many meanings. It might be used correctly of any gathering or assembly, secular or religious; actually it is commonly employed either to denote those who are united in a definite religious aim, or to signify the building in which they come together for united worship. In this article we are dealing with the word in a strict theological sense. By it we mean the visible body or organization which Christ Himself set up to perpetuate for all time the authoritative teaching of the truths which He came on earth to reveal to mankind. In this sense there can be only one Church, divinely constituted, divinely protected, in order that it may accomplish its mission. A more technical definition would be as follows: "The Church instituted by Jesus Christ is the visible society of men who, having received baptism, are united in the profession of the same faith and in one communion, and are seeking the same spiritual end under the authority of the Roman Pontiff, the successor of St. Peter, and of the bishops who are in union with him." To this Church Christ the Founder has given the right and duty to guard, teach and maintain the doctrine which He taught, and to preach it to the whole world without let or hindrance on the part of any human power. From the very nature of this one Church it is clear that men are bound to submit to its authority as soon as they become clearly aware of its existence and of its divine claims to their allegiance. Such submission is necessary for salvation.

In this living organism, the Church, we may distinguish the *body* and the *soul*. The body is the visible union of the Faithful, and their external government and organization; while the soul denotes all those invisible elements which give life to the body, rendering it capable of attaining the supernatural end for which alone it exists, namely sanctifying grace, the infused virtues, the gifts of the Holy Spirit and the like. As sanctifying grace is essentially necessary for salvation, no one can be saved who does not belong to the *soul* of the Church, and who does not, at least implicitly, desire and intend to belong also to its body. Such desire and intention are found in the sincere will to observe all the divine precepts and to take all means necessary for salvation. They are necessarily included in a real act of love of God and perfect sorrow for sin.

The Church, as we have said, has the right and duty of teaching all without exception. To those who by baptism have become its subjects the Church proposes its doctrine and expects from them obedience to its teaching. Those who are not baptized are bound not by the authority of the Church, but by the divine law, to seek, and when found, to accept the truth which God has revealed.

To sum up, Catholics believe that there is in the world a society which is both supernatural and visible, which is holy and universal; that this society was established by Jesus Christ Himself, while He sojourned on this earth; and that He called this society His Church. They believe, furthermore, that the unity of the Church is founded upon the Apostolic See of Rome; and that all men are strictly bound by divine law to enter into the unity of this Church so soon as they become really aware of its existence and fully conscious of its divine claim upon them. (F. Bo.)

ORGANISATION

The Catholic Church is governed by a hierarchy of bishops with the pope as bishop of Rome at the head. Under him patriarchs, archbishops and other greater prelates are possessed of various local jurisdictions over the bishops of their respective provinces. The Church teaches that the origin of all this varied jurisdiction must be sought in the authority given by our Lord Himself, and recorded for us in the Gospels. Just as no man, not even an Apostle or the Chief of the Apostles, could institute a Sacrament, so it was not in the power of man alone to originate the fundamental organization of the Church. Christ Himself before He ascended into heaven left the Church an organized body, with a system of rule that could indeed be developed indefinitely to meet the constant changes which must inevitably occur as the centuries passed, but which in its fundamental principles must remain unchanged to the end of the world. As we study the Gospels we find that all authority over this Church was left by Christ in the hands of a body of 12 chosen disciples, afterwards called the Apostles, over whom as a chief he placed one

of themselves in the person of St. Peter. The essential and unchangeable organisation of the Church is, therefore, according to Catholic doctrine, that the organisation instituted by Christ must be perpetuated; that there must always be the College of the Apostles ruling the Church, and that above all there must be the heir of St. Peter, governing all as the Good Shepherd in Christ's place in virtue of the great Petrine texts Matt. xvi. 16–19; Luke xxii. 32 and most of all, John xxi. 15–17. (*See* PAPACY and POPE.) The great scarcity of documentary evidence for the history of the Church, from the close of the Apostolic age to the beginning of the 3rd century, makes it impossible to trace in anything like accurate detail the steps by which the system of episcopal government, each bishop ruling in his own diocese and limited as to his personal jurisdiction to that diocese, followed and took the place of government by the Apostles themselves. We can see the beginning of it in the Pastoral Epistles of St. Paul, in the cases of Timothy and Titus, but no more than the beginnings. But at the beginning of the 3rd century, when first we can get a clear idea from surviving documents of the actual system by which the Church was being governed, we are confronted with the change as an accomplished fact. The Apostles themselves have long since passed away, but the Apostolic College remains in the College of Bishops. No single bishop is in himself an Apostle in the full sense, for each is limited to a local jurisdiction. But the whole body of the bishops is the successor, as a body, of the whole body of the Apostles, and by them, as a body, the whole of the powers granted by Christ to his Apostles are preserved and exercised. Over them, as their primate or chief, there is one of their own number, the bishop of Rome, acting as such in virtue of the claim that he is the successor of St. Peter, as being the bishop of the see in which St. Peter died and to which he left his privileges. No other bishop claims in the same way to be the successor of any other apostle. No apostle, except St. Peter alone, left a successor behind him. The bishop of Rome alone lays claim to being in his own person possessed of the full Apostolic power and to be in virtue of his succession to St. Peter the Universal Shepherd of all Christ's sheep. Naturally in those difficult times of persecution, the government of the Church was far less centralized than it afterwards became, for communications were always dangerous and often impossible, but the primacy of the bishop of Rome was everywhere acknowledged as well as claimed, and although its extent and the method of its exercise had to be developed and defined as the years went on and the needs of the Church required, it has always been based upon our Lord's grant to St. Peter and draws its sanction and authority from that grant and from nothing else.

As the Apostles, with the exception of St. Peter, were all equal, so also were the bishops among themselves. But it was found at an early date that some further organisation was needed, and neighbouring bishops were grouped together under the authority, generally, of the bishop of the metropolitan town. The organisation of the Church has always, for obvious reasons of convenience, tended to follow to a considerable extent the secular arrangements of the locality. The earliest time at which we can get any clear idea of the organisation of the period is that of the Council of Nicaea, A.D. 325, the sixth Canon of which runs as follows: "Let the ancient custom continue in force which subsists in Egypt, Libya and Pentapolis, by which the bishop of Alexandria possesses authority over all these, since the like custom subsists also with the Roman bishop. In like manner also their privileges should be preserved to the churches, as to Antioch and the other provinces." The Council does not create but recognises these privileges which it says were already ancient, but it justifies this exercise of authority by one bishop over another by referring it to the example of the primacy of the Roman See. In these earlier times the bishops of the three great Sees of Rome, Alexandria and Antioch were regarded as all sharing in the Petrine prerogative, Alexandria as having been founded by St. Mark, acting as the direct representative of St. Peter; Antioch as having been actually the temporary seat of his authority. While Rome was always held as the immediate superior of both Alexandria and Antioch it was through the Bishops of these places and not directly that Roman authority was at first exercised in the East. These three bishops were at the head of the Hierarchy of the Church and later on were given the title of "Patriarch." The bishop of Rome, who as head of the whole Church acquired later on the exclusive title of "Pope," was also the sole Patriarch of the West, while Alexandria and Antioch governed most of the East. In the 5th century two other bishops attained to the Patriarchal rank, Constantinople as being the seat of the empire and civil capital of the world, and Jerusalem as the cradle of the Church. Under these was a complicated and ever varying system of jurisdictions of exarchs, metropolitans and archbishops. To trace the historical changes of these jurisdictions would be quite beyond the possibilities of such an article as this, but the principle by which alone the whole system of subordination of one bishop to another can be justified in view of the essential equality of all, can only be found in the special grant by our Lord of the Primacy to St. Peter and the delegation of some share in that primacy to the rest of the Hierarchy.

This principle, which as we have seen was recognized even at Nicaea, is nowadays symbolized and expressed by the practice of sending the "Pallium" by the pope to every archbishop in possession of jurisdiction. The Pallium comes from the tomb of St. Peter, where a supply is kept in readiness, and symbolises and conveys such share in the Petrine primacy as belongs to the particular office. Till an archbishop has received his Pallium from the pope, he cannot exercise any archiepiscopal jurisdiction, though he is possessed as soon as he is fully appointed of all the jurisdiction which belongs to him as bishop of his own diocese. At the present time the number of Catholics in the world is roughly estimated at 300,000,000, all and each of whom are immediately subject to the Pope as the Universal Shepherd (John xxi., 15–17) and who are also governed by some 1,500 archbishops and bishops, each in his own diocese.

1. **The Primacy.**—As the pope has the care of the whole Church, that is of many million Catholics spread throughout the world, there is need for an extensive and detailed organisation at Rome adequate to cope with the varied questions that arise. This organisation is called the Curia. (*See* the special article CURIA ROMANA for details.)

i. **Cardinals.**—At the head of the *Curia* is the College of Cardinals, numbering 70 in all when the College is complete, who form the supreme Senate of the Church and the immediate advisers of the Pope. Historically they are the occupants of the six "suburban" sees, known as cardinal bishops; the incumbents of the principal parishes of Rome, known as cardinal priests; and seven who are the successors of the seven deacons who were responsible in early times for the more secular details of administration, and who are known as cardinal deacons. But these ranks are distinct from the orders of the Church and the cardinal priests are always bishops; about half of their number being the occupants of various important sees and non-resident in Rome; while the cardinal deacons are nowadays always priests.

ii. **Secretary of State.**—The cardinal secretary is, so to speak, the prime minister of the Pope. It is his office to deal with all political affairs, and especially all diplomatic relations with the separate countries and governments. From his department depend the nunciatures and delegations which represent the Holy See abroad, and it is with him that the ambassadors from foreign countries to the Holy See do their business.

iii. **Congregations.**—The causes which come to Rome for solution are referred for solution to a number of permanent *Congregations* each with a cardinal at its head, and with other cardinals as members and a number of other priests, specially learned in the particular subject involved, as assessors and advisers. There are eleven such *Congregations* of which the principal are:

1. *The Holy Office;* dealing with all questions of faith and morals.
2. *Consistorial;* dealing with the appointment of Bishops and other dignitaries except in countries subject to the *Propaganda;* the erection and division of dioceses and the reports

made by Bishops concerning the state of their diocese.

3. *Sacramental Discipline;* dealing with legislation concerning the Sacraments and questions as to their validity; especially the validity of marriages and ordinations.

4. *The Council;* dealing with matters connected with the summoning and management of councils; regulations as to parish priests, benefices and ecclesiastical property. It also deals with dispensations other than those from religious.

5. *Affairs of Religious;* dealing with all disputes between bishops and religious orders. Also it grants dispensations to religious, and deals with their internal disputes.

6. *de Propaganda Fide.* This is the great missionary organization of the Church. It has jurisdiction over all missionary countries, even over some where episcopal hierarchies have already been established.

iv. **Offices.**—The ordinary and routine business of the Church is carried on by the *Offices.* These have not now very great importance. They are:

(1) The *Chancery,* which sends out those important papal communications known as "Bulls." This is nowadays almost its sole duty.

(2) The *Dataria,* which deals with benefices the appointment of which is reserved to the Holy See.

(3) The *Apostolic Camera,* which formerly was of great importance as having control of the affairs of the Papal States, now has the care of the property of the Holy See.

(4) The *Office of Briefs* sent to princes, and *of Latin letters.*

v. **The Tribunals** which control the judicial functions of the primacy. These are:

(1) The *Sacred Penitentiary,* handling matters of conscience.

(2) The *Sacred Rota,* which was formerly the chief court for the Papal States. It is now the court which hears all appeals which are made from the courts of the bishops to the Holy See, and consists of ten judges who generally sit in threes, or more if the case is very important.

(3) The *Apostolic Segnatura.* This is the Supreme Court of Appeal and consists of six cardinals with assistants. An appeal lies from the *Sacred Rota* to the *Segnatura.*

2. **Archbishops, Metropolitans and Patriarchs.**—Besides their own episcopal jurisdiction over their own diocese, these greater prelates, whatever their title, have a provincial jurisdiction over their "suffragan" bishops. This jurisdiction is one strictly limited by law, the presumption being always in favour of the bishop and against the archbishop. It is attached to the office and therefore is "ordinary" jurisdiction, and affects the suffragan bishops immediately and the faithful of their dioceses through them. The extent of this jurisdiction varies very much in different localities, and is now everywhere less extensive than in former years. It is the archbishop's duty to summon his comprovincials to the Provincial Synod, which need now only be done once every twenty years, and in that Synod he presides of right, though his vote counts for no more than that of any other bishop. If the suffragan bishop has neglected to carry out the canonical visitation of his diocese, the archbishop may visit, after obtaining permission from Rome, and has full power of redressing abuses. When any one of the suffragan Sees becomes vacant it is generally the duty of the archbishop to see that the Cathedral Chapter elects a vicar capitular to carry on the administration of the diocese during the vacancy. An appeal lies from the Court of any one of the suffragan bishops to that of the archbishop, and where the rights of the bishop are involved he may hear cases from that bishop's diocese as a Court of first instance. Appeals from his own diocesan court, which formerly had to be taken to the Holy See, are now heard by some one bishop selected by the archbishop for that purpose once for all, and approved by the Holy See. The archbishop has always the right of pontificating in any church in his province, and may bless the people, grant 100 days indulgence, and have the cross carried before him in the church. He may not, however, except when he holds a visitation, perform any other acts which imply jurisdiction.

3. **Bishops.**—The bishop and the diocese form the most essential part of the Church's organisation, being of Divine institution under the primacy of the pope. A Bishop is nominated under different conditions in different parts of the world, but even after he has been thus canonically nominated he has no power until that nomination has been confirmed by the Holy See. Once this confirmation has been given and has been communicated to his Cathedral Chapter he has full possession of all episcopal jurisdiction, though he can do no acts involving the power of order, such as ordaining clergy or confirming children, until he has been consecrated. His jurisdiction is "ordinary," limited by restrictions imposed by the Holy See, but independent of his people and even of his clergy. In certain important matters he is bound to seek the advice of his Cathedral Chapter, though he is not usually bound to follow it. He is bound to make a visit *ad limina* to the Holy See at stated intervals to report on the state of his diocese. His authority over his diocese is fourfold: (1) *Teaching,* with authority over all schools, and the right of superintending all the publications of the faithful and especially of the clergy within his diocese. (2) *Legislative,* in which his power is strictly limited by the *jus commune* and by all existing laws which have wider scope than the bounds of his own diocese. He can dispense from all diocesan laws. (3) *Judicial.* He is judge of first instance in all cases which belong to the ecclesiastical tribunal. *In foro interno* he can reserve to himself the absolution from certain sins. He can enforce his sentences of ecclesiastics by suspending them from their functions. (4) *Administrative.* The Bishop can nominate, subject to any local rights of patronage, to all benefices in his diocese. He can oblige ecclesiastics to undertake special work, though he cannot force the cure of souls upon them if they are unwilling. He has authority over all ecclesiastical property, and none can be alienated or sold without his consent. But in nothing is his power unlimited, he is always subject to the precepts of Canon Law.

4. **Organisation of a Diocese.** (1) **The Cathedral Chapter.**—In the general regulations of his diocese the bishop must conform to the general laws of the Church and must not do anything which would impair the general unity of Church government. He has as his constitutional council, to assist him in the work of government, the canons of his Cathedral Chapter. The cathedral itself is the Church in which he has his seat (*καθέδρα*), and this he cannot choose at will, the pope reserving to himself the right of erecting a church to be a cathedral, as well as of instituting a chapter. Generally of course, the bishop finds both already established and in existence. The appointment of individual canons is generally in the hands of the bishop, though the appointment of dignitaries in the chapter is often reserved to the Holy See. As the chapter constitutes the diocesan senate the bishop is bound to convene it, and to ask its consent or advice in important matters. In some matters, which touch diocesan rights, or affect diocesan property, its consent is necessary and the bishop cannot validly act without it. In other matters, though the advice of the chapter must be asked, the bishop is not bound to act upon the counsel tendered. When the see is vacant by the death or resignation of the bishop, the chapter succeeds to his ordinary jurisdiction, but not to any jurisdiction that was personal to himself. Within eight days after the vacancy the chapter must elect a "vicar capitular," to whom the whole administration of the diocese immediately passes. In the United States of America and elsewhere, where Cathedral Chapters have not as yet been constituted, a body of "diocesan consultors" has generally to be appointed by the bishop, and he is bound to ask the advice of these consultors on important matters, though they have not the power of vetoing his action.

5. **The Vicar General.**—The bishop generally appoints one or more priests to assist him, deputing to them with a certain universality of power all his own jurisdiction within the diocese, so that the vicar general is his *alter ego,* and no appeal lies from the one to the other. By virtue of this general mandate the vicar general exercises "ordinary" jurisdiction throughout the diocese in the bishop's name. This jurisdiction however, being dependent on that of the bishop, ceases at the bishop's death, or with the cessation of the bishop's own jurisdiction. The office of a vicar general ceases also with his own death or resignation, or with the

withdrawal of his vicarial mandate, which last however can only be taken from him for a grave cause, allowing of an appeal to the Holy See.

6. **The Diocesan Chancery.**—This is the office through which the ordinary and routine work of the diocese is carried on. At its head is the chancellor. His duties are to carry on the official correspondence of the diocese and to see that records are duly kept. He can be removed by the bishop, but by the vicar capitular during a vacancy only with the consent of the whole chapter.

7. **The Parish.**—Where the full organisation of the Church is in force, the diocese is subdivided into parishes covering the whole ground. Each parish should have its own church, and is under its own pastor having care of souls, and irremovable except for grave cause. But where the full organisation is not in force, there are *quasi-parishes,* with pastors who do not possess the full rights of parish priests. The full parish system has not yet been introduced either in England or the United States, though certain mission districts or *quasi-parishes* have pastors who are not removable at the will of the bishop. The bishop can alter the boundaries of parishes, erect new ones, or join two together where there is just cause for so doing. He is bound however first to ask the counsel of the chapter, though he is not bound to follow it.

The pastor of a properly constituted parish has "ordinary" jurisdiction. His rights within the parish are regulated by canon law, and include the faculties of preaching, celebrating Mass, hearing confessions and administering the sacraments, though he can delegate this authority. Where the parish is too large to be administered by one priest, assistant priests are sent by the bishop to help him. These assistants are appointed by the bishop (though in some places the parish priest has the right of nomination) and are removable by him but only for just cause. Their jurisdiction is "delegated" and they receive their faculties from the bishop.

If the parish priest is ill or incapacitated for any reason, the bishop must send a coadjutor to fill his place, and in like manner will appoint an administrator of the parish during a vacancy.

8. **Vicars Apostolic.**—In districts where the ordinary hierarchy of the Church has not yet been established and there are no proper dioceses erected, the Holy See governs directly by means of a delegate who has received episcopal consecration to a titular see, and who has the title of vicar apostolic, or prefect apostolic. The main difference between the two is that the vicar apostolic is bound to make the visit *ad limina* at certain intervals while the prefect apostolic is not. They are not diocesan bishops and therefore have no cathedral and no chapter, and all their powers are "delegated" and not "ordinary." Otherwise they enjoy as a rule all the powers that bishops have by canon law in their own dioceses. They have no vicar general, though they can give special faculties to individual priests to enable them to assist in the rule of the district, and as they have no chapters they are bound to nominate three or more of their leading priests to act as counsellors. There are at the present time vicariates apostolic, prefectures apostolic and "missions." In addition there are vicariates apostolic of Uniat Greco-Bulgar rite; and four vicars apostolic of the Syro-Malabar rite in India.

The Uniate Churches of the East.—All that has been written so far on the local organisation of the Catholic Church applies only to the Western Church and the Latin rite, which include the vast majority of Catholics. But there are also a number of so-called Uniate Churches in full communion with the Holy See, but organized separately. These do not represent, as is often thought, any sort of compromise or intermediate position between Western Catholicism and the various schismatic or heretical churches of the east. All the Uniate Churches accept the full Catholic faith and are in matters of doctrine absolutely at one with Rome. They all accept in its fulness the primacy of the Holy See and are subject to its supreme jurisdiction. In each case the Uniate Church is made up of those faithful ones who have refused to follow the great body of their fellow countrymen into heresy or schism, and they retain their old privileges and represent the church of that district or country as it would have been had t schism never occurred. In no case, however, has the successi from the ancient hierarchy been preserved, but a new hierarcl has been instituted from Rome, with the old titles and privileg and with the preservation of the ancient rite. The object aim at by Rome in instituting a Uniate Church is not the Latinizing the ancient rites, but the union of hearts in the one faith, a under the one primacy of the Holy See.

Religion in the East has always been far more a matter nationality than it has in the West. It has been found impossibl therefore to carry out the strict system of territorial jurisdictio which obtains everywhere in the West. In the East the churche are distinguished rather by nationality, by language, and by rit than by locality, and in consequence there is a system of inter penetrating jurisdictions which make it very difficult to explai clearly the plan on which the various Uniate Churches are or ganized. There are, for instance, at present seven patriarchs o Antioch, of whom three are schismatic, but four are in communio with the Holy See: the Latin patriarch, whose position is merely titular, originating during the Crusades and who resides in Rome; the Melchite patriarch, the Syrian patriarch and the Maronite patriarch. These last three each have jurisdiction over the Catholics of their own rite only.

The Uniates in Europe are more or less directly subject to the general system of the Catholic Church. Those in Asia and Africa, however, since the rights of the patriarchates have been preserved, enjoy greater autonomy, being ruled by the Holy See mainly through their respective patriarchs.

Exact statistics of the various Uniate Churches have always been very difficult to obtain, and the task is now harder than ever on account of the political changes which have followed on the War in Eastern Europe and in Asia. The total number of their adherents is probably somewhere about five millions, of whom the greater part belong to the Ruthenian Church. Their organisation too is very varied, some being under the local Latin bishops, some under a hierarchy of their own independent of the local Latin hierarchy; and some under the sole jurisdiction of their own patriarchs. The clearest way to exhibit this complicated system of jurisdiction is probably by a classification according to the rite employed.

1. **Catholics of the Byzantine Rite in Europe.**—These are to be found for the most part in the territory which at one time belonged to the Turkish empire in Europe at the time of its greatest extension, and which later belonged to Austria-Hungary. They use the Byzantine Liturgy.

a. *The Ruthenian Church.*—This is by far the most important of the Uniate Churches and is said to number between three and four millions. It is however but a fragment of the great body that gave in its adhesion to Rome in 1596, at the Synod of Brest in Lithuania; an adhesion which later on was completed in 1700 and 1702, after a bitter resistance, by the submission of the dioceses of Lemberg and Luzk. The larger part of these Catholics were in Russian territory and were forced to unite with the Orthodox Church of that country in successive persecutions in 1795, 1839 and 1875. At the present time Galicia and Hungary hold the greater number of these Uniates. In Galicia they have an independent hierarchy under the archbishop of Lemberg, with two suffragan sees at Przemysl and Stanislawov. In Hungary there are two bishoprics of the Ruthenian rite, but they are under the Latin archbishop of Gran. In Yugoslavia the Ruthenian bishop of Koros is under the Latin Archbishop of Agram. The liturgical language of these churches is Old Slavonic.

b. *The Rumanian Church.*—The Catholics of the Byzantine rite in Rumania, who number about 1,000,000, have their own organisation under an archbishop at Agaras, with three suffragan sees.

c. *Russia.*—The Uniate Ruthenian Church in Russia was finally extinguished by Alexander II. who put an end to the only diocese which still survived, that of Chiem, and forced all its adherents to join the Orthodox Church. There is at present no organisation for any Catholics other than those of the Latin rite existing in Russia, and those Russians who desire to live in union

with the Holy See have for the most part been obliged to accept the Latin rite for their own protection. But it is very difficult to obtain really trustworthy information as to what is the exact state of affairs on this point under the Soviet Government.

d. In *European Turkey* and in *Greece,* Catholics of the Byzantine rite are only found in small and scattered communities, who are under prelates known as "Ordinaries." In *Bulgaria* they are now under the Latin hierarchy, though formerly they had two vicars apostolic of their own.

e. In *Italy, Southern Italy* and in *Sicily* there are considerable numbers of Catholics who belong to the Byzantine rite, the descendants of a more numerous body who have been there since the 8th century. At the present time they number altogether between 50,000 and 60,000. They have no bishop of their own with territorial jurisdiction, but are under the Latin hierarchy. For the purpose of ordination however a titular archbishop resident in Naples is appointed by the Pope to ordain their priests. They have also a college of their own in Rome for the education of the clergy, St. Atanasio dei Greci, in the Via Babuino.

2. **Catholics of the Armenian Rite.**—These have never been very numerous. Before the war their numbers were estimated at 1,000,000; but in common with the rest of their nation they suffered much from Turkish persecution during the war and in the years which immediately followed. Their patriarch has the title of the patriarch of Cilicia. He has under him two archbishops, of Mardin in Iraq and of Sebaste and some twelve suffragan bishops. He has also jurisdiction over the archbishoprics of his own rite of Ispahan, and of Aleppo and the bishopric of Alexandria in Egypt. There is a well known Catholic Armenian monastery belonging to the Mechitarist monks at Venice, and another at Vienna, from both of which a great deal of good literary work has been done.

3. **Catholics of the Coptic Rite.**—There is a Catholic Coptic patriarch at Alexandria, with two suffragan sees at Hermopolis and Thebes. The number of Catholic Copts is not large, but is increasing. The patriarchate was founded by Leo XIII. in 1895. The Coptic liturgy is used.

4. **The Four Uniate Patriarchates of Antioch.** a. *The Melchite Patriarchate.*—The patriarch has jurisdiction over all the Uniates of Greek nationality in the Turkish empire. Under him are six archbishoprics and seven bishoprics. They are of the Byzantine rite, and the liturgical language is Arabic. There is a large seminary for the priests of this rite at Jerusalem in the Church of St. Anne, under the charge of the White Fathers of Cardinal Lavigerie. The patriarch draws his title from Antioch, but his residence is at the monastery of Ain-Traz in the Lebanon.

b. *The Maronite Patriarchate.*—The Maronites have their centre in the Lebanon. They are some 300,000 in number of whom only about 70,000 reside outside of the mountainous districts of Syria. The exact origins of this body are a matter of much controversy, but they are certainly the oldest of the Uniate Churches, even if their claim never to have been in schism or heresy cannot be substantiated. The Patriarch resides in the Lebanon and has under him ten bishops. The rite is Syrian, and Syriac is the liturgical language. But the original rite has been conformed to the Western practices much more than is the case with other Eastern Uniate rites.

c. *The Syrian Patriarchate.*—The patriarch resides at Mardin in Iraq, and has nothing directly to do with Antioch. He has jurisdiction over about 200,000 people, a secession from the Jacobite heresy. They suffered very much from Turkish persecution in the war and are consequently less numerous than they were. There are 3 bishoprics in Syria, and four in Iraq.

d. *The Latin Patriarchate* of Antioch is purely titular, and the patriarch, who is generally an Italian, resides at Rome.

5. **Catholics of the Chaldean Rite.**—These are under a patriarch, whose title is drawn from Babylon. He resides at Mosul, which is his own diocese, and has eight suffragan bishops in Iraq besides three in Persia, which last are under the archbishop of Urmia. This body also suffered very much from the Turkish persecution. Its numbers were formerly estimated at 50,000.

6. **Christians of St. Thomas** (Malabar coast).—For these Christians the claim is made that they come down directly from the mission of the apostle St. Thomas, and his tomb is venerated at Mylapur. In any case they are an extremely ancient body, whose history goes back to the early centuries. They are of the Syrian rite, and are governed, since 1895, by four bishops. Before that date they were under two Latin vicars apostolic. They number about 250,000 in all. (A. S. Ba.)

For bibliography referring to Catholic organization *see* Papacy, and Canon Law.

HISTORY OF THE CHURCH

In this section of the article attention is specially directed to the activity of the Roman Catholic Church as an organized society in relation to the human society of the State.

Thus considered the subject is conveniently divided into five sections. 1. The period to 313, of open war. 2. The period from 313 to the middle of the 8th century, of uneasy alliance with the State encroaching on the Church. 3. The period from the 8th to the 11th century. This is chaotic, and the relations of Church and State are variable, but generally the State as represented mainly by the petty nobles of Europe, has practical control. 4. The period from the 11th to the 16th century: during this there is again an alliance, but the Church is the dominant partner. Both the alliance and the dominance however weaken steadily. 5. The period down to our own time, mainly of rebellion of State against the Church, and of fluctuating alliances of the Church with different States.

A. **The First Period.**—As space forbids detailed treatment we must carefully expound the principles to be used in judging facts elsewhere more fully disclosed. Christianity was always unique; like the Jews, Christians were theocratic; but they were not confined to one nation. Pagans usually conceived of external religion as the business of the State. Thus the Jews were persecuted because they would not admit this secular authority in religion. This refusal the Christians maintained; they were ready "to honour the king," to obey the State in all secular matters, but religion was entirely outside secular control. Moreover they had none of the Jewish exclusiveness, but from the first were so active amongst the Gentiles that these very soon outnumbered the Jewish Christians. Thus the Christian Church was always a kingdom which refused authority in its own sphere to any other power, and was yet a kingdom that knew no boundaries. It was this that rendered inevitable conflict with pagan States, and difficulties with Christian States.

In this period three achievements are of importance. First the Church freed herself from Jewish prejudices, which many of her first members showed, and which would have hampered her expansion. Then she established her own independence of secular control in religion. Finally she developed the fundamental organisation inherent in her constitution as a true society, and necessary for her mission to preach Christ's teaching and to supply to men those means of eternal salvation which Christ had instituted. To sum up and to repeat the principles without which Christian history cannot be understood: the business of the Church is to help men to be eternally saved; this work is all-important, and in its performance of this supreme task the Church can recognise no earthly superior.

In the destruction of Jewish separatism the chief agents were the Apostles S. Peter and S. Paul. Others co-operated, and,—for some force must be allowed to the tradition attesting this,—even preached in parts so remote that they were beyond the practical control of the central authority. But S. Peter was undoubtedly the leader who first realized that the Church was to include all peoples, and S. Paul was the most active preacher to the civilised pagans of the Greco-Roman world. Christ intended the society of His followers to be world-wide. But after Pentecost the Apostles at first confined their preaching to the Jews. St. Peter, however, received into the Church a Roman, Cornelius, and his household. Shortly afterwards St. Paul began his missions to the pagans, and met with fair success. The presence of this Gentile element led to a dispute on the obligatory force of the Jewish law. This dispute was settled against the Judaisers by a Council

at Jerusalem in accordance with St. Peter's decision fully accepted by the others for whom St. James spoke.

This increased the hostility of the Jewish leaders. Their opposition led to the first contact between the Church and the State. At Thessalonica, for example, the Jews renewed against the Christians the accusation of their priests against Christ that His teaching was treasonable because it recognised another king than Caesar. At first indeed the State took no action conceiving of the whole affair as merely a strife about some Jewish rites. But the Jews were in disfavour themselves, and gradually this disfavour was directed towards the Christians, to the pagans merely the outcasts of the outcast Jews. The first attack upon the Church was made to find scapegoats for the imperial misdeeds. But the persecution was renewed at intervals during the next three centuries. For convenience this almost persistent attack has been divided into ten persecutions, but actually there was one long struggle of varying degrees of bitterness. The test imposed upon Christians that they should worship the gods and the Emperor shows the true nature of the conflict. The pagan world could not allow the Christian "imperium in imperio." Christians on the other hand could not accept secular control of religion, and must either reject it unto death or cease to be members of the Christian society. Sometimes the imperial authorities tried to permit Christians to live unmolested, but always the persecution was renewed. Even under the most favourable Emperors, even under Gallienus (260–270) who recognised Christianity as a lawful religion, there were martyrs. Hence we can say that under the pagan Empire Christians knew little peace. As long as a temporal ruler could claim authority over religion the Church would always be in danger.

The final grim struggle came under Diocletian. That very able man tried to re-organise the Empire that he might save it. By 300 Christianity had many adherents, and Diocletian was persuaded that the decadence he was fighting was partly due to this. Hence he began in 303 to publish a number of edicts which led to the most bitter of the persecutions. The effort to destroy Christianity continued under his successors, who divided the imperial authority between them. Only in Gaul was there comparative peace under Constantius Chlorus. When his son Constantine fought for the empire, he relied somewhat on Christian help. His success in 323 led to the enforcement of his own Edict of Milan of 313. By this Christianity was given peace, a peace never afterwards openly broken, save under Julian the Apostate (361–363) who reverted to paganism. With peace came victory. Gradually paganism died out. The open war had been won by the Church.

During the struggle the Church in her reaction to successive crises had shown clearly that she was an organised society. The duty of unity between Christians was always recognised. Only by official membership of the Church could salvation be secured, and such membership depended upon the authorities of the Church. She was the Body of Christ, mystically but really; and only by union with that Body could a man be united to Christ. We can see this in numerous passages of the New Testament, especially in St. John's Gospel and in the Epistles of St. Paul; the same doctrine is prominent in the works of St. Irenaeus, in the Pastor of Hermas, in the writings of Tertullian, and perhaps most clearly in the works of St. Cyprian. It is evidently assumed in the practice of excommunication, the refusal of membership to great sinners, in the importance of Baptism, in the practice of Penance. This unity, moreover, was universal. By councils, by letters, by mutual prayer, the union of all Christian communities was constantly expressed.

The central authority inevitably acompanying this unity was always found in the pre-eminence of the Roman Church. The details of this authority may be difficult to ascertain from the evidence. But from the various controversies, especially from those in which the Roman authority was questioned, it seems plain to the writer that the community of Rome was the leading one of the Christian Church, and that only by union with it could a man be truly a member of the Church itself; and, further, that from Apostolic days, each community was ruled by priests, and that among the priests at least mere convenience caused one to recognised as leader. This one was shortly called the Bishop, a to him the fullness of the priesthood was soon reserved. Thus t leader or bishop of the Roman community was the leader of t Church as a whole.

The heresies and difficulties of the first three centuries ma even clearer the duty of unity, and the authority of the Roma bishop. By 300 it is perfectly certain that there was establishe a hierarchy of bishops, priests and deacons to rule individu communities. Unless we also recognise that these individual cor munities were also united to each other by the bond of thei common union with Rome, we cannot understand such contro versies as the Montanist, the Quattuor-Deciman, the Novatian or the discussion on re-baptism, nor can we hope to understan later history and the steady development of Roman authority We may disbelieve in this unity and in its corollary the authorit of Rome, but as historians we must admit that these doctrine were believed from the beginning.

B. **The Second Period.**—We cannot treat fully of the peace thus established. So far the Church had resisted successfully an openly hostile State which expressly attacked the Christian Revelation. Now the attack was subtler. As gradually paganism was destroyed, and ultimately made illegal, the temporal rulers, being themselves Christian and accepting the basic Christian principle that God had revealed Himself, tried to intervene in doctrinal disputes. Though the rulers of the Church always saw in this attempt disloyalty to Christ, this was not realised so clearly by everybody. Consequently the State was able to make the effort, with at times apparent chance of success.

During this period certain developments occurred. Since much of the Imperial effort to assert authority consisted in supporting faulty expressions of Christian doctrine, the Church's resistance led to a clearer understanding and a more definite expression of those doctrines. Thereby moreover the authority of the Church as the sole authentic exponent of Revelation became more manifest. The great heresies of the period may be divided into three groups. There is first the group which led to discussion of the Trinity and the Incarnation. These heresies are obviously akin. Arius in trying to simplify the doctrine of the Trinity destroyed it, by denying true divinity to the Second Person. The refutation of this error led naturally to discussion of the Third Person. Once the doctrine of the Trinity was safeguarded discussion easily arose on the Incarnation of the Second Person. Re-action against denial of any true divinity to Christ led easily to a virtual denial of true humanity. When these heresies, despite State support, were all refuted, not only did the doctrines attacked stand out the clearer, but there was inevitably a surer recognition of the majesty of the Church, founded by the Incarnate God, His Mystical Body, which spoke in His name and by his authority.

In the West two heresies contributed to the Church's development as we are studying it. Donatism focussed attention on the Church's very organisation and on her Sacraments, whereby she fulfills her work of sanctification. Its refutation,—though here the State played a more beneficent part—brought out very clearly the essential unity of the Church under the authority of the Pope. Then the Pelagian and kindred controversies caused the better understanding of the life of grace within the soul to foster which the Church was founded. Thus these two heresies helped to clarify men's ideas on the Church as a society independent in her own sphere, and on the work that was hers to do.

Against each heresy the authority of Rome was ultimately decisive. Though St. Athanasius, St. Cyril, St. Augustine, St. Sophronius and others were often the most active champions against error, though on rare occasions the Pope himself was over-cautious or hesitant, ultimately the rejection of heresy was due to the leadership of Rome and to veneration for the unsullied faith of that Church.

Further the State being Christian paid great respect to the rulers of the Church. These therefore began to acquire a temporal authority they had not before enjoyed. By actual law they were at times even temporal magistrates in their own cities. Thus as they always exercised spiritual authority, and as sometimes

temporal authority was added to this, the bishops in many cities won a traditional position which when Imperial authority declined in regular efficiency made the bishops the chief rulers of their own districts. Great bishops increased the force of this tradition. The most notable example outside Rome is St. Ambrose at Milan. But it was at Rome that the development was most marked. By founding Constantinople and making it the centre of government Constantine could not destroy the tradition of centuries whereby Rome was ruler of the world. Gradually within the city the secular authority of the bishop, as a kind of Imperial representative, became paramount. He organised taxation, social works, administered law, even at times entered into treaties with the barbarians who invaded Italy, acted as spokesman of the people to the Emperor and of the Emperor to the people, and occasionally even had to provide for the military protection of the city. The majority of the popes were as worthy of their high position as could reasonably be desired. Two however were specially eminent, St. Leo the Great (440–461) and St. Gregory the Great (590–604).

As the Empire weakened under the pressure of new dangers and owing to the inevitable decay that besets all human institutions, especially after the disappearance from 475 of a separate Western Empire, this temporal authority of the Church was gradually greatly increased. The Imperial power weakened in the West, and the people, in their desperate needs arising from the chaos consequent upon the barbarian invasions, looked more and more for help to their immediate guides and rulers. This was peculiarly so in Rome. The theological disputes not only widened the breach between East and West but increased the veneration of the West for the Papacy. The popes, by now manifestly the rulers of the Christian Church, joined in their persons the majesty of the Christian Kingdom and the glamour of the old Roman Imperial traditions.

From the 5th century the coming of the barbarians which affected mainly the West, contributed greatly to the development of this ecclesiastical power. Of these barbarian tribes the majority were converted to Arianism. Hence they never established any alliance with the Christian Church. But the Franks who had conquered Gaul, were converted to Christianity, and from the 5th century close relations existed between them and the Holy See. The Lombards who were the last to occupy Italy were difficult to convert and to civilise. They did not as their predecessors the Goths had done, pay even nominal respect to the Empire. From their coming in the 6th century they were a ceaseless anxiety to the people of Italy and a danger to Roman civilisation.

Meanwhile in the East a new enemy had appeared in Mohammedanism. In Africa the Mohammedans established themselves and from there advanced against Southern Italy, Spain and threatened even Gaul. The centre of the Empire Constantinople was itself disturbed by them, and by other Eastern enemies. Thus Europe at the opening of the 8th century was in a desperate plight. Roman civilisation was not indeed destroyed, but it was weakened and in danger. A new and terrible enemy was threatening it and threatening also the Christianity which alone could save traditional culture. The Empire was only nominally one; in the West its authority was nowhere more than nominal, and over the greater part of the West it has disappeared entirely. But at the same time the essential unity of the Church was more clearly recognised, Papal authority had been put beyond question, fundamental Christian doctrine had been clearly expressed and heresies averted. Thus, especially in the West, the one hope lay in this power of the Church; she alone exercised universal authority, she alone was capable of transmitting to the anxious future the civilised traditions of the past, in her the glory of Christianity was joined to the splendour of Roman tradition.

The 8th century saw the inevitable happen. One last heresy came to sunder East and West. The emperor Leo the Isaurian in extreme reaction against the excessive veneration of images in the East, went too far and rejected all such veneration. This error was naturally condemned by Rome. At the same time the Lombard troubles were increasing and the emperors were doing nothing to help. But among the Franks, the old allies of the Papacy, had appeared a family of marked ability, which controlled the nominal rulers. In 732 one of this family, Charles Martel, overthrew the Saracens at Poitiers in France; this victory saved Christian Europe. Thus the Franks already devoted to the Holy See, were under the leadership of this family of Pippin showing themselves to be the military saviours of Christendom. Moreover they were helping the Englishman St. Boniface to widen the boundaries of Christendom by his evangelisation of the Teutons. By 752 Pippin, the son of Charles Martel, was so powerful that it seemed absurd to refuse him royal authority. Before making the change however the Franks applied to Pope Zachary for sanction. This was due to their veneration for Rome and their desire to secure the security of religious authorisation for their new ruler. In return for Zachary's support, Pippin came to Italy and reduced the Lombards to order. He also recognised the Pope as temporal ruler of the lands around Rome which he had saved by force of arms. This Frankish intervention was continued by Pippin's son Charlemagne. At length in 800 the Pope Leo III., accepting facts, crowned Charlemagne successor in the West to the old Roman emperors. Thus came into being the Holy Roman empire. It was a mere recognition of the fact that in the West the Eastern Emperors no longer exercised real authority, and had by their heresies forfeited even respect, whereas the Franks were the effective rulers of the West and had by their services to Christendom deserved well of the Christian people.

Before discussing the consequent changes in the relations of Church and State we must summarise. After defeating the attempt of the State to stop belief in Christ, the Church had had to defeat the State in its effort to interpret that belief. This conflict combined with political and social difficulties did not indeed lead as yet to a final religious breach of East from West—for the Iconoclast controversy came to an end—but it prepared the way for such a breach, and resulted in actual political division. Meanwhile the officials of the Church, especially the pope, had by force of circumstances acquired temporal power. New states were being formed in the West. Of these the chief was the Frankish kingdom. This kingdom had always shown great veneration for Rome mainly as the repository of Christian and Imperial traditions. Finally the Roman empire and its traditions were saved in the West by the transference of imperial authority to the Franks, the actual rulers of the West. However altered, the Empire was still an empire, and a Roman empire.

One other point must be mentioned. When the Vandals were destroying Roman civilisation in Africa pagans saw in this a punishment for desertion of the gods. To answer them the great St. Augustine composed *The City of God*. In this work he expounded Christian theocratic teaching. The book itself, and later elaborations of it, produced a conception of the Church which can be summarised: Men are destined for supernatural life in eternity; those who have attained to this and those who are in possession of sanctifying grace, which enables them to merit this salvation, form the city of God; on earth these citizens are grouped into the Church, the city of God on earth, ruled by Christ through his Vicar; the work and interests of this City are paramount, transcending in importance all earthly welfare. With this conception the Holy Roman Empire came into being.

C. **Third Period.**—The exact relations between pope and emperor after the establishment of the Empire are of slight importance. The Empire as such ceased to be of importance shortly after its founder's death, and did not recover for a century. Only the tradition endured as an ideal. In its inception the Empire was intended to be the continuation of the old Roman empire, and the Protector and co-ruler of the Christian world with the papacy. The Christian Civitas of S. Augustine was to have a temporal ruler and a spiritual, each to govern his own affairs, each with a certain divine sanction, and the temporal was to give the spiritual that protection it needed in this turbulent world. The further relations of the two were left ill-defined. Naturally during the lifetime of Charlemagne his great personality made him the dominant partner in practice. But in theory there was no subordination of the Church.

His descendants declined in power. During the next two centuries Western Europe broke up into three great sections. First

there were the true Franks, the inhabitants of ancient Gaul, who formed the Western part of the empire. After many vicissitudes this section came under the rule of the family of Hugh Capet, and the Carolingian line disappeared. For all practical purposes this change removed France from the empire. Secondly there was the Eastern section of the empire. Though this included the Rhine basin, and therefore was partly Roman in tradition, its boundaries had been extended to the east. Hence it also included many peoples who were alien to that tradition and had only recently been converted. This section too passed from the Carolingian line. But by a freak of fate, through the greatness of its Saxon rulers and their successful intervention in Italy this least Roman part of the empire became the centre of it. Thirdly there was the Italian section. This was perhaps more Roman even than southern France, but it never established its permanent independence of the German Emperors. In addition there was a fourth section of little general importance. Between France and Germany there stood the varying Middle Kingdom, chiefly a buffer and disputed State. England and Spain were outside the empire, but recognised the universal authority of the Papacy.

But these great divisions do not represent effective centres of authority. Under the Saxon kings the German monarchy was reasonably strong. But even they were compelled to assert their authority especially on the borders of Germany, and in Italy, where they had but the shadow of power save when they visited it at the head of an army. Real power was localized, and individual nobles, lay or spiritual established themselves as the effective rulers of a district, paying a respect to central authority that varied with circumstances. Rome itself fell into the hands of the nobles whose large estates outside Rome gave them pre-eminence within. Feudalism was beginning, and feudalism is roughly a system which identifies ownership of land with rule over it. The Pope therefore was often but the creature of the most powerful noble. This break-up of society, and destruction of effective central power resulted in loss of civilisation, in a constant appeal to immediate force, in ineffective law, and in an alarming moral decadence.

The trouble was aggravated by the activities of the Scandinavian pirates who from the 9th to the 11th centuries were an almost annual source of disturbance.

We must realize that nevertheless the Church remained the most vigorous influence for civilisation in Western Europe. It was this that enabled her later to establish so strong a power. Churchmen were often as bad as their lay fellow-Christians, and therefore more reprehensible. But the actual machinery of government in the Church preserved better than any other institution the traditions of unity and of central authority. Moreover it was Christian teaching that gave rise to all efforts at reform. Sometimes it led to what may seem to us excessive asceticism, but this was at least better than the excessive self-indulgence prevalent, and was perhaps a necessary counter-balance. Monasticism which had developed steadily since its re-organization by St. Benedict in the 6th century, afforded a shelter to those anxious to live in peace. At frequent intervals mainly from the monasteries, reforms were started which became very influential. The greatest of these movements was that of Cluny, founded in the 10th century. This movement owing to the influence of one of the Cluniac abbots, S. Odo, affected a temporary reform at Rome itself. But there were other revivals. In Germany the influence of S. Bruno of Cologne and the ability of the Saxon emperors led to a reform, ultimately of great importance. The Normans, the Scandinavians, the Slavs were all converted during this period. Finally especially in the 9th century certain great popes preserved the splendid traditions of the papacy. The most notable was St. Nicholas (858–867). As even lesser popes did not neglect their work the recollection of these great periods helped to keep for the papacy a dignity that its actual subservience to the nobles might have lost. It remained the central authority of Europe, and the hope of all who were working for reform.

Meanwhile the breach between East and West had grown wider. The ambitions of Photius led to a temporary schism, and though this was healed, there remained an ever-growing difference in outlook and in interests. This caused the papacy to concentrate on the West, and led the Western peoples gradually to identify themselves with the Church, and later facilitated the creation of the papal monarchy.

In spite however of the good work undoubtedly done by the Church the general tone even of churchmen was low. Immorality was rife even in monasteries; the clergy were often amazingly ignorant; such learning as there was consisted too much in the slavish retention of past thought; law was almost non-existent effectively; and peace was almost entirely dependent upon the direct use of force. The Church was riddled with pluralism, simony and nepotism; clerical celibacy was an almost forgotten ideal; many of the higher clergy were merely rough warriors or ambitious schemers, the creatures of their lay backers. In such circumstances civilisation, culture and peaceful industry were almost impossible. The crowning evil was that the very class that should have raised the moral standards by their teaching and example was so entirely under lay control, that little could be expected of it. The separatism of political power, and the use of direct force made lay rulers all important in the choice of ecclesiastical authorities. Until this power was broken, no reform could attain success. Once lay support was withdrawn reformers became powerless. We see this at Rome where Alberic's death led to the cessation of Cluniac influence, and in England where St. Dunstan, so influential under Edgar, became so powerless under Ethelred that he had to bribe that king to refrain from arbitrary violence against the see of Rochester.

This was the state of affairs when there arrived in Rome the men who were to end it. The papacy under Benedict IX. had reached its lowest degradation. Germany was then ruled by a good and capable king, Henry III. He invaded Italy to assert his Imperial authority, and to end the scandals in the papacy. By high-handed action he ousted all claimants and began to appoint German Popes. This effort of 1046 like earlier ones would have failed, had it continued to depend upon Imperial support. But the third German pope was St. Leo IX. He was a man of remarkable ability, who, helped by the young monk Hildebrand, began the formation of a party of reform in Rome itself. This party, subsequently led by Hildebrand, was able to free the papacy from dependence upon any individual power, and by full use of its spiritual authority, to enable it to assert its active control over Europe so effectively that it began the great revival of the 12th century.

During this third period then the Church, more and more confined in practice to the West, had in spite of the political chaos and the consequent moral decadence, maintained its unity, and the papacy, in spite of its dependence, had maintained its authority. Once this papal power fell into the hands of a man of genius it was capable of leading Europe, and of re-establishing the old traditions of civilisation.

D. **The Fourth Period.**—This is the most important of our periods, for during it the status of the Church as a society is definitely established. Protestantism did not affect the Catholic doctrine on the constitution of the Church; this owed nothing of its development to the attacks of the Reformers. The chief modern development, the definition of papal infallibility, was an answer rather to mediaeval errors.

St. Leo showed at once that he was not content with imperial nomination; he therefore insisted on election. But apart from this his pontificate and that of Victor II. were spent mainly in promoting definitely clerical reforms. By Victor's death there was at Rome a strong party of zealous reformers under the leadership of Hildebrand. Further, the movement towards reform directed by Rome had spread throughout Europe; allies had been found who though helpful would not be domineering; the Roman nobles had been suppressed, and papal temporal authority in Rome restored; finally papal finances had been reorganised. All this was mainly the work of Hildebrand. The Eastern Church also had at last broken from communion with Rome. This lamentable defection still further confirmed the identification of the Latin patriarchate with the Church, which so encouraged the formation of the Christian kingdom.

During the reign of Stephen IX. (X.) attention was expressly directed to the evil of lay control over Churchmen. In this control Cardinal Humbert in his book against simony found the main source of the prevalent evils. The minority of the new German king, Henry IV., and the consequent intrigues taught the same lesson. The systematic government of the Church would tend to keep the reform active, providing bad appointments did not take place. But such appointments would certainly be made if lay control continued since there could be no guarantee against bad or weak lay rulers.

The work already accomplished had started the necessary reforms within the Church. But these, especially clerical celibacy and the suppression of simony, were being bitterly resisted. As the young Henry grew older he chose the worst advisers, and fostered the evils that Hildebrand and his friends were determined to destroy. In 1073 Hildebrand himself was forced to become pope. He chose the title Gregory VII. After warning Henry he solemnly excommunicated him. This act, unprecedented for centuries, startled Europe. That the emperor designate, the temporal ruler of the Christian kingdom, should be expelled from that kingdom, forced men to ask which was the true authority over the Church. This was the issue at stake; the investiture difficulty was merely a practical presentation of the problem. In addition to the power of ruling a ruler must have jurisdiction, *i.e.*, must have subjects assigned to him. Though nobody thought that a lay ruler could ordain or consecrate, the practice of lay investiture suggested that he was the source of jurisdiction. Thus this practice gave lay rulers practically the right to appoint spiritual authorities, and this rendered numerous bad appointments inevitable. To combat this evil, which led to so many others, St. Gregory condemned lay investiture, and when Henry persisted in it excommunicated him. The struggle continued with varying fortunes till 1122 when by the Concordat of Worms the papacy under Calixtus II. secured the victory.

This Concordat is usually called a compromise. On the question of investiture itself it is indeed a compromise, but on the wider issues at stake the struggle had ended in a papal victory. The object of the Hildebrandine movement had been the reform of European society through the reform of clerical life. This end was reached: we have but to compare the Europe of Benedict IX. with that of St. Bernard to see this. Abuses indeed remained; as long as men are men the cockle will grow with the wheat. But the general tone of Europe was incomparably higher. Again though in the concordat the papacy had modified some extreme claims, it had lost no right that it had actually possessed; but the emperor had lost much. The papacy was free; never again did an emperor successfully make and unmake popes as Henry III. had done. Though also the popes recognized the emperor's right to homage from clerics and allowed him therefore a supervision of elections even in Germany this was merely a supervision.

The real weakness of the concordat is that in that age of personal influence little value was attached to any document. A written decision would not necessarily be effective. Consequently the concordat was no secure guarantee for the future. Moreover though the empire claimed universal rule, its effective power was at best over Germany and Italy. Elsewhere in Europe therefore the concordat had no value at all, save as a precedent for similar difficulties.

Thus after defeating the State in its open effort to control the souls of men the Church led by the papacy had prevented the State from direct intervention in religious matters; later temporal rulers had been able to usurp a practical disciplinary control over ecclesiastical authorities. At length the papacy had asserted itself, used its universal authority, manifested the unity of the Church and vindicated its supreme power over the souls of men. Christendom is one society, and in that society the spiritual authority is paramount because of its greater dignity, and the far greater importance of its work. In any difficulties between spiritual and temporal rulers the spiritual must be the judges, for without treason to Christ they may not permit anything earthly however important to interfere with the work of salvation. If therefore the rulers of the Church—even mistakenly—judge that this work is hampered by some temporal policy, loyal Christians must abide by the decision. Before this these truths had been believed and taught, but they had never been given so clear a practical expression as during the investiture struggle.

After the concordat there was a short interlude. The papacy consolidated its position under the influence of St. Bernard. Frederic Barbarossa however on coming to the Imperial throne began a reaction. In his desire to re-establish fully the Imperial authority he wished to abolish the recently asserted clerical independence. Moreover papal temporal power had been extended. Various feudal claims had been made, and some were recognized. The Countess Matilda of Tuscany had left her great possessions to the papacy, and it was at least tenable that the bequest was lawful. On these bases there had been growing at Rome a tendency hardly expressed, to claim feudal authority over all princes, even over the emperor. This papal tendency, and the actual papal temporal power, was obviously even more opposed to Barbarossa's ambitions than clerical independence. Consequently there is in the ensuing struggle much justice on the Imperial side. But Frederic's appointment of an anti-Pope and his excessive claims justified the vigour of Alexander III.'s resistance to him. In 1177 the Peace of Venice settled the dispute roughly in favour of the Church. The independence of the papacy in its rule of the Church had again been vindicated, and the claims to feudal authority though left in abeyance had not been finally abandoned.

The early death of Frederic's son Henry VI. saved the papacy from a severe struggle, and the election of Innocent III. brought the papacy to its maximum power. Innocent, a man of high ideals and of great ability, was the guardian of Frederic II., Henry's youthful son. The pope secured for his ward his Sicilian inheritance. But he definitely excluded him for some time from the empire, which he rightly declared was not hereditary. He further declared that the papacy was even temporarily the superior power: the popes had founded the empire in the West; they made a king emperor by crowning him; therefore they had the responsibility of seeing that the emperor designate was worthy, before they could conscientiously give to him the authority that was in their keeping. Innocent therefore claimed a right of veto, which was almost equivalent to the right to appoint. This claim fortune and his own ability enabled him to make good. The situation of Henry III.'s days was almost exactly reversed. Elsewhere also Innocent claimed a right of supervision over princes even in temporal affairs. This, though it goes beyond St. Gregory's explicit claims, is consistent with them, and even their logical sequel. Any temporal action may affect the spiritual destinies of men and may therefore come within the province of the supreme spiritual authority.

On Innocent's death new troubles arose. Frederick II. no longer a minor showed himself able, ambitious, and unscrupulous. The main source of dispute was his revival of Barbarossa's schemes despite his oaths against such revival. But as the conflict progressed, he apparently claimed even supreme spiritual authority; he certainly arrogated some spiritual supremacy. Gregory IX. the first pope to oppose him was succeeded by Innocent IV. Innocent's methods were deplorable, and the bitterness of the struggle alienated sympathy from both parties. Ultimately Frederic's death enabled the papacy to secure a Pyrrhic victory. The subsequent extinction of the Hohenstaufen family (that of Barbarossa), though the papacy was probably not responsible for the crime, made the empire no longer a serious rival to the papacy for universal rule. However, the long bitter struggle, its ferocity, its intrigues, the financial exactions necessary for its maintenance had cost the papacy much of its prestige. The Italian successes of Charles of Anjou, the rising power of French nationalism, and the growing French influence at Rome itself indicated where the next difficulty was to be. When there was under the empire some shadow of universal temporal authority, Innocent III.'s solution of the problem of the relations between Church and State might have been made practicable. But the formation of nations made a new solution necessary.

The new difficulty first became acute under Boniface VIII. His hostility to the French, his tactlessness, the reasonable claim of

the French king that the clergy should support financially the Government whereby they benefited must not blind us to the extreme claims at least suggested by the French. The French court wished not merely to obtain temporal freedom of action but to secure control of spiritual authority and to use this control in their own interests. The attempt failed. The death of Boniface, and the comparative subservience of subsequent popes to France, did not undo the real work of Boniface himself. He had saved the spiritual authority of the papacy, and at the very end of its temporal dominance had clearly defined the meaning of that spiritual authority. The bull "Unam Sanctam" declared that subjection to the Roman Pontiff was of absolute necessity for every man who desired salvation. The body of the bull elaborated this doctrine and made it plain that where spiritual welfare was concerned temporal interests must not only be set aside, but temporal authority must even be used to further that spiritual welfare. This declaration was necessary in view of the extreme statements of French legists, as Dubois, and in view of the practical actions of Philip IV. of France, which had tended to obscure the papal spiritual supremacy by the attack on its temporal influence. This temporal hegemony was gone. During the 14th century the popes resident at Avignon under French influence steadily lost their former prestige.

This became clear when Gregory XI.'s death at Rome permitted an election free from French influence. An Italian, Urban VI., was elected. Shortly afterwards the French party declaring the election invalid chose Clement VII. Clement was certainly an anti-pope; whatever personal faults Urban had, his election had been valid. The chief cause of the schism is undoubtedly to be found in the extreme nationalism of the French cardinals. This unhappy division lasted from 1378 to 1417. During it the various theories of Church government and of the relations of Church and State that had been formulated during the 14th century crystallised into the Conciliar theory. The old Imperial ideas had been maintained by Dante and others, and had received heterodox development from such men as Marsiglio of Padua, and the extreme Spirituals among the Franciscans. They had all involved some subordination of the papacy, or at least some check upon its power. In a desperate effort to end the scandal of the schism a few theologians developed this idea into the Conciliar theory of Church government. According to this the pope was not absolute but dependent on a General Council. Though the theory was merely the result of desperation thanks to the emperor Sigismund and the reasonably good co-operation of the Roman pope, Gregory XII., the Conciliar party succeeded in gathering the Council of Constance. Here after Gregory had resigned and the anti-popes had been deposed, Martin V. was elected. He rejected the Conciliar theory and though it was maintained for a time by a few, it steadily declined.

During the next century the licence of the pagan Renaissance, and the general decadence of morals still further harmed the reputation of the papacy. Many of the popes themselves were too affected by the general materialism. But save by the Hussites in Bohemia their spiritual authority was not seriously questioned. The most significant feature of this century from our point of view is the extension of the policy of individual arrangements between the papacy and the nations. Martin V. himself at Constance had followed this policy. The two Pragmatic Sanctions of Bourges and of Mainz though not concordats and though rejected ultimately, represent the same tendency. The constant political work into which the papacy was drawn caused further loss of prestige. But at the same time this very political activity testifies to the survival of the papal spiritual authority. Its mere temporal power could never have given it so great an importance.

Thus by the beginning of the 16th century extreme solutions of the problem of reconciling the universal authority of the Papacy over the Church with national sovereignty seemed to have been set aside. The Conciliar theory had left its marks, but had been itself destroyed, extreme nationalism had been beaten in Bohemia, the more extensive claims of the papacy to a right of interference in national affairs had been checked by anti-papal legislation in different countries, and by individual concordats. The solution of the problem might have seemed to be merely a matter of time. At this moment however the rise of Luther and the coincidence of other unexpected events led to the revolt from Christian unity of a large part of Europe, and postponed the solution.

E. **The Fifth Period.**—At the opening of the 16th century there occurred a coincidence of events that defied anticipation. The abuses that undoubtedly existed within the Church had occupied the minds of right-thinking men for many years; slowly, but surely, they were being checked. Unfortunately they were still so patent as to give occasion to rebellion. But the rebellion when it came was almost fortuitous. Genius defies all laws, and the greatest Protestant leader had genius. Luther might have been as unsuccessful as many of his predecessors but for his amazing popular appeal. His robust vigour, his deep knowledge of human nature, his eloquence and intellectual energy, make him one of the great figures of history. The Catholic will naturally judge that these gifts were abused, but no sane historian can deny their existence. To discuss his motives would lead one into controversy. Leaving them aside, we must record that in the early 16th century he led a revolt against the Church. This revolt, so successful thanks to his ability, gave immense help to other malcontents. At the same time another event occurred, which was beyond anticipation. Henry VIII. of England, enjoying the absolute authority bequeathed him by his father, found motives for questioning the authority of Rome. Again there can be no short uncontroversial discussion of these motives, but all must admit that merely personal desires went to their making.

These two revolts found allies in those tendencies to rebellion that would otherwise have been leaderless. The abuses of ecclesiasticism, the adventurous impulses of the Renaissance, the ease with which ideas could be spread thanks to the discovery of printing, the loss of prestige which the papacy had suffered, all now combined against the Church. The Reformation had come.

From the Catholic point of view, the notable feature of the Reformation is that it postponed a general solution of the problem of the Church's relations with political states. The problem had become acute with the disappearance of even the ideal of political unity. The 14th and 15th centuries had seen the removal of extreme solutions. The Reformation diverted nationalism from the path of reconciliation, and forced the papacy to stress its universal authority. Naturally the revolt against the papacy where it was successful led to a nationalist conception of religion. There were indeed further extremists whose religion was entirely personal but generally in Protestant countries nationalism prevailed.

Meanwhile in Catholic countries the movement for reform which had existed before Protestantism, acquired new vigour, but was given a narrower orientation. Hence it is usually known—very inaccurately—as the Counter-Reformation. To call it this is to concentrate merely on one of its activities. However, once Protestantism had appeared, Catholic saints and reformers devoted themselves mainly to its refutation and defeat. The Society of Jesus, which was founded with no reference to the Reformation, and which maintained a remarkable activity in every direction, gave special attention to the fight against Protestantism. The Council of Trent which represented a movement older than Protestantism, and which initiated many reforms, was largely busied with Catholic defence against the Reformers. The unity of the Church had to be asserted vigorously, a stricter uniformity, even in non-essentials, had to be imposed to safeguard that unity. Though this was necessary it had the casual effect of re-arousing the extreme nationalism which had seemed in the preceding century to be disappearing.

Outside the Church the Protestant countries regarded loyal subjects of the Catholic Church as traitors to the new States which claimed absolute sovereignty even in religion. Also these new States naturally considered the Catholic States as enemies to their own national existence. Hence arose the wars and persecutions which make the history of the period so melancholy. But at least this atmosphere of strife roused Catholic fervour, and the 16th century is crowded with great saints. Gradually this increased fervour and the political superiority of the Catholic States checked

the revolt. It would be unfair to stress the part played by war and intrigue. After the first blows, violence did not succeed notably in affecting the religious situation.

Thus by the end of the 16th century the movement had come to an end. Northern Europe had broken away from Catholic unity, and southern Europe had remained loyal. The relations of the papacy with Protestant States can be dismissed shortly. They were openly hostile, and the papacy at first, pursuant of its mediaeval traditions, encouraged Catholic princes to use force against its enemies. But as the futility of this became manifest the papacy was content to preserve the balance of power. The growth of Gallicanism made the popes even ready to favour Protestant States; these were already lost, but France was still Catholic, and its Catholicity was threatened by Gallicanism.

Towards Catholic princes it had already been clear that the papacy was adopting an individual policy, and negotiating separately with each State on non-essential points. Meanwhile even in these countries the spread of the Reformation and the growth of despotic monarchy revived the moribund nationalism. During the 17th and 18th centuries this assumed various forms. As monarchs were despotic and as the theory of the Divine Right of Kings established itself nationalism usually became tinged with Regalism, but always there remained at the basis the theory that though the pope was the ruler of the Church he was not absolute, but was subject to general councils. In France this spirit was known as Gallicanism, in Germany as Febronianism, in Austria as Josephism, in Italy and more generally as Regalism. There were shades of difference between them. Sometimes the views expressed might be almost orthodox; but from the Catholic point of view all were fundamentally vitiated by the tendency, always latent, usually manifest, to limit papal authority over the Church. In the 18th century these theories were very widespread, but they did not succeed in destroying fundamental Catholicism. For the history of the Catholic Church in England *see* the section IN ENGLAND AND SCOTLAND below.

The most mighty opponent within the Church of this nationalism was undoubtedly the Society of Jesus. The views of their great writers Suarez and Blessed Robert Bellarmine on political science did not meet with the approval even of Catholic kings. One of their writers, Mariana, whose views were repudiated by the Society itself, went so far as to advocate the assassination of tyrants who were manifestly oppressive and who could not be otherwise removed. Much of the difficulty between the Jesuits and their fellow-Catholics was due to this strong anti-nationalism. This is evident from many of the Catholic pamphlets against the Society published during this time. In the 18th century Regalism won a great victory, securing the suppression of the Society in 1773. This suppression was demanded by the enemies of the Church, and its actual accomplishment by the papacy can be defended only on the plea that the part must be sacrificed to save the whole. Still it seemed a victory for the infidels and their half-allies, the nationalists, in the struggle against the universal authority of the pope. How events might have turned out it is impossible to say. The French Revolution, though it had its causes in the past, was an unexpected and catastrophic event, and it was followed by the career of Napoleon, who, like Luther, was unforeseen, since genius knows no laws. Europe was thus thrown into the melting pot, and the nineteenth century saw the disappearance of many of the old tendencies, and the amazing recovery of the papacy.

Meanwhile the great geographical discoveries of the 16th century had begun to have their effect. By them immense lands were either discovered or opened up where Christ was not known. Missionary activity began to win to the Church new peoples far removed from the petty intrigues of Europe. Once more the Jesuits were the pioneers. St. Francis Xavier's work in Japan was followed up and a great Christian Church sprung into existence there. A persecution, whose length and severity recalled the days of the Roman Empire, almost destroyed this Church. In India, Xavier and others began the task of conversion. In China, Ricci and Schall are, perhaps, the most notable names. In North America, B. Isaac Jogues and in South America, Anchieta and Ruiz da Montoya are the chief leaders. In South America there was established successfully the great Mission of Paraguay, one of the most striking achievements of the age. In both Americas the colonisation by white men gave to the Church new districts which in size and wealth far exceeded Europe. Thus the Church under the Papacy found itself occupied with the whole world and no longer merely with Europe. This extension of the papal interests coincided with the entire disappearance from Europe of political unity. Moreover in these new lands there was little question of the Papacy's activities being other than religious. Finally when, shortly after the establishment of the United States, the Church, under the leadership of Bishop Carroll and others, began to advance in that great country, the change in the papal outlook was completed. Where before the main attention of the popes had been focussed on Western Europe, with an occasional distraction to the Eastern Church, where before they had consequently become involved in the political struggles—often so mean—that went on in Europe, from the opening years of the 19th century their attention was being more and more called to genuinely universal problems, their rule was truly world-wide.

The French Revolution and the Napoleonic crisis swept away the benevolent despotism of the previous century. However much it might be maintained for a time by the political skill of Metternich, the thing itself was doomed already even at the Congress of Vienna which seemed to be restoring it. The Revolutionaries had attacked both the old social order and the Church with such exaggerated violence as to win for both friends where before men had been indifferent. The very persecutions as usual brought the best to the front, and the Church began to win good opinions even from non-Catholics. Napoleon's violence against the pope continued this rehabilitation of the Church in the eyes of her former enemies. Especially in England, where the humanitarian infidelity of the 18th century had re-acted against religious persecution, the respect shown to the Holy See in its sufferings was remarkable, and the welcome accorded to the refugee clergy of France equally wonderful. The Catholic Church in this country began to be active once more and agitation for the full repeal of the penal laws set in. Elsewhere the opposition to the Revolution and to Napoleon had produced similar results. Thus when Consalvi represented the papacy at Vienna, though he was unable to secure the restoration of ecclesiastical States in Germany, he was able to win for the papacy respect for its own territories and able also to confirm the rising influence of the Church.

However nationalism was not yet dead. In Austria indeed Josephism had gone, but there remained weighing on the Church the deadening influence of State privileges and protection. In Germany Protestant Prussia was becoming the leader, and gradually extended its authority over the Catholic States. The opposition of the Church to the attempt to Prussianize all Germany led to that attack on the Church known as the Kulturkampf. This attack was made in the name of Culture against the supposedly reactionary ignorance of the Church. It is more fairly described as a war between the traditional culture of Europe maintained by the most traditional body in Europe and the new methods which in their attempt to extend learning were forgetting what had been already learnt. However until the World War the authority of Prussia was able to hamper the work of the Catholic Church in Germany.

In England after the Emancipation of 1829 the Church was left in peace and slowly made headway. The restoration of the hierarchy in 1850 and the brilliant and painstaking leadership of this hierarchy have since enabled the Church not only to increase her numbers but also to wield an influence greater than those numbers warranted. This is true also of the United States. Of course one reason for this in both countries is that, though a comparatively small body, the Catholic Church in each country is united and disciplined.

In France Gallicanism continued a steadily failing existence. It was from Gallican France that came the book which did so much at the beginning of the 19th century to help the revival of papal prestige—*Du Pape*, by Joseph de Maistre. The Revolution moreover had increased the infidelity of the previous century and

against this Christianity was engaged in a war to the death, a war not yet ended. Gallicanism thus could not stand. The somewhat sciolistic but brilliant controversy of Louis Veuillot, the revival of the Jesuits who soon became extremely influential again, the desperate pass to which the Church was brought at the time of the Commune, all helped to make the decree of papal infallibility the effective death-blow to Gallicanism. The subsequent repudiation of the Concordat with the French Government made the Church in France more vigorous than ever. At the same time the French Catholics have shown themselves generally too anti-republican on political grounds to be as politically effective as they might have been. However there are signs that this inactivity is ending. The recent affair of the *Action Française* is too fresh for any historical judgment to be passed upon it.

Turning to the papacy itself we find that at the opening of the century the papacy re-adopted even more fully the policy of Concordats. Throughout the century it has shown itself willing to make any possible concessions to national desires, in order to secure circumstances favourable to the spiritual activity of the Church. Especially was this notable in Russia, where the heretical Government was allowed an extraordinary control over clerical appointments and discipline. The development of the supposed hostility between science and religion which was a feature of the 19th century led those blind to the signs of the times to regard Catholicism and the papacy as out-of-date, obscurantist, and doomed. The spirit which animated so many led them to conceive of themselves as the ultimate judges of everything; dazzled by the advances in mechanical and scientific knowledge, they lost their heads and decided that everything old was wrong and the new only was right. This was merely a passing phase. Throughout the century the papacy was steadily gaining. The decree of papal infallibility came at the right moment. However much some of the finer minds might wonder about its opportunism, the courageous and clear declaration of the doctrine inherent from the beginning in the Catholic conception of the Church and of the papacy was needed. The papacy had disentangled itself from the sordid politics of Europe. It stood outside the scheming warring States of the Continent and made its moral appeal to the world as a whole. This was always its true position, sometimes unfortunately obscured. The decree made clear that it was and is in virtue of its spiritual authority—because only by union with it could a man secure membership of the Church, only by submission to it could a man avoid error on matters concerning the Christian Revelation—that the papacy has commanded the obedience of men and has attained to its great position. All this was clearly brought out by the decree, just at the moment when its world-wide authority so evidently not based on mere political position or scheming made such a manifestation desirable.

Almost as a commentary upon this fact, the very year of the decree saw Italian nationalism under the House of Savoy forcibly deprive the papacy of its temporal authority.[1] Yet this deprivation in no way lessened its authority. Rather it has from then onwards increased its prestige so much that during the War even those who did not recognize its claims seemed to expect it by some kind of inspiration to decide a practical problem insoluble in default of evidence. Many States who reject its claims have followed this up by securing representation to it, since they must admit its actual authority.

The Christian Church had begun by defeating the open attack of the State on revealed religion. It had then combated successfully the attempt of the State to control that Revelation. Then its organisation had fallen under the practical control of the State, and had been therefore hampered in its work for salvation. Freed from this dependence, it had worked in uneasy alliance with the State which still preserved some sense of complete political unity. As that disappeared, the Church found herself under the necessity of coping with many States that she might be free to carry out her duties arising from Revelation. This problem is still with us.

(H. Hn.)

[1]Since this was written the Lateran Treaty between the Holy See and Italy, constituting the Vatican City State, was signed and ratified. (*See* Italy, History and Pius XI.) (Ed. E.B.)

IN ENGLAND AND SCOTLAND

The separation between the English Catholics who acknowledged the pope and the English State again became an accomplished fact by the Acts of Supremacy and Uniformity which were enacted before anything else in the first parliament of Elizabeth (1559). The former, which did not call the Queen supreme head but "Governess" of the Church in England, was followed immediately by the Act of Uniformity which prescribed the use in public worship of the Second Prayer Book of Edward VI. This was to come into force on June 24, 1559. The Oath of Supremacy was tendered to all the surviving bishops, 14 in number, to many of the beneficed clergy, and to certain laymen who held important offices. The bishops with the exception of Kitchin of Llandaff, refused the oath, and were deprived of their sees. They were put under "various degrees of restraint, ranging from mere surveillance to hard captivity in prison." As the years went on they died in the different abodes assigned to them, the two last being Watson of Lincoln (1584) and Goldwell of St. Asaph's (1585), the latter having long before effected his escape to Rome.

We are partly left to guesswork as to how many of the lower clergy had the Oath of Supremacy tendered to them, and as to how many refused it. It is supposed that some 6,000 took it, but it is not clear how many of the minority of from 2,000 to 3,000 refused it. At least 200 refused, and it is credibly held that some 500 others evaded it in one way or another. Anyhow a majority took it and a minority refused it. With the laity in general, attendance at Sunday service in the parish church was made the test, and many who still adhered to the pope appear to have thought that they could still safely be present at the legal service as an Act of civil obedience. When the question was asked in Rome this way of acting was condemned and the cleavage thus accentuated.

It became a vital matter for Elizabeth's government to fill up the sees of the deprived bishops. Canterbury was vacant by the death of Cardinal Pole, and hence to the primatial see an incumbent was appointed as early as the 1st of August 1559 in the person of Dr. Matthew Parker. This prelate, once consecrated, then proceeded to consecrate in turn the bishops named by the crown. At first, doubtless, many of the laity, estimated variously at anything between 90% and 50%, held to the old religion, but the pressure on them was steady, and conformity with the Establishment went on with increasing momentum as the supply of Marian priests died out.

Catholic worship never completely ceased in Protestant England, but it was evident that once the Marian priests who would still perform it became extinct, it could go on no longer unless some means were taken to keep it up. William Allen (1532–1594), afterwards cardinal, was the first to work for colleges or seminaries abroad to train priests for the English mission. He succeeded in establishing Douay college in 1568, which so flourished that it was not long before it contained 150 students. Through stress of war it had to be moved to Reims for a time but returned to Douay as soon as it was feasible. At Reims and Douay respectively a translation of the New and Old Testaments was made for the use of English Catholics, and this, though with subsequent revision, is still in use at the present day. In 1575 the English college in Rome was founded by Gregory XIII., and colleges followed in Valladolid, Seville, and other places. In this a supply of clergy, known as the seminary priests, was provided for the needs of the English Catholics. The early years of Elizabeth's reign up to 1571 were spent in the exercise of moderate pressure to ensure conformity with the Establishment, and in fruitless efforts to reconcile Elizabeth with the Holy See; such hopes died slowly in the minds of the pope, the king of Spain and the English Catholics: even the Council of Trent put aside the proposal to excommunicate the English Queen. But before 1571 there was a new pope St. Pius V., and holding compromise impossible, he issued on the 25th of February (1570) the Bull *Regnans in excelsis*, both excommunicating and deposing Elizabeth. There was a formidable rival for the English throne in Mary Queen of Scots, and after her capture and imprisonment, many Catholic nobles took part in the insurrection in her favour

known as the "Rising of the North." This was suppressed, and Northumberland, Norfolk and about 900 others were executed. It was probably the unjustified hopes for the success of their enterprise which led to the publication of the bull of deposition, which was unknown and disapproved by both the imperial and Spanish rulers. It failed to shake the throne of Elizabeth, but led to bitter persecution of the Catholics. It emphasized the opposition between Catholicism and the English State, though indirectly welding the Catholics into a much reduced but solid body of "recusants." The parliament of 1571 legislated against Rome, making it high treason to declare the queen a heretic or schismatic, or to bring into England any papal letter: forfeiture of goods was incurred by absence beyond the seas without licence. The execution of Mary Queen of Scots in 1587 also brought to a head Spain's attempt by the Armada to win a final victory over England in the war gradually provoked by mutual aggression. Soon the tale of those who suffered death through the laws, which made treason and profession of Catholic faith and rites practically the same, grew longer: the "Elizabethan martyrs" began to appear. The total number who endured the extreme penalty was in all 189, of whom 128 were priests, 58 laymen, and 3 women. As to the body of the laity the large minority of the early years of the reign sank to anything between 120,000 and a third of the population: there were on the mission 300 seminary priests, 50 Marian priests and 16 Jesuits.

More peaceful times were hoped for through the accession of James I., but these hopes were doomed to disappointment. James may not have been very hostile to the religion of his baptism, but his training had been Calvinist, and the Puritan party was gradually waxing stronger. One outcome of the loss of hope among Catholics was the murderous Gunpowder Plot devised by a few of them, but the only result was a new Penal Code and the execution of several who were charged with complicity in the plot. A new oath of allegiance was framed, calling on those who took it to swear that the deposing power of the Pope was "impious, heretical and damnable." Some Catholics thought they could in conscience do this, while others held the contrary. Hence arose much controversy among them. The oath was condemned by Paul V., but even this did not end the dispute for many, among them George Blackwell the archpriest, who had governed the recusant clergy since 1598 and considered that the condemnation only represented the Pope's private opinion, and hence did not bind in conscience. Blackwell was superseded by Birkhead as archpriest, and he was followed by Harrison. But the clergy had long been petitioning to be ruled by a bishop, and in 1623 Dr. William Bishop was appointed and consecrated as titular bishop of Chalcedon.

Again towards the end of James' reign there seemed prospect of indulgence on account of the negotiations in progress for the marriage of Prince Charles with the Infanta of Spain. For some years there had been but few executions for religion, but fines and penal exactions had brought in £36,000 a year to the king, and the prisons were full of recusants. The first step towards the marriage treaty was the release of all these. But the marriage was never arranged. Partly from hostility to any indulgence to Catholics which was necessarily involved in the settlement, parliament was averse to the match, and at last James had to draw back. The penal laws were enforced anew, and things were soon almost as bad as ever. But then another matrimonial scheme raised the question once more. This was the plan to marry Prince Charles to Henrietta Maria of France. Concessions to the Catholics at least equal to those promised to the Spaniards were demanded by Richelieu. Still, the marriage seemed desirable both to James I. and to Louis XIII., so a secret understanding was signed that ample indulgence should be given to the main body, as well as full liberty to the princess to practise her religion. Hence the marriage took place. But meanwhile James was dead, and Prince Charles was king.

The new monarch at once found himself in considerable difficulty. Promises had been made to France, and on the other hand parliament, ever stronger and more Puritan, called for the execution of the penal laws. Charles took the path of least resistance, put the laws in force, and declared that the treaty with France had only been a device to obtain the pope's consent to a dispensation for the marriage. All that France could do was to secure a Catholic court, in great part foreign, for Queen Henrietta Maria.

In 1632 the Holy See sent a trusty envoy, Gregorio Panzani, to report on the state of religion in England. This report, still extant, affords an interesting view of the position. Panzani estimates the Catholics at 150,000, and the priests at 800. He names the Catholic peers, beginning with the Marquis of Worcester, 13 in number, but hazards the guess that many more strive to be reconciled to the Church on their death-beds. He describes the stately services at the Queen's chapel, notes the adoption of many rites by the High Church divines, and laments the growth of Puritanism. He favours the naming of a resident bishop, but Charles I. was opposed to this. Hence the Catholics had no bishop in England for the next 30 years, Dr. Smith, Bishop's successor, having retired to France. Shifty towards Catholics, Charles was not less so towards the bulk of the nation, and at last Civil War broke out. Catholics were mainly on the royalist side. They recognized the Puritans as their bitterest enemies, yet there was hostility to them in the royal camp as well, and a disinclination to accept their aid if coupled with freedom for themselves. But, when the royalist cause was losing, these scruples were flung away, and the king had no more faithful servants than these recusant gentry and their dependents. The sieges of Raglan and Wardour Castle held for the king are but instances of tenacious fidelity. But at last the king's cause ended in defeat, and the royalists could do no more. Parliament was supreme, and worked its will both on the monarch and on his followers. When bloodshed was over on the battlefield it did not cease on the scaffold, so that not a few priests suffered death in the parliamentary period, and are reckoned by their fellow Catholics as martyrs. The policy of Oliver Cromwell as protector was not in general one of persecution, but the fanaticism of his followers was irrepressible.

With the Restoration came an earnest of greater tranquillity. Charles II.'s court in exile had been in part Catholic, and he seems to have been convinced in his heart that that was the true religion. But he was quite alive to the need, if he was to be king, of dissembling his sentiments. But he married Catherine of Braganza with the rites of her faith, while the free exercise of her religion was guaranteed. Hence the queen always had a staff of priests at her court, where the services were splendid and almost public. As the reign advanced opposition grew stronger, being in part stimulated by the reception into the Church of several notable people, chief amongst whom was James, duke of York, the king's brother. Again, an attempt to strengthen the royal position by an alliance with Louis XIV., and the acceptance of a subsidy from him led to a strong contrary current of opinion. Charles bent to the storm, and new legislation to debar the Catholic peers from sitting in the House of Lords was passed (Test Act). Finally, the efforts of the Protestant party centred on the proposal to exclude the Duke of York from the royal succession. Charles set himself with courage and still greater skill to defeat this, but at first without much success. The popular imagination was inflamed by the so-called Titus Oates plot. Oates, whose former record was of the worst, deposed on oath to the existence of a plot among Catholics to seize the king, subvert the Protestant religion, and set up their own in its place. Public opinion was maddened and the perjured wretch gained general credence. Many persons were charged with sharing these treasonable designs, and a considerable number, both priests and laymen, were brought to the scaffold, the most illustrious being Lord Stafford and Oliver Plunket, archbishop of Armagh. Though Charles believed these victims to be innocent, he did not, perhaps could not, interfere to save them. Yet, while they went to their death, the king had won. Alive to the least sign of a turn in the tide, he dissolved parliament, but found the new one again hostile. He dissolved again, and by this time finding himself in the full flood of reaction in his favour, governed for the last two years of his reign without any other. He went on to take vengeance on his enemies of whom some were executed and others escaped to

the Continent. There was no longer any chance of an Exclusion bill. Charles died Feb. 6, 1685, being received into the Catholic Church on his death-bed.

James II. was proclaimed in absolute peace, and the subsequent rebellions of Argyle and Monmouth seemed but to strengthen the loyalty of the majority. Yet the king strangely misjudged the strength of the Protestant opposition to anything Catholic, and acted as though he could safely disregard it. An envoy was despatched to ask for the cardinal's hat for Reginald d'Este, and that Leyburn might be made vicar-apostolic. The latter petition alone was granted, and Leyburn was consecrated at Whitehall by d'Adda, the papal envoy; he was also given a pension of £1,000 a year. The king pushed on with his policy, but the penal laws were still in force, and repeal in parliament was hopeless. So James acted by himself, and issued two successive Declarations of Indulgence, in which he granted toleration to Catholics and all dissenters on the strength of the royal dispensing power. The legality of this was tried in a test case against Sir Edward Hales, a Catholic who held a commission in the army. A majority of the judges affirmed the legality of the dispensation, but resistance was not overcome. The Anglican clergy were ordered to read the Declaration of Indulgence in Church, but many declined to do so. Thereupon seven bishops who had petitioned against it were sent to the Tower. After three weeks they were tried in Westminster hall before their peers, and acquitted amid scenes of the greatest enthusiasm.

The king's action now drove the Protestant party to take extreme steps. An invitation was sent through seven Whig statesmen to the prince of Orange to come and deliver the land from danger to the Protestant Succession. On Nov. 5, 1688, William landed in Torbay. Opposition was useless, as the main body of the army and the bulk of the people could not be relied upon, and seven weeks later James fled to France.

The Revolution meant a victory for nearly all the religious elements which were in opposition to Catholicism. Latitudinarians, Puritans, and others shared in this, and the Act of Toleration favoured them all. But it expressly excluded Catholics from any advantage from its provisions. There were Anglicans who looked with disfavour on the new régime, and the non-jurors conscientiously refused to swear allegiance, and forfeited their benefices. It was not that William of Orange had any sympathy with persecution, but his throne was none too secure, and his hand was forced by his Whig supporters. There was no more shedding of blood for religion, but new penal laws in 1700 applied in a more comprehensive way than the savage statutes of the past the dull pressure, financial, social and religious, which threatened to crush all life out of the Catholics.

John Leyburn, the vicar-apostolic appointed in 1685, had his vicariate divided in 1688 into four, and retaining the London district saw Bishops Giffard, Smith and Ellis appointed for the Midlands, North and West respectively. This four-fold arrangement lasted till 1840, though each district usually had a coadjutor bishop as well. Controversy with non-Catholics was carried on at first almost single-handed by John Gother (1633–1704); though an indirect influence was wielded by John Dryden, the poet (1631–1700). But other champions appeared later, foremost among whom was Bishop Challoner (1691–1781) as well as the mathematician, Bishop Walmesley (1722–1792), Alban Butler, author of the *Lives of the Saints*, and his nephew, Charles Butler, the well known lawyer. But the main body settled down to a life of isolation from their fellow countrymen, striving to lead a life of solid piety, and to escape notice and the danger of persecution. Not a few conformed to the Established Church, worn out with the struggle, and shrinkage prevailed in all directions. A Government return made at the beginning of William's reign, gives only about 30,000 Catholics for the whole country, but few would be inclined to accept the enumeration as complete. A return made to the House of Lords in 1780 gives 70,000, and this appears the lowest reliable figure ever reached. The first step to civil liberty was the Relief Act of 1778, which removed the disabilities inflicted in William's reign, leaving unrepealed the Elizabethan laws whose sanguinary penalties it was not intended to enforce. But even this limited measure stirred up much opposition, and the Gordon riots of 1780 were a direct consequence of it.

In order to further the attainment of a still greater amount of freedom, a number of leading laymen formed in 1782 the "Catholic committee." Unfortunately they did not take the bishops into their confidence, and domestic differences arose within the fold. A new bill was drafted for presentation to parliament, but the new oath of allegiance which went with it proved unacceptable. All the same, most of the leading statesmen of England were now anxious to grant more ample concessions, so that at last, after the oath had been amended, and the offensive term "Protesting Catholic Dissenters" deleted, the bill became law on June 10, 1791.

Two new influences now came into play in favour of progress. The one was the residence in England of several thousand French priests with their bishops, who had fled from the Revolution. They were most generously treated both by the Government and by private individuals, while they, by their blameless lives and self-denying services, created the best of impressions. Many a still-existing Catholic flock in various parts of England owes its origin to them. The other influence was the growing strength of the Irish demand for religious liberty. Yet the demands made in the early years of the 19th century to obtain full emancipation all ended in failure. The "Catholic committee" was succeeded by a "Catholic board" of similar character, and a Government veto on episcopal appointments proposed. This was hotly opposed by Bishop Milner and the Irish bishops, and the internal dissensions thereupon broke out anew. The final impetus which led to success came mainly from Ireland. Daniel O'Connell founded the "Catholic Association" "to gain civil liberty for Catholics," and, as soon as this Society seemed strong enough to win, he himself stood for parliament in the vacant constituency of Clare. He was, of course, triumphantly returned, but could not legally take his seat. The prime minister, Wellington and his colleagues, even if averse to emancipation, would not face the prospect of civil war in Ireland, combined with the force of liberal opinion in England, and threatened to resign. At last the king reluctantly yielded. The Emancipation Act passed through both Houses, and received the royal assent in 1829. After vexatious delays O'Connell was able to take his seat in the Commons. Meanwhile the duke of Norfolk and other peers took the oath and their seats in the Lords. Some few restrictions on complete religious equality were suffered to remain.

The next important movement in advance was the change from the missionary status of government by vicars-apostolic to the normal government by territorial bishops. The agitation for this was an old one, but it only acquired sufficient driving force to win after 1830. A temporary half-way measure was the division of the four districts into eight, made by Gregory XVI. in 1840, but other developments were to follow, and at length after much discussion and consultation, an ecclesiastical hierarchy was ordered by Pius IX., on Sept. 29, 1850. It comprised an archdiocese of Westminster and twelve episcopal sees. Nicholas Wiseman (1802–1865), a Roman scholar of wide repute, son of an Irish merchant in Seville, and descended from an old Essex family of recusants, became the first archbishop, and was made cardinal. In the course of the next year or two the other sees were filled as well as circumstances allowed. Moreover, the new dioceses were gradually organized, and provincial councils were held at Oscott in 1853, 1855 and 1859, and at Ware in 1873. Following on the Irish Famine of 1847, immigration on a large scale from Ireland led to a phenomenal increase in the number of the flock, and provided new energy and vigour for the work of the Church. For whereas in 1814 the bishops returned their people as about 160,000 in all, and in 1837 as about 400,000, in 1851 the census pointed to not less than 800,000.

The "Oxford Movement" (1833–1845) proved to be a powerful help in providing many cultured leaders and preachers for the advancement of the Church. At first, confined to the Church of England, it found an issue for many of its most illustrious supporters in submission to the Holy See. Such was the case with

John Henry Newman, Ward, Oakeley, Faber, Coffin, Coleridge, Lockhart, Brownlow, Northcote and a host of others. Beginning with it, a stream of converts, clerical and lay, has flowed from the Established Church, now greater now less, but never interrupted even to the present time. It was an accession small in numbers compared with the influx from Ireland, but important on account of the learning, influence and character of its members.

At Wiseman's death, one of the chief Oxford converts, Henry Edward Manning, was chosen to succeed him, and he governed the see for 27 years (1865–1892), being made cardinal in 1875. It is not solely for his life-long struggle to provide a Catholic education for the poor, nor for his foundation of the Oblates of St. Charles, nor his attempt to found a Catholic university, but for his championship of social reform and justice for the workers that Manning won a remarkable position of trust and veneration as one of the leading men in the England of his day. Herbert Vaughan, bishop of Salford, founder of the Mill Hill Missionary college, was next called to the see of Westminster and the cardinalate (1892–1903). He obtained a reversal of the policy of the Holy See forbidding Catholics to attend the universities of Oxford and Cambridge, and was a party to the arrangement by which the elementary schools, while provided by the contributions of the faithful, were to enjoy full maintenance by the State, according to Balfour's school act of 1902. He also built a noble Cathedral at Westminster designed for him by J. F. Bentley, which has taken a place in the life of London that has fully justified his courageous forecast. In 1903 he was followed by Bishop Francis Bourne of Southwark, who was raised to the cardinalate in 1911. Much progress has been made since. Three archbishoprics have been established, namely, at Liverpool, Birmingham and Cardiff, while the number of diocesan sees has also been increased. The number of converts from other religious bodies, which was about 7,000 in Vaughan's time, has risen to about 12,000 a year. There has been a notable multiplication of churches, schools, clergy, institutions and religious houses. Moreover, though thoroughly reliable figures cannot be had, because of the lack of a government census of religions, there is every reason to believe from conversion, difference of birth-rate and emigration, that the number of Catholics has greatly increased. From what can be gathered from baptisms, schools and private enumeration it should seem that the total is now at least 2,500,000. As one factor in the situation, Catholic infant baptisms average one tenth of the births in England. The number of priests exceeds 4,000.

BIBLIOGRAPHY.—Pollen, *English Catholics in the Reign of Elizabeth* (1920); Oscar Meyer, *England and the Catholic Church under Elizabeth* (1916); Bishop Ward, *Dawn of the Catholic Revival* (1909), *Eve of Catholic Emancipation* (1911); *Sequel* to this (1915); Canon Burton, *Life and Times of Challoner;* W. Ward, Lives of *Wiseman, Newman* and *Ward;* Purcell, *Life of Cardinal Manning;* Abbot Butler, *Life of Bishop Ullathorne;* Stebbing, *The Church in England* (1921); W. J. Amherst, *The History of the Catholic Emancipation and the Progress of the Catholic Church in the British Isles* (1886); E. L. Cutts, *Parish Priests and their People in the Middle Ages in England* (1898); A. Savine, *English Monasteries on the Eve of the Dissolution* (1909); Cardinal F. A. Gasquet, *Henry VIII. and the English Monasteries* (1888–89), *A Short History of the Catholic Church in England* (1903), *English Monastic Life* (1903), *Henry III. and the Church* (1905), *Parish Life in Mediaeval England* (1906). (G. A. St.)

IN IRELAND

George Browne, an Augustinian of Blackfriars, London, was appointed by Henry VIII., to the see of Dublin without any reference to the pope (1534). Acts drawn up by the Privy Council for the royal supremacy, against the authority of the bishop of Rome, for the first fruits to the king, etc., were passed by the Dublin parliament (1536), but other acts against the power of the pope and the tax of the twentieth on benefices were passed only when the votes of the ecclesiastical proctors were withdrawn. Browne, impeded by dissensions in the Council of Ireland and by opposition from the clergy, was a failure as a reformer. But he burned shrines within the Pale and the staff of Jesus (St. Patrick's Crozier) in Dublin. On the sole ground that the religious houses were addicted to "superstitious ceremonies" and the "pestiferous doctrines of the Romish Pontiff" they were suppressed (1539). Leases and grants of the temporalities and spiritualities were made to obedient lords and officials, many of whose descendants owe their titles and lands to these confiscations. The plate, jewels, and ornaments were reserved for Henry. There were about 556 religious houses, many possessed of immense wealth derived from grants. In Dublin alone the annual revenue amounted to £2,600 (about £40,000 in 1914 value). In all cases the surrender was made to appear voluntary, small pensions were granted to the heads of the houses but the other members were sent adrift penniless. The Irish princes now made their surrender to Henry, renouncing the Pope's jurisdiction by oath, and in return received back their lands and titles. To make Henry's position more secure, parliament (1541) conferred on him the title "king of Ireland" in the presence of two archbishops, twelve bishops, Anglo-Norman earls, lords, and barons, and some Irish noblemen. Though it is beyond question that the majority of the Irish bishops temporised and accepted the Supremacy, yet their action had practically no effect on the clergy and people. Under Edward VI. the "Order of Communion" (1548), attached to the Latin Liturgy, the First Book of Common Prayer (1551), and the Second Book (1552) were introduced, but the bishops as a body refused to use them as they were subversive of the mass. The priests abstained from the churches, and celebrated mass and preached to the people in private. The reform then depended mainly on Browne, Staples of Meath, and the new married bishops. Deputy Sentleger arrived in Dublin (Nov. 1553) with instructions from Queen Mary to restore the old religion, but to grant liberty of worship to all. The Reform bishops who submitted were continued in their sees, but the married ones were deprived of theirs (1554). Mary renounced the title "Head of the Church in Ireland" but she was confirmed by Pope Paul IV. as queen of Ireland. There was, however, no restoration of religious houses (except the Hospitallers, Kilmainham), or persecution of Protestants.

Though the Dublin parliament (1560) under Elizabeth was dissolved "by reason of its aversion to the Protestant religion," yet the Acts credited to it restored the royal supremacy and enjoined the use of the Book of Common Prayer. Offending clergy were threatened with deprivation and perpetual imprisonment, and the laity were to be fined twelve pence (12/– in 1914 value) for non-attendance at Protestant service. With the exception of Curwen of Dublin, and probably two or three others, it cannot be proved that the bishops were disloyal to their trust, and the people clung tenaciously to their religion. Even in the Pale the Government did not press matters to extremes, for the chief gentlemen were still Catholics, and Elizabeth required them for her attacks against Shane O'Neill and other chiefs. The coming of Father Wolf, S.J. as papal envoy to Ireland to organise the Church, the deputation to Rome and Spain for help, the Bull of Excommunication of Elizabeth (1570), and the landing of James Fitzmaurice, cousin of the earl of Desmond at Dingle (1579) served to harden Elizabeth. From 1580 the persecution was carried on with great bitterness, and many bishops, priests, and laymen were thrown into prison where they died in chains or were hanged, not for treason, as was ingeniously made to appear, but for their religion. The churches were allowed to go into ruins by Elizabeth's lessees; some English clergy, chiefly of "bad note," took charge of the cures, and Trinity college was founded (1595) as a bulwark of Protestantism. With the failure of the Spanish expedition at Kinsale (1601) the Catholic cause was in a parlous condition.

The expected toleration from James I. was not forthcoming. Nay more, all priests were ordered to leave the country (1605). A Star Chamber imposed such heavy fines on conscientious Catholics that the Catholic noblemen petitioned against these acts of intolerance, but many of them were thrown into prison. They were afterwards granted toleration in return for their support against the northern chiefs and for their approval of the confiscation of Ulster. The plantation of English and Scottish settlers drove the Catholic population out of the north (1609). Thousands of acres were appropriated for the support of Protestant schools and of Trinity college, Protestant bishops were urged to

suppress popery, and inquisitions were set up in every part of the country. In spite of all, about a thousand priests were known to be carrying on their pastoral work, but Catholics were forbidden to teach school and Catholic parents to send their children abroad.

In the opening years of Charles I. the persecution was less violent. Chapels were opened in the large cities, the Jesuits opened a Catholic university in Back lane, Dublin, the "Graces" were granted for a subsidy, and fines for non-attendance at church were not to be levied. But the persecution broke out again (1629), and the troops destroyed altars and imprisoned priests. The war of 1641 saw the Ulster lands restored to their former owners, but the wild stories of Protestant massacres are without any solid foundation. The agreement of the Anglo-Irish of the Pale with Ormond (1646), abolishing the oath of Supremacy, removing statutory and educational disabilities, and opening all civil and military offices to Catholics, did not satisfy the majority of the Supreme Council of the Catholic Confederates, including the Papal Legate, Rinuccini, and so Owen Roe O'Neill continued the war.

The situation was now obscured by the arrival of Cromwell to crush both Catholics and Royalists. Wholesale slaughter filled his ten months in Ireland, Drogheda and Wexford suffering most. Priests were shipped abroad, and later in crowds to the Island of Aran, and the Catholic people were transplanted to Connaught. The soldiers were paid the arrears of their pay by grants of farms or estates. Under the Restoration of Charles II. (1660), the clergy returned, the Holy See filled many vacant Sees, and the Catholics as a body enjoyed comparative calm. Consequent, however, on the infamous story of the Popish Plot bishops were ordered to depart the country within a month (1678). After the accession of James II. (1685) a Dublin Parliament granted liberty of conscience to all (1689), but the battles of the Boyne, Aughrim, and Limerick put an end to James's hopes. The Treaty of Limerick, ratified by William and Mary (1692), granting freedom of religion to Catholics as enjoyed under Charles II., was rejected by the Dublin parliament embittered by the bigotry of the Protestant bishop of Meath, and Catholics were excluded from parliament. Lord Capel brought over with him a bill to secure the Protestant settlement by a system of penal laws framed to uproot the Catholic religion, to drive Catholics out of all offices of power and emolument, and to bestow the lands and offices on the Protestant minority, a sixth of the population. (*See* IRELAND.) Returns of names and abodes of all priests were made by the revenue officers (1697). The accession of Queen Anne (1702) led to a still more violent persecution, priests as a body refused to take the Oath of Abjuration; wholesale arrests were made and spies employed to track them down (1709). Under George II. (1727–60) persecution began to abate, but at the suggestion of Primate Boulter Catholics were deprived of the vote at parliamentary and municipal elections. Barristers and solicitors were not admitted to practice unless they had taken oaths that no Catholic could take, mixed marriages were null and void, and the priest celebrating such was guilty of felony (the death penalty was decreed later). At this time there were about 3,000 priests in Ireland.

The first Catholic committee (1757), composed of noblemen, doctors and merchants, presented an address of loyalty to the king, signed by 400 members, which brought the first official recognition of the Catholic body. Another address to George III. (1760) on his accession was signed by 600. Relief bills were passed in 1771, 1774 and 1778 permitting Catholics to acquire leases of land, inherit and bequeath property provided they took an oath that the Pope could not depose princes or exercise any civil authority in these realms. Catholics found no difficulty in taking this oath. In 1782 other penal laws were repealed. The spread of democratic ideas was softening the bigotry bequeathed by the 16th and 17th centuries. Men like Grattan and Edmund Burke advocated equal rights for Catholics and Protestants, whilst Wolfe Tone, a Republican, favoured a more forward policy in a union of Catholics and Dissenters. The first club of the United Irishmen, composed chiefly of Presbyterians, was formed in Belfast (1791). Their petition that the penal laws be repealed was rejected by Parliament. A Relief bill, however, permitting Catholics to vote—for Protestants—was passed (1793). Pitt's promise of State aid for Catholic clergy alarmed Protestants. It was his deliberate intention to play off Catholic against Protestant in the hope of securing the Union of the English and Irish parliaments. The country resorted to secret societies which were condemned by the bishops, and the rebellion (1798) was suppressed with wanton cruelty. The Union was ultimately carried (1800). With the promised State pay for the clergy a veto in the appointment of Catholic bishops was sought by English ministers. After bitter controversy both were refused by the bishops who declared that the oath of allegiance was sufficient guarantee of their loyalty. Daniel O'Connell, a young lawyer, put new heart into the people and opened their minds to the power of the vote. Elections at Waterford and elsewhere were won for candidates favouring Emancipation. O'Connell was elected for Clare but refused to take the anti-Catholic oath (1828). The Emancipation Act was carried by Peel (1829). It had two great defects: the 40/– freeholder was disfranchised, and severe regulations against Jesuits and other religious bodies were inserted in it. And twenty years afterwards nine-tenths of all offices of emolument and power were still in the hands of the dominant minority. With richly-endowed schools Protestants now opened a campaign of proselytism and vilification of Catholic doctrine, but bishops like Drs. Doyle and McHale strongly opposed them. After a veritable war Catholic tithes for the support of Protestant worship were abolished (1838). To remove the legal insecurity surrounding Catholic donations for religious purposes a body styled the "Commissioners of Charitable Bequests" was set up (1844). As to education; Maynooth college was founded (1795) for the education of Catholic clergy and endowed by Parliament with £8,000 a year (£40,000 in 1914 value), commuted in 1869 to a capital sum of £370,000. National primary schools for Protestants and Catholics were opened in 1831. The intermediate school system was introduced (1878) and, by prizes, exhibitions and result fees, gave indirect financial assistance which was of immense help to schools such as those of the Christian Brothers depending on private resources. The Queen's colleges (1845) were condemned at the Synod of Thurles (1850). A Catholic university founded in 1850, with Dr. Newman as rector, was a failure through want of a charter and funds. The Royal university (1879) pleased no one, and finally the Irish Universities Act (1908) established two universities, Belfast and Dublin, leaving Trinity college with its status and endowments. (M. V. R.)

UNITED STATES

Whatever may be the final verdict of history in regard to the very ancient and fascinating Celtic tales of ocean wanderings in which St. Brendan and his companions figure so prominently, many historians of the Catholic Church in the New World have accepted some of these legends as an initial page in their chronicles. A well-documented study of the *Navigatio Brendani* and the Land of Promise with an exhaustive bibliography was published in the *Catholic Historical Review* (Jan. 1921, pp. 395–477), by Prof. Joseph Dunn, head of the Celtic department of the Catholic University of America. The historical link between the alleged pre-Columbian discoveries of the New World and the mediaeval Church in Greenland is found in the Norse Sagas. The Norse Church in mediaeval America attracted the attention of scholars owing to the publication (1893) of the documents from the Vatican archives pertaining to the diocese of Gardar in Greenland. This first Catholic diocese in the New World was established about 1125, and had resident bishops until 1377. After this date until 1492, few of the incumbents of the see resided in Greenland. The letter of Pope Alexander VI. (1493) appointing the last bishop says that "on account of the freezing of the sea no ship is supposed to have touched there during the past eighty years" (*cf.* "The Norse Church in Medieval America," in the *Cath. Hist. Rev.*, July, 1925: bibliography).

Of the three principal colonizing nations—Spain, France and England—the two former were Catholic and the third began its voyages of discovery under a Catholic king, Henry VII. The first

attempt to set up Church organization in the newly-discovered continent was the appointment in 1493 of Rt. Rev. Bernard Boyl, or Buil, as vicar-apostolic of the "Indies." Bishop-elect Boyl accompanied Columbus on his second voyage. His labours were of short duration and of no permanent value. In 1504, Pope Julius II. appointed three bishops to Hispaniola (Haiti), but the Spanish crown refused to confirm their election and the sees were suppressed. Seven years later the permanent dioceses of San Domingo and Conception (Haiti) and San Juan (Porto Rico) were established. The see of Santiago de Cuba, erected in 1522, was the ecclesiastical centre of the Spanish missions on the mainland until 1545, when the three provinces or archbishoprics—Lima, Mexico City and San Domingo—were erected by Pope Paul III. In 1565, the parish of St. Augustine, the first within the confines of the present United States, was founded as part of the diocese of Santiago. Thus, three-quarters of a century after the discovery by Columbus, the regular canonical life of the Church was well established. Out of the archdiocese of Mexico City grew later the suffragan Mexican sees of Guadalajara, Durango, Linares and Sonora which ruled the south-western portion of the United States until the middle of the 19th century. One of the heroic chapters in American history is that on the Franciscan, Dominican and Jesuit missions of the South-west and in California (*cf.* Engelhardt's *Missions and Missionaries of California*, San Francisco, 1908). The former Mexican Church is now represented within the United States by 14 dioceses (*cf.* "Diocesan Organization of the Spanish Colonies," in the *Cath. Hist. Rev.*, July, 1918).

The French explorers and colonizers of the 16th and 17th centuries were, with few exceptions, Catholics and were ably supported by missionary groups; among them were the Récollets, Jesuits, Sulpicians, Capuchins and the secular clergy. New France was erected into a vicariate-apostolic in 1658, with Bishop Laval at its head. The see of Quebec (1674) had spiritual jurisdiction over all the vast province of France in North America, including the wide-spreading valley of the Mississippi, together with Louisiana. Seven of the 15 ecclesiastical provinces which now constitute the American Church were eventually erected in this former French territory, and there are at present about 50 dioceses in this same region (*cf.* Rothensteiner, *History of the Archdiocese of St. Louis [1673–1928]*, St. Louis, 1928).

In the English colonies along the Atlantic coast, Catholicism was generally legally proscribed. The exceptions were: Maryland, from its foundation by the Catholic Calverts in 1634 until the Puritan uprising of 1650; Rhode Island, presumably from its settlement by Roger Williams in 1636 and historically from the charter of 1663; and Pennsylvania, founded by Penn in 1682, where there is evidence of Catholics from its earliest settlement. Thus, according to Catholic historians, Maryland has the distinction of being the first English settlement where religious freedom was part of the common law (*cf.* Russell, *Maryland, Land of Sanctuary*, Balto., 1907). From 1634 to 1773, Jesuits, of English and American origin, ministered to the Catholics in Maryland, Pennsylvania and northern Virginia. After the suppression of the Society of Jesus (1773), the legal Corporation of the Roman Catholic Clergy continued to carry on missionary work, with Father John Lewis as superior. In 1784, Father John Carroll, who had won national reputation through his part in the commission to Canada (1776), was appointed prefect-apostolic of the Church in the United States. Six years later he became the first bishop of Baltimore, with jurisdiction over the entire Church in the new Republic. There were at this time (1790) 25 priests and about 30,000 Catholics in the United States. In 1808, Baltimore became a province or archdiocese with suffragan sees at Boston, New York, Philadelphia and Bardstown (Ky.). Ten years later, Archbishop Maréchal reported to the Holy See that there were 52 priests and about 100,000 Catholics in the United States (*cf.* Guilday, *Life and Times of John Carroll*, New York, 1922).

There is hardly any parallel in the history of Catholicism to the rapid growth of the Church in the United States during the 100 years from the death of Archbishop Maréchal (1828) to the present. This growth has given rise to serious discussion among Catholic writers. Some hold the increase from 25,000 in 1785 to be about 25,000,000 in 1929 to warrant the stand that there has been no leakage; others, basing their study upon the same figures (immigration, statistics, census reports, etc.) hold that there has been a considerable loss (*cf.* Canevin, *An historical and statistical Examination into the Progress and Population of the Catholic Church in the United States from 1780 to 1920*). The growth of the Catholic Church in the United States is due primarily to immigration, natural increase and conversions. The statistics generally accepted by Catholic writers, based upon the estimates made by John Gilmary Shea in 1891 and continued to 1920. are as follows:—

1790	40,000
1820	243,000
1830	337,620
1840	661,254
1850	1,767,841
1860	3,392,980
1870	4,901,980
1880	7,026,820
1890	10,419,668
1900	13,537,697
1910	18,483,320
1920	22,733,254

This computation would apparently support the claim that there are in the neighbourhood of 25,000,000 Catholics in the United States at the present day (1929), although the *Official Catholic Directory* for 1928 gives the total Catholic population as 19,689,049.

The question of loss and gain in the Church has been recently studied by Shaughnessy, in his *Has the Immigrant Lost the Faith?* (1925), which covers the period 1790–1920.

Racial Composition.—Racially, the Church in the United States is made up of groups from every nation in the world, with the English-speaking peoples in the majority. Up to the middle of the 19th century, the Irish and the Germans furnished the greater quota of its adherents. Later the French-Canadians, Italians, Mexicans, Poles, Lithuanians, Slovaks, Hungarians and others added notably to the number. There is also an appreciable percentage of Oriental Catholics—Greeks (Uniates), Syrians, Armenians, etc.

External Relations.—This almost unprecedented growth of a religious organization which had been subject to legal and political disabilities since the 16th century was bound to give rise to misunderstandings in a country so largely composed of Protestants. Since the rise of the American Republic several organized politico-religious movements were instituted for the purpose either of hindering the exercise of the franchise on the part of American Catholic citizens or of keeping Catholic Americans out of offices of public trust. Chief among these were the American Protestant Association (1829), the Native-American party (1837–44), the Know-Nothings (1855–61), the American Protective Association (1896), and recently the Ku Klux Klan. Being under the protection of the Constitution, and enjoying the advantages of the common law, Catholicism has not met with any official governmental opposition. All such outbursts of political or religious anti-Catholicism were but temporary or local and did not represent the more general attitude of American citizens. These anti-Catholic movements never became national and were due to conditions in which political, social and industrial problems were closely intermingled. The political theory of an inherent antagonism between Catholicism and Americanism has given rise to many interesting studies. Among these are: the *Catholic Builders of the Nation* (Boston, 1923); Kinsman, *Americanism and Catholicism* (1924); McNamara, *American Democracy and Catholic Doctrine* (1927); Shuster, *Catholic Spirit in America* (1927); Ryan, *The Catholic Church and the Citizen* (1928); Williams, *Catholicism and the Modern Mind* (1928). Many writers on this alleged incompatibility between Catholicism and republican institutions fail to give due allowance to the racial and economic adjustments involved in these sectional antagonisms to the Church.

Internal Development.—The internal development of the

Church in the United States has been of a uniform nature. Its doctrinal history offers little of importance. The Church discipline in vogue is similar to that of the other churches of Catholicism. Unity of doctrine, of moral law and of liturgical observance is preserved by an intimate union with the see of Rome. The universal canonical legislation of the Church as reorganized in the New Code of Canon Law (1918), the legislation by papal rescript, the decisions in contentious cases by the apostolic delegation at Washington, D.C. and a certain number of customs and practices which have grown up in the American Church during the past century and a half of its organized life form the basis for its domestic relations. Every five years each American bishop is expected to pay a visit to Rome (*ad limina Apostolorum*) and to make a report of the spiritual condition of his diocese. A system of diocesan synods provides for local unity among the bishops, clergy and laity. Each province is convened into provincial councils from time to time, and at greater intervals a national or plenary council is held. Three such councils have been held (1852, 1866, 1884) at Baltimore. It is of interest to note that a Graduate School of Canon Law exists at the Catholic University of America.

Education.—An outstanding factor in the internal development of the Church in the United States has been in the field of education (*cf.* Burns, *Catholic School System in the United States*, New York, 1907–12). According to the *Official Catholic Directory* for 1928, there are 7,061 parochial or elementary schools in which 2,281,837 boys and girls receive secular and religious instruction. The principal outlay involved in the parochial school system amounts to over $70,000,000 annually. Catholics at the same time contribute their proportionate share to the maintenance of the public schools. There are 225 high schools, colleges and universities for boys, and 729 academies for girls. This system of secondary education is crowned by the Catholic University of America, at Washington, established (1887) by Pope Leo XIII. and the American hierarchy and endowed with the privileges of the old pontifical universities of Europe. The purpose of the founders of this central institution was to carry the graduates of the Catholic colleges into higher scholarship, and thus prepare teachers for the entire Catholic educational system as well as leaders in the world of science and literature. The Catholic Sisters college, founded as an integral part of the Catholic University of America (1914), gives to the religious women teaching in the Catholic schools equal opportunities for higher training. There are ten Catholic universities in charge of the Society of Jesus, three under the Vincentians, three under the Holy Cross Fathers, and one each under the Benedictines, Holy Ghost Fathers and the Brothers of Mary. The National Catholic School of Social Service for Women (Washington) sends out each year trained workers for social study and research (*cf. Official Catholic Year Book for 1928*, pp. 426–431).

Between the years 1920 and 1928 the enrolment in Catholic secondary schools increased 60%. There are 32% more lay than religious instructors in Catholic universities and colleges for men. The education of the clergy is provided for by 136 seminaries, in which there are 14,432 students. *A Directory of Catholic Schools and Colleges* for the United States has been printed (1926), as well as a *Directory of Catholic Charities* (1926). There are 351 orphan asylums with 51,961 inmates. Other charitable institutions number over 2,000 and include every form of private and public charity.

Administration.—The actual government of the Church in the United States is represented (1929) by the apostolic delegate at Washington, four cardinals (Boston, New York, Philadelphia and Chicago); 15 archbishops (Baltimore, Boston, Chicago, Cincinnati, Dubuque, Milwaukee, New Orleans, New York, Oregon City, Philadelphia, St. Louis, St. Paul, San Antonio, San Francisco and Santa Fe); 103 bishops; 18,370 diocesan clergymen, under the sole and immediate direction of their bishops; 7,403 members of religious orders, subject to episcopal supervision—in all 25,773 clergymen. There are 11,699 churches with resident priests, and 6,175 mission churches—in all 18,293 churches, to which must be added several thousand chapels. Several hundred daily, weekly, bi-weekly and monthly publications are printed in English and foreign languages. There exist also several literary and academic reviews, published monthly and quarterly, of a high order of merit. *A Catholic Press Directory* was published in 1928.

National Development.—Students of the social and intellectual forces of Catholicism in the United States are giving considerable attention to the recent development of the Church along national lines. The change in the immigration policy of the country has rendered this development possible, since it permits the racial elements to be more easily assimilated to national ideals. Many agencies are at work effecting this general evolution. Among them are the Catholic Educational Assn., the National Conference of Catholic Charities, the Catholic Hospital Assn., the International Catholic Guild of Nurses, the Catholic Near East Welfare Assn., the Central Bureau of the Central-Verein, the American Catholic Philosophical Assn. and the American Catholic Historical Association. All these organizations are aided by the central bureaux of the National Catholic Welfare Conference at Washington. National organization is also being effected through such societies as the Holy Name Society, the Knights of Columbus, the Daughters of Isabella and the Catholic Daughters of America, the International Catholic Truth Society and the International Federation of Catholic Alumnae.

An annual meeting of the American hierarchy is held in September at the Catholic University of America, Washington, for the discussion of mooted points in Church discipline and progress. The national Catholic welfare conference is directed by an administrative committee of bishops, who report annually at the aforesaid meeting. A recent development is the creation of the home and foreign missionary board.

Mission Work.—Missionary work has been begun by American priests and sisters in foreign fields. The Catholic Foreign Mission Society of America (Maryknoll, N.Y.), and the Dominicans and the Foreign Mission Sisters of St. Dominic, have stations in China. The Holy Cross Fathers maintain missions in India. The Catholic Students Mission Crusade is an active participant in these projects. There is a bureau for Catholic Indian missions at Washington, and a national board for mission work among the coloured people, with headquarters in New York city. In social and educational welfare work the Knights of Columbus, with a membership approaching 1,000,000 men, has occupied a position of leadership.

Authorities.—The chief foreign source-collections for the history of the Church in the United States are in Rome (Vatican archives and archives of propaganda), Paris, London (Westminster archives), Seville (Archivo general de Indias), Mexico City (national archives), and Quebec (archiepiscopal archives). Transcripts of these documents are in the Shea collection at Georgetown university, in the archives of the Dominican House of Studies (Washington), and in the Guilday transcripts at the Catholic University of America. Every episcopal see has its own archives, and considerable material exists at the headquarters of the religious orders and congregations, particularly in Rome. The Catholic archives of America at Notre Dame university are particularly rich in unpublished material. Printed sources will be found in the quarterly *Records* and *Reviews* of the Catholic historical societies in the United States (*cf.* Guilday, "Catholic Historical Societies in the United States [1884–1928]," in *Off. Cath. Year Books*, 639–644). The *Catholic Historical Review* (1915–1921) contains bibliographical references for all phases of American Catholic history. Ecclesiastical legislation will be found in the *Acta et Decreta* of the Third Plenary Council of Baltimore. The new code of canon law has been analysed for American purposes in a supplementary volume of the *Catholic Encyclopedia* (1918).

The literature of American Catholic history of general and special nature is large in extent. Shea's four volumes on the *History of the Catholic Church in the United States* (New York, 1886–92) is still the standard work. The *Catholic Encyclopedia* contains articles on practically every noteworthy aspect of American Catholic history and is especially valuable for biographical sketches. *The Lives of the Deceased Bishops*, in two volumes, by R. F. Clarke (New York, 1872), is generally trustworthy, though inadequate. Statistics are given annually in

the *Official Catholic Directory* (New York). The extended bibliographies of American Church history, found in Guilday's *Life of Archbishop Carroll* (1922) and his *Life and Times of Bishop England* (1927), as well as in O'Daniel's *Life of Bishop Fenwick* (1925), give a list of provincial, diocesan and corporative histories. *See* also T. O'Gorman, *A History of the Roman Catholic Church in the United States* (1895); The Catholic University of America's *Studies in Church History* (7 vols., 1922–28); *American Catholic Historical Researches;* Jesuit Relations (73 vols., 1896–1901), edited by R. G. Thwaites, and the condensation in two volumes by Edna Kenton (1925). *See* also the article in the *Catholic Historical Review*, Vol. 7, p. 470–7 (1927) on "Catholic Historical Scholarship in the United States"; W. Gleeson, *History of the Catholic Church in California* (1871–72); F. N. Blanchet, *Historical Sketches of the Catholic Church in Oregon* (1884); E. V. O'Hara, *Catholic History of Oregon* (1916); L. Palladino, *Indian and White in the Northwest* (1894); P. J. DeSmet, *Western Missions and Missionaries* (1863); Chittenden and Richardson, *Life, Letters and Travels of Pierre De Smet* (4 vols., 1905). (P. Gu.)

LEGAL POSITION

The Roman Catholic religion has never been contrary to the common law of England, but for a time was made illegal by statute. These statutory prohibitions have gradually been removed, and therewith the common law legality of the religion has revived. The penal statutes were numerous during the reigns of Henry VIII., Edward VI. (some relief being given during Mary's reign), Elizabeth, the Stuart monarchs and throughout the 17th century. The details of the illegality were many and confused, but in the aggregate they amounted to absolute proscription. Not only the saying but the hearing of Mass, and whether in public or private, was prohibited—a prohibition which lasted until 1791; and the law had heavy penalties attaching to breach of it. And not only were adherents of the old religion forbidden their own worship, but they were forced under pain of "recusancy" to attend the Protestant parish church. Among the detailed prohibitions may be cited the early law—3 and 4 Ed. VI. *c.* 10—which forbade any one to possess a missal or other like book of devotion under pain of a fine, or for a third offence imprisonment at the king's will; and the Act of 35 Elizabeth *c.* 2, which forbade popish recusants leaving or even travelling beyond five miles from their accustomed place of abode, under pain of forfeiting all their lands to the queen.

Further instances of legislation against the religion (connected with the dynasty) are to be found in the latter part of the 17th century in the Bill of Rights and the Act of Settlement, providing for a succession of Protestant sovereigns, who would join in communion with the Church of England and make declarations against Transubstantiation. Even as late as 1715 an Act (1 Geo. I. *c.* 50) was passed "for appointing commissioners to enquire of the estates of certain traitors, and of popish recusants, and of estates given to superstitious uses in order to raise money out of them severally for the use of the public."

But thereafter legislation was mostly of an ameliorative character, and the present legal position of Roman Catholics may be gauged from a summary of that legislation.

The Relief Act, 1791, was passed to "relieve, upon conditions, and under restrictions, the persons therein described from certain penalties and disabilities to which papists or persons professing the popish religion, are by law subject." It allowed such persons, on taking an oath of undivided allegiance to George the Third and his Hanoverian successors and of abjuration of a right to murder heretics, etc., to move out of their five-mile limit; to live in London and Westminster; to stay away from the Protestant church; to say and hear Mass (but not in a building with a steeple or bell); to educate in the popish religion (but not to teach in endowed colleges, or to receive the child of a Protestant father in a school kept by a Roman Catholic, or to establish a Roman Catholic school); to join a religious order (but not to wear its habit out of doors or to found or endow an order); to be exempt (if in holy orders) from serving on juries; and to be protected from brawlers. The declaration against Transubstantiation, which had been imposed by an Act of 1672 upon peers and civil and military officers, was abolished.

In 1829 this carefully restricted freedom again to practise the proscribed religion was extended by the statute commonly known as the Catholic Emancipation Act (10 Geo. IV., *c.* 7). It further disestablished oaths and declarations against Transubstantiation, the invocation of saints and the sacrifice of the mass, by making such oaths and declarations no longer a qualification for membership of parliament or the holding of any office, franchise or civil right, except offices in or connected with the Established churches, or in any educational institution in regard to which such oaths obtained. But a new oath, against any attempt to subvert the Protestant religion, was imposed upon Members of Parliament, naval, military and municipal officers and electors. Priests were forbidden to sit in the House of Commons, but all civil and military offices were thrown open to Catholics, except the regency of the kingdom, the lord chancellorship, the lord-lieutenancy of Ireland and the high commissionership of the Church of Scotland. Also they could not present to livings in the Church of England. Many other restrictions upon religious liberty were maintained. Judicial and municipal officers were forbidden to attend in their insignia any public worship, except in a building of the Established Church; priests and monks were prohibited from conducting ceremonies or wearing habits save in their churches or private houses. Jesuits and all other male persons under religious vows already in the country were to register themselves—they did so for many years—and the entry into the country of those not already there was forbidden, with the exception of those of them who, being natural born British subjects, had left the country temporarily, and of others who might get a licence from a Protestant secretary of State to come into the country for a period not exceeding six months. To admit a person into a religious order was made a misdemeanour; the admitted person was to be banished for life, and transported for life if he had not gone within three months after the sentence of banishment. An attempt (apparently the only attempt) to enforce this law against religious orders was made as late as 1902, but the magistrate refused a summons and was upheld by the High Court: *R.* v. *Kennedy;* 86 Law Times Rep. 753. In 1898 parliament had declined to pass a bill for repealing the law, but it has now been repealed by the Roman Catholic Relief Act, 1926.

Further relief was granted in the Act of 1832—2 and 3 Will. IV. *c.* 115—which in respect to schools, places of worship, education and charitable purposes, placed Catholics upon the same footing as Protestant dissenters—*i.e.*, brought them within the Toleration Act, 1688, which had given Protestant dissenters liberty of public worship in their own registered buildings.

In 1844 a fresh advance was made, in the Act 7 and 8 Vic. *c.* 102, which repealed a whole series of penal Acts, some of which had already become obsolete or anachronistic, such as the 5 and 6 Ed. VI. *c.* 1, which made it an offence to be present at any religious service except that prescribed by the Act; the 1 Eliz. *c.* 1, which forfeited all a man's possessions if he taught the spiritual authority of the Popes, and the 1 Eliz. *c.* 2, which made attendance at the parish church on Sunday compulsory. Roman Catholics were also exempted from the obligation to attend a service of thanksgiving on Guy Fawkes day, and they were permitted to send their children "to be popishly bred beyond the Seas," and, even though converts, they were permitted (what had been prohibited to converts by 25 Car. 11, *c.* 2) to "breed up" their children in the popish religion. There was also repealed the statute of 1688 which had made it an offence punishable by three months' imprisonment, forfeiture, and payment of treble value of the articles seized, for any papist or suspected papist who refused to subscribe the declaration against Transubstantiation and the invocation of saints, to possess arms or ammunition or a horse worth more than £5. But even this enabling Act retained the prohibition of 1 Jac. I., *c.* 4 against Catholics keeping schools. The purport of the Act nevertheless was to emphasize and round off the work of the Acts of 1829 and 1832, and restore the legality of the Roman Catholic religion.

The restoration was not however complete. The tangled mass of penal legislation was not cleared away even by the Act of 1844; there was indeed a set-back in the Ecclesiastical Titles Act, 1851, which forbade Catholic bishops assuming territorial titles from places in the United Kingdom; but that Act was repealed in 1867.

In 1860 some further relief was granted in the Roman Catholic Charities Act, which ordained that charitable gifts for Catholic purposes should not be invalidated because they included a purpose deemed to be superstitious or otherwise unlawful, but that the illegal part of the disposition might be separated by the Chancery Court and given to a lawful Catholic purpose.

The Promissory Oaths Acts 1867 and 1871 gave further relief by abolishing the oaths still imposed upon Catholics (the sovereign's coronation declaration against Transubstantiation was changed to a mere declaration of Protestantism in 1910).

Disabilities still remained however, and in 1926 yet another repeal Act was passed, the Roman Catholic Relief Act, 1926 (which however does not apply to Northern Ireland). The enactments repealed by this latest legislation are, in addition to the repeal of the law against religious orders already referred to, as follows:—The Act of 1549, forbidding the possession of Catholic liturgies and books of devotion and statues, is repealed. The Religious Houses Act, 1559, which declared religious orders to be superstitious, and gifts for their benefit therefore voidable, as being for a superstitious use is also revoked. So is the Act of 1715, above referred to, for appointing commissioners to raise money out of recusants' estates. Then the Relief Act of 1791 was made more fully relieving by removing from it the section which forbade steeples and bells in Catholic churches and prohibited a priest from officiating at funerals in (presumably Protestant) churches or church-yards, or from exercising any rights or ceremonies or wearing the habits of an order out of doors or in a private house where more than five persons in addition to the household were assembled, or from exercising his functions at all unless he had first taken the oath of allegiance and abjuration (a similar prohibition in the Act of 1829 being also removed). From the Act of 1791 was also eliminated the section which prohibited the establishment or endowment of a religious order or school or college by Roman Catholics.

What must be regarded as further relief from the penal laws was made in a judicial decision, and so would more accurately be described as the removal of a misunderstanding of the law. It related to bequests for masses for the testator's soul, and the decision may be classed with the measures of legislative relief since, until 1919, when the decision was given, it had been assumed (after ineffectual attempts to obtain legal sanction for such bequests) that they were unlawful. The decision was given by the House of Lords in the case of *Bourne* v. *Keane* (Law Rep. [1919] App. Cas. 815). It overruled the leading case of *West* v. *Shuttleworth* (decided in 1835) and other cases following that decision, which had proceeded on the assumption that bequests for masses for the dead were now illegal because the Chantries Act of 1547 had confiscated gifts for such masses in existence at that time. It was held by the House of Lords in *Bourne* v. *Keane* that this was a wrong interpretation of the Chantries Act, that that Act did not govern subsequent bequests, and that with the repeal of the statutes which had made the Catholic religion illegal, the old common law legality of masses for the dead revived.

Subject to the Protestantism of the Crown and the lord chancellorship and of the provisions of the law for preventing Roman Catholics interfering in the management of the Church of England, as by nominating to benefices, it may now be said, with some confidence (but the maze of anti-Catholic legislation and the piecemeal nature and intricacies of the repeals make absolute confidence appear rash) that full liberty is now restored to the Catholic religion, and equality also, except as regards the incidents attaching to the Protestant Establishment, which has inherited the old-time property and privileges of the Catholic Church. And whenever new legislation is passed in which the interests of religion are affected (as in education, guardianship of children, chaplaincies or poor law) the Roman Catholic religion receives equal treatment with other denominations. (E. E. W.)

BIBLIOGRAPHY.—*See* also article "Church" by G. M. Joyce, and article "Catholic" by Herbert Thurston in the *Catholic Encyclopedia;* Murray, *De Ecclesia* (Dublin, 1866); Wiseman, *Lectures on the Church;* Newman, *Development of Christian Doctrine; Difficulties of Anglicans,* and *Essays Historical and Critical* (*Essay IX.*); Batiffol, *Etudes d'histoire et de la theologie positive* (Paris, 1906); Turmel, *Histoire de la theologie positive* (1904); Wilhelm and Scannell, *Manual of Catholic Theology;* G. K. Chesterton, *The Catholic Church and Conversion* (1926); H. Belloc, *The Catholic Church and History* (1926).

ROMANCE, originally a composition written in "Romance" language, *i.e.,* in one of the phases on which the Latin tongue entered after or during the dark ages. For some centuries by far the larger number of these compositions were narrative fictions in prose or verse; and since the *special* "Romance" language of France—the earliest so-called—was the original vehicle of nearly all such fictions, the use of the term for them became more and more accepted in a limited sense. Yet for a long time there was no definite connotation of *fiction* attached to it, but only of narrative story; and the French version of William of Tyre's *History of the Crusades,* a very serious chronicle written towards the close of the 12th century, bears the name of *Roman d'Éracle* simply because the name of the emperor Heraclius occurs in the first line. But if the explanation of the name "Romance" is quite simple, certain and authentic, the same is by no means the case with its definition, or even with the origin of the thing to which that name came mostly to be applied. For some centuries an abstraction has been formed from the concrete examples. "Romance," "romanticism," "the romantic character," "the romantic spirit," have been used to express sometimes a quality regarded in itself, but much more frequently a difference from the supposed "classical" character and spirit. The following article will deal chiefly with the matter of Romance, excluding or merely referring to accounts of such individual romances as are noticed elsewhere. But it will not be possible to conclude without some reference to the vaguer and more contentious signification.

Romance in antiquity.—Speculations on the origin of the peculiar kind of story which we recognize rather than define under the name of romance have been numerous and sometimes confident; but a wary and well-informed criticism will be slow to accept most of them. It is certain that many of its characteristics are present in the *Odyssey;* and it is a most remarkable fact that these characteristics are singled out for reprehension—or at least for comparative disapproval—by the author of the treatise *On the Sublime.* The absence of central plot, and the prolongation rather than evolution of the story; the intermixture of the supernatural; the presence and indeed prominence of love-affairs; the juxtaposition of tragic and almost farcical incident; the variety of adventure arranged rather in the fashion of a panorama than otherwise: all these things are in the *Odyssey,* and they are all, in varying degrees and measures, characteristic of romance. Nor are they absent from the few specimens of ancient prose fiction which we possess. If the *Satyricon* of Petronius was ever more than a mass of fragments, it was certainly a romance, though one much mixed with satire, criticism and other things; and the various Greek survivals from Longus to Eustathius always and rightly receive the name. But two things were still wanting which were to be all-powerful in the romances proper—chivalry and religion. They could not yet be included, for chivalry did not exist; and such religion as did exist lent itself but ill to the purpose except by providing myths for ornament and perhaps pattern.

The "Saint's Life."—A possible origin of the new romance into which these elements entered (though it was some time before that of chivalry definitely emerged) has been seen by one of the least hazardous of the speculations above referred to in the hagiology or "Saint's Life," which arose at an early though uncertain period, developed itself pretty rapidly, and spreading over all Christendom (which by degrees meant all Europe and parts of Asia) provided centuries with their chief supply of what may be called interesting literature. If the author of *On the Sublime* was actually Longinus, the minister of Zenobia, there is no doubt that examples both sacred and profane of the kind of "fiction" ("imitation" or "representation") which he deprecated were mustering and multiplying close to, perhaps in, his own time. The Alexander legend of the pseudo-Callisthenes is supposed to have seen the light in Egypt as early as A.D. 200, and the first Greek version of that "Vision of Saint Paul," which is the ancestor of all the large family of legends of the life after death, is pretty

certainly as old as the 4th century and may be as old as the 3rd. The development of the Alexandreid was to some extent checked or confined to narrow channels as long as something like traditional and continuous study of the classics was kept up. But hagiology was entirely free from criticism; its subjects were immensely numerous; and in the very nature of the case it allowed the tendencies and the folklore of three continents and of most of their countries to mingle with it. Especially the comparative sobriety of classical literature became affected with the Eastern appetite for marvel and unhesitating acceptation of it; and the extraordinary beauty of many of the central stories invited and necessitated embroidery, continuation, episode. Later, no doubt, the adult romance directly reacted on the original saint's life, as in the legends of St. Mary Magdalene most of all, of St. Eustace, and of many others. But there can be very little doubt that if the romance itself did not spring from the saint's life it was fostered thereby.

The Gathering of Matter.—Proceeding a little further in the cautious quest—not for the definite origins which are usually delusive, but for the tendencies which avail themselves of opportunities and the opportunities which lend themselves to tendencies—we may notice two things very important to the subject. The one is that as Graeco-Roman civilization began to spread north and east it met, to appearance which approaches certainty, matter which lent itself gladly to "romantic" treatment. That such matter was abundant in the literature and folk-lore of the East we know: that it was even more abundant in the literatures and folk-lore of the North, if we cannot strictly be said to *know*, we may be reasonably sure. On the other hand, as the various barbarian nations (using the word in the wide Greek sense), at least those of the North, became educated to literature, to "grammar," by classical examples, they found not a few passages in these examples which were either almost romances already or which lent themselves, with readiness that was almost insistence, to romantic treatment. Apollonius Rhodius had made almost a complete romance of the story of Jason and Medea. Virgil had imitated him by making almost a complete romance of the story of Aeneas and Dido: and Ovid, who for that very reason was to become the most popular author of the middle ages early and late, had gone some way towards romancing a great body of mythology. We do not know exactly who first applied to the legendary tale of Troy the methods which the pseudo-Callisthenes and "Julius Valerius" applied to the historical wars of Alexander, but there is every reason to believe that it was done fairly early. In short, during the late classical or semi-classical times and the whole of the dark ages, things were making for romance in almost every direction.

It would and did follow from this that the thing evolved itself in so many different places and in so many different forms that only a person of extraordinary temerity would put his finger on any given work and say, "This is the first romance," even putting aside the extreme chronological uncertainty of most of the documents that could be selected for such a position. Except by the most meteoric flights of "higher" criticism we cannot attain to any opinion as to the age and first developed form of such a story as that of Weland and Beadohild (referred to in the *Complaint of Deor*), which has strong romantic possibilities and must be almost of the oldest. The much more complicated Volsung and Nibelung story, though we may explore to some extent the existence backwards of its Norse and German forms, baffles us beyond certain points in each case; yet this, with the exception of the religious element, is romance almost achieved. And the origin of the great type of the romance that *is* achieved—that has all elements present and brings them to absolute perfection—the Arthurian legend, despite the immense labours that have been spent upon it and the valuable additions to particular knowledge which have resulted from some of them, is, still more than its own Grail, a quest unachieved, probably a thing unachievable. The longest and the widest inquiries, provided only that they be conducted in any spirit save that which determines to attain certainty and therefore concludes that certainty has been attained, will probably acquiesce most resignedly in the dictum that romance "grew"—that its birthplace is as unknown as the grave of its greatest representative figure.

But when it has "grown" to a certain stage we can find it, and in a way localize it, and more definitely still analyse and comprehend its characteristics from their concrete expressions.

CLASSES OF SOURCE

Approaching these concrete expressions, then, without at first putting forward excessively hard and fast requirements in regard to the validation of the claims, we find existing in Europe about the 11th century (the time is designedly left loose) divers classes of what we should now call imaginative or fictitious literature, nearly all (the exceptions are Scandinavian and Old English) in verse. These are: (i.) The saints' lives; (ii.) the Norse sagas, roughly so-called; (iii.) the French *chansons de geste;* (iv.) the Old English and Old German stories of various kinds; (v.) perhaps the beginning of the Arthurian cycle; (vi.) various stories more or less based on classical legend or history from the tales of Alexander and of Troy down to things like *Apollonius of Tyre,* which have no classical authority of either kind, but strongly resemble the Greek romances, and which were, as in the case named, pretty certainly derived from members of the class; (vii.) certain fragments of Eastern story making their way first, it may be, through Spain by pilgrimages, latterly by the crusades.

Now, without attempting to fence off too rigidly the classical from the romantic, it may be laid down that these various classes possess that romantic character, to which we are, by a process of netting and tracking, slowly making our way, in rather different degrees, and a short examination of the difference will forward us not a little in the hunt.

With i. (the saints' lives) we have least to do: because by the time that romance in the full sense comes largely and clearly into view, it has for the most part separated itself off—the legend of St. Eustace has become the romance of Sir Isumbras, and so forth. But the influence which it may, as has been said, have originally given must have been continually re-exerted; the romantic-dynamic suggestion of such stories as those of St. Mary of Egypt, of St. Margaret and the Dragon, of St. Dorothea, and of scores of others, is quite unmistakable. Still, in actual result, it works rather more on drama than on narrative romance, and produces the miracle plays.

In ii. (the sagas), while a large part of their matter and even not a little of their form are strongly romantic, differences of handling and still more of temper have made some demur to their inclusion under romance, while their final ousting in their own literatures by versions of the all-conquering French romance itself is an argument on the same side. But the Volsung story, for instance, is full of what may be called "undistilled" romance—the wine is there, but it has to be passed through the still—and even in the most domestic sagas proper this characteristic is largely present.

It is somewhat less so in iii. (the *chansons de geste*), at least in the apparently older ones, though here again the comparative absence of romantic characteristics has been rather exaggerated, in consequence of the habit of paying disproportionate and even exclusive attention to the *Chanson de Roland.* There is more, that is, of romance in *Aliscans* and others of the older class, while *Amis and Amiles,* which must be of this class in time, is almost a complete romance, blending war, love and religion—*salus, venus, virtus*—in full degree.

The other four classes, the miscellaneous stories from classical, Eastern and European sources, having less corporate or national character, lend themselves with greater ease to the conditions of romantic development; but even so in different degrees. The classical stories have to drop most of their original character and allow something very different to be superinduced before they become thoroughly romantic. The greatest success of all in this way is the story of *Troilus and Cressida.* For before its development through the successive hands of Benoît de Sainte-More, Boccaccio (for we may drop Guido of the Columns as a mere middleman between Benoît and Boccaccio) and Chaucer, it has next to no classical authority of any kind except the mere names. In the

various Alexandreids the element of the marvellous—the Eastern element, that is to say—similarly overpowers the classical. As for the Eastern stories themselves, they are particularly difficult of certain unravelment. The large moral division—such as *Barlaam and Josaphat*, the *Seven Wise Masters* in its various forms, etc., comes short of the strictly romantic. We do not know how much of East and how much of West there is in such things as *Flore et Blanchefleur* or even in *Huon of Bordeaux* itself. Contrariwise we ought to know, more certainly than apparently is known yet, what is the date and history of such a thing as that story of Zumurrud and Ali Shahr, which may be found partly in Lane and fully in the complete translations of the *Arabian Nights*, though not in the commoner editions, and which is evidently either copied from, or capable of serving as model to, a Western *roman d'aventures* itself.

We come, however, much closer to the actual norm itself—closer, in fact, than in any other place save one—in the various stories, English, French, and to a less extent German,[1] which gradually received in a loose kind of way the technical French term just used, a term not to be translated without danger. Nearly all these stories were drawn, by the astonishing centripetal tendency which made France the home of all romance between the 11th and the 13th centuries, into French forms; and in most cases no older ones survive. But it is hardly possible to doubt that in such a case, for instance, as *Havelok*, an original story of English or Scandinavian origin got itself into existence before, and perhaps long before, the French version was retransferred to English, and so in other cases. If, once more, we take our existing English *Havelok* and its sister *King Horn*, we see that the latter is a *more* romanced form than the former. *Havelok* is more like a *chanson de geste*—the love interest in it is very slight; while in *King Horn* it is much stronger, and the increased strength is shown by the heroine being in some forms promoted into the title. If these two be studied side by side the process of transforming the mere story into the full romance is to no small extent seen in actual operation. But neither exhibits in any considerable degree the element of the marvellous, or the religious element, and the love interest itself is, even in *Horn*, simple and not very dramatically or passionately worked out. In the later *roman d'aventures*, of which the 13th century was so prolific (such as, to give one example out of many, *Amadas and Idoine*), these elements appear fully, and so they do in the great Auchinleck collection in English, which, though dating well within the 14th century, evidently represents the meditation and adaptation of French examples for many years earlier.

The last of our divisions, however, exhibits the whole body of romantic elements as nothing else does. It is not our business in this place to deal with the Arthurian legend generally as regards origin, contents, etc., nor, in the present division of this actual article, to look at it except for a special purpose and in connection with and contradistinctive to the other groups just surveyed. Here, however, we at last find all the elements of romance, thoroughly mixed and thoroughly at home, with the result not merely that the actual story becomes immensely popular and widely spread; not only that it receives the greatest actual development of any romantic theme; but that, in a curious fashion, it attracts to itself great numbers of practically independent stories—in not a few cases probably quite independent at first—which seem afraid to present themselves without some tacking on (it may be of the loosest and most accidental description) to the great *polycentric* cycle, the stages of which gather round Merlin, the Round Table, the Grail and the Guinevere-Lancelot-Mordred catastrophe. All the elements, let it be repeated, are here present: war, love and religion; the characteristic extension of subject in desultory adventure-chronicles; the typical rather than individual character (though the strong individuality of some of the unknown or half-known contributors sometimes surmounts this); the admixture of the marvellous, not merely though mainly as part of the religious element; the presence of the chivalrous ideal. The strong dramatic interest of the central story is rather superadded to than definitely evolved from these elements; but they are still present, just as, though more powerfully than, in the weakest of miscellaneous *romans d'aventures*.

[1] Italian romance seems to have modelled itself early on French, and it is doubtful, rich as is the late crop of Spanish romances, whether we have any that deserve the name strictly and are really early.

TYPES OF STORY, INCIDENT AND PERSONAGES

A further step in the logical and historical exploration of romance may be taken by regarding the character-and-story classes round which it groups itself, and which from the intense community of mediaeval literature—the habit of mediaeval writers not so much to plagiarize from one another as to take up each after each the materials and the instruments which were not the property of any—is here especially observable. Prominent above everything is the world-old motive of the quest; which, world-old as it is, here acquires a predominance that it has never held before or since. The object takes pretty various, though not quite infinitely various, forms, from the rights of the disinherited heir and the hand or the favour of the heroine, to individual things which may themselves vary from the Holy Grail to so many hairs of a sultan's beard. It may be a friendly knight who is lost in adventure, or a felon knight who has to be punished for his trespasses; a spell of some kind to be laid; a monster to be exterminated; an injured virgin or lady, or an infirm potentate, to be succoured or avenged; an evil custom to be put an end to; or simply some definite adventure or exploit to be achieved. But quest of some sort there must certainly be if (as in *Sir Launfal*, for instance) it is but the recovery of a love forfeited by misbehaviour or mishap. It is almost a *sine qua non*—the present writer, thinking over scores, nay hundreds, of romances, cannot at the moment remember one where it is wanting in some form or another.

It will be observed that this at once provides the amplest opportunity for the desultory concatenation or congregation of incident and episode which is of the very essence of romance. Often, nay generally, the conditions, localities and other circumstances of the quest are half known, or all but unknown, to the knight, and he is sometimes intentionally led astray, always liable to be incidentally called off by interim adventures. In many (perhaps most) cases the love interest is directly connected with the quest, though it may be in the way of hindrance as well as of furtherance or reward. The war interest always is so connected; and the religious interest commonly—almost universally in fact—is an inseparable accident. But everything leads up to, involves, eventuates in the fighting. The quest, if not always a directly warlike one, always involves war; and the endless battles have at all times, since they ceased to be the great attraction, continued to be the great obloquy of romance. It is possible no doubt that reports of tournaments and single combats with lance and sword, mace and battle-axe, may be as tedious to some people as reports of football matches certainly are to others. It is certain that the former were as satisfactory in former times to their own admirers as the latter are now. In fact the variety of incident is almost as remarkable as the sameness. And the same may be said, with even greater confidence, of the adventures between the fights in castle and church and monastery, in homestead or hermitage. The actual stories are not much more alike than those who have read large numbers of modern novels critically know to be the case with them. But the absence, save in rare cases, of the element of character, and the very small presence of that of conversation, show up the sameness that exists in the earlier case.

The same deficiency in individual character-drawing, and in the conversation which is one of its principal instruments, brings out in somewhat unfair relief some other cases of apparent sameness—the "common forms" of story and of character itself. The disinherited heir, the unfaithful or wronged wife, the wicked stepmother, the jealous or wrongly suspected lover, are just as universal in modern fiction as they are in mediaeval—for the simple reason that they are common if not universal in nature. But the skeleton is more obvious because it is less clothed with flesh and garments over the flesh; the texture of the canvas shows more because it is less worked upon. Some of these common forms, however, are more peculiar to mediaeval times; and some, though not many, allow excursions into abnormalities which, until

recently, were tabooed to the modern novelist. Among the former the wickedness of the steward is remarkable, and of course not difficult to account for. The steward or seneschal of romance, with some honourable exceptions, is as wicked as the baronet of a novel, but here the explanation is not metaphysical. He was constantly left in charge in the absence of his lord and so was exposed to temptation. The extreme and almost Ephesian consolableness of the romance widow can be equally rationalized—and in fact is so in the stories themselves—by the danger of the fief being resumed or usurped in the absence of a male tenant who can maintain authority and discharge duties. While such themes as the usually ignorant incest of son with mother or the more deliberate passion of father for daughter come mostly from very popular early examples—the legend of St. Gregory of the Rock or the story of Apollonius of Tyre.

Characters of Romance Proper.—The last point brings us naturally to another of considerable importance—the singular *purity* of the romances as a whole, if not entirely in atmosphere and situation, yet in language and in external treatment. It suited the purposes of the Protestant controversialists of the Renaissance, such as our own Ascham, to throw discredit upon work so intimately connected with Catholic ceremony and belief as the *Morte d'Arthur;* and it is certain that the knights of romance did not even take the benefit of that liberal doctrine of the *Cursor Mundi* which regards even illicit love as not mortal unless it be "with spouse or *sib.*" But if in the romances such love is portrayed freely, and with a certain sympathy, it is never spoken of lightly and is always punished; nor are the pictures of it ever coarsely drawn. In a very wide reading of romance the present writer does not remember more than two or three passages of romance proper (that is to say before the latter part of the 15th century) which could be called obscene by any fair judge. And the term would have to be somewhat strained in reference even to these.

The contrast with the companion divisions of *fabliaux* and farces is quite extraordinary; and nearly as sharp as that between Greek tragedy on the one hand and Greek comedy or satiric play on the other. It is brought out for the merely English reader in Chaucer of course, but in him it might have been studied. In the immense *corpus* of known or unknown French and English writers (the Germans are not quite so particular) it comes out with no possibility of deliberation and with unmistakable force.

The history of the forms in which romance presents itself follows a sufficiently normal and probable course. The oldest are always—save in the single case of part of the Arthurian division, in which we probably possess none of the *actually* oldest, and in some of the division of Antiquity which had a long line of predecessors in the learned languages—the shortest. They become lengthened in a way continued and exemplified to the present moment by the tendency of writers to add sequels and episodes to their own stories, and made still more natural by the fact that these poems were in all or almost all cases *recited.* "Go on" is the most natural and not the least common as well as the most complimentary form of "Bravo!" and the reciter never seems to have said "no" to the compliment. In not a few cases—*Huon of Bordeaux, Ogier the Dane, Guy of Warwick,* are conspicuous examples—we possess the same story in various stages; and can see how poems, perhaps originally like *King Horn* of not more than a couple of thousand lines or even shorter in the 13th century, grew to thirty, forty, fifty thousand in the 15th. The transference of the story itself from verse to prose is also—save in some particular and still controverted instances—regularly traceable and part of a larger and natural literary movement. While, also naturally enough, the pieces become in time fuller of conversation (though not as yet often of conversation that advances the story or heightens its interest), of descriptive detail, etc. And in some groups (notably that of the remarkable *Amadis* division) a very great enlargement of the proportion and degradation of the character of the marvellous element appears—the wonders being no longer mystical, and indeed being magical only in the lower sense.

CHARACTERISTIC EXAMPLES

And so we come to the particular characteristics of the kind or kinds demonstrated in individual examples. Of these the English reader possesses a matchless although a late instance in the *Morte d'Arthur* of Malory, a book which is at once a *corpus* and a pattern of romance in gross and in detail. The fact that it is not, as has been too often hastily or ignorantly asserted, a mere compilation, but the last of a singular series of rehandlings and redactions—conducted with extraordinary though for the most part indistinctly traceable instinct of genius—makes it to some extent transcend any single example of older date and more isolated composition. But it displays all the best as well as some of the less good characteristics of most if not all. Of the commonest kind—the almost pure *roman d'aventures* itself—the Gareth-Beaumains episode (for which we have no direct original, French or English, though *Lybius Disconus* and *Ipomedon* come near to it in different ways) will give a fair example; while its presentation of the later chapters of the Grail story, and the intertwisted plot and continuing catastrophe of the love of Lancelot and Guinevere, altogether transcend the usual scope of romance pure and simple, and introduce almost the highest possibilities of the romantic novel. The way in which Malory or his immediate authorities have extruded the tedious wars round the "Rock of the Saxons," have dropped the awkward episode of the false Guinevere, and have restrained the uninteresting exuberance of the continental wars and the preliminary struggles with the minor kings, keeps the reader from contact with the duller sides of romance only. Of the real variety which rewards a persistent reader of the class at large it would be impossible to present even a miniature hand-index here; but something may be done by sample, which will not be *mere* sample, but an integral part of the exposition. No arbitrary separation need be made between French and English; because of the intimate connection between the two. As specially and symptomatically noteworthy the famous pair—perhaps the most famous of all—*Guy of Warwick* and *Bevis of Hampton,* should *not* be taken. For, with the exception of the separation of Guy and Felise in the first, and some things in the character of Josiane in the second, both are somewhat spiritless concoctions of stock matter. Far more striking than anything in either, though not consummately supported by their context, are the bold opening of *Blancandin et l'orgueilleuse d'amour,* where the hero begins by kissing a specially proud and prudish lady; and the fine scenes of fight with a supernatural foe at a grave to be found in *Amadas et Idoine.* Reputation and value coincide more nearly in the charming fairy story of *Parthenopex de Blois* and the Christian-Saracen love romance of *Flore* (Florice and other forms) *et Blanchefleur.* Few romances in either language, or in German, exhibit the pure adventure story better than Chrestien de Troyes's *Chevalier au Lyon,* especially in its English form of *Ywain and Gawain;* while the above-mentioned *Lybius Disconus* (*Le Beau Déconnu*) makes a good pair with this. For originality of form and phrase as well as of spirit, if not exactly of incident, *Gawain and the Green Knight* stands alone; but another Gawain story (in French this time), *Le Chevalieur aux deux épées,* though of much less force and fire, exceeds it in length without sameness of adventure. Only the poorest romances—those ridiculed by Chaucer in *Sir Thopas*—which form a small minority, lack striking individual touches, such as the picture of the tree covered with torches and carrying on its summit a heavenly child, which illuminates the huge expanse of *Durmart le Gallois.* The various forms of the *Seven Wise Masters* in different European languages show the attitude of the Western to the Eastern fiction interestingly. The beautiful romance of *Emarè* is about the best of several treatments of one of the exceptional subjects classed above—the unnatural love of father for daughter, while if we turn to German stories we find not merely in the German variants of Arthurian themes, but in others a double portion of the mystical element. French themes are constantly worked up afresh—as indeed they are all over Europe—but the Germans have the advantage of drawing upon not merely Scandinavian traditions like those which they wrought into the *Nibelungen Lied* and

Gudrun, but others of their own. And both in these and in their dealings with French they sometimes show an amount of story-telling power which is rare in French and English. No handling of the Tristan and Iseult story can compare with Gottfried's; while the famous *Der arme Heinrich* of Hartmann von Aue (the original of Longfellow's *Golden Legend*) is one of the greatest triumphs and most charming examples of romance, displaying in almost the highest degree possible for a story of little complexity all the best characteristics of the thing.

What, then, are these characteristics? The account has now been brought to a point where a reasoned résumé of it will give as definite an answer as can be given.

Even yet we may with advantage interpose a consideration of the answer that *was* given to this question universally (with a few dissidents) from the Renaissance to nearly the end of the 18th century and not infrequently since; while it is not impossible that, in the well-attested revolutions of critical thought and taste, it may be given again. This is that romance on the whole, and with some flashes of better things at times, is a jumble of incoherent and mostly ill-told stories, combining sameness with extravagance, outraging probability and the laws of imitative form, childish as a rule in its appeal to adventure and to the supernatural, immoral in its ethics, barbarous in its aesthetics, destitute of any philosophy, representing at its very best (though the ages of its lowest appreciation were hardly able even to consider this) a necessary stage in the education of half-civilized peoples, and embodying some interesting legends, much curious folk-lore and a certain amount of distorted historical evidence. On the other hand, for the last hundred years and more, there have been some who have seen in romance almost the highest and certainly the most charming form of fictitious creation, the link between poetry and religion, the literary embodiment of men's dreams and desires, the appointed nepenthe of more sophisticated ages as it was the appointed pastime of the less sophisticated. Between these opposites there is of course room for many middle positions, but few of these will be occupied safely and inexpugnably by those who do not take heed of the following conclusions.

Romance, beyond all question, enmeshes and retains for us a vast amount of story-material to which we find little corresponding in ancient literature. It lays the foundation of modern prose fiction in such a fashion that the mere working out and building up of certain features leads to, and in fact involves the whole structure of the modern novel (*q.v.*). It antiquates (by a sort of gradual "taking for granted") the classical assumption that love is an inferior motive, and that women, though they "may be good sometimes" are scarcely fit for the position of principal-personages. It helps to institute and ensure a new unity—the unity of interest. It admits of the most extensive variety. It gives a scope to the imagination which exceeds that of any known older literary form. At its best it embodies the new or Christian morality, if not in a Pharisaic yet in a Christian fashion, and it establishes a concordat between religion and art in more ways than this. Incapable of exacter definition, inclining (a danger doubtless as well as an advantage) towards the vague, it is nevertheless comprehensible for all its vagueness, and, informal as it is, possesses its own form of beauty—and that a precious one. These characteristics were, if perceived at all by its enemies in the period above referred to, taken at their worst; they were perceived by its champions at the turn of the tide and perhaps exaggerated. From both attitudes emerged that distinction between the "classic" and the "romantic" which was referred to at the beginning of this article as requiring notice before we conclude. The crudest, but it must be remembered the most intentionally crude (for Goethe knew the limitations of his saying), is that "Classicism is health; Romanticism is disease." In a less question-begging proposition of single terms, classicism might be said to be method and romanticism energy. But in fact sharp distinctions of the kind do much more harm than good. It is true that the one tends to order, lucidity, proportion; the other to freedom, to fancy, to caprice. But the attempt to reimpose these qualities as absolutely distinguishing marks and labels on particular works is almost certain to lead to mistake and disaster, and there is more than mere irony in the person who defines romance as "Something which was written between an unknown period of the Dark Ages and the Renaissance, and which has been imitated since the later part of the 18th century." What that something really is is not well to be known except by reading more or less considerable sections of it—by exploring it like one of its own forbidden countries. But something of a sketch-map of that country has been attempted here.

To illustrate and reinforce the above, *see* in the first place articles on the different national literatures, especially French and Icelandic; as also the following:—

Classical or Pseudo-Classical Subjects.—APOLLONIUS OF TYRE; LONGUS; HELIODORUS; APULEIUS; TROY; THEBES; CAESAR, JULIUS; ALEXANDER THE GREAT; HERCULES; JASON; OEDIPUS; VIRGIL.

Arthurian Romance.—ARTHURIAN LEGEND; and the articles on romance writers such as Malory, Wolfram von Eschenbach, Chrétien de Troyes, Gottfried of Strasbourg, etc.

French Romance.—CHARLEMAGNE; GUILLAUME D'ORANGE; DOON DE MAYENCE; OGIER THE DANE; ROLAND; RENAUD DE MONTAUBAN (*Quatre fils Aymon*); HUON OF BORDEAUX; GIRART DE ROUSSILLON; MACAIRE; PARTONOPEUS DE BLOIS; ROBERT THE DEVIL; FLORE AND BLANCHEFLEUR; RAOUL DE CAMBRAI; GUILLAUME DE PALERME; BENOÎT DE SAINTE-MORE, etc.

Anglo-Norman, Anglo-Danish, English Romance.—BEVIS OF HAMPTON; HORN; HAVELOK; GUY OF WARWICK; ROBIN HOOD; MAID MARIAN.

German.—NIBELUNGENLIED; ORTNIT; DIETRICH OF BERN; WOLFDIETRICH; HELDENBUCH; WALTHARIUS; GUDRUN; HILDEBRAND, LAY OF; RUODLIEB.

Northern.—SIGURD; WAYLAND; HAMLET; EDDA.

Spanish.—AMADIS DE GAULA.

Various.—REYNARD; ROMAN DE LA ROSE; GRISELDA and kindred stories; GENEVIEVE OF BRABANT; GESTA ROMANORUM; BARLAAM AND JOSAPHAT; SEVEN WISE MASTERS; MAELDUNE, VOYAGE OF.

BIBLIOGRAPHY.—The first modern composition of importance on romance (putting aside the dealings of Italian critics in the 16th century with the question of romantic *v.* classical unity) is the very remarkable dialogue *De la Lecture des vieux romans* written by Chapelain in mid-17th century (ed. Feillet, 1870), which is a surprising and thoroughgoing defence of its subjects. But for long afterwards there was little save unintelligent and mostly quite ignorant depreciation. The sequence of really important serious works almost begins with Hurd's *Letters on Chivalry and Romance* (1762). In succession to this may be consulted on the *general* subject (which alone can be here regarded) the dissertations of Percy, Warton and Ritson; Sir Walter Scott, "Essay on Romance" in the supplement to the *Encyclopædia Britannica* (1816–24); Dunlop, *History of Fiction* (1816, usefully supplemented and completed by its 4th edition, 1888, with very large additions by H. Wilson); C. L. B. Wolff, *Allgemeine Geschichte des Romans* (Jena, 1841–50); H. L. D. Ward, *Catalogue of Romances in the British Museum* (vol. i. 1883, vol. ii. 1893) (the most valuable single contribution to the knowledge of the subject); G. Saintsbury, *The Flourishing of Romance and the Rise of Allegory* (1897), and its companion volumes in *Periods of European Literature* [W. P. Ker, *The Dark Ages* (1904); F. J. Snell, *The Fourteenth Century* (1899); G. Gregory Smith, *The Transition Period* (1900); D. Hannay, *The Later Renaissance* (1898)]; W. P. Ker, *Epic and Romance* (1897).

(G. SA.)

ROMANCE LANGUAGES. The name given to the seven groups of languages, viz., Portuguese, Spanish, Provençal (including Catalan), French, Italian, the Rhaeto-Romanic idioms and Rumanian.

They are called "romance" (from post-classical Latin *romanice*, derived from Latin *romanus*) because their basis is the Latin which was spoken in the Imperium Romanum. They are sometimes called "daughter languages" (*langues filles*) of Latin, though in no sense daughters, but Latin itself in the transformed state it has reached in the various countries in which it was spoken. The word Neo. Latin has been used for "Romance" by some scholars.

The comparative method systematically used by F. Diez (1794–1876) in his *Grammatik der romanischen Sprachen*, of which the first volume appeared in 1836, demonstrated conclusively that each of the above-mentioned languages was directly evolved from Vulgar or Popular Latin.

Within a few years of the appearance of Diez's studies new tendencies began to be felt, tendencies which Diez had himself approved but for lack of opportunity had not embodied. First, chiefly under the impulse of Paul Meyer (1840–1917) the documents preserved in the archives were taken into account; next came the study of the *patois* instigated by Gaston Paris (1839–1903) keenly pursued by investigators such as abbé Rous-

selot (1846–1924) and Gilliéron (1854–1926), and yielding fresh materials for phonetic and lexicographical research; finally, the study of semantics began simultaneously in different countries.

W. Meyer-Luebke, availing himself of the philological material now accessible in recorded dialect and patois, completely revised Diez's grammar and compiled a new *Grammatik der romanischen Sprachen* (4 vols. 1890–1902) on a much broader basis. This achievement marks the close of this period of romance philology.

The opening of the latest period is distinguished by the use of "linguistic geography" initiated by the appearance of the *Atlas historique de la France* by Gilliéron and Edmont, containing 2,319 maps, 1,920 for France proper (1902–1910) and 399 for Corsica (1914). Similar surveys have been attempted in other countries, but few have attained successful completion. Alone worthy of mention as regards romance languages are Weigand, *Linguisticher Atlas des dacorumänischen Sprachgebietes* (Leipzig, 1909), containing 67 maps only and none of the Bánat; Ch. Guerlin de Guer, *Atlas dialectologique de la Normandie* (1903), comprising 123 maps but unfinished; Griera, *Atlas linguistique de Catalunya*, which is to form 10 volumes (2,000 maps) vols. i., ii., and iii., with 586 maps having so far appeared (Barcelona, 1923–24).

POPULAR LATIN

With Latin, as with all languages, there existed from the outset divergences between the written and spoken idioms affecting the vocabulary and various portions of the grammar.

The name Popular Latin, especially applied to the spoken language with all its individual and dialectical idiosyncrasies, was also termed *inconditus, cotidianus, usualis, vulgaris, plebeius, proletarius* and *rusticus*, as opposed to the written language from which it was progressively differentiated by the operation of social influences and the growth of literature. Thus the contact of Latin with Greek, and particularly Greek philosophy, science and art, resulted in the coinage of learned terms, *e.g., epistola, grammatica, schola, stylus, poeta, poesis, poema, papyrus, paragraphus, heros, aer, aether, encaustum, podagra, sarcophagus, horologium.* These were Greek words with Latin endings. In formation they were contrary to the genius of the native Latin which enriched its word-stock by its traditional system of composition and derivation, especially by means of suffixes, destined to play such an important rôle in the romance languages. Till the end of the 1st century A.D. however, the classical language withstood the assaults of Popular Latin which it dominated in some degree by the prestige of its literary masterpieces, by the exigencies of the administration which compelled all officials to employ the higher language, and by the influence of the schools in which teaching was given in the *sermo urbanus.* But, with the passing of the golden age, the written language became even more artificial. When in A.D. 212 Caracalla conferred by edict the dignity of Roman citizenship upon all free-born inhabitants of the Empire, he introduced into Rome, according to the picturesque phrase of Isidore of Seville (Origines, ii. 31) *"vitia et verborum et morum"* (sins of speech and morality) and thenceforth the evolution of Popular Latin in all provinces, as far as we can trace, proceeded to all intents unchecked conformably with its inherent character. Two fresh historical factors next intervened, hastening the downfall of classical Latin, the religious revolution and the invasions of the Barbarians. Of the Christian propagandists the vast majority belonged to the lower classes; among the most zealous were many slaves and women, the language they used was essentially popular and even the educated among them found that to carry out their evangelisation efficiently they must resort to the vulgar tongue. The greatest of the Fathers of the Church, notwithstanding he had been a professor of rhetoric, wrote without hesitating: "Non timemus ferulas grammaticorum, dum tamen ad veritatem solidam et certiorem perveniamus. Melius est quod reprehendant nos grammatici quam non intelligant populi." (S. Augustinus, *Enarrationes in Psalmos,* 138, 20.) "We don't fear the schoolmaster's cane if only we can arrive at a sure and more weighty truth. It were better to be reproved by the pedants than to be not understood by the people." Pope Gregory the Great appeals to Almighty God against the tyranny of the declensions: "Casus servare contemno quia indignum vehementer esistimo ut verba coelestis oraculi restringam sub regulis Donati." (*Praefatio,* Job, 1. 6.) "I refuse the slavery of the declensions because I think strongly that it is not fitting that I should force the words of the Divine Message into the rules of Donatus."

The anarchy which ensued when the Roman empire was overthrown proved eminently favourable to the growth of dialects and special idioms. Vulgar Latin and pre-literary Romance was a spoken language, but can in some measure be reconstituted from the information derived from the treatises composed by grammarians, the Latin Bible, the early Latin manuscripts, inscriptions, collection of formulae of the laws of the Barbarians, divers glossaries, literary, historical and technical texts ranging from the 4th to the 8th century, and the coins and charters of the Merovingian and Carolingian epochs. Thus the *Appendix Probi* (most probably of the 3rd century) contains remarks on declension, conjugation, orthography and the meaning of words. It is a kind of manual of "don'ts," interesting from the philological standpoint precisely on account of the forms quoted as mistakes to be avoided. The mention *porphireticum marmor* ñ *purpureticum marmur* attests the popular pronunciation of *ph,* in which Vulgar Latin dropped the aspiration, and the confusion of *ŏ* and *ŭ; speculum* ñ *speclum* shows the dropping in popular pronunciation of the post-tonic vowel in proparoxytones; *pecten* ñ *pectinis* instances a nominative formed by popular analogy. *The Glossary of Reichenau* (the ms. dates from the 8th century) translates certain words of the Vulgate no longer understood by words which, although given Latin case or verb inflexions, belonged in fact to a dialect of North-western France. Thus in the sentence "Sed et serpens erat callidior" (Genesis iii., 1) *callidior* is rendered by *vitiosior.* This means that *callidus* had ceased to be intelligible (*callidus* has in fact totally vanished from the romance languages), and that *vitiosus* had taken its place in Vulgar Latin (*vitiosus* survives indeed in Italian *vezzoso,* Spanish and Portuguese *vicioso,* and is represented in Old French by *voisos*).

The material is both scarce and scanty, despite the richness and variety of the dialects spoken in all parts of the Roman empire. Reconstruction must in many cases resort to the comparative method. Thus, take the name for "finch" in various romance languages, *pincione* in Tuscan, *pintsuni* in Sicilian, *pinson* in French, *pinsó* in Catalan, *pinsón* in Spanish; comparison of these differing forms shows that all are derived from a common prototype which can be reconstituted as *pincionem.* Again if we take the words for "to advance," *avanzare* in Italian, *avaunzer* in the Engadine dialect, *vantsá* in Frioulan, *avansar* in Provençal and Catalan, *avancer* in French, there can be do doubt as to the legitimacy of our reconstituting a prototype verb *abantiare* formed from the Latin *ante.*

General Characteristics of the Romance Languages.—After an evolutionary process occupying some three centuries Popular Latin had taken on an individual character according to the different regions of the Romanic world in which it was spoken, and the dawn of "romance" may be regarded as coincident with the 8th century.

1. Vocabulary.—The Romance languages retained only negligible traces of the idioms originally spoken in their various territories before the advent of Latin. In French not more than fifty words can be traced back to Celtic; in Spanish the number of Iberian terms is no greater; in Northern Italian there are but infinitesimal relics of Osco-Umbrian and Celtic; in Southern Italian and Sicilian a few traces of Greek. As regards the Rhetic and Rumanian words which are ascribed to the primitive tongues of the Dacians, Thracians and Illyrians, the identification rests on practically indemonstrable hypotheses. The most important additions to the vocabularies of the romance languages come, for the occidental portion, from Germanic, Greek and Arabic, and, for the oriental portion, from Slavonic. The Germanic contribution embraces terms dealing with war, military art, costume, rural life and parts of the body, a few abstract terms and a great quantity of proper names. It is peculiarly important in French by reason of the Frankish invasion of Gaul and the influence exerted by the Merovingian and Carolingian kings who

were of Germanic origin. The Greek element during the middle ages, was of only slight importance, and was restricted to terms brought back by the Crusaders in the 11th and 12th centuries, or incorporated as a result of the commercial relations between Orient and Occident. The influx of Greek words was accelerated in the 14th century and with the 19th century became very abundant. The Arabic element is particularly important in Spanish, Portuguese and Provençal; many terms have percolated into Italian, and about three hundred are extant in Modern French. Finally at various periods other languages have supplied contributions, and there has been a continuous interpenetration between the different romance languages themselves. All romance languages contain (*a*) popular words, *i.e.*, derived by slow evolution from Popular Latin: (*b*) words of learned formation, *i.e.*, borrowed direct from ancient or modern languages. In some cases the same original word has yielded two derivatives belonging to *a* or *b* respectively.

2. Phonetics.—The general law applying to all romance languages is that the incidence of the tonic accent remains as in Popular Latin. All popular words are therefore stressed at the same point as they were eighteen centuries ago; as in some romance languages the vowels have persisted much as they were during the imperial epoch, a modern Italian or Spaniard pronounces some words almost exactly as did a subject of Marcus Aurelius or Commodus. The atonic or intertonic vowels have weakened, or in some of the romance languages disappeared (except *a*). Proparoxytones have tended to become paroxytones, but many have survived in Italian and Rumanian, a few in Spanish; a small number existing in Old French were gradually eliminated during the middle ages. French and Portuguese have evolved nasal vowels unknown in Latin; the *ü* sound, also unknown in Latin, is found in French, Provençal, and the Northern Italian and Engadine dialects. Initial consonants have, in general, suffered no change. In Spanish, however, *b* has developed into an intermediary sound between *b* and *v*, whilst *c* + *e* or *i* is pronounced like English voiceless *th* and *j* has become a velar fricative. In French *c* + *a* has given rise to the sound *ch*, (*e.g.*, campum > champ) and *g* + *a* to the sound *j* (*e.g.*, gaudia > joie); *h* has totally disappeared. The intervocalic consonants have proved less resistant; *b* has passed to *v* in all romance languages (even when orthographed *b* as in Spanish and Gascon, it is pronounced with the intermediary sound). Final *m* and *n* have disappeared apart from some rare exceptions (Sp. *quien*, F. *rien*) and *ns* has been reduced to *s*, processes of which signs are already visible in classical Latin. (Rumanian offers many peculiarities: *see* RUMANIAN LANGUAGE AND LITERATURE.)

3. Morphology.—The following features set forth the double character which prevailed in the evolution of the romance languages (*a*) the modification of the declension and conjugation system, (*b*) the development of the analytical tendencies of romance as opposed to the synthetic character of classical Latin.

The neuter has disappeared from all romance languages; a few relics of it still survived in the mediaeval period. The term "neuter" used in Rumanian to designate the third declension applies to substantives conforming to the masculine declension in the singular and to the feminine declension in the plural, *e.g.*, *un cutit* (a knife), *niste cutite* (knives). The two-case system of declension (nominative and accusative) characterising the early period of some romance languages (French, Provençal and perhaps Rhaeto-Romanic) has disappeared (*see* RUMANIAN LANGUAGE AND LITERATURE); substantives and adjectives now possess only a single case in the singular and in the plural. More numerous traces of declension are preserved by the personal and relative pronouns. The definite article and personal pronoun of the third person are in all romance languages derived from *ille* (or *illi*), *illa*. The cardinal numbers 1 to 10 correspond in all romance languages to the Latin cardinals, but from 11 onwards there are varied divergences. A noteworthy feature of French is the use of 20 as multiplier. The synthetic comparatives and superlatives have mostly been ousted by *magis* or *plus* preceding the positive, *e.g.*, *grandior*, *grandissimus*, replaced by *magis* or *plus grandis*. The tense paradigms have been profoundly modified; the future and conditional of occidental romance languages are derived from new Vulgar Latin creations which substitute for the synthetic classical *amabo*, *amarem*, forms made up of infinitive + (*h*)*abeo* (*amare* + [*h*]*abeo*) for the future, and of infinitive + (*h*)*abebam* (*amare* + [*h*]*abebam*) for the conditional. In Italian, however, the prototype of the conditional was infinitive + (*h*)*abui* (*amare* + [*h*]*abui*). In Rumanian and the Rhetic idioms the future and conditional are periphrastic. Romance languages have further evolved a new perfect and pluperfect based on Latin (*h*)*abui* and (*h*)*abebam* + past participle: (*h*)*abui* + *amatum* and (*h*)*abebam* + *amatum*. The imperative either perpetuates the Latin forms (somewhat curtailed), as in Italian, or replaces the plural by indicative or subjunctive forms. The infinitives in *-are* and *-ire* have evolved regularly; but those in *-ēre* and *-ĕre* have suffered varying fates in the different romance languages. As to past participles, most striking is the extension of forms in *-ūtus* at the expense of those in *-ītus* and *-ŭtus*. In the personal flexions of the various tenses analogy has worked many changes; *e.g.*, in Italian and Rumanian the second person singular of all tenses ends in *-i*. Romance retains no vestige of the deponent verbs, all of which have been assimilated to active verbs, *e.g.*, *nasci* has become *nascere*. Romance has substituted for the synthetic tenses of the passive voice, a periphrasis compounded from the different forms of *essĕre* (Vulgar Latin for *esse*) or of *stare* + past participle.

4. Syntax.—Evolution has been towards a more rational and logical word-order and stricter connection both of clauses and of words. Many new syntactical features are closely correlated with the modifications mentioned in **2** and **3**. There has been constant action and reaction between phonetics, morphology and syntax. If the structure of the Romance sentence is compared with that of the Latin sentence the salient innovations observable are (*a*) the normal constructional order subject, verb, complement, replacing the elaborate artifices of classical Latin which had gradually disappeared in Vulgar Latin; (*b*) the substitution of the relative clause of the Vulgar Latin type, *credo quod* (or *quem* or *quatenus*) for the infinitive construction *e.g.*, *credo quod illum verum est* for *credo illud verum esse;* (*c*) increase in use and number of prepositions which in Vulgar Latin perform the functions of the lost genitive, dative and ablative cases; (*d*) creation of a definite article (from *ille*, *illa*) and an indefinite article (from *unus*, *una*); (*e*) increase in number of tenses permitting greater precision in expression of the past (past anterior, past imperfect and past conditional); (*f*) ingenious devices for formation of adverbs and prepositions more adequately expressing the shades of abstract thought, *e.g.*, French, *en*, *ens*, *dans*, *dedans*, corresponding respectively to *in*, *intus*, *de* + *intus*, *de* + *de* + *intus;* (*g*) complexity of certain interrogative forms best exemplified by the French equivalent for the Latin *Quid est?: Qu'est-ce que c'est que cela?* the etymological counterpart of which would be: *Quid est eccehoc quod eccehoc est quod ecce illac?* (Example quoted from the *Dictionnaire Général*).

BIBLIOGRAPHY.—G. Gröber, *Grundriss der romanischen Philologie*, vol. i. (2nd ed.). (1904–1906), vol. ii. (1897–1902); W. Meyer-Luebke, *Romanisches Etymologisches Wörterbuch* (1911); P. Savj-Lopez, *Le origini neolatine* (1920); W. Meyer-Luebke, *Die romanische Sprachwissenschaft der letzten zwölf Jahre* in *Revue de linguistique romance* p. 9–34 (1925). The ensemble of these gives a full bibliography. *Mélanges de philologie et d'histoire offerts à Monsieur Antoine Thomas*, 1927 (containing a complete list of the contributions to romance philology by the eminent French philologist). (L. B.)

ROMAN DE LA ROSE, a French poem of which the first part was written about 1230 by Guillaume de Lorris (*q.v.*), and which was completed about 40 years later by Jean de Meun (*q.v.*). Guillaume de Lorris wrote an allegory, which is an artistic presentment of the love philosophy of the troubadours. In a dream the Lover visits a park to which he is admitted by Idleness. In the park he finds Pleasure, Delight, Cupid and other personages, and at length the Rose. Welcome grants him permission to kiss the Rose, but he is driven away by Danger, Shame, Scandal, and especially by Jealousy, who entrenches the Rose and imprisons Welcome, leaving the Lover disconsolate. The story, thus left incomplete, was finished in 19,000 lines by Jean

de Meun, who allows the Lover to win the Rose, but only after a long siege and much discourse from Reason, the Friend, Nature and Genius. In the second part, however, the story is entirely subsidiary to picturesque and poetic digressions, and to violent satire in the manner of the fabliaux against the abuse of power, against women, against popular superstition, and against the celibacy of the clergy. The length of the work and its heterogeneous character proved no bar to its enormous popularity in the middle ages, attested by the 200 mss. of it which have survived.

The *Romaunt of the Rose* was translated into English by Chaucer (*see* the prologue to the *Legende of Good Women*), but the version which has come down to us (*see* an edition by Dr. Max Kaluza, Chaucer Society, 1891), is generally admitted to be by another hand. For a list of books on the authorship of the English translation *see* G. Körting, *Grundriss der engl. Lit.* (Münster, 1905, 4th ed. p. 184). Three editions of the *Roman de la Rose* were printed at Lyons between 1473 and 1490; two by Antoine Verard (Paris, 1490? and 1496?), by Jean du Pré (Paris, 1493?), by Nicholas Desprez for Jean Petit (Paris), by Michel le Noir (Paris, 1509 and 1519). In 1503 Jean Molinet produced a prose version. Marot modernized the text (1526), and his corrections were followed in subsequent editions. There is a modern English version by F. S. Ellis (3 vols., 1900).

ROMAN-DUTCH LAW. The term Roman-Dutch law describes the system of law which existed in the province of Holland (*see* HOLLAND) from the 15th to the 19th centuries. This system, introduced by the Dutch into their colonies, was retained in those of them which passed to the British Crown at the end of the 18th and the beginning of the 19th centuries. These were the maritime districts of Ceylon, the Cape of Good Hope, and the settlements upon the coast of South America now comprised within the colony of British Guiana. In a secondary sense therefore Roman-Dutch law is the original common law of these countries. In Ceylon this system has been extended to the Kandyan Provinces (annexed in 1815), while in South Africa it was carried forward with the expanding range of white settlement into the Republics and Natal. To-day it is in force in the whole of British Africa south of the Zambesi, as well as in the Mandated Territory, known as the Protectorate of South-West Africa.

In British Guiana on the other hand the Roman-Dutch law having been found unsuited to the existing conditions of the colony has by the local Civil Law of British Guiana Ordinance 1916, taking effect from Jan. 1, 1917, been to a very great extent replaced by the common law of England. When it is said that Roman-Dutch law forms the common law of British South Africa and Ceylon, this must be understood with a reservation in favour of native law and custom, so far as these are recognized, and with the qualification that the general law of these countries, as will be seen, has in many respects departed from its original type.

Historical Development.—It does not fall within the scope of this article to investigate the historical sources of the old Dutch law. It is enough to say that in the 15th and 16th centuries the Roman law was "received" *in subsidium* in the province of Holland, as it was sooner or later in the Netherlands generally, as well as in Germany. General and local customs, based ultimately upon Germanic tribal law (Frankish, Frisian, Saxon), afforced by privileges and by-laws (*keuren*), and affected, doubtless, by an earlier "infiltration" of Roman law, held their ground. Hence resulted the mixed system for which Simon van Leeuwen in 1652 invented the term "Roman-Dutch law." This remained in force until superseded in 1809 by the Code Napoléon, which in 1838 gave place to the existing Dutch civil code. The old law was abrogated in the Dutch colonies also, so that to-day the Roman-Dutch law is no longer in force outside the British empire. (*See* ROMAN LAW.)

We have spoken of two elements in the Roman-Dutch system, Roman law and Germanic custom. To these must be added a third, viz., legislative acts of the Burgundian and Spanish periods. Such were the Great Privilege of Mary of Burgundy of 1476; the Placaat of the emperor Charles V. of 1529, requiring immovable property to be transferred before the local court; the Perpetual Edict of the same monarch of 1540, relating to clandestine marriages and other matters; the Maritime Laws of Charles V. of 1551 and of Philip II. of 1563; the Codes of Criminal and Civil Procedure of Philip II. of 1570 and 1580; the Political Ordinance of the States of Holland of 1580; the Placaat on Intestate Succession of 1599. There was much legislation in the 17th and 18th centuries, but it had little effect upon the general character of the legal system. Apart from legislation we derive our knowledge of the Roman-Dutch law from collections of decided cases, from collections of opinions, commonly termed *consultatien* or *advijsen*, and from a rich juristic literature.

Systematization.—The first attempt to reduce the Roman-Dutch civil law to system was made by Hugo de Groot (Grotius) in his *Introduction to the Jurisprudence of Holland* (*Inleiding tot de Hollandsche Rechts-geleertheyd*), written while he was a prisoner in Loevestein in 1619–20, published in 1631. This short treatise, a masterpiece of condensed exposition, remains to this day a legal classic. But after Grotius honor must be assigned to Johannes Voet (1647–1713), professor at Utrecht and Leyden, whose *Commentarius ad Pandectas* (1698–1704) more than any work of the old law is in use to-day. In the 18th century the most famous name is Cornelis van Bijnkershoek, for 20 years president of the Supreme Court (1673–1743). Towards the end of the century Dionysius Godefridus Van der Keessel, professor at Leyden, lectured on the *jus hodiernum*, of which he published a summary in *Theses selectae juris Hollandici et Zelandici* (1800). Copies of the lectures themselves, commonly known as Van der Keessel's *Dictata*, circulate in ms., and these have been cited in judgments of the South African Courts. A younger contemporary of Van der Keessel was Joannes van der Linden, the author of a popular textbook, *Regtsgeleerd, Practicaal en Koopmans Handboek*. These two names conclude the list of the contemporary writers on the old Dutch law.

The Dutch carried to their colonies the law of the home country, just as the English took with them their common law, and subject to the same necessary adaptation to local conditions. In practice the law of the province of Holland was followed. Hence the extension to the colonial empire of the Roman-Dutch system of law. This was supplemented by local ordinances of the governors in council, and in the East Indies by laws made by the governor-general in council established at Batavia. These were collected by Van Diemen in 1642 and by Van der Parra in 1766. The supreme direction of the East India company was exercised by the Council of XVII. and of the West India company by the Council of X. The ultimate legislative authority was vested in the States General.

In the British Empire.—When the Dutch colonies passed to the British Crown, the old law was in principle retained, but during the century and more which has since elapsed it has undergone profound modifications due partly to changed social and economic conditions, partly to the incursion of rules and institutions derived from English law. In commercial matters, in particular, English influences have been predominant. This was so even in the South African republics, and after annexation their law was brought into closer harmony with that of the neighbouring colonies.

The South Africa Act 1909 provided (sec. 135) for the continuance of all laws in force in the several colonies at the establishment of the Union until repealed by the Union parliament, or by the provincial councils within the sphere assigned to them. But since this Act took effect on May 31, 1910, the Union parliament and the appellate division of the Supreme Court of South Africa (which hears appeals not only from the Union, but also from Southern Rhodesia and the Mandated Territory) have been active in consolidating, amending and explaining the law, and will continue to introduce uniformity in place of diversity. Many of the rules of the old law have already been pronounced to be obsolete by disuse.

But, except where the field is occupied by statute or invaded by English law, the law of South Africa (and in a less degree the law of Ceylon) retains the character of a Roman law system. In many departments of the law the texts of the *Corpus Juris* are still cited as authoritative. The approach to them is through the writings of the Dutch jurists, Grotius, van Leeuwen, Voet, van der Keessel, van der Linden and the rest. The influence of English

law has been profound, most of all in British Guiana, where its victory has been complete, less in Ceylon, least in South Africa. But at some points the Roman-Dutch law has offered a stubborn resistance. Thus, it is now settled for both South Africa and Ceylon that "consideration" is not necessary to the validity of a contract. South Africa (but not Ceylon) retains almost unchanged the old law of community of goods with its consequences in the proprietary relations of the spouses.

Upon a general view it must be said that a system of law, which can draw at the same time upon the treasures of the Roman and of the English law has great elements of strength, particularly in a virile and progressive community. But the need to resort to law-books of by-gone centuries is a serious inconvenience.

BIBLIOGRAPHY.—Hugo de Groot, *Inleiding tot de Hollandsche Rechtsgeleerdheid,* with notes by Groenewegen and Schorer (1767); the same edit. by S. J. Fockema Andreae (3rd ed., revised by L. J. van Apeldoorn, 1926); Engl. trans. by Herbert (1845), Maasdorp (3rd ed., 1903), Lee (1926); Simon van Leeuwen, *Het Roomsch Hollandsch Recht,* with commentary by Decker (1780; Eng. trans. and commentary by Sir J. G. Kotzé, 2nd ed., 1921); Johannes Voet, *Commentarius ad Pandectas* (best ed., 4 vols., Paris, 1827–29); D. G. van der Keessel, *Theses Selectae Juris Hollandici et Zelandici* (1800; Eng. trans. by Lorenz, 2nd ed., 1901); Joannes van der Linden, *Regtsgeleerd, Practicaal, en Koopmans Handboek* (1806), Eng. trans. by Henry (1828), Sir H. Juta (4th ed. 1904), Morice (2nd ed. 1922); A. S. Fockema Andreae, *Het Oud-Nederlandsch Burgerlijk Recht* (Haarlem, 1906) and *Bijdragen tot de Nederlandsche Rechtsgeschiedenis* (1888–1900); A. S. de Blecourt, *Kort Begrip van het Oud-Vaderlandsch Burgerlijk Recht* (2nd ed., 1924); R. W. Lee, *Introduction to Roman-Dutch Law* (2nd ed., 1925); Sir A. F. S. Maasdorp, *The Institutes of Cape Law* (4th and 3rd ed., 1922–26); Hon. J. W. Wessels, *History of the Roman-Dutch Law* (1908); Hon. W. Pereira, *The Laws of Ceylon* (2nd ed., 1913); Hon. Ll. C. Dalton, *The Civil Law of British Guiana* (Georgetown, 1921). *See* also the *Cape Law Journal* and the *South African Law Journal.* (R. W. L.)

ROMAN EMPIRE, LATER. The reign of Constantine the Great forms the most deep-reaching division in the history of Europe. The external continuity is not broken, but the principles which guided society in the Greek and Roman world are replaced by a new order of ideas. Emperor-worship, which expressed a belief in the ideal of the earthly empire of Rome, gives way to Christianity; this is the outward sign that a mental transformation, which we can trace for 300 years before in visible processes of decay and growth, had reached a crisis.

Besides the adoption of Christianity, Constantine's reign is marked by an event only second in importance, the shifting of the centre of gravity of the empire from the west to the east by making Byzantium a second capital, a second Rome. The foundation of Constantinople (*q.v.*) determined the subsequent history of the State; it established permanently the division between the eastern and western parts of the empire—a principle already introduced—and soon exhibited, though not immediately, the preponderance of the eastern half. The eastern provinces were the richest and most resourceful, and only needed a Rome in their midst to proclaim this fact; and further, it was eastward that the empire fronted, for here was the one great civilized State with which it was in constant antagonism. Byzantium was refounded on the model of Rome, had its own senate, and presently a *praefectus urbi.* But its character was different in two ways: it was Christian and it was Greek. From its foundation New Rome had a Christian stamp; it had no history as the capital of a pagan empire. There was, however, no intention of depressing Rome to a secondary rank in political importance; this was brought about by the force of circumstances.

The Christian Roman empire, from the first to the last Constantine, endured for 1,130 years, and during that long period, which witnessed the births of all the great modern nations of Europe, experienced many vicissitudes of decline and revival. In the 5th century it lost all its western provinces through the expansion of the Teutons; but in the 6th asserted something of its ancient power and won back some of its losses. In the 7th it was brought very low through the expansion of the Saracens and of the Slavs, but in consequence of internal reforms and prudent government in the 8th century was able before the end of the 9th to initiate a new brilliant period of power and conquest. From the middle of the 11th century a decline began; besides the perpetual dangers on the eastern and northern frontiers, the empire was menaced by the political aggression of the Normans and the commercial aggression of Venice; then its capital was taken and its dominions dismembered by Franks and Venetians in 1204. It survived the blow for 250 years, as a shadow of its former self.

During this long life its chief political rôle was that of acting as a defender of Europe against the great Powers of western Asia. While it had to resist a continuous succession of dangerous enemies on its northern frontier in Europe—German, Slavonic, Finnic and Tatar peoples—it always considered that its front was towards the east, and that its gravest task was to face the Powers which successively inherited the dominion of Cyrus and Darius. From this point of view we might divide the external history of the empire into four great periods, each marked by a struggle with a different Asiatic power: (1) with Persia, ending *c.* 630 with the triumph of Rome; (2) with the Saracens, who ceased to be formidable in the 11th century; (3) with the Seljuk Turks, in the 11th and 12th centuries; (4) with the Ottoman Turks, in which the Roman power went down.

Mediaeval historians, concentrating their interest on the rising States of western Europe, often fail to recognize the position held by the later empire and its European prestige. Up to the middle of the 11th century it was in actual strength the first Power in Europe, except in the lifetime of Charles the Great, and under the Comneni it was still a power of the first rank. But its political strength does not express the fullness of its importance. As the heir of antiquity it was confessedly superior in civilization, and it was supreme in commerce. Throughout the whole period (to 1204) Constantinople was the first city in the world. The influence which the empire exerted upon its neighbours, especially the Slavonic peoples, is the second great rôle which it fulfilled for Europe—a rôle on which perhaps the most speaking commentary is the doctrine that the Russian Tsar was the heir of the Roman Caesar.

HISTORICAL SKETCH

Diocletian's artificial experiment of two Augusti and two Caesars had been proved a failure, leading to 20 years of disastrous civil wars; and when Constantine the Great (*q.v.*) destroyed his last rival and restored domestic peace, he ruled for the rest of his life with undivided sway. But he had three sons, and this led to a new partition of the empire after his death, and to more domestic wars, Constans first annexing the share of Constantine II. (340) and becoming sole ruler of the west, to be in turn destroyed by Constantius II., who in 350 remained sole sovereign of the empire. Having no children, he was succeeded by his cousin, Julian the Apostate (*q.v.*). This period was marked by wars against the Germans, who were pressing on the Rhine and Danish frontiers, and against Persia. Julian lost his life in the eastern struggle, which was then terminated by a disadvantageous peace. But the German danger grew graver, and the battle of Adrianople, in which the Visigoths, who had crossed the Danube in consequence of the coming of the Huns (*see* GOTHS and HUNS), won a great victory, and the emperor Valens perished (378), announced that the question between Roman and Teuton had entered on a new stage. Theodosius the Great saved the situation for the time by his Gothic pacification. The efforts of a series of exceptionally able and hard-working rulers preserved the empire intact throughout the 4th century, but the dangers which they weathered were fatal to their weaker successors. On the death of Theodosius the decisive moment came for the expansion of the Germans, and they took the tide at the flood. There were three elements in the situation. Besides the Teutonic peoples beyond the frontier there were dependent people who had settled within the empire (as Visigoths in Moesia, Vandals in Pannonia), and further there were the semi-Romanized Germans in the service of the empire, some of whom had risen to leading positions (like Merobaudes and Stilicho). A Germanization of the empire, or part of it, in some shape was inevitable, but, if the rulers of the 5th century had been men of the same stamp as the rulers of the 4th, the process might have assumed a different form. The sons

of Theodosius were both incapable; and in their reigns the future of the State which was divided between them was decided. The dualism between the east (under Arcadius) and the west (under Honorius) developed under the rule of these brothers into antagonism verging on hostility. The German danger was averted in the east, but it led in a few years to the loss of many of the western provinces, and at the end of 90 years the immediate authority of the Roman emperor did not extend west of the Adriatic. The reign of Honorius saw the abandonment of Britain, the establishment of the Visigothic kingdom in Aquitaine, the occupation of a great part of Spain by Vandals and Sueves (Suebi). Under Valentinian III. the Vandals founded their kingdom in north Africa, the Visigoths shared Spain with the Sueves, the Burgundian kingdom was founded in south-east Gaul. The last Roman possession in Gaul passed to the Franks in 486 (*see* GOTHS; VANDALS; FRANKS). It is significant that the chief defenders of the empire against the Germans who were dismembering it were men of German race, Stilicho, who defended Italy against Alaric, Aëtius, whose great work was to protect the imperial possessions in Gaul, and Ricimer. It was also a German, Fravitta, who played a decisive part in suppressing a formidable Gothic movement which menaced the throne of Arcadius in 399–400. It was characteristic of this transformation of Europe that the Germans, who were imbued with a profound reverence for the empire and its prestige, founded their kingdoms on Roman soil in the first instance as "federates" of the emperor, on the basis of formal contracts, defining their relations to the native provincials; they seized their dominions not as conquerors, but as subjects. The double position of Alaric himself, as both king of the Visigoths and a *magister militum* of the empire, is significant of the situation.

The development of events was complicated by the sudden growth of the transient empire of the Huns (*q.v.*) in central Europe, forming a third great power, which, reaching from the Rhine to the Caucasus, from the Danube to the Baltic, might be compared in the extent of its nominal supremacy, but in nothing else, to the empires of Rome and Persia. The Huns, whose first appearance had precipitated the Germans on the empire, now retarded for some years the process of German expansion, while they failed in their own attacks upon the empire. On Attila's death (453) his realm collapsed, and his German vassals (Ostrogoths, etc.) founded important kingdoms on its ruins.

After the death of Valentinian III., the worst of his house, the Theodosian dynasty expired in the west, and the authority of the western emperors who succeeded him in rapid succession reached little beyond Italy. For most of this period of 20 years the general Ricimer, of German birth, held the scales of power in that peninsula, setting up and pulling down emperors. After his death the western throne was no longer tenable. First there was a usurpation; the general Orestes set up his child-son Romulus Augustulus against the legitimate Augustus, Julius Nepos, who was acknowledged by the eastern emperor; but this temporary Government was overthrown (476) by a Germanic military revolution headed by Odoacer, who appropriated part of the soil to his German soldiers and founded an Italian kingdom under the nominal supremacy of the emperor at Constantinople, who, however unwilling, recognized his position (after the death of Nepos).

The escape of the eastern provinces from the fate of the western illustrates the fact that the strength of the empire lay in the east. These provinces were more populous and presented greater obstacles to the invaders, who followed the line of least resistance. But it was of immense importance that throughout this period the empire was able to preserve a practically unbroken peace with its great eastern rival. The struggle with Persia, terminated in 364 by the peace of Jovian, was not renewed till the beginning of the 6th century. It was of greater importance that the rulers pursued a discreet and moderate policy, both in financial administration and in foreign affairs; and the result was that at the end of 100 years the diminished empire was strong and consolidated. Theodosius II. was a weak prince, but his Government was ably conducted by Anthemius, by his sister Pulcheria and by the eunuch Chrysaphius. His reign was important for the Armenian question. Theodosius I. had committed the error of consenting to a division of this buffer State in the Roman and Persian spheres of influence, Persia having much the larger. The Sassanid Government tried to suppress the use of the Greek language. But the Government of Theodosius II. officially supported the enterprise of translating the Bible into Armenian (Mesrob had just invented the Armenian alphabet), and this initiated the production of an abundant literature of translations from the Greek, which secured the perpetual connection of Armenia with European culture, and not with Oriental. This reign is also distinguished by the building of the great land walls of Constantinople, by the foundation of a university there and by the collection of the imperial laws in the Codex Theodosianus, which is a mine of material for the social condition of the empire. It reveals to us the decline of municipal liberty, the decay of the middle classes in the West, the evils of the oppressive fiscal system and an appalling paralysis of Roman administration which had once been so efficient; it shows how the best-intentioned emperors were unable to control the governors and check their corruption; and discloses a disorganization which facilitated the dismemberment of the empire by the barbarians.

In the reign of Zeno it seemed probable that an Ostrogothic kingdom would be established in the Balkan peninsula, but the danger was diverted to Italy (*see* GOTHS). The kingdom which Theodoric founded there was, in its constitutional aspect, a continuation of Odoacer's régime. He, like Odoacer and Alaric, held the double position of a German king and a Roman official. He was *magister militum* as well as *rex*. His powers were defined by capitulations which were arranged with the emperor Anastasius and loyally observed. The right of legislation was reserved to the emperor, and Theodoric never claimed it; but for all practical purposes he was independent.

Justinian.—In the 6th century the emperor Justinian, whose talents were equal to his ambitions, found himself, through the financial prudence of his predecessors, in a position to undertake the reconquest of some of the lost western provinces. The Vandal power had declined, and Africa was won back in one campaign by Belisarius in 533. The conquest of Italy was far more difficult. Begun by Belisarius in 535, it was not completed till 554, by Narses. A portion of southern Spain was also won from the Visigoths, so that the Romans again commanded the western straits. Justinian, possessed by large ideas and intoxicated with the majesty of Rome, aspired to be a great conqueror, a great lawgiver, a great pontiff, a great diplomatist, a great builder, and in each of these spheres his reign holds a conspicuous place in the annals of the empire. His legal work alone, or the building of Santa Sophia, was enough to ensure him immortal fame. But deep shadows balance the splendour. The reconquest of Africa was thoroughly justified and advantageous, but Italy was bought at a ruinous cost. In the first place, the Persian empire was at this time ruled by one of its greatest kings, Chosroes I. (*q.v.*), who was far from peacefully inclined. Justinian was engaged in a long Persian and a long Gothic war at the same time, and the State was unequal to the strain. In the second place, it was all-important for his western policy to secure the goodwill of the Italian provincials and the Roman bishop, and for this purpose he involved himself in an ecclesiastical policy (*see* below) which caused the final alienation of the Syrian and Egyptian provinces. The reconquest of the West was purchased by the disunion of the East. Thirdly, the enormous expenses of the Italian and Persian wars, augmented by architectural undertakings, caused a policy of financial oppression which hung as a cloud over all the brilliance of his reign, and led to the decline which ensued upon his death. Nor is it to be forgotten that he had at the same time to fulfil the task of protecting the Danube against the Germans, Slavs and Bulgarians, who constantly threatened the Illyrian provinces. He spared no expense in building forts and walls. Justinian's name will always be associated with that of the gifted Theodora, an actress of doubtful fame in her early life, who shared his throne. Their mosaic portraits are preserved in the contemporary church of San Vitale at Ravenna. She possessed great political influence, and the fact that she was a heretic (monophysite), while Justinian was devoted to orthodoxy, did

not mar their harmony, but only facilitated the policy of extending secret favour to the heretics who were publicly condemned, and enabled the left hand to act without the knowledge of the right. The events of the half-century after Justinian's death exhibited the weakness to which his grandiose policy had reduced the empire. It was attacked on the west, on the north and on the east, and at all points was unequal to coping with its enemies. (1) Italy fell a victim to the Lombards (*q.v.*), and in a few years more than half of the peninsula had passed under their sway. (2) The Avars, a Hunnic people who had advanced from the Caspian, took possession of Pannonia and Dacia, and formed an empire, consisting of Slavonic and Bulgarian subjects, which endured for about 60 years. Their chief occupation was to invade the Illyrian peninsula and extort tribute and ransoms from the emperors. So far as the Avars themselves were concerned, these incursions had no permanent significance, but the Slavs who overran the provinces did more than devastate. These years saw the beginning of the Slavonic settlements which changed the ethnical character of the peninsula, and thus mark the commencement of a new period. Slavs occupied Moesia and a large part of Macedonia, even close to Thessalonica, which they besieged; they penetrated southward into Greece and made large settlements in the Peloponnesus (*see* GREECE, *History*, "Roman period," *ad fin.*). They occupied the north-western provinces, which became Croatia and Servia, as well as Dalmatia (except some of the coast towns). In the northern part of the peninsula the Slavonic element remained dominant, but in Greece it was assimilated to the Greek (after the 9th century) and has left little record of itself except in place names. (3) The empire was simultaneously engaged in the perennial strife with Persia. A short interval of peace was secured when the emperor Maurice assisted Chosroes II. to dethrone a usurper, but after Maurice's death (602) the final and mortal struggle began (*see* PERSIA, *History*, section. "The Sassanian Empire"). Throughout the incompetent reign of Phocas the eastern provinces were overrun by the Persians, as the Illyrian were overrun by the Slavs. The unpopular rule of this cruel usurper was terminated in 610 by the intervention of the governor of Africa, whose son Heraclius sailed to Constantinople and, welcomed by an influential party, met with little resistance. Phocas, murderer of Maurice, was murdered by the people, and the victor was crowned emperor to find himself in presence of a desperate situation. Antioch, Damascus and many other great cities were captured by the Persians; and in 614 Jerusalem was destroyed and the Holy Cross, along with the patriarch, carried off to Ctesiphon. This event produced a profound sensation in Christendom. In 616 Egypt was conquered. The army had fallen into utter disorder under Phocas, and Heraclius so deeply despaired of saving Constantinople that he thought of transferring the imperial capital to Carthage. But the extreme gravity of the situation seems to have wrought a moral change among his subjects; the patriarch Sergius was the mouthpiece of a widespread patriotic feeling, and it was largely through his influence that Heraclius performed the task of creating a capable army. His efforts were rewarded in a series of brilliant campaigns (622–628), which, in the emphasis laid on the contrast between Christianity and fire-worship and on the object of recovering the Cross, had the character of crusades. Heraclius recovered his provinces and held Persia at his mercy (decisive battle at Nineveh, end of 627).

This war is remarkable for the attempt of the Persians to take Constantinople (626) in conjunction with the Avars and Slavs. Soon afterwards the Avar power began to decay, and the Slavs and Bulgarians shook off their yoke. It seemed as if the Roman Government would now be able to regain the control in the Illyrian lands which it had almost entirely lost. It seems probable that Heraclius came to terms with the Slavs—Croatians and Servians—in the north-west; their position was regularized, as vassals of the empire. But fate allowed no breathing-time to do more; the darkest hour had hardly passed when a new storm-cloud, from an unexpected quarter, overspread the heavens.

At this point we have to note that the Hellenic element in the State had definitely gained the upper hand before the end of the 6th century, so that henceforward the empire might be described as Greek. Justinian's mother-tongue was Latin, and he was devoted to the Latin traditions of Rome, but even he found it necessary to publish his later laws in Greek and from his reign Greek was the official language.

Rise of Islam.—With the rise of Islam (*see* CALIPHATE; MOHAMMED) two universal religions, for the first time, stood face to face, each aspiring to win the universe The struggle, therefore, which then began was not only a new phase of the strife between Europe and Asia, but was one in which the religious element was fundamental. Fire-worship was only a national religion and did not present the danger of Islam. The creation of the political power of the Mohammedans was so sudden that it took the world by surprise. Bostra, the fortress of Roman Arabia, fell into their hands in 634, and before the death of Heraclius in 641 they had conquered Syria and all Egypt, except Alexandria, which opened its gates to them in 643. The religious alienation of the Syrian and Egyptian peoples from Constantinople, expressing as it did a national sentiment antagonistic to the Greeks, was an important political factor in the Mohammedan (as in the previous Persian) conquest. Thus the Mohammedans definitely cut the empire short in the East, as the Germans had cut it short in the West; Egypt was never recovered, Syria only for short periods and partially, while the integrity of Asia Minor was constantly menaced and Cilicia occupied for many generations. By their conquest of Persia the Caliphs succeeded to the position of the Sassanids; this led to the conquest of Armenia (*c.* 654); while, in the West, Africa was occupied in 647 (though the conquest was not completed till the capture of Carthage and other strong places in 698). Thus within 20 years from the first attack the empire was girt about by the new aggressive power from the precincts of the Caucasus to the western Mediterranean.

Fortunately Constans II., grandson of Heraclius, was a man of eminent ability and firmness. The State owed to him the preservation of Asia Minor, and the creation of a powerful fleet (*see* below) which protected the Aegean coasts and islands against the naval power which the Mohammedans created He was responsible for completing a new, efficient military organization, which determined the lines of the administrative reforms of Leo III. (*see* below). In his last years he turned his eyes to Italy and Africa He dreamed of restoring Old Rome as the centre of the empire. But he did not succeed in recovering south Italy from the Lombards (Duchy of Beneventum), and having visited Rome he took up his residence in Syracuse, where he was assassinated, having lost two fleets which he sent against the Arabs of Africa The strain lasted for another 50 years. Constantinople sustained two great sieges (673–677 and 717–718) which stand out as crises, for, if in either case the enemy had been successful, the empire was doomed.

The Heraclian dynasty, which had fallen on evil times and rendered inestimable services to the empire, came to an end in anarchy, which was terminated by the elevation of the Syrian (commonly called Isaurian) Leo. III., whose reign opens a new period. His reforming hand was active in every sphere of government, but the ill-fame which he won by his iconoclastic policy obscured in the memory of posterity the capital importance of his work. His provincial organization was revolutionary, and his legislation departed from the Roman tradition (*see* below). From his reign to the middle of the 10th century the continuous warfare by land with the Caliphs consisted of marauding expeditions of each power into the other's territory, captures of fortresses, guerilla fighting, but no great conquests or decisive battles The efficiency of the army was carefully maintained, but the neglect of the navy led to the losses of Crete (conquered by Muslim adventurers from Spain 826) and Sicily (conquered by the Saracens of Africa). Panormus was taken in 832, Syracuse in 878 (*see* SICILY) The Africans also made temporary conquests, including Bari, in south Italy. This period saw the loss of the exarchate of Ravenna to the Lombards (750), the expansion of the Frankish power under Pippin and Charlemagne in Italy, and in close connection therewith the loss of Old Rome.

The iconoclast emperors pursued a moderate foreign policy, consolidating the empire within its contracted limits; but under

the "Macedonian" dynasty, which was of Armenian descent, it again expanded and became the strongest power in Europe. The 9th century also witnessed a revival of learning and culture which had been in eclipse for 200 years. The reign of Basil I. was marked by an energetic policy in south Italy, where his forces co-operated with the western emperor Louis II. The Saracens were expelled from their strongholds, Bari was recovered, Calabria saved, and the new province (Theme) of Longibardia formed. This secured the entrance to the Adriatic, and the increase of dominion here at the expense of the Lombards was a compensation for the loss of Sicily. Leo VI. did much for reorganizing the navy, but his reign was not fortunate; Saracen pirates plundered freely in the Aegean and, under the able renegade Leo of Tripolis, captured Thessalonica and carried off countless captives (904). But a great tide of success began 50 years later. Nicephorus Phocas won back Crete (961) as general of Romanus II., and then as emperor recovered Cilicia and North Syria (with Antioch) 968. Cyprus was also recovered. The tide flowed on under his equally able successor, John Zimisces (of Armenian race) and under Basil II.; these reigns mark the decisive victory of the empire in the long struggle with the Saracens, whose empire had been broken up into separate States. The eastern frontier was strengthened by the active policy of Basil II. in Armenia, which was more fully incorporated in the empire under Constantine IX.

Basil II.—The reign of Basil II. marks the culmination of the power of the Eastern empire, for it also witnessed the triumphant conclusion of another conflict which had lasted almost as long. In the reign of Constantine IV. the Bulgarians (*see* BULGARIA) had founded a kingdom in Lower Moesia, reducing the Slavonic tribes who had occupied the country, but less than two centuries sufficed to assimilate the conquerors to the conquered, and to give Bulgaria the character of a Slavonic State. The reign of Constantine V. was marked by continuous war with this enemy, and Nicephorus I. lost his life in a Bulgarian campaign. This disaster was followed up by Prince Krum, who besieged Constantinople in 815. His death was followed by a long peace. Prince Boris was converted to Christianity (reign of Michael III.); a metropolitan see of Bulgaria was founded, dependent on the patriarch of Constantinople; and the civilization of the Bulgarians, and beginnings of their literature, were entirely under Byzantine influence. The conversion was contemporary with the work of the two missionaries Cyril and Methodius, who (while the field of their personal activity was in Great Moravia and Pannonia) laid the south-eastern Slavs under a deep debt by inventing the Glagolitic (*q.v.*), *not* the so-called "Cyrillic" alphabet (based on Greek cursive) and translating parts of the Scriptures into Slavonic (the dialect of the Slavs of Macedonia). The most brilliant period of the old Bulgarian kingdom was the reign of Simeon (893–927), who extended the realm westward to the shores of the Adriatic and took the title "Tsar (*ie.*, Caesar) of Bulgaria and autocrator of the Romans." The aggression against the empire which marked his ambitious reign ceased under his successor Peter, who married a daughter of Romanus I., and the Bulgarian Patriarchate founded by Simeon was recognized at Byzantium. But the Byzantine rulers only waited for a favourable time to reduce this formidable Slavonic State. At length Zimisces subjugated eastern Bulgaria and recovered the Danube frontier. But while Basil II. was engaged in contending with rivals, the heroic Samuel (of the Shishmanid family) restored the Bulgarian power and reduced the Servians. After a long and arduous war of 14 years Basil (called the "Bulgar-slayer") subdued all Bulgaria western and eastern (1018). He treated the conquered people with moderation, leaving them their political institutions and their autonomous church, and to the nobility their privileges. Some Bulgarian noble families and members of the royal house were incorporated in the Greek nobility; there was Shishmanid blood in the families of Comnenus and Ducas. Greek domination was now established in the peninsula for more than 150 years. The Slavs of Greece had in the middle of the 9th century been brought under the control of the Government.

In the reign of Basil II. the Russian question also was settled. The Dnieper and Dniester gave the Russians access to the Euxine, and the empire was exposed to their maritime attacks (Constantinople was in extreme danger in 860 and 941). In 945 a commercial treaty was concluded, and the visit of the princess Olga to Byzantium (towards the end of the reign of the learned emperor Constantine VII., Porphyrogennetos) and her baptism seemed a pledge of peace. But Olga's conversion had no results. Sviatoslav occupied Bulgaria and threatened the empire, but was decisively defeated by Zimisces (971), and this was virtually the end of the struggle. In 988 Prince Vladimir captured Cherson, but restored it to the emperor Basil, who gave him his sister Anna in marriage, and he accepted Christianity for himself and his people. After this conversion and alliance, Byzantium had little to fear from Kiev, which came under its influence. One hostile expedition (1043) indeed is recorded, but it was a failure. Much about the same time that the Russians had founded their State, the Magyars (*see* HUNGARY; the Greeks called them Turks) migrated westward and occupied the regions between the Dnieper and the Danube, while beyond them, pressing on their heels, were another new people, the Petchenegs (*q.v.*). The policy of Byzantium was to make use of the Magyars as a check on the Bulgarians, and so we find the Romans (under Leo. VI.) and the Magyars co-operating against the tsar Simeon. But Simeon played the same game more effectively by using the Petchenegs against the Magyars, and the result was that the Magyars before the end of the 9th century were forced to move westward into their present country, and their place was taken by the Petchenegs. From their new seats the Magyars could invade the empire and threatened the coast towns of Dalmatia. The conquest of Bulgaria made the Petchenegs immediate neighbours of the empire, and during the 11th century the depredations of these irreclaimable savages, who filtered into the Balkan peninsula, constantly preoccupied the Government. In 1064 they were driven from the Dniester regions into Little Walachia by the Cumans, a people of the same ethnical group as themselves. They were crushingly defeated by Alexius Comnenus in 1091, and disappear from history.

The Seljuk Turks.—In the Macedonian period a grave domestic question troubled the Government. This was the growth of the large estates of the rich nobles of Asia Minor, at the expense of small properties, to an excess which was politically and economically dangerous. The legislation against the evil began under Romanus I. and was directed to the defence of the poor against the rich, and to protecting the military organization which was based on holdings of land to which the obligation of military service was attached. There was also danger in the excessive influence of rich and powerful families, from which the great military officers were drawn, and which were extensively related by alliances among themselves. The danger was realized in the struggle which Basil II. had to sustain with the families of Sclerus and Phocas. Various kinds of legislation were attempted. Under Romanus I. alienation of property to the large landowners was forbidden. Nicephorus Phocas, whose sympathies were with the aristocracy to which he belonged, holding that there had been enough legislation in favour of the poor, sought to meet the difficulty of maintaining a supply of military lands in the future by forbidding further acquisitions of estates by the church. Basil II. returned to the policy of Romanus, but with much greater severity, resorting to confiscation of some of the immense private estates; and he endeavoured to keep down the aristocrats of Asia Minor by very heavy taxation. Through the recovery of the Balkan provinces he gained in Europe a certain political counterpoise to the influence of Asia Minor, which had been preponderant since the 7th century. Asia Minor meant the army, and opposition to its influence expressed itself in the 11th century in a fatal anti-military policy, which is largely responsible for the conquests of a new enemy, the Seljuk Turks, who now entered into the inheritance of the Caliphs (*see* CALIPHATE *ad fin.* and SELJUKS). Constantinople was haunted by the dread of a military usurpation. An attempt of the military hero George Maniaces (who had made a remarkable effort to recover Sicily) to wrest the crown from Constantine IX. had failed; and when Isaac Comnenus, who represented the military aristocrats of Asia Minor, ascended the

throne, he found himself soon compelled to abdicate, in face of the opposition. The reign of Constantine X., of the rival family of Ducas, marked the culmination of this antagonism. The senate was filled with men of the lower classes, and the military budget was ruthlessly cut down. This policy reduced the army and stopped the supply of officers, since there was no longer hope of a profitable career. The emperor thought to meet dangers from external enemies by diplomacy. The successes of the Seljuks (after the fall of the great Armenian fortress of Ani in 1064) at length awoke the Government from its dream of security. The general Romanus Diogenes was proclaimed emperor. He had to create an army and to train it; he did not spare himself, but it was too late. He was defeated and captured by Alp Arslan on the decisive field of Manzikert (1071). Released by the sultan, who honoured his bravery, he was deposed in favour of Michael Ducas, and falling into the hands of his enemies, was blinded. The east and centre of Asia Minor were thus lost; the Seljuk kingdom of Rūm was founded; Nicaea was captured by the Turks in 1080. The provinces which escaped the Seljuk occupation were thoroughly disorganized, a prey to foreign and native adventurers and usurpers (*see* SELJUKS).

Thus in the '70s of the 11th century the empire seemed through incompetence and frivolity to have been brought to the verge of dissolution. The disorder was terminated by the accession of the extraordinarily able statesman Alexius Comnenus (1081), who effected a reconciliation with the rival family of Ducas, established a strong Government and founded a dynasty. He had to deal with three great dangers—the Seljuks, the Petchenegs (*see* above), and in the west the Normans. The Normans had wrested from East Rome its possessions in south Italy (1041–71)—succeeding where German emperors had failed—and throughout the Comnenian period the empire was threatened by their projects of conquest beyond the Adriatic, projects which aimed at Constantinople itself.

Four great attempts against the empire were made by the Normans; they were unsuccessful, but they heralded the Western conquest of 1204. (1) Expedition of Robert Guiscard, 1081–85, repelled by Alexius with help of Venice; (2) Bohemond's expedition, 1105–07, foiled by the able strategy of Alexius; (3) the invasion of Greece by Roger of Sicily, 1147; Venice supported Manuel Comnenus, and the Normans were driven from Corfù, 1149; (4) the expedition of William II. of Sicily, 1185, who succeeded in capturing Thessalonica; the invaders were defeated at Demetritsa, but they gained the islands of Cephallenia and Zacynthus.

The First Crusade.—The two most important events in the reign of Alexius were the prices which he paid for help against his enemies. (1) He was obliged (1084) to grant to Venice (*q.v.*) in return for her naval aid against the Normans, commercial privileges which practically made the empire commercially dependent on the republic. (2) He sought auxiliary forces in western Europe to help him against the Seljuks; the answer of the pope and Latin Christendom was the First Crusade—a succour very different from that which he desired. Through his tact and discretion, the State was safely steered through the dangers with which the disorderly hosts of barbarous allies menaced it, and the immediate results were salutary; large parts of Asia Minor, including Nicaea, were restored to the empire, which was thus greatly strengthened in the East while the Turks were weakened (*see* CRUSADES). But for this help Byzantium might not have recovered the transient strength and brilliance which it displayed under Manuel. In Asia Minor the crusaders kept the terms of their agreement to restore to the emperor what had belonged to him; but on capturing Antioch (1098) they permitted the Norman Bohemond to retain it, in flagrant violation of their oaths; for to Antioch if to any place the emperor had a right, as it had been his a few years before. This was in itself sufficient to cause a breach between Byzantium and the Latin kingdom of Jerusalem (founded 1099). But otherwise the new political situation created by the Crusade was dangerous, ultimately fatal, to the empire. For its lands and seas became a highway from western Europe to the Latin colonies in Syria; the Byzantine Government was forced to take precautions to protect itself against the crusading expeditions which travelled to the Holy Land; and these precautions were regarded by the western Powers as a hindrance to the sacred objects of the crusades. The bitter religious antagonism between the Greek and Latin Christians increased the mutual distrust and the danger.

The history of the new relations between East and West dating from the First Crusade is closely connected with the history of the futile attempts at bringing about a reunion between the Greek and Latin Churches, which had severed communion in 1054. To heal the hurtful schism and bring the Greek Church again under the domination of Rome was a principal object of papal policy from Gregory VII. forward. The popes alternated between two methods for attaining this, as circumstances dictated: namely, a peaceful agreement—the policy of union; or an armed occupation of the empire by some western power (the Normans)—the policy of conquest. Their views varied according to the vicissitudes of their political situation and their struggles with the western emperors. The eastern emperors were also constantly preoccupied with the idea of reconciliation, constantly negotiating with a view to union; but they did not care about it for its own sake, but only for political advantages which it might bring, and their subjects were bitterly opposed to it. Manuel Comnenus during the first part of his reign was the close friend and ally of the western emperor Conrad III., but after Conrad's death he formed the ambitious plan of realizing in Europe a sovereignty like that of Justinian, and hoped to compass it in conjunction with Rome, the enemy of the Hohenstaufen. His forward policy carried war into Italy; he seized Ancona. But his strength was unequal to such designs. His Latin sympathies, no less than his financial extravagance, made him highly unpopular at home; and the national lack of sympathy with his Western policy was exhibited—after the revolution which overthrew his son Alexius and raised his cousin Andronicus I. to the throne—by the awful massacre of the Latin residents at Constantinople in 1182, for which the expedition of William of Sicily (*see* above) and the massacre of the people of Thessalonica was the revenge. The short reign of the wicked and brilliant Andronicus was in all respects a reaction, prudent, economical and popular. His fall was due to the aristocracy against whom his policy was directed, and the reign of Isaac Angelus undid his efforts and completed the ruin of the State. Oppressive taxation caused a revolt of the Bulgarian and Walachian population in the European provinces; the work of Zimisces and Basil was undone, and a new Bulgarian kingdom was founded by John Asen—a decisive blow to the Greek predominance which the Macedonian emperors seemed to have established.

Dismemberment of the Empire.—In the fatal year 1204 the perils with which the eastward expansion of western Christendom (the Crusades and the commercial predominance and ambitions of Venice) had long menaced the empire, culminated in its conquest and partition. It was due to a series of accidents that the cloud burst at this moment, but the conditions of such a catastrophe had long been present. Isaac Angelus was dethroned by his brother Alexius III., and his son escaped (1201) to the west, where arrangements were being made for a new crusade, which Venice undertook to transport to the Holy Land. The prince persuaded Philip of Swabia (who had married his sister) and Boniface of Montferrat to divert the expedition to Byzantium, in order to restore his father and himself to the throne, promising to furnish help to the Crusade and to reconcile the Greek Church with Rome; Venice agreed to the plan; but Pope Innocent III., the enemy of Philip, forbade it. Isaac and his son, Alexius IV., were restored without difficulty in 1203, and the crusading forces were prepared to proceed to Palestine, if Alexius had performed his promises. But the manner of this restoration, under Latin auspices, was intensely unpopular; he was not unwilling, but he was unable, to fulfil his pledges; and a few months later he was overthrown in favour of one who, if an upstart, was a patriot, Alexius V. Then the Crusaders, who were waiting encamped outside the city, resolved to carry out the design which the Normans had repeatedly attempted, and put an end to the Greek empire. The leaders of the Fourth Crusade must be acquitted of having

formed this plan deliberately before they started; it was not conceived before 1204. They first arranged how they would divide the empire amongst themselves (March); then they captured the city, which had to endure the worst barbarities of war. In partitioning the empire, which was now to become the spoil of the conquerors, the guiding mind was the Venetian leader, the blind doge, Henry Dandolo. He looked to the interests of Venice from the narrowest point of view, and in founding the new Latin empire, which was to replace the Greek, it was his aim that it should be feeble, so as to present no obstacles to Venetian policy. The Latin empire of Romania was a feudal State like the kingdom of Jerusalem; the emperor was suzerain of all the princes who established themselves on Greek territory; under his own immediate rule were Constantinople, southern Thrace, the Bithynian coast, and some islands in the Aegean. But he was hampered from the beginning by dependence on Venice, want of financial resources, and want of a fleet; the feudal princes, occupied with their separate interests, gave him little support in his conflict with Greeks and Bulgarians; at the end of ten years the worthless fabric began rapidly to decline, and the efforts of the popes, for whom it was the means of realizing Roman supremacy in the East, were unavailing to save it from the extinction to which it was doomed in its cradle.

Three Greek States emerged from the ruin of the Roman empire. A member of the Comnenian house had founded an independent State at Trebizond, and this empire survived till 1461, when it was conquered by the Ottomans. A relation of the Angeli maintained in Europe an independent Greek State known as the Despotate of Epirus. But the true representative of the imperial line was Theodore Lascaris, who collected the Byzantine aristocracy at Nicaea and was elected emperor in 1206. He and his successors advanced surely and rapidly against the Latin empire, both in Europe and Asia. It was a question whether Constantinople would fall to the Walacho-Bulgarians or to the Greeks. But an astute diplomat and general, the emperor Michael Palaeologus, captured it in 1261. His object was to recover all the lost territory from the Latins, but he was menaced by a great danger through Charles of Anjou, who had overthrown the rule of the Hohenstaufen in the two Sicilies, and determined to restore the Latin kingdom of Romania. To avert this peril, Michael negotiated with Pope Gregory X.; he was ready to make every concession, and a formal union of the Churches was actually brought about at the Council of Lyons in 1274. The emperor had the utmost difficulty in carrying through this policy in face of clerical opposition; it aroused disgust and bitterness among his subjects; and it was undone by his successor. Meanwhile the pope had with difficulty bridled Charles of Anjou; but in Martin IV. he found a more pliable instrument, and in 1282 he made vast preparations for an expedition against the Greek empire. It was saved by the Sicilian Vespers (*see* SICILY), to be the prey of other Powers.

The Ottoman Turks.—The end of the 13th century saw the rise of the Ottoman power in Asia and the Servian in Europe. The empire was assisted by a band of Spanish mercenaries (the Catalan Grand Company; *see* GREECE, *History*, "Byzantine Period") against the advance of the Ottoman Turks in Asia Minor; they distinguished themselves by saving Philadelphia (1304). In 1326 Brusa (Prusa) became the Ottoman capital, while on the other side the Servians (crushing the Bulgarians in 1330) were gradually closing in on Byzantium. Under Stephen Dušan (1331–55) Servia attained the height of her power. The enemies were strengthened by the domestic struggles within the empire, first between Andronicus II. and his son, then between John VI. and the usurper Cantacuzenus. But before the fate of Byzantium was settled the two enemies on its flanks came face to face. In 1389 the Servian power was crushed on the field of Kossovo by the Ottomans (who had crossed the Hellespont in 1360 and taken Philippopolis in 1363). Sultan Bayezid I. won Philadelphia, the last Asiatic possession of the empire, and conquered Trnovo, the Bulgarian capital, in 1393. Constantinople was now surrounded. The Ottoman power was momentarily eclipsed, and the career of conquest checked, by the Mongol invasion of Timur and the great defeat which it sustained in the battle of Angora (1402). Mohammed I. found it necessary to ally himself with the emperor Manuel. But the pause was brief. Murad II. took Adrianople, and tried (1422) to take Constantinople.

It was small compensation that during this time the Palaeologi had been successful against the Franks in Greece. The situation was desperate. The Turks were in possession of the Balkan peninsula, threatening Hungary; there was no chance of rescue, except from western Europe. John VI. and Manuel had both visited the West in search of help. The jeopardy of the empire was the opportunity of Rome, and the union of the Churches became the pressing question. It was taken up earnestly by Pope Eugenius IV., and the result was the Decree of Union at the Council of Florence in 1439. The emperor and the higher clergy were really in earnest, but the people and the monks did not accept it, and the last agony of Byzantium was marked by ecclesiastical quarrels. Eugenius IV. preached a crusade for the rescue of the empire, and in 1443 an army of Hungarians and Poles, led by the Hungarian king, won a victory over Murad, which was more than avenged in the next year on the memorable field of Varna. The end came nine years later under Murad's successor, Mohammed II. An army of about 150,000 blockaded the city by land and sea, and Mohammed began the siege on the 7th of April. The emperor Constantine XI., Palaeologus, on whom the task of the forlorn defence devolved (and whose position was all the more difficult because he was alienated from his subjects, having embraced the Latin rite), can have had little more than 8,000 men at his disposal; he received no help from the Western powers; but an experienced Genoese soldier of fortune, John Justiniani, arrived with two vessels and 400 cuirassiers and aided the emperor with his courage and advice. The resident foreigners, both Venetians and Genoese, loyally shared in the labours of the defence. The final storm of the land walls took place on the night of the 29th of May. All looked to Justiniani for salvation, and when he, severely wounded, retired from the wall to have his wound looked to, a panic ensued. The enemy seized the moment, and the Janissaries in a final charge rushed the stockade which had been constructed to replace a portion of the wall destroyed by the Turkish cannon. This decided the fate of the city. Constantine fell fighting heroically. Soon after sunrise (May 30) the Mohammedan army entered Constantinople (Stambul = *'s τὴν πόλιν*, "the city"), which was in their eyes the capital of Christendom.

The ultimate responsibility for this disaster is generally imputed to the political adventurers who dismembered the empire in 1204. It may indeed be said that at that time the Byzantine State seemed already stricken with paralysis and verging on dissolution, and it was menaced by the re-arisen power of Bulgaria. But more than once before (in the 7th century and in the 11th) it had recovered its strength when it was weak and in dire peril; and, considering what the emperors of Nicaea and Michael VIII. accomplished, it seems probable that, if there had been no Fourth Crusade, it might have so revived and consolidated its forces in the course of the 13th century, as to be able to cope successfully with the first advances of the Ottomans. The true statement is that the Fourth Crusade was only an incident (not in itself decisive) in a world-movement which doomed the Eastern empire to extinction—namely, the eastward movement of western Europe which began in the 11th century with the rise of the Normans and the First Crusade. Henceforward the empire was a middle State, pressed between expanding forces on the east and on the west, and its ultimate disappearance was inevitable.

CHURCH AND STATE

In making the State Christian, Constantine made the Church a State institution, and therefore under imperial control. Caesaropapism was the logical consequence. The *sacerdotium* was united with the *imperium* in the person of the monarch as in the pagan State. The Church acquiesced, and yet did not acquiesce, in this theory. When a heretical emperor sought to impose his views, champions of ecclesiastical freedom never failed to come forward. At the very beginning Athanasius fought for the independence of the Church against the emperor Constantius. But the political principle which Constantine had taken for granted, and which was

an indispensable condition of his adoption of Christianity, was fully recognized under Theodosius I., and, notwithstanding protests from time to time, was permanent. It is significant that Constantinople, which had become a second Rome politically, with its senate and capitol, became then a second Rome ecclesiastically, and that the elevation of the see of Constantinople to patriarchal rank next to the Roman see was due to Theodosius (381), who gave a permanent form to the dualism of the empire. The patriarch became a State minister for religion. The character of the Church as a State institution is expressed above all in the synods. The general councils are not only summoned by the emperor, but are presided over by him or by his lay deputies. The order of the proceedings is modelled on that of the senate. The emperor or his representative not only keeps order but conducts the deliberations and intervenes in the theological debates. It has been erroneously thought that at the Council of Chalcedon (451) the legate of Pope Leo presided; but the acts of that assembly teach us otherwise; the privilege which the Roman legates possessed was that of voting first (the right of the *princeps senatus*). The first general council at which a churchman presided was the seventh (at Nicaea, 787), at which the emperor (or empress) deputed, not a layman, but the patriarch Tarasius to preside. The resolutions of these ecclesiastical State-councils did not become the law of the empire till they were confirmed by imperial edicts.

The emperors, in their capacity as heads of the Church, did not confine themselves to controlling it by controlling the councils. They soon began to issue edicts dealing with theology, by virtue of their own authority. It has been said that the council of Chalcedon closed an epoch of "parliamentary constitutionalism"; a general council was not summoned again for more than 100 years, though the empire during that period was seething with religious disunion and unrest. The usurper Basiliscus in his short reign set an example which his successors were not slow to follow. He issued an edict quashing the decision of Chalcedon. Zeno's *Henōtikon* issued a few years later was the second and more famous example of a method which Justinian largely used, and of which the *Ecthesis* of Heraclius, the *Type* of Constans II. and the iconoclastic edicts of Leo III. are well-known instances. It was a question of political expediency (determined by the circumstances, the intensity and nature of the opposition, etc.) whether an emperor supported his policy or not by an ecclesiastical council.

The emperor was always able to control the election of the patriarch, and through him he directed the Church. Sometimes emperor and patriarch collided; but in general the patriarchs were docile instruments, and when they were refractory they could be deposed. There were several means of resistance open to a patriarch, though he rarely availed himself of them. His participation in the ceremony of coronation was indispensable, and he could refuse to crown a new emperor except on certain conditions, and thus dictate a policy (instances in 812, Michael I.; 969, John Zimisces). There was the power of excommunication (Leo VI. was excommunicated on account of his fourth marriage). Another means of resistance for the Church was to invoke the support of the bishop of Rome, who embodied the principle of ecclesiastical independence and whose see admittedly enjoyed precedence and primacy over all the sees in Christendom. Up to the end of the 8th century he was a subject of the emperor, and some emperors exerted their ecclesiastical control over Rome by drastic measures (Justinian and Constans II.). But after the conquest of Italy by Charles the Great, the pope was outside the Byzantine domination; after the coronation of Charles in 800 he was associated with a rival empire; and when ecclesiastical controversies arose in the East, the party in opposition was always ready to appeal to him as the highest authority in Christendom. Under the iconoclastic emperors the image-worshippers looked to him as the guardian of orthodoxy.

Theological Controversies.—As to the ecclesiastical controversies which form a leading feature of Byzantine history, their political significance alone concerns us. After the determination of the Arian controversy in 381 new questions (as to the union of the divine and human elements in the person of Christ: one or two natures?) arose, and it may seem surprising that such points of abstruse theology should have awakened universal interest and led to serious consequences. The secret was that they masked national feelings; hence their political importance and the attention which the Government was forced to bestow on them. The reviving sense of nationality (anti-Greek) in Syria and in Egypt found expression in the 5th century in passionate monophysitism (the doctrine of one nature): theology was the only sphere in which such feelings could be uttered. The alienation and dissension which thus began had fatal consequences, smoothing the way for the Saracen conquests of those lands; the inhabitants were not unwilling to be severed politically from the empire. This ultimate danger was at first hardly visible. What immediately troubled the emperors in the first half of the 5th century was the preponderant position which the see of Alexandria occupied, threatening the higher authority of Constantinople. The Council of Chalcedon, called by Marcian, an able statesman, was as much for the purpose of ending the domination of Alexandria as of settling the theological question. The former object was effected, but the theological decision of the council was fatal; it only sealed and promoted the disunion. The recalcitrant spirit of Syria and Egypt forced Zeno, 30 years later, to issue his Henōtikon, affirming the decisions of previous councils but pointedly ignoring Chalcedon. This statesman-like document secured peace in the East for a generation. Rome refused to accept the Henōtikon, and when Justinian resolved to restore imperial supremacy in the Western kingdoms, conciliation with Rome became a matter of political importance. For the sake of this project, the unity of the East was sacrificed. The doctrine of Chalcedon was reasserted, the Henōtikon set aside; New Rome and Old Rome were again hand in hand. This meant the final alienation of Egypt and Syria. The national instinct which had been alive in the 5th century grew into strong national sentiment in the 6th. One of the chief anxieties of Justinian's long and busy reign was to repair the mischief. Deeply interested himself in matters of dogma, and prepared to assert to its fullest extent his authority as head of the church, he has been called "the passionate theologian on the throne"; but in his chief ecclesiastical measures political considerations were predominant. His wife Theodora was a monophysite, and he permitted her to extend her protection to the heretics. He sought new formulae for the purpose of reconciliation, but nothing short of repudiation of the Chalcedon acts would have been enough. The last great efforts for union were made when the Saracens invaded and conquered the dissident provinces. A new formula of union was discovered (One Will and One Energy). This doctrine of monotheletism would never have been heard of but for political exigencies. The Egyptians and Syrians would perhaps have accepted this compromise; but it was repudiated by the fanatical adherents of Chalcedon. Heraclius sought to impose the doctrine by an edict (Ecthesis, 638), but the storm, especially in Italy and Africa, was so great that ten years later an edict known as the Type was issued by Constans forbidding all disputation about the number of wills and energies. Constans was a strong ruler, and maintained the Type in spite of orthodox opposition throughout his reign. But the expediency of this policy passed when the Saracens were inexpugnably settled in their conquests, and in his successor's reign it was more worth while to effect a reconciliation with Rome and the West. This was the cause of the 6th Ecumenical Council which condemned monotheletism (680–681).

Image-worship.—In the Hellenic parts of the empire devotion to orthodoxy served as a chrysalis for the national sentiment which was to burst its shell in the 10th century. For the Greeks Christianity had been in a certain way continuous with paganism. It might be said that the old deities and heroes who had protected their cities were still their guardians, under the new form of saints (sometimes imaginary) and archangels, and performed for them the same kind of miracles. Pagan idolatry was replaced by Christian image-worship, which by the Christians of many parts of Asia Minor, as well as by the Mohammedans, was regarded as simply polytheism. Thus in the great iconoclastic controversy, which distracted the empire for nearly 120 years, was involved, as in the monophysitic, the antagonism between different racial elements and geographical sections. Leo III., whose services as a

great deliverer and reformer were obscured in the memory of posterity by the ill-fame which he won as an iconoclast, was a native of Commagene. His first edict against the veneration of pictures evoked riots in the capital and a revolt in Greece. The opposition was everywhere voiced by the monks, and it is not to be overlooked that for many monks the painting of sacred pictures was their means of existence. Leo's son Constantine V. pursued the same policy with greater rigour, meeting the monastic resistance by systematic persecution, and in his reign a general council condemned image-worship (753). Iconoclasm was supported by the army, *i.e.*, Asia Minor, and a considerable portion of the episcopate, but it was not destined to triumph. When the Athenian Irene, wife of Leo IV., came to power after her husband's death, as regent for her son, Constantine VI., she secured the restoration of the worship of icons. The Iconoclastic Council was reversed by the 7th Ecumenical Council of 787. The iconoclastic party, however, was not yet defeated, and (after the neutral reign of Nicephorus I.) came again to the helm in the reigns of the Armenian Leo V. and the first two Phrygian emperors, Michael II. and Theophilus. But the empire was weary of the struggle, and on the death of Theophilus, who had been rigorous in enforcing his policy, icon-worship was finally restored by his widow Theodora (843), and the question was never reopened. This was a triumph for the Greek element in the empire; the "Sunday of orthodoxy" on which iconoclasm was formally condemned is still a great day in the Greek Church.

The ablest champions who wielded their pens for the cause of icons, defending by theological arguments practices which really had their roots in polytheism, were in the early stage John of Damascus and in the later Theodore (abbot of the monastery of Studium at Constantinople). The writings of the iconoclasts were destroyed by the triumphant party, so that we know their case only from the works of their antagonists.

Schism Between the Greek and Latin Churches.—In this struggle the Greeks and Latins were of one mind; the image-worshippers had the support of the Roman see. When the pope resisted him, Leo III. confiscated the papal estates in Sicily and Calabria; and the diocese of Illyricum was withdrawn from the control of Rome and submitted to the patriarch of Constantinople. But when iconoclasm was defeated, there was no question of restoring Illyricum, nor could there be, for political reasons; since the iconoclastic schism had, with other causes, led to the detachment of the papacy from the empire and its association with the Frankish power. By the foundation of the rival Roman empire in 800 the pope had definitely become a subject of another State. No sooner had the iconoclastic struggle terminated than differences and disputes arose between the Greek and Latin Churches which finally led to an abiding schism, and helped to foster the national self-consciousness of the Greeks. A strife over the patriarchal chair between Ignatius (deposed by Michael III. and supported by Rome) and Photius, the learned statesman who succeeded him, strained the relations with Rome; but a graver cause of discord was the papal attempt to win Bulgaria, whose sovereign, Boris, had been baptized under the auspices of Michael III. (*c.* 865), and was inclined to play Old Rome against New Rome. Photius stood out as the champion of the Greeks against the claim of the Roman see, and his patriarchate, though it did not lead to a final breach, marks the definite emancipation of the Greeks from the spiritual headship of Rome. This is the significance of his encyclic letter (867), which formulated a number of differences in rite and doctrine between the Greek and Latin Churches, differences so small that they need never have proved a barrier to union, if on one side there had been no question of papal supremacy, and if the Greek attitude had not been the expression of a tenacious nationality. There was a reconciliation about 900, but the Churches were really estranged, and the open and ultimate breach which came in 1054, when the influence of the Cluny movement was dominant at Rome (Leo IX. was pope and Michael Cerularius patriarch), sealed a disunion which had long existed. Subsequent plans of reunion were entertained by the emperors merely for political reasons, to obtain Western support against their foes, or to avert (through papal influence) the aggressive designs of Western princes. They were doomed to futility because they were not seriously meant, and the Greek population was entirely out of sympathy with these political machinations of their emperors. The Union of Lyons (1274) was soon repudiated, and the last attempt, the Union of Florence in 1439, was equally hollow (though it permanently secured the union of the Rumanians and of the Ruthenians). Part of the historical significance of the relations between the Greek and Latin Churches lies in the fact that they illustrated and promoted by way of challenge the persistence of Greek national self-consciousness.

The emperors legislated against paganism and against heresy, not merely under ecclesiastical pressure, but because they thought religious uniformity politically desirable. Theodosius the Great, a Spaniard, with no sympathy for Hellenic culture, set himself the task of systematically eradicating pagan institutions and customs. Though his persecution accomplished much, paganism was far from being extinct either in the East or in the West in the 5th century. Not only did heathen cults survive in many remote districts, but the old gods had many worshippers among the higher classes at Rome, Constantinople, Antioch, Alexandria and Athens. The most distinguished Greek literati of that period were non-Christian. Justinian, who united theological enthusiasm with belief in the ideal of uniformity and, like Theodosius, was out of sympathy with Hellenism ("Hellene" now came to mean "pagan"), persecuted polytheism more earnestly and severely than his predecessors. His measures created a panic among the higher classes at Byzantium, of whom many, as he suspected, were addicted to the ancient religion. He instituted a regular inquisition, exacted oaths of orthodoxy from all officials and teachers, and closed the philosophical schools of Athens. Missionaries (and it is remarkable that he employed monophysite heretics) were sent to abolish the old heathen worship which survived in many parts of Asia Minor where Christianity had hardly penetrated. By the end of the 6th century formal paganism had practically disappeared.

In Asia Minor, especially in the east, there were many dissident communities which asserted independence of the Church of Constantinople and of all ecclesiastical traditions, founding their doctrines directly on the Bible. Most important of these heretics were the Paulicians (*q.v.*), a dualistic sect whom the Church regarded as Manichaeans.

THE MACHINERY OF GOVERNMENT

The Autocracy and Its Constitutional Forms.—With Diocletian the Principate of Augustus had become undisguisedly an absolute monarchy, and this constitution prevailed to the end. There is virtually no constitutional history in the proper sense of the term in the later Roman empire, for there was neither evolution nor revolution. The monarchical system remained in all its essential points unchanged, and presents a remarkable example of an autocracy of immense duration which perfectly satisfied the ideas of its subjects. No attempt was made to alter it—to introduce, for instance, a limited monarchy or a republican Government; all revolts and conspiracies were aimed at the policies of particular autocrats, not at autocracy itself; generally they only represented sectional antagonisms and personal ambitions. The emperors inherited a deeply rooted instinct of legality as a tradition from Old Rome; and this respect for law which marked their acts, along with the generally good administration of justice, was a palladium of the monarchy. They were supreme in legislation, as well as in the administrative and judicial spheres; but they were on the whole moderate in wielding legislation as an instrument of policy.

There were, however, recognized constitutional principles which it would have been impossible for the emperor to override.

(1) The elective principle, inherited from the republic, was never changed. A new emperor had to be elected by the senate and acclaimed by the people. The succession never became automatic. But even Augustus had indirectly introduced the dynastic principle. Theodosius the Great, by causing his two sons, Arcadius and Honorius, to be elected Augusti in their infancy, practically elevated the dynastic idea into a constitutional principle; hence

forward it was regarded as in the regular course that the son born to a reigning sovereign should in his infancy be elected Augustus. Thus the election, though always an indispensable form, was only a reality when a dynasty came to an end.

(2) When the position of Christianity was assured by the failure of Julian's reaction, it was evident that profession of that religion would henceforward be a necessary qualification for election to the throne. This was formally and constitutionally recognized when the coronation of the emperor by the patriarch was introduced in 457, or perhaps in 450.

(3) The sovereignty of the emperor was personal and *not territorial*. In this respect it always retained the character which it had inherited as the offspring of a Roman magistracy. Hence no Roman territory could be granted by the emperor to another power. For instance, the Western emperor Conrad III. could promise to hand over Italy to Manuel Comnenus as the dowry of his wife, but it would have been constitutionally illegal for Manuel to have made such a promise to any foreign prince; an Eastern emperor had no right to dispose of the territory of the State. Tendencies towards a territorial conception begin indeed to appear (partly under Western influence) in the time of the Palaeologi, especially in the custom of bestowing appanages on imperial princes.

(4) While the senate of Rome generally lost its importance and at last became a mere municipal body, the new senate of Constantine preserved its position as an organ of the State till the fall of Constantinople. For the imperial elections it was constitutionally indispensable, and it was able sometimes to play a decisive part when the throne was vacant—its only opportunity for independent action. The abolition, under Diocletian's system, of the senatorial provinces deprived the senate of the chief administrative function which it exercised under the Principate; it had no legislative powers; and it lost most of its judicial functions. It was, however, still a judicial court; it tried, for instance, political crimes. In composition it differed from the senate of the Principate. The senators in the 4th century were chiefly functionaries in the public service, divided into the three ascending ranks of *clarissimi, spectabiles, illustres*. The majority of the members of the senatorial order lived in the provinces, forming a provincial aristocracy, and did not sit in the senate. Then the two lower ranks ceased to have a right to sit in the senate, which was confined to the *illustres* and men of higher rank (patricians). The senatorial order must therefore be distinguished from the senate in a narrower sense; the latter finally consisted mainly of high ministers of State and the chief officials of the palace. It would be a grave mistake to underrate the importance of this body, through an irrelevant contrast with the senate of the republic or even of the Principate. Its composition ensured to it great influence as a consultative assembly; and its political weight was increased by the fact that the inner council of imperial advisers was practically a committee of the senate. The importance of the senate is illustrated by the fact that in the 11th century Constantine X., in order to carry out a revolutionary, anti-military policy, found it necessary to alter the composition of the senate by introducing a number of new men from the lower classes.

(5) The memory of the power which had once belonged to the *populus Romanus* lingered in the part which the inhabitants of New Rome, and their representatives, played in acclaiming newly elected emperors, and in such ceremonies as coronations. In the 6th century the factions ("demes") of the circus, Blues and Greens, appear as political parties, distract the city by their quarrels, and break out in serious riots. On one occasion they shook the throne ("Nika" revolt, 532). The emperors finally quelled this element of disturbance by giving the factions a new organization, under "demarchs" and "democrats," and assigning them a definite quasi-political *locus standi* in the public ceremonies in the palace and the capital. The duty of providing *panem et circenses* was inherited from Old Rome; but the free distribution of bread cannot be traced beyond the 6th century (had the loss of the Egyptian granary to do with its cessation?), while the spectacles of the hippodrome lasted till the end. Outside the capital the people took little interest in politics, except when theology was concerned; and it may be said generally that it was mainly in the ecclesiastical sphere that public opinion among the masses, voiced by the clergy and monks, was an influence which made itself felt.

The court ceremonial of Constantinople, which forms such a marked contrast to the ostentatiously simple establishments of Augustus and the Antonines, had in its origin a certain constitutional significance. It was introduced by Aurelian and Diocletian, not, we must suppose, from any personal love of display, but rather to dissociate the emperor from the army, at a time when the State had been shaken to its foundations by the predominance of the military element and the dependence of the emperor on the soldiers. It was the object of Diocletian to make him independent of all, with no more particular relation to the army than to any other element in the State; the royal court and the inaccessibility of the ruler were calculated to promote this object. The etiquette and ceremonies were greatly elaborated by Justinian, and were diligently maintained and developed. The public functions, which included processions through the streets to various sanctuaries of the city on the great feast-days of the Church, supplied entertainment of which the populace never wearied; and it did not escape the wit of the rulers that the splendid functions and solemn etiquette of the court were an effective means of impressing the imagination of foreigners, who constantly resorted to Constantinople from neighbouring kingdoms and dependencies, with the majesty and power of the Basileus.

The imperial *dignity* was collegial. There could be two or more emperors (*imperatores*, *βασιλεῖς*) at the same time; edicts were issued, public acts performed, in their joint names. Through the period of dualism, in the 4th and 5th centuries, when the administration of the Eastern provinces was generally separate from that of the Western, the imperial *authority* was also collegial. But after this period the system of divided authority came to an end and was never renewed. There was frequently more than one emperor, not only in the case of a father and his sons, or of two brothers, but also in the case of a minority, when a regent is elected emperor (Romanus I.; *cf.* Nicephorus II. and John Zimisces). But one colleague always exercised the sole authority, was the real monarch, the "great" or the "first" Basileus; the other or others were only sleeping partners. Under the Comneni a new nomenclature was introduced; a brother, *e.g.*, who before could have become the formal colleague of the ruler, received the title of *Sebastocrator* (Sebastos was the Greek equivalent of Augustus).

Legislation.—The history of the legislation of the Eastern empire is distinguished by three epochs associated with the names of (1) Justinian, (2) Leo III., (3) Basil I. and Leo VI.

For (1) the Justinianean legislation, *see* JUSTINIAN.

(2) Justinian's reign was followed by a period in which juristic studies decayed. The 7th century, in which social order was profoundly disturbed, is a blank in legal history, and it would seem that the law of Justinian, though it had been rendered into Greek, almost ceased to be studied or understood. Practice at least was modified by principles in accord with the public opinion of Christian society and influenced by ecclesiastical canons. In a synod held at Constantinople in the reign of Justinian II. numerous rules were enacted, differing from the existing laws and based on ecclesiastical doctrine and Mosaic principles, and these were sanctioned as laws of the realm by the emperor. Thus Church influence and the decline of Roman tradition, in a State which had become predominantly Greek, determined the character of the ensuing legislative epoch under the auspices of Leo III., whose law book (A.D. 740), written in Greek, marks a new era and reflects the changed ideas of the community. Entitled a "Brief Selection of Laws" and generally known as the *Ecloga*, it may be described as a Christian law book. In regard to the *patria potestas* increased facilities are given for emancipation from paternal control when the son comes to years of discretion, and the paternal is to a certain extent replaced by a *parental* control over minors. The law of guardianship is considerably modified. The laws of marriage are transformed under the influence of the Christian

conception of matrimony; the institution of *concubinatus* is abolished. Impediments to marriage on account of consanguinity and of spiritual relationship are multiplied. While Justinian regarded marriage as a contract, and therefore, like any other contract, dissoluble at the pleasure of the parties, Leo III. accepted the Church view that it was an indissoluble bond. Ecclesiastical influence is written large in the criminal law, of which a prominent feature is the substitution of mutilation of various kinds for the capital penalty. Death is retained for some crimes, such as murder and high treason; other offences were punished by amputation (of hand, nose, etc.). This system (justified by the passage in the New Testament, "If thine eye offend thee," etc.), though to modern notions barbaric, seemed a step in the direction of leniency; and it may be observed that the tendency to avoid capital punishment increased, and we are told that in the reign of John Comnenus it was never inflicted. (The same spirit, it may be noted, is apparent in the usual, though by no means invariable, practice of Byzantine emperors to render dethroned rivals or members of a deposed dynasty innocuous by depriving them of eyesight or forcing them to take monastic orders, instead of putting them to death.) The Church, which had its own system of penalties, exercised a great influence on the actual operation of criminal law, especially through the privilege of asylum (recognized by Justinian, but with many reserves and restrictions), which was granted to Christian churches and is admitted without exceptions in the *Ecloga*.

(3) The last period of legislative activity under Basil I. and Leo VI. represents a reaction, in a certain measure, against the *Ecloga* and a return to Justinian. The *Ecloga* had met practical needs, but the Isaurian and Phrygian emperors had done nothing to revive legal study. To do so was the aim of Basil, and the revival could only be based on Justinianean law books or their Greek representatives. These books were now treated somewhat as Justinian and his lawyers had treated their own predecessors. A handbook of extracts from the Institutes, Digest and Code was issued in 879 (ὁ πρόχειρος νόμος, "the law as it is"), to fulfil somewhat the same function as the Institutes. Then a collection of all the laws of the empire was prepared by means of two commissions, and completed under Leo VI. It was entitled the *Basilika*. In many points (in civil, but not in criminal, law) the principles of the *Ecloga* are set aside in favour of the older jurisprudence. Thus the Justinianean ordinances on the subject of divorce were revived, and there remained henceforward a contradiction between the civil and the canon law.

After this there was no legislation on a grand scale; but there was a great revival of legal study under Constantine IX., who founded a new law-school, and there were many learned specialists who wrote important commentaries, such as John Xiphilin (11th century), Theodore Balsamon (12th century), Harmenopulos (14th century). The civil code of Moldavia (published 1816–17) is a codification of Byzantine law; and modern Greece, although in framing its code it took the Napoleonic for its model, professes theoretically to base its civic law on the edicts of the emperors as contained in the *Hexabiblos* of Harmenopulos.

Administration.—Three principles underlay the administrative reform of Diocletian: the separation of civil from military functions; the formation of small provincial units; and the scalar structure which depended on the interposition of the vicar of a diocese and the praetorian prefect between the provincial governor and the emperor. This system lasted unchanged for three and a half centuries. The few unimportant alterations that were made were in harmony with its spirit, until the reign of Justinian, who introduced certain reforms that pointed in a new direction. We find him combining some of the small provinces into large units, undermining the scalar system by doing away with some of the dioceses and vicars, and placing in some cases military and civil authority in the same hands. The chief aim of Diocletian in his general reform had been to secure central control over the provincial Governments; the object of Justinian in these particular reforms was to remedy corruption and oppression. These changes, some of which were soon cancelled, would hardly in themselves have led to a radical change; but they prepared the way for an administrative revolution, brought about by stress of external necessities. In the 7th century all the energies of the empire, girt about by active enemies, were centred on war and defence; everything had to give way to military exigencies; and a new system was gradually introduced which led ultimately to the abolition of the old. The change began in Italy and Africa, at the end of the 6th century, where operations against the Lombards and the Berbers were impeded by the friction between the two co-ordinate military and civil authorities (masters of soldiers, and praetorian prefects). The military governors were made supreme with the title of *exarchs*, "viceroys"; the civil authority was subordinated to them in case of collision, otherwise remaining unaltered. The change is an index of the dangerous crisis through which these provinces were passing. In the East similar circumstances led to similar results. The Saracen danger hanging imminent over Asia Minor imposed a policy of the same kind. And so before the end of the 7th century we find the empire divided into six great military provinces, three in Europe and three in Asia: (1) Exarchate of *Africa*, (2) Exarchate of *Italy*, (3) Strategia of *Thrace*, (4) County of *Opsikion* (=*obsequium*), including Bithynia, Honorias, Paphlagonia, parts of Hellespontus and Phrygia, (5) Strategia of the *Anatolikoi*, most of west and central Asia Minor, (6) Strategia of the *Armeniakoi*, eastern Asia Minor. In addition to these there was a naval circumscription, (7) the Strategia of the *Karabisianoi* (from κάραβος, a vessel), including the southern coastland of Asia Minor, and the Aegean (*see* below under *Navy*).

The lands of the old prefecture of Illyricum were not included in the system, because this part of the empire was then regarded as a lost position. On the contrary, here military powers were committed to the prefect of Illyricum, whose actual sphere extended little beyond Thessalonica, which was surrounded by Slavonic tribes.

The Eastern changes, perhaps initiated by Heraclius, but probably due mainly to Constans II., did not interfere with the civil administration, except in so far as its heads were subordinated to the military commanders. But Leo III., who as a great administrative reformer ranks with Augustus and Diocletian, did away with the old system altogether. (1) Reversing Diocletian's principle, he combined military and civil powers in the same hands. The *strategos* or military commander became also a civil governor; his higher officers (turmarchs) were likewise civil functionaries. (2) The scalar principle disappeared, including both the vicars and the praetorian prefect of the East (some of whose functions were merged in those of the prefect of the city); no authority interposed between the strategoi and the emperor. (3) The new provinces, which were called *themes* (the name marks their military origin: *thĕma*=corps), resembled in size the provinces of Augustus, each including several of the Diocletian divisions. This third and last provincial reform has, like its predecessors, its own history. The list of themes in the 11th century is very different from that of the 8th. The changes were in one direction—the reduction of large provinces by cutting off parts to form smaller themes, a repetition of the process which reduced the provinces of Augustus. Hence the themes came to vary greatly in size and importance. Leo himself began the process by breaking up the Anatolic command into two themes (Anatolic and Thracesian). The principle of splitting up was carried out systematically by Leo VI. (who was also responsible for a new ecclesiastical division of the empire).

Imperial Officials.—In the central administration, the general principles seem to have remained unchanged; the heads of the great administrative bureaux in Constantinople retain the *palatine* character which belonged to most of them from the beginning. But there were many changes in these offices, in their nomenclature and the delimitation of their functions. There are great differences between the administrative corps in the 5th, in the 10th and in the 15th centuries. We can hardly be wrong in conjecturing that, along with his provincial reform, Leo III. made a rearrangement of the central bureaux; the abolition of the praetorian prefecture of the East entailed, in itself, modifications. But minor changes were continually being made, and we may note the fol-

lowing tendencies: (1) Increase in the number of ministers directly responsible to the emperor, (*a*) subordinate offices in the bureaux being raised to the rank of independent ministries; (*b*) new offices being created and old ones becoming merely titular. (2) Changes in nomenclature; substitution of Greek for Latin titles. (3) Changes in the relative importance and rank of the high officials, both civil and military.

The prefect of the city (ἔπαρχος) controlled the police organization and administration of justice in the capital; he was vice-president of the imperial court of justice, and, when the office of prefect of the East was abolished, he inherited the functions of that dignitary as judge of appeals from the provinces. But the *praefectus vigilum,* commander of the city guards, who was subordinate to him, became an independent officer, entitled drungary of the watch, and in the 11th century superseded him as vice-president of the imperial court. We are told that in the last years of the empire the prefect of the city had no functions at all; but his office survives in the *Shehr-imaneti,* "city prefecture," of the Ottomans, in whose organization there are many traces of Byzantine influence.

Instead of the quaestor of the sacred palace, whose duty was to draft the imperial laws and rescripts, we find in the 9th century a quaestor who possesses certain judicial and police functions and is far lower in the hierarchy of rank. It has been supposed that the later quaestor really inherited the duties of another officer, the *quaesitor,* who was instituted by Justinian. In the latest period the quaestor, if he still existed as a name, had no functions.

The master of offices, who supervised the bureaux in the palace and was master of court ceremonies, also performed many functions of a minister of foreign affairs, was head of the imperial post (*cursus*), and of the corps of *agentes in rebus* or imperial messengers. This ministry disappeared, probably in the 8th century, but the title was retained as a dignity at all events till the end of the 9th. The most important functions, pertaining to foreign affairs, were henceforward performed by the logothete of the post (λογοθέτης τοῦ δρόμου). In the 12th century this minister was virtually the chancellor of the empire; his title was changed to that of great logothete by Andronicus II.

The two financial ministers, *comes sacrarum largitionum* and *comes rei privatae,* continued to the end under the titles λογοθέτης τοῦ γενικοῦ (general logothete) and ὁ ἐπὶ τοῦ ἰδικοῦ (Anastasius added a third, the count of the sacred patrimony, but he was afterwards suppressed). But in the 9th century we find both these ministers inferior in rank to the *sacellarius,* or private purse-keeper of the emperor. Besides these there was a fourth important financial department, that of the military treasury, under a logothete.

The employment of eunuchs as high ministers of State was a feature of the Byzantine empire from the end of the 4th century. It is laid down as a principle (A.D. 900) that all offices are open to them, except the prefecture of the city, the quaestorship, and the military posts which were held by "domestics." There were then eight high posts which could only be held by eunuchs, of which the chief were the *parakoimōmenos* and the *protovestiarios* (master of the wardrobe).

An emperor who had not the brains or energy to direct the affairs of the State himself, necessarily committed the task of guiding the helm to some particular minister or court dignitary who had gained his confidence. Such a position of power was outside the constitution, and was not associated with any particular office; it might be held by an ecclesiastic or a eunuch; it had been held by the eunuchs Eutropius and Chrysaphius in the reigns of Arcadius and Theodosius II. respectively. In later times, such a first minister came to be denoted by a technical term, ὁ παραδυναστεύων. This was the position, for instance, of Stylianus, the father-in-law of Leo VI. Most of the emperors between Basil II. and Alexius Comnenus were under the influence of such ministers.

The orders of rank (which must be distinguished from titles of office) were considerably increased in later times. In the 4th and 7th centuries there were the three great classes of the *illustres, spectabiles* and *clarissimi;* and above the *illustres* a small, higher class of patricians. In the 9th century we find an entirely different system; the number of classes being largely augmented, and the nomenclature different. Instead of epithets, like *illustres,* the names are titles which had designated offices; "patrician" alone survives. The highest rank is now (1) the *magistroi;* then come the patricians in two classes: (2) proconsular patricians, (3) respectable patricians; below these (4) *protospatharioi,* (5) *dishypatoi* (=*bis consules*), (6) *spatharokandidatoi,* (7) *spatharioi,* and other lower ranks. Particular ranks do not seem now to have been inalienably attached to particular offices. The *strategos* of the Anatolic theme, *e.g.,* might be a patrician or only a protospathar. Whoever was promoted to one of these ranks received its insignia from the emperor's hand, and had to pay fixed fees to various officials, especially to the palace eunuchs.

In the provinces ordinary justice was administered by judges (κριταί) who were distinct from the governors of the themes, and inherited their functions from the old provincial governors of Diocletian's system. In Constantinople higher and lower courts of justice sat regularly and frequently. The higher tribunals were those of the prefect and the quaestor, before whom different kinds of cases came. Appeals reached the emperor through the bureau of petitions (τῶν δεησέων); he might deal with the case immediately; or might refer it to the imperial court of appeal, of which he was president; or else to the special court of the Twelve Divine Judges (θεῖοι δικασταί), which was instituted by Justinian.

Fiscal System.—While the administration of justice was one of the best features of the Eastern empire, its fiscal system, likewise inherited from the early empire, was one of its worst. If the Government had been acquainted with the principles of public economy, which have not been studied till comparatively recent times, a larger revenue might have been raised without injuring the prosperity of the inhabitants. Taxes were injudiciously imposed and oppressively collected. The commerce of the empire was one of its great sources of strength, but the Government looked on the merchants as a class from which the utmost should be extorted. The chief source of revenue was the land. The main burdens which fell upon the landed proprietors throughout the whole period were the land tax proper and the *annona.* The land tax (*capitatio terrena*=the old *tributum* of the imperial, *stipendium* of the senatorial provinces) was based, not on the yearly produce, but on the capital of the proprietor, the character and value of the land being taken into account. In later times this seems to have become the καπνικόν, or hearth tax. The *annona* was an additional impost for supporting the army and imperial officials; it was originally paid in produce. The province was divided into fiscal districts, and the total revenue to be derived from each was entered in a book of assessment. The assessment was in early times revised every 15 years (the "indiction" period), but subsequently such revisions seem to have been very irregular. The collection of the taxes was managed through the curial system, while it lasted (till 7th century?). The decurions, or municipal councillors, of the chief town in each district were responsible for collecting and delivering the whole amount, and had to make good the sums owed by defaulters. This system of collective responsibility pressed very heavily on the decurions, and helped to cause their decay in the Western provinces. After the abolition of the curial organization, the principle of collective responsibility remained in the form of the ἐπιβολή or additional charge; that is, if a property was left without an owner, the taxes for which it was liable became an extra charge on the other members of the district. The taxes were collected by *praktóres,* who were under the general logothete. The peasant proprietors were also liable to burdens of other kinds, of which the most important was the furnishing of horses, vehicles, postboys, etc., for the State post (*see* ANGARIA).

The history of landed property and agrarian conditions in the Eastern empire still awaits a thorough examination. It may be noted that individual hereditary proprietorship was always the rule (on Crown and monastic lands as well as in other cases), and that the commonly supposed extensive existence of communities possessing land in common is based on erroneous inter-

pretation of documents. When imperial lands were granted to monasteries or as fiefs to individuals, the position and rights of the peasant proprietors on the estates were not changed, but in many cases the imposts were paid to the new master instead of to the fisc. In the 4th, 5th and 6th centuries the cultivators were attached to the soil (*coloni, ascripticii; see* SERFDOM), in the interests of the fiscus; it has been supposed, on insufficient grounds, that this serfdom was abolished for a time by Leo III., though it is probable that the condition of the peasants was largely changed by the invasions of the 7th century. In any case the system of compulsory attachment of peasants to their lands remained in force, and the class of *adscripticii* (ἐναπόγραφοι) existed till the latest times. The chief sources for agrarian conditions are, besides the imperial laws, monastic records, among which may be mentioned as specially valuable those of the monastery of Lemboi near Smyrna.

MEANS OF DEFENCE

The general principle of the military defence of the empire in the 4th century consisted in large forces stationary on the frontiers, and reserve forces, stationed in the interior provinces, which could be moved to any point that was in danger. Thus the army was composed of (1) the *limitanei,* frontier-troops (under *duces*), and (2) reserve forces (under *magistri militum*) of two denominations, (*a*) *palatini* and (*b*) *comitatenses*. The *limitanei* were the more numerous; it has been estimated that if they numbered about 350,000, the *comitatenses* and *palatini* together amounted to less than 200,000. It is to be noted that for the old legion of 6,000 men a smaller legion of 1,000 had been substituted, and that the proportion of cavalry to infantry was small. In the 6th century the fundamental principles of the system were the same; but the cavalry had become a much more important branch of the service, and in the wars of Belisarius the *foederati,* barbarian mercenaries of various races, commanded by their own chiefs, played a great rôle. The peasants of Illyria and Thrace, the mountaineers of southern Asia Minor still supply an important part of the army, but the number of barbarians (Heruli, Vandals, Goths, Slavs, Arabs, etc.) is much larger. Solidity and a corresponding want of mobility characterized at this time both cavalry and infantry; their great merit was straight and rapid shooting: Belisarius ascribed his success in Italy to the excellence of the archery. It is remarkable with what small forces (not more than 25,000) the first conquest of Italy was achieved, though Belisarius was far from being a military genius and the discipline in his army was flagrantly defective.

Justinian carried out on the frontiers and in the exposed provinces a carefully devised and expensive system of defensive works. Fortified towns along the *limes* were connected by intervening forts, and at some distance behind was a second line of more important fortresses more strongly garrisoned, which furnished both a second barrier and places of refuge for the inhabitants of the open country. There was an elaborate system of signals by which the garrisons of the front stations could announce not only the imminence of a hostile invasion, but the number and character of the enemy. In North Africa there are abundant remains of the forts of the 6th and 7th centuries, displaying the military architecture of the period and the general frontier system. The typical fortress had three defences: the wall flanked by square towers of three storeys; at a few yards' distance a second wall of stone; and outside a deep foss about 20yd. wide, with vertical sides, filled with water, and along its edge a rampart of earth.

The Army.—We have already seen how the disasters and losses of the 7th century led to a radical change in the military organization, and how the empire was divided into themes. The preponderant influence which Asia Minor won and retained till the 11th century is reflected in the military establishment, which mainly depended on the Asiatic provinces. The *strategos* of a large theme commanded a corps of 10,000 and the scheme of the divisions and subordinate commands has a remarkable resemblance to the organization of some of the armies of modern Europe.

The recorded scheme was probably not uniform in all the themes, and varied at different periods. The *Thĕma* (corps) consisted of 2 *turmai* (brigades) under *turmarchai;* the *turma* of 5 *banda* (regiments), each under a *drungarios* (colonel); the *bandon* of 5 *pentarkhiai* (companies) under a *komētes* (captain). The *pentarkhia,* containing 200 men had 5 subdivisions under *pentekontarkhai* (lieutenants); and there was a smaller unit of ten men under the *dekarkhes* (corporal). The total strength in the 9th century was 120,000; in Justinian's time it was reckoned at 150,000.

Distinct from the military forces (*θέματα*) of the provinces were the forces (*τάγματα*) stationed in or near the capital. The most important of these were the *scholae* and the *excubitores*. The scholarian troops were in early times under the master of offices, but subsequently their chief officer, the domestic of the schools, became the highest military commander in the empire next to the *strategos* of the Anatolic theme. In war, when the emperor did not assume the chief command himself, he might entrust it to any commander, and he often entrusted it to the domestic. In the 11th century, after the conquest of Bulgaria, there were two domestics, one for the East and one for the West, and under Alexius Comnenus the domestic of the West received the title great domestic. Under the Palaeologi the great domestic was superior in rank to all other ministers.

Besides the scholarians and the *excubitores* (who had been organized in the 5th century), there were the regiments of the *hikanatoi,* the *arithmos* and the *numeroi.* The *numeroi* were foot-soldiers. The *optimatoi,* also infantry, properly belonged to the same category, though they were constituted as a theme. It is to be observed that the demes or corporations of Constantinople were partly organized as militia, and were available for purposes of defence.

The great difference between this Byzantine army and that of the earlier empire is that its strength (like that of the feudal armies of the West) lay entirely in cavalry, which the successors of Heraclius and the Isaurian emperors developed to great perfection. The few contingents of foot were subsidiary. The army was free from the want of discipline which was so notable in the 6th century; it was maintained in Asia Minor, which was the great recruiting ground, by a system of military holdings of land (an extension of the old Roman system of assigning lands in the frontier districts to federate barbarians and to veterans). The conditions of the marauding expeditions and guerilla warfare, continuously carried on against and by the Saracens in the 8th, 9th and 10th centuries, were carefully studied by generals and tacticians, and we possess the theory of the Byzantine methods in a treatise composed by the emperor Nicephorus Phocas, and edited by one of his pupils. Every detail of an inroad into Saracen territory is regulated.

In the 8th and 9th centuries there was a system of signals by which an approaching Saracen incursion was announced to Constantinople from the Cilician frontier. The news was flashed across Asia Minor by eight beacon fires. The first beacon was at Lulon (which commanded the pass between Tyana and the Cilician Gates), the last on Mt. Auxentius in Bithynia. When this fire appeared, a light was kindled in the pharos of the imperial palace at Constantinople. The system was discontinued in the reign of Michael III., probably after the capture of Lulon by the enemy in 860, and was not renewed, though Lulon was recovered in 877.

The loss of a great part of Asia Minor to the Seljuks, and the disorganization of the provinces which they did not acquire, seriously weakened the army, and the emperors had recourse more and more to foreign mercenaries and barbarian auxiliaries. The employment of Scandinavians had begun in the 10th century, and in 988 was formed the Varangian guard. In the arsenal of Venice are two lions, which were transported from the Peiraeus, inscribed with obscure Runic characters, carved perhaps by Scandinavians in the army of Basil II. Under Michael IV. the famous Norwegian prince Harald Hardrada (described by a Greek writer as "Araltes, son of the king of Varangia") fought for the empire in Sicily and in Bulgaria. But in the latter part of the 11th century foreign mercenaries greatly increased in numbers and importance,

The note of the Byzantine army was efficiency, and nowhere is the immeasurable superiority of the civilization of the Eastern empire to the contemporary States of Europe more apparent. The theory of military science was always studied and taught; constant practice, interpreting and correcting theories, safeguarded it against pedantry; and a class of magnificent staff officers were trained, who in the 10th century were the terror of the enemy. The particular tactics of the various foes whom they had to face were critically studied. We have a series of military text-books, from the time of Anastasius I. to that of Basil II., in which we can learn their principles and methods. In this army there was plenty of courage, and distinct professional pride, but no love of fighting for fighting's sake, nor the spirit which in western Europe developed into chivalry. The Byzantines despised such ideas as characteristic of barbarians who had physical strength and no brains. The object of a good general, as Leo VI. shows in his important treatise on Tactics, was in their opinion not to win a great battle, but to attain success without the risks and losses of a great battle. The same author criticizes the military character of the Franks. Paying a tribute to their fearlessness, he points out their want of discipline, the haphazard nature of their array and order of battle, their eagerness to attack before the word was given, their want of faculty for strategy or tactical combinations, their incapacity for operations on difficult ground, the ease with which they could be deceived by simple artifices, their carelessness in pitching camps, and their lack of a proper intelligence department. These criticisms, borne out by all we know of feudal warfare, illustrate the contrast between a Western host, with its three great "battles," rushing headlong at the foe, and the Byzantine army, with its large number of small units, co-operating in perfect harmony, under a commander who had been trained in military science, had a definite plan in his head, and could rely on all his subordinates for strict and intelligent obedience.

The Navy.—Under the early empire, as Rome had no rival in the Mediterranean, it was natural that the navy and naval theory should be neglected. When Constantine the Great decided to besiege Byzantium by sea, both he and his opponent Licinius had to create fleets for the struggle. Even when the Vandals in Africa made transmarine conquests and became a naval power, the Romans did not seriously address themselves to building an efficient navy. The Vandals harried their coasts; their expeditions against Africa failed. And even when the Vandal power was in its decline and Belisarius set forth on his successful expedition of conquest, his fears for the safety of his squadron in case he should be attacked at sea allow us to suspect that the fleet of the enemy was superior to the Roman. The conquest of Africa secured for Justinian the undisputed command of the Mediterranean, but he did nothing for the naval establishment. It was not till the Saracens, aspiring to conquer all the Mediterranean coastlands, became a naval power that the Roman empire was forced, in a struggle for its being, to organize an efficient fleet. This, as we saw, was the work of Constans II., and we saw what it achieved. In this first period (*c.* 650–720) the naval forces, designated as the *Karabisianoi*, were placed under the command of an admiral, with title of *strategos*. They consisted of two geographical divisions, each under a *drungarios*: the province of the Cibyrrhaeots (probably named from the smaller Cibyra in Pamphylia) which included the southern coast districts of Asia Minor, and the Aegean province, which embraced the islands and part of the west coast of Asia Minor. The former was the more important; the marines of this province were the hardy descendants of the pirates, whose subjugation had taxed the resources of the Roman Government in the last years of the republic. It was a new principle to impose the burden of naval defence on the coast and island districts. Distinct from these fleets, and probably organized on a different principle, was the naval contingent stationed at Constantinople. Leo III. changed the naval administration, abolishing the supreme command, and making the Cibyrrhaeot and Aegean provinces separate independent themes under *strategoi*. The change was due to two motives. There was a danger lest a commander of the whole navy should become over powerful (indicated by the political rôle played by the navy before Leo's accession); but apart from this, the general reform of Leo, which united civil and military powers in the same hands, naturally placed the commanders of the two branches of the navy on a new footing, by making them provincial governors. In this and the following reigns, the tendency was to neglect the fleet; the interest of the Government was concentrated on the army. For a time this policy was prosecuted with impunity, since the Omayyad dynasty was growing weak, and then under the Abbasids, who transferred the capital from Damascus to Baghdad, the sea-power of the caliphate declined. But the neglect of the fleet was avenged in the 9th century, when Crete and Sicily were wrested from the empire, the loss of south Italy was imminent, and Muslim squadrons sailed in the Adriatic—losses and dangers which led to a reorganization of the navy under Basil I. and Leo VI. After this reform we find the navy consisting of two main contingents: the imperial fleet (stationed at Constantinople), and the provincial fleets, three in number, of (*a*) Cibyrrhaeot theme, (*b*) Aegean theme, (*c*) theme of Samos. A small distinct contingent was supplied by the Mardaites who, natives of Mt. Lebanon, had been transplanted (partly to Pamphylia, partly to Epirus, the Ionian islands and Peloponnesus). The imperial fleet seems to have consisted of about 100 warships manned by 23,000 marines (the same men fought and rowed); the provincial fleets of 77 warships manned by 17,000. When the fleets acted together, the admiral in supreme command for the time was called the "drungary of the naval forces." The warships (δρόμωνες, "dromonds") were mainly biremes, but there were also uniremes, built for speed, called "galleys" (γαλαῖαι). Pyrotechnic was an important department in the naval establishment; the manufacture of the terrible explosive known as *liquid* or *marine fire* (*see* GREEK FIRE) was carefully guarded as a State secret.

The navy, active and efficient in the 10th century, is described by a military and therefore unprejudiced officer of the 11th as the glory of Romania. But towards the end of the 11th century it declined, the main cause being the disorganization of the naval provinces of Asia Minor, which, as we saw, was a result of the Seljuk conquest of the interior. This decline had important indirect consequences; it led to the dependence of the empire on the Venetian navy in the struggle with the Norman power, and for this help Venice exacted commercial privileges which injured Byzantine commerce and opened the door to the preponderant influences of the Venetians in eastern trade. In the period of the Palaeologi the imperial navy, though small, was active; and the importance which it possessed for the State is illustrated by the high rank at court which the admiral (who in the 11th century had received the title of great duke, μέγας δούξ) then occupied; the only minister who was superior to him was the great domestic.

Diplomacy.—In protecting the State against the barbarians who surrounded it, diplomacy was a weapon as important in the eyes of the Byzantine Government as soldiers or fortifications. The peace on the frontiers was maintained not only by strong military defences, but by more or less skilful management of the frontier peoples. In the later empire this kind of diplomacy, which we may define as the *science of managing the barbarians*, was practised as a fine art; its full development was due to Justinian. Its methods fall under three general heads. (1) One people was kept in check by means of another. The imperial Government fomented rivalry and hatred among them. Thus Justinian kept the Gepidae in check by the Lombards, the Kuturgurs by the Utigurs, the Huns by the Avars. (2) Subsidies were given to the peoples on the frontiers, in return for which they undertook to defend the frontier adjacent to them, and to supply fighting men when called upon to do so. The chiefs received honours and decorations. Thus the Berber chiefs on the African border received a staff of silver, encrusted with gold, a silver diadem, white cloak, embroidered tunic, etc. More important potentates were invested with a costlier dress. In these investitures precedence was carefully observed. The chiefs thus received a definite position in the empire, and the rich robes, with the ceremony, appealed to their vanity. In some cases they were admitted to posts in the official hierarchy,—being created patricians, masters of soldiers, etc. They were extremely fond of such honours, and considered themselves half-Romans. Another mode of winning influence was to marry barbarian princes

to Roman wives, and rear their sons in the luxury of the palace. Dissatisfied pretenders, defeated candidates for kingship, were welcomed at Constantinople. Thus there were generally some princes, thoroughly under Byzantine influence, who at a favourable opportunity could be imposed on their compatriots. Throughout Justinian's reign there was a constant influx of foreign potentates to Constantinople, and he overwhelmed them with attentions, pompous ceremonies and valuable presents. (3) Both these methods were already familiar to the Roman Government, although Justinian employed them far more extensively and systematically than any of his predecessors. The third method was new and characteristic. The close connection of religion and politics at Constantinople prepares us to find that Christian propaganda should go hand-in-hand with conquest, and that the missionary should co-operate with the soldier. The missionary proved an excellent agent. The typical procedure is as follows. In the land which he undertakes to convert, the missionary endeavours to gain the confidence of the king and influential persons, and makes it a special object to enlist the sympathies of the women. If the king hesitates, it is suggested that he should visit New Rome. The attraction of this idea is irresistible, and when he comes to the capital, the pomp of his reception, the honours shown him by the emperor, and the splendour of the religious ceremonies overcome his last scruples. Thenceforward imperial influence is predominant in his dominion; priests become his advisers; a bishop is consecrated, dependent on the patriarch of Constantinople; and the barbarians are transformed by the penetration of Byzantine ideas. By the application of these various means, Justinian established Roman influence in Nubia, Ethiopia and south Arabia, in the Caucasian regions, and on the coast of the Euxine. The conversion of the Lazi (of Colchis) was specially notable, and that of the Sabiri, who were politically important because they commanded the eastern pass of the Caucasus known as the Caspian Gates. It will be observed that the great prestige of the empire was one of the conditions of the success of this policy.

The policy had, of course, its dangers, and was severely criticized by one of Justinian's contemporaries, the historian Procopius. Concessions encouraged greater demands; the riches of the empire were revealed. It was a system, of course, which could not be permanently successful without military power behind it, and of course it was not infallible; but in principle it was well-founded, and proved of immeasurable value.

In the 10th century we have again the means of observing how the Government conducted its foreign policy on carefully thought out principles. The empire was then exposed to constant danger from Bulgaria, to inroads of the Magyars, and to attacks of the Russians. The key to the diplomatic system, designed to meet these dangers, was the cultivation of friendly relations with the Petchenegs, who did not menace the provinces either by land or sea and could be incited to act against Russians, Bulgarians or Magyars. The system is explained in the treatise (known as *De administrando imperio*) composed by the emperor Constantine Porphyrogennetos (*c.* 950). The series of these northern States was completed by the kingdom of the Khazars (between the Caucasus and the Don), with which the empire had been in relation since the time of Heraclius, who, to win its co-operation against Persia, promised his daughter in marriage to the king. Afterwards the Khazars gave two empresses to New Rome (the wives of Justinian II. and Constantine V.). Their almost civilized State steered skilfully between the contending influences of Islam and Christianity, and its kings adopted the curious means of avoiding suspicion of partiality for either creed by embracing the neutral religion of the Jews. Commercial and political relations with the Khazars were maintained through the important outpost of the empire at Cherson in the Crimea, which had been allowed to retain its republican constitution under a president (*πρωτεύων*) and a municipal board (*ἄρχοντες*), though this freedom was limited by the appointment of a *strategos* in 833, a moment at which the Khazars were seriously threatened by the Petchenegs. The danger to be feared from the Khazars was an attack upon Cherson, and it seems probable that this was a leading consideration with Leo III. when he wedded his son Constantine V. to a Khazar princess. In the 9th century it was an object of the Government to maintain the Khazars (whose army consisted mainly of mercenaries) against the Petchenegs; and hence, if it should become necessary to hold the Khazars in check, the principle was to incite against them not the Petchenegs, but other less powerful neighbours, the Alans of the Caucasus, and the people of "Black Bulgaria" on the middle Volga (a State which survived till the Mongol conquest).

For this systematic diplomacy it was necessary to collect information about the peoples whom it concerned. The ambassadors sent to the homes of barbarous peoples reported everything of interest they could discover. We owe to Priscus a famous graphic account of the embassy which he accompanied to the court of Attila. We possess an account of an embassy sent to the Turks in central Asia in the second half of the 6th century, derived from an official report. Peter the Patrician in Justinian's reign drew up careful reports of his embassies to the Persian court. When foreign envoys came to Constantinople, information was elicited from them as to the history and domestic politics of their own countries. It can be shown that some of the accounts of the history and customs of neighbouring peoples, stored in the treatise of Constantine Porphyrogennetos referred to above (furnishing numerous facts not to be found anywhere else), were derived from barbarian ambassadors who visited Constantinople, and recorded by the imperial secretaries. We may conjecture with some probability that the famous system of the *Relazioni,* which the Venetian Government required from its ambassadors, goes back originally to Byzantine influence.

BIBLIOGRAPHY.—1. General works: Gibbon's *Decline and Fall of the Roman Empire;* Finlay's *History of Greece* (ed., Tozer; vols. i.–iv., 1877); C. W. C. Oman, *The Byzantine Empire* (1892) (a popular sketch). 2. Works dealing with special periods, or branches of the subject: T. Hodgkin, *Italy and her Invaders* (8 vols., 1879–99) (to A.D. 800); J. B. Bury, *History of the Later Roman Empire,* A.D. 395–800 (2 vols., 1889); E. Pears, *The Fall of Constantinople, being the Story of the Fourth Crusade* (1885), and *The Destruction of the Greek Empire* (1903). *See* bibliographies in the *Cambridge Mediaeval History,* vol. iv. (J. B. B.)

ROMANES, GEORGE JOHN (1848–1894), British biologist, was born at Kingston, Canada, on May 20, 1848. He was educated at Gonville and Caius college, Cambridge, and early formed an intimate friendship with Charles Darwin, whose theories he did much during his life to popularize and support. When studying under Sir J. Burdon Sanderson at University college, London, in 1874–76, he began a series of researches on the nervous and locomotor systems of the Medusae and Echinodermata. The results were published in *Jelly-fish, Star-fish, and Sea-urchins* (1885). In 1879 Romanes was elected F.R.S. Meantime he had been also devoting his attention to broader problems of biology. In 1881 he published *Animal Intelligence,* and in 1883 *Mental Evolution in Animals,* in which he traced the parallel development of intelligence in the animal world and in man. He followed up this line of argument in 1888 with *Mental Evolution in Man,* in which he maintained the essential similarity of the reasoning processes in the higher animals and in man, applying Darwin's theory of evolution to the development of the mind. From 1886–90 Romanes delivered a course of lectures on "The Philosophy of Natural History" at Edinburgh, and was Fullerian professor of physiology at the Royal Institution from 1888 to 1891. In 1892 he brought out an *Examination of Weismannism,* in which he upheld the theory of the hereditability of acquired characters. In 1890 he settled at Oxford, where he founded a lectureship to be delivered annually on a scientific or literary topic. In 1893 he published the first part of *Darwin and after Darwin,* a work dealing with the development of the theory of organic evolution, and physiological selection, first propounded in a paper contributed to the Linnean Society in 1886, which provoked much controversy; a second part appeared in 1895 after his death, which occurred at Oxford on May 23, 1894; the third part is still unpublished.

His *Life and Letters,* by his widow, appeared in 1896; his essays were edited by C. L. Morgan (1897). He was also the author of a number of poems, a selection from which was published in 1896.

ROMANESQUE ARCHITECTURE: *see* BYZANTINE AND ROMANESQUE ARCHITECTURE.

ROMANESQUE ART. The term Romanesque is used in widely varying senses by different authorities. In general, it denotes the art and culture of Europe exclusive of the eastern empire and Russia, from the time of the fall of Rome (476) down to the development of Gothic art which occurred at various dates in different countries, but entirely between 1100 and 1300; in portions of Italy art remained dominantly Romanesque well into the 14th century. The attempt is sometimes made to limit the use of the word to the era following the Carolingian empire (800–987); this, however, causes undue difficulties of chronology and complexities in the identification of much work, so that the broader sense is both more true and more simple.

The dominant element in all Romanesque art is the attempt, increasingly successful with the passage of time, of peoples originally barbaric, brought gradually into touch with the ruins of a magnificent culture, and at the same time under the inclusive and unifying influence of an enthusiastic Christianity, to develop, for themselves, art forms which they could, with their own skill, create and which would satisfy their own emotional demands, so different both from those of the Roman empire and those of the cultivated and Christianized earlier Roman provinces. At first, this attempt was most evidently influenced by Roman art forms and produced caricatures of them; only in such long Christianized provinces as Gaul did some traces of the traditional, technical skill persist through the much troubled pre-Carolingian times. As time went on, however, not only did the fast growing skill of the former barbarians and the conquered peoples under them lead to an increasing freedom from the Roman models, but other influences crept in. Thus, by the beginning of the 12th century, there is evident in all Romanesque work throughout Europe a combination of differing tendencies and traditions whose varying proportions in different localities gave rise to the individual characteristics of different schools of art. These commingled influences may be briefly listed. The first, and still the most important, is Roman art; the fact that Rome was the centre of the Christian church at the time added to its power. The second element was Byzantine, for in Constantinople, throughout the dark ages, the manufacture of all sorts of objects of great beauty continued unabated; with the growing culture of the west, Byzantine and Syrian artists and craftsmen were in great demand and apparently large numbers of them were at work, at least in France. The third element is that which comes directly from the near east, especially Persia and Mesopotamia, through the medium of textiles which were among the most prized church decorations of the time and whose ornamental forms were copied alike in stone carvings and on manuscripts. The last element, which is the most difficult to analyze and evaluate, is the influence of the northern background of Lombard, Goth, Teuton and Celt. The intense vigour of Romanesque art, however crude, is evidence of the power of this influence; to it are also probably due the obvious love of beasts and some of the grotesque element.

This young and vigorous art found expression in many fields. In architecture new forms were developed which eventually gave birth to the Gothic style. (*See* BYZANTINE and ROMANESQUE ARCHITECTURE.) The sculpture of the period is so largely architectural that separate treatment of it can only consider part of its purpose and effect. Up to the 12th century it is crude but tremendously alive. Unable to render the polished graciousness of classic forms, the early sculptor turned first to shallow imitations of Byzantine ornaments, and later naïve interpretations in stone of manuscript decorations and miniatures. Only in Italy, where some remnants of earlier skill seem to have persisted, there developed in the latter part of the 11th century any adequate sculptural technique. In Tuscany this seems to have been largely based on classic tradition, but in Lombardy there appears a mixture of Byzantine elements absorbed from Venetia and more vivid and naturalistic elements, at times strongly impregnated with grotesque feeling, more like the Romanesque across the Alps. Meanwhile, farther north, sculptural technique was rudimentary. Anglo-Saxon sculpture consisted of hardly more than scratchings on stone, and the earliest Norman work, both in France and England, is hardly more advanced. In Scandinavia and countries in which a Scandinavian culture was imposed upon a Celtic background, as in Ireland, the Scottish islands and western England, a much greater skill appears; traditional Scandinavian and Celtic forms, such as the intricate interlaces, frequently based on dragon or snake forms, and much simplified human figures, often themselves worked into geometrical forms, are carved with brilliant decorative effect; the old Norse, pagan shapes merging with the new Christian symbolism, as in the famous stone crosses of England and Ireland.

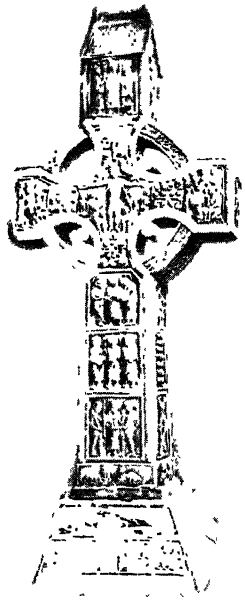
During the 12th century there was an enormous change throughout Europe, as if, almost suddenly, latent decorative imagination and technical skill had come to maturity. Twelfth century sculpture, alike in France, Italy, Germany, Spain and England was accomplished, and at times, almost sophisticated. A blend of conventionalism and naturalism makes the porches of hundreds of churches beautiful examples of architectural sculpture.

In painting and mural decoration the influences at work were largely Byzantine. (*See* BYZANTINE ART.) Crude attempts to imitate Byzantine mosaic are found in much early Italian Romanesque work, and from manuscript accounts it would appear that similar attempts were once common in Romanesque churches farther west and north. Decorative painting shows also the dominance of Byzantine tradition into the 12th century; here, however, various local schools of illuminated manuscripts (*q.v.*) modified and freed mural decoration. Nevertheless, the chief aim was decorative rather than pictorial. Architectural members were richly patterned and wainscots painted with imitations of stone joints and hanging textiles, with little attempt at realism. Figures were painted flat, with little or no desire for light and shade, and arranged according to a purely decorative pattern; their size was frequently determined by relative importance or decorative necessity rather than any endeavour to achieve realism.

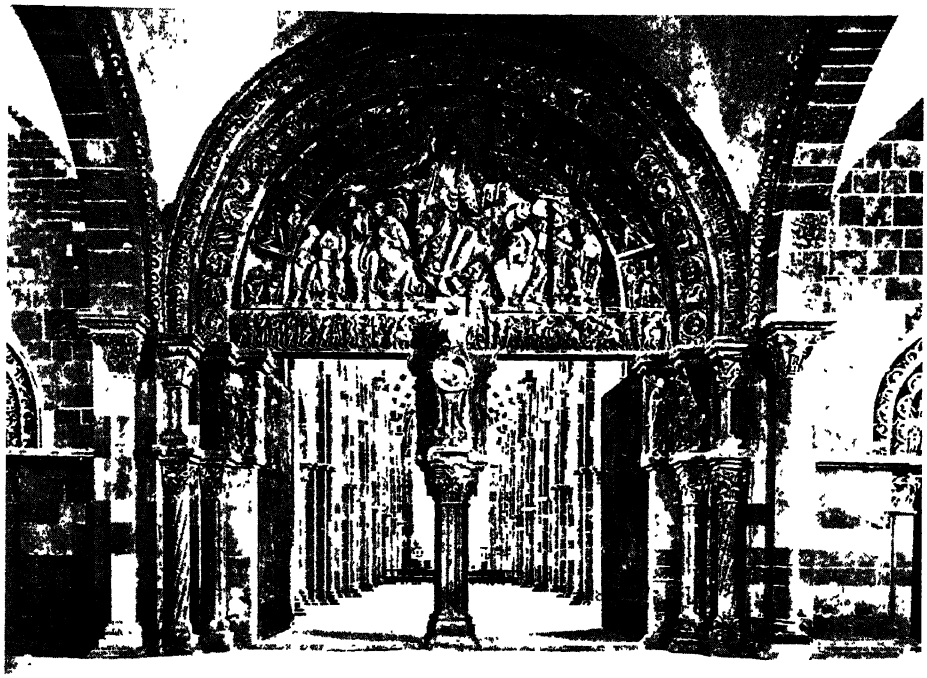
The Romanesque genius found one of its most congenial outlets in the decoration and illustration of books. As early as the 7th century, a vivid school of manuscript design had developed in Ireland and from there spread to the Scotch islands. The works of the school are marked by rich capitals, borders made of geometric interlaces, which often also cover the field of the page, and an occasional use of dragon's heads, birds and grotesque human figures. The complex beauty of these pages exerted a strong influence on later Romanesque work in many parts of Europe and Carolingian manuscripts show a combination of Celtic interlaces with classic motives and drawings inspired by late Roman manuscripts. Later, the intricate Celtic forms passed out of use, the Roman traditions were modified and naturalistic treatment appeared. By the beginning of the 12th century manuscripts in all the countries north of the Alps tended to resemble each other, and the figures show many of the characteristics of 12th century sculpture; the same dignity, decorative design and convincing emotional quality. Borders and ornamental initials had lost the intricate geometric shapes of the earlier period and the stylized leaves and flowers which were later to develop into the glories of Gothic illumination were beginning to appear.

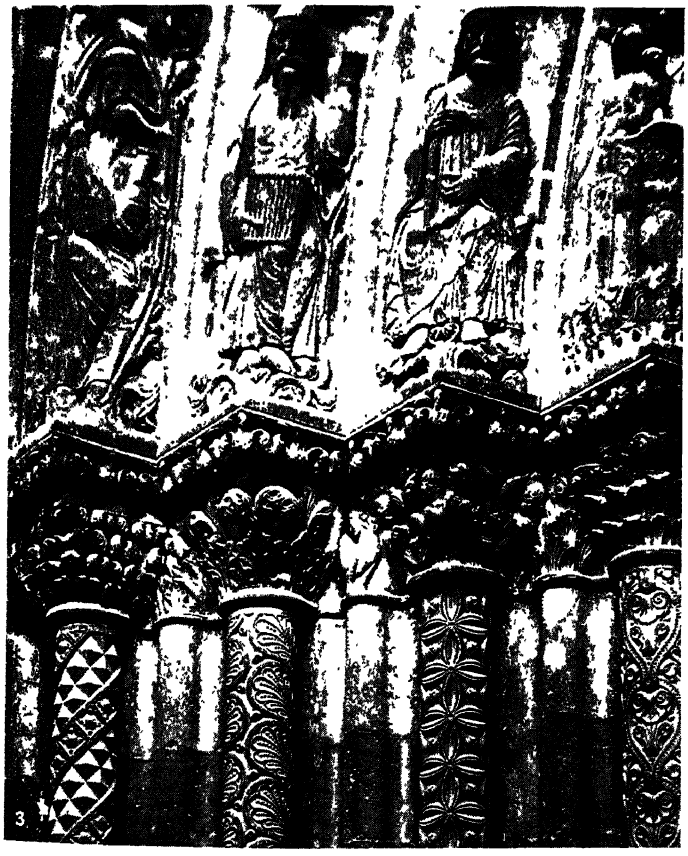
South of the Alps manuscript decoration was following different lines. There, the influence of Byzantine manuscripts, with occasional reminiscences of classic work, remained dominant.

Romanesque metal work followed many of the same lines of development as Romanesque sculpture. In early work that of the Celtic countries was outstanding and magnificent silver-ware and jewellery were produced. Filigree (*q.v.*) was peculiarly congenial to the northern love of interlaces and complexities and was frequently applied, with excellent decorative effect, in small areas, to large, simple cups and chalices. (*See* DRINKING VESSELS.) Meanwhile, Byzantine church silver-ware and goldsmith's work was widely imported into Europe and exerted a strong influence upon the metal work of the later Romanesque times. (*See* SILVERSMITHS' AND GOLDSMITHS' WORK.) Particularly important was the development in France of a famous school of enamel workers, who worked both in *cloisonné* and *champlevé*. (*See* ENAMELS.) Little of the early wrought iron remains, but the exquisite workmanship and powerful design of many 12th century grilles, door hinges, etc., give evidence of a tradition which must have existed

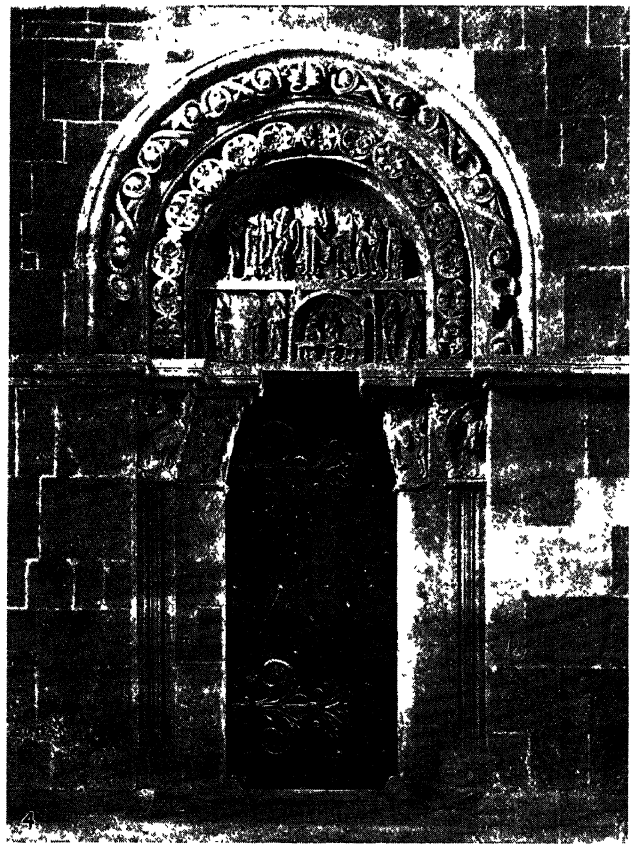


1





3

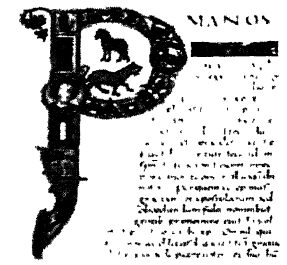


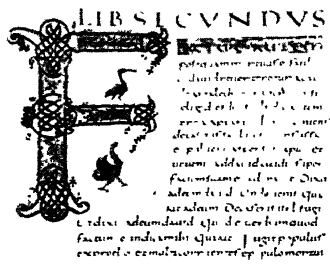
BY COURTESY OF (1) THE METROPOLITAN MUSEUM OF ART, NEW YORK, PHOTOGRAPHS (2, 4) LEVY AND NEURDEIN, (3) COLLECTION ARCHIVES PHOTOGRAPHIQUES

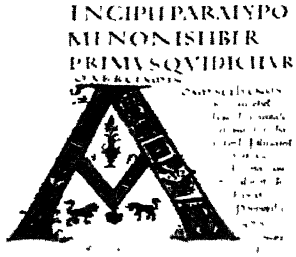
ARCHITECTURAL DETAILS OF THE ROMANESQUE PERIOD

1. Celtic cross of limestone from Monasterboice, Ireland (900–923?)
2. Church of the Madeleine (restored) at Vézelay, in central France. Built about 1130 by the Benedictine order. Central door of the narthex (enclosed porch) looking into the nave. The circular doorway, richly carved, with columns of varied design and recessed arches, is characteristic of the French Romanesque style
3. Columns and spring of the arches of a doorway in the Abbey of St. Denis, near Paris, begun 1137. The carving of the shafts as well as of the capitals of the columns, and the use of sculptured figures in the recesses of the arches, are features typical of the Romanesque and early Gothic periods
4. A side door of the narthex in the Church of the Madeleine, Vézelay (*see* fig. 2)

ROMANESQUE ART





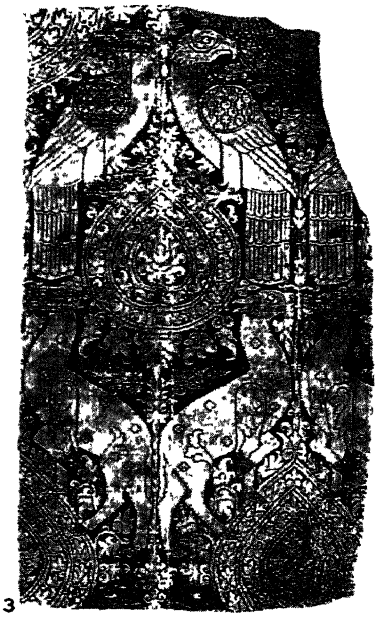




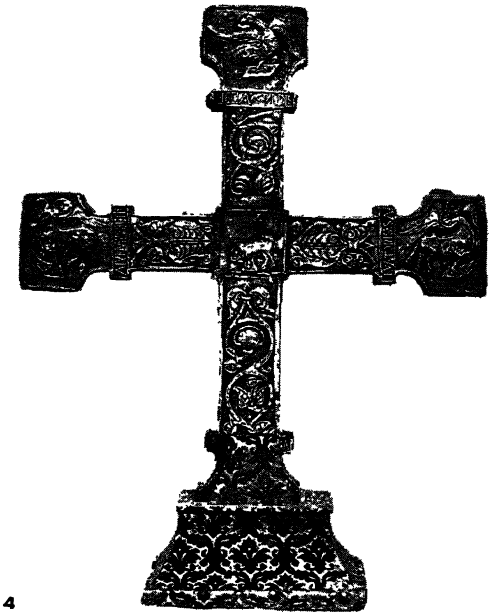
1



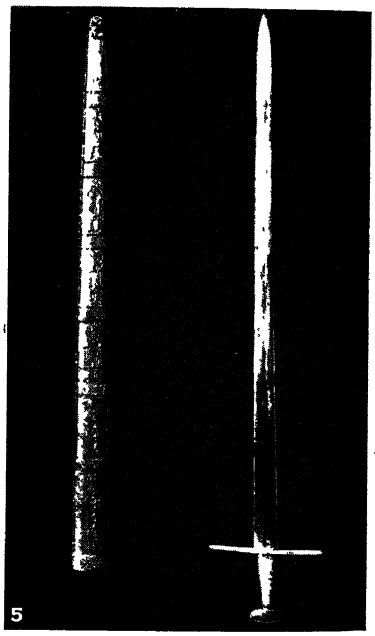
2



3



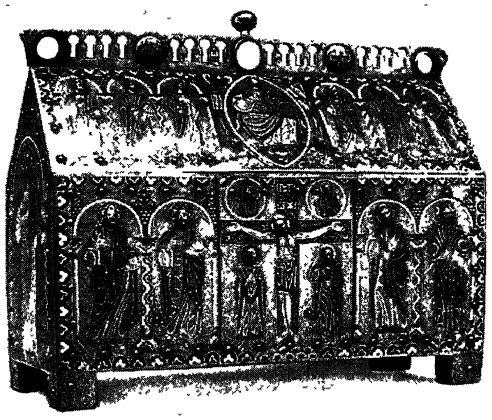
4



5



6



7

BY COURTESY OF (1, 2) THE TRUSTEES OF THE BRITISH MUSEUM, (3, 4, 7) THE METROPOLITAN MUSEUM OF ART, NEW YORK, (5) OSTERREICHISCHE LICHTBILDSTELLE, WIEN, (6) THE NATIONAL MUSEUM OF IRELAND

APPLIED ARTS OF THE ROMANESQUE PERIOD

1. A portion of the illuminated manuscript of the Alcuin Bible. English, 9th century. 2. An illuminated page from the "Lindisfarne Gospels" or the "Gospel of St. Cuthbert." English, about 700. 3. Reproduction of a Sicilian brocade of the Norman period (12th century). The design is in buff on a green ground, with the details in silver thread. 4. Processional cross of silver repoussé work and parcel-gilt on a wood core. Designed by Sanccia Guidisalvi, 12th century. 5. The (reputed) sword of Charlemagne in the Vienna Museum. 6. The chalice of Ardagh, of gold, 7" high; believed to be not later than the 10th century. 7. Reliquary or chasse of Limoges enamel (*champlevé* on copper). French, 12th or 13th century

for some time. In these 12th century examples the chief beauty comes from the expression of structure and the harmony of the decorative forms with their material. (*See* BRONZE AND BRASS.)

The popularity of Byzantine and Persian textiles in Romanesque Europe was a distinct hindrance to the formation of native schools of vital decorative textile design; in most cases products of Romanesque looms were the plainest and simplest materials for practical use. There was, on the other hand, a great deal of rich embroidery produced, of which the Bayeux tapestry (11th century) is the best known example. There are also, in many church sacristies, altar frontals and occasional vestments which reveal a similar skill in the medium and an even greater richness and decorative imagination. (*See* TEXTILES AND EMBROIDERIES; TAPESTRY.) (T. F. H.)

ROMAN LAW. The term "Roman law" is one of somewhat indefinite meaning. It denotes first of all the law of the city of Rome and of the Roman empire. This in itself is an enormously wide subject, for it includes, in the west, the law in force at any period from the foundation of the city (traditional date 753 B.C.) until the fall of the Western empire in the 5th century A.D., and in the east, can be taken to include the law of the Eastern empire, until it too fell with the capture of Constantinople by the Turks in 1453; for the law even of the later Eastern empire remained, in spite of changes, more Roman in character than most other branches of its civilization.

But "Roman law" does not mean merely the law of those political societies to which the name Roman may in some sense be applied, for the legal institutions evolved by the Romans have had, not merely influence on those of other peoples, but in many cases actual application, in times long after the disappearance of the Roman empire as a political entity, and even in countries which were never subject to Roman rule. Thus, to take the most striking example, in a large part of Germany until the adoption of a common code for the whole empire in 1900, the Roman law was in force as "subsidiary law," *i.e.*, it was applied unless excluded by contrary local provisions. This law, however, which was in force in parts of Europe long after the fall of the Roman empire, was not the Roman law in its original form. Its basis was indeed always the *Corpus iuris civilis, i.e.*, the codifying legislation of the Emperor Justinian (A.D. 527–565, *see* below), but from the eleventh century onwards (*see* GLOSS; IRNERIUS, ACCURSIUS) this legislation was interpreted, developed and adapted to later conditions by generations of jurists, and necessarily received additions from non-Roman sources. All the forms which it assumed in different countries and at different epochs can also claim to be included under the title "Roman law."[1]

The importance of Roman law is, however, not confined to the actual application of its rules as such either in the Roman empire or elsewhere, for its influence on the development of law in general has been immense. Even to-day, if we look at the legal systems of peoples with a Western civilization, we can say that they fall (with some exceptions, especially the Scandinavian countries) into two groups—an English group, and a group in which the main elements are of Roman origin. To the English group belong England, nearly all the United States of America, and most of the British dominions and colonies; to the Roman group belong the rest. The nations of the Continent are, nearly all of them, living to-day under Codes which, though they contain much that is not Roman, are Roman in their structure, their fundamental categories and their general method of thought. Within the British empire there is Scotland with a system fundamentally Roman, Quebec with its French law, built largely with Roman materials, and South Africa which, like Ceylon, has a system known as "Roman-Dutch," that is to say based on the Roman law as developed by the jurists of the Netherlands. Even English law itself, though owing less to Roman law than any other system, has at different times and in different ways received considerable accessions from Roman sources. (*See* ENGLISH LAW; and *e.g.*, Pollock and Maitland, *History of English Law* I. 88 *seq.*, Holdsworth *History of English Law* II. 145–149, 176–178 228 *seq.*)

[1] The term "civil law" is frequently used, in England at least, to denote the Roman system in this sense, as opposed to the native "common law."

These developments however lie outside the scope of the arti which is confined to the history of private law within the emp up to the death of Justinian.

Periods in the History of the Law.—Considerations space make it impossible to discuss separately the different stag through which Roman law passed during the 13 centuries whi elapsed between the foundation of the city and the death of Ju tinian, but some idea of the chief periods and their characteristi is essential for the understanding of what follows, and we m perhaps divide as follows:—

(*a*) *The Period of Conjecture.*—This includes the monarcl (753–510 B.C. according to tradition) and the republic up to t passing of the XII. Tables (451–450). For this period we ha really no evidence but unreliable tradition and inference fro later institutions.

(*b*) *The Mid-Republican Period, from the XII. Tables Un About the Middle of the Second Century B.C.*—Apart from fra ments of the Tables and from the historians, who are of cour chiefly of use for constitutional law, our evidence is not a gre deal better than for the previous period when it comes to deta and the history of law, like the rest of Roman history, suffe still from the destruction of records when Rome was burnt by tl Gauls in or about 387 B.C. However we know of some law passed, of the existence of certain legal institutions and the nam of some famous lawyers, though no professedly legal work has su vived, and indeed few were written. The period is pre-eminent one of the *ius civile,* as opposed both to the *ius honorarium* magisterial law and to the *ius gentium,* in the sense to be explain below.

(*c*) *The Late Republican Period.*—For the last century ar a half of the republic the position as regards evidence is alreac different. A few quotations from legal writers of the time su vive in Justinian's digest; we have Cicero, in all of whose worl there are numerous references to legal matters, and we have oth non-legal literature from which information on law can be deduce We have too the text of a few laws in inscriptions. The peric is that in which magisterial edict comes to be the chief reform ing factor in Roman law and it may thus be described as th period of the earlier *ius honorarium.* It was also the period which the *ius gentium* began to be of importance, and these tw facts are not unconnected, for it was probably through the mediu of the Edicts that a large part of the *ius gentium* found its wa into the law as administered between citizens.

Ius gentium is a difficult phrase to explain, because it has tw distinct, though related, meanings, the one practical, the oth theoretical. In the practical sense it means that part of th Roman law which was applied by the Romans both to themselv and to foreigners, while *ius civile,* as opposed to it, means tha part which the Romans applied only to themselves. This dicho omy can only be explained historically. Roman law like oth ancient systems, adopted originally the principle of personalit *i.e.* that the law of the state applied only to its citizens. The fo eigner was strictly rightless, and unless protected by some treat between his state and Rome could be seized, like an ownerle piece of property, by any Roman. But from early times the were treaties with foreign states guaranteeing mutual protectio and even where there was no treaty, the increasing commerci interests of Rome made it necessary for her to protect, by som form of justice, the foreigners who came within her borders. No a magistrate charged with the administration of such justice coul not simply apply Roman law, because that was the privilege c citizens, and even had there not been this difficulty, the foreigner especially those coming from Greek cities and used to a mor developed and freer system, would probably have objected to th cumbrous formalism which characterized the early *ius civile.*

What the magistrate in fact did, was to apply a system com posed of the already existing "law merchant" of the Mediter ranean peoples and a strong Roman flavouring, the Roman ele ment being, however, purged to a large extent of its formalis elements. This system was also adopted when Rome began to hav

provinces and her governors administered justice to the provincial *peregrini* (foreigners), a word which came to mean, not so much persons living under another government (of which, with the expansion of Roman power, there came to be fewer and fewer) as Roman subjects who were not citizens. The general principle adopted seems to have been to allow disputes between members of the same (subject) state to be settled by their own courts according to their own law, while the governor's courts applied *ius gentium* to disputes between the provincials of different states or between provincials and Romans. The law thus developed in its turn reacted on the law as administered between Romans, especially by way of making it less formal, with the result that to a considerable extent the two systems were identical, and this is true particularly of the law of contract. When therefore a Roman lawyer says that the contract of sale, for instance, is *iuris gentium,* he means that it is formed in the same way and has the same legal results whether the parties to it are citizens or not. This is the practical sense of *ius gentium,* but the idea is closely interwoven with a theoretical sense, that of a law common to all peoples and dictated by Nature which the Romans took from Greek philosophy.

Aristotle had already divided law into that which is natural (*φυσικόν*) and that which is man-made (*νομικόν*) and had asserted that the natural part was in force everywhere. This conception fitted well with the Stoic ideal of a life "according to nature," and became a commonplace which was borrowed by the Roman jurists, who, like other educated Romans, were much under the influence of the Stoic system. In their works this theoretical law of nature, "common to all mankind," then becomes identified with the really practical law which the Romans administered to all free men, irrespective of citizenship, simply on the basis of their freedom.

(*d*) *The Early Empire and the Classical Period.*—The change from republic to empire did not make any immediate difference to private law, except in so far as, bringing peace after a century of turmoil, it was favourable to legal progress. Legal literature, too, increased in volume and a number of quotations from authors of the first century survive in the Digest. This age in fact merges insensibly into the classical period, which is generally taken to include the second century A.D. and the early third century, and is thus considerably later than the classical period of Latin literature. It falls roughly into two divisions, an earlier one covered by the reigns of Hadrian (A.D. 117–138) and the Antonine emperors (death of Commodus A.D. 193) and a later one under the Severi (accession of Septimius Severus A.D. 193—death of Severus Alexander A.D. 235). Not that there is any break in the continuity of development, but the work of the earlier period was of a more creative character, while the later represents the working out of existing principles over the whole field of law. In the Digest there are quotations from all the authors of the classical age, but those taken from three writers of the later period (Papinian, Paul, Ulpian) alone comprise over half the work.

(*e*) *The Post-classical Period.*—With the era of confusion that followed the murder of Severus Alexander, there came a rather sudden falling off in the value of the legal work done, and the restoration of order by Diocletian (A.D. 284–305) did not revive legal literature. The law, of course, did not stand still. New ideas were introduced, especially from Greek sources, through the establishment of the Eastern empire with its capital at Constantinople, and through the growth of Christianity, while the great social and political changes of the sinking empire necessarily had their repercussions on private law. But it was not until the age just preceding Justinian that there was something of an intellectual revival in legal matters, and this revival Justinian was able to use for his great purpose.

SOURCES OF LAW

The Romans themselves divided their law into *ius scriptum* and *ius non scriptum;* by "unwritten law" they meant custom, by "written law," not only that derived from legislation, but, literally, that which was based on any source which was in writing and the list of written sources comprises *leges, plebiscita, senatus consulta, edicta magistratuum, responsa prudentium* and *constitutiones principum.* This list is repeated in Justinian's Institutes though ever since the close of the classical period the only source of new law (apart from custom) had been the emperor's constitutions.

A. **Ius Non Scriptum or Custom.**—Custom (*mos maiorum, consuetudo*) was recognized by the Romans not only as having been the original source of their law, but as a source from which new law could spring. The theory given by the jurists is that the people, by adopting a custom, show tacitly what they wish to be law, just as they might do expressly by voting in the assembly. In the developed law it would seem, however, that custom as an independent source was not very fruitful, and that it exercised its influence rather through the medium of juristic opinion and the practice of the courts.

B. **Ius Scriptum.**—(1) *Leges and Plebiscita.—Lex* is properly an enactment of one of the assemblies of the whole Roman people, the *comitia centuriata, tributa* or *curiata* (*see* COMITIA), but the most ancient of these, the *comitia curiata,* ceased, before the beginning of reliable history, to have any real political functions, though it continued right up to classical times to exist for certain formal purposes. The validity of *plebiscità, i.e.,* resolutions of the purely plebeian assembly, was one of the chief matters of contention between the patricians and plebeians, and the struggle between the orders may be said to come to an end in 287 B.C. when, by the *lex Hortensia, plebiscita* were given the force of *leges.* Thereafter enactments which were strictly *plebiscita* were often loosely referred to as *leges.*

Roman assemblies, like those of the Greek city states, were primary, *i.e.,* the citizen came and voted himself and did not send a delegate, but their power was restricted by the rule that only a magistrate could put a proposal before them and by the absence of any opportunity for amendment or debate. The only function of the people was to answer "yes" or "no" to the magistrate's "asking" (*rogatio*), and constitutional practice further required that the magistrate should consult the senate before putting a proposal to the assembly. In the later republic, at any rate, rejection of a bill was practically unknown and the real power lay with the senate and the magistrates.

Leges Regiae.—The historians have a good deal to say of *leges* passed in the time of the kings, but legislation at so early a date is unlikely. What they took for laws were probably statements of ancient custom from pontifical sources.

The XII. Tables.—Of much greater importance are the XII. Tables, said to have been passed in 451–450 B.C., some 60 years after the expulsion of the kings. The accounts given by the historians of their compilation (*see* ROME, *History*) are inconsistent and mainly mythical, but tradition is no doubt right in representing it as an incident in the struggle of the plebeians for political equality. The moving cause was a desire to obtain a written and public code which patrician magistrates could not wrest at their will against plebeian litigants. What weight should be given to that part of the story which tells of a preliminary embassy sent to Athens to study the laws of Solon, has been much debated. That the embassy itself is legendary can hardly be doubted, but on the other hand, that there was some Greek influence is clear. (See, *e.g.,* Tab. VII. 2-D. 10.1.13.) In the main, however, the materials of the code were taken from native customary sources. The authenticity of the whole compilation has been attacked in recent times, but the most authoritative modern opinion holds, in spite of all scepticism as to details, that the XII. Tables really were an enacted code of law, and that tradition is not far wrong in ascribing them to the middle of the fifth century B.C.

The text of the code has not survived, a remarkable fact, for copies (probably in more or less modernized language) must have been abundant in Cicero's time if, as he says (De Leg. 2, 23, 59) it was still customary in his youth for boys to learn it by heart. All that we have is a number of "fragments" which have had to be collected from allusions and quotations in the works of various authors, *e.g.,* Cicero. (Modern collections are to be found in Bruns' *Fontes iuris Romani antiqui,* 7th ed., 1919, Girard's *Textes de droit Romain,* 5th ed., Paris, 1923, and Riccobono's

Fontes iuris Romani anteiustiniani.)

On the establishment of the empire by Augustus, the assemblies did not immediately cease to function, but their assent to any proposal was a mere formal ratification of the emperor's wishes. The last *lex* known to have been passed was a *lex agraria* under Nerva (A.D. 96–98).

Senatus Consulta.—The senate acquired legislative power in early imperial times though this was never conferred on it by any imperial enactment. The resolution of the senate preceding the placing of a bill before the people had always been practically decisive, and with the decay of the *comitia* their assent evidently came to be regarded as a formality which might be omitted. Actually, the senate nearly always, if not always, legislated at the instigation of the emperor, latterly, indeed, simply embodying his *oratio* or proposal in a resolution, and not long after the classical period, the emperors ceased to use the senate as a vehicle of their legislation.

Edicta Magistratuum.—An edict is a proclamation, originally no doubt oral, later in writing, and any superior magistrate might find it necessary to issue such edicts regarding matters which came within his competence. A peculiarity of Roman law, however, is that the magistrates entrusted with jurisdiction made particular use of this power and that their edicts became one of the most important sources of law. Originally the duty of *iurisdictio,* which means supervising the administration of justice rather than actually deciding cases (*see* p. 454, "Procedure") had presumably lain with the king, from whom it descended to the consuls. With the growth of business it became impossible for the consuls to discharge this duty in addition to their other functions and in 367 B.C. a new magistrate, the *praetor,* was appointed for the purpose. About the year 242 B.C. the increase of foreigners at Rome made it necessary to separate the conduct of suits in which they were concerned from those to which citizens alone were parties, and a second praetor, *praetor peregrinus,* was appointed to deal with cases in which a foreigner was involved. In contradistinction to him, the original praetor, now confined to suits between citizens, came to bear the title *urbanus*[1].

Other judicial officers at Rome whose edicts were of importance were the curule aediles, whose duties included the supervision of the market place. In the provinces supreme judicial power lay with the governors, and quaestors carried out functions analogous to those of the aediles at Rome. The law derived from the edicts of all these magistrates was called *ius honorarium,* as opposed to *ius civile* in the sense of law based on legislation or custom, but owing to the pre-eminent position of the praetors, the phrase is often used simply as equivalent to *ius praetorium.* The nature of this magisterial law is peculiar. The praetor was not a legislator, and he could not therefore make law directly as could the sovereign people, but the Roman system of procedure (especially the formulary system, *see* p. 454) gave him a great power over the provision or refusal of remedies as well as over the form which remedies were to take, and consequently the edict which he issued at the beginning of his term of office setting out what he intended to do was a document of the greatest importance. In it he could say, for instance, "If one man makes such and such an allegation against another, *I will give an action,*" even though the circumstances alleged would not give any right at civil law. The edict called *perpetuum* (continuous) because it was intended to announce the principles by which the praetor would be governed throughout his year of office, necessarily ceased to have any validity when that term expired, but it became the practice for each succeeding praetor to take over and reissue as his own much of his predecessor's edict, and by the end of the republic, the part which was thus carried on from year to year (*tralaticium*) must have been considerable, for jurists were just beginning to write commentaries on the edict, a practice which would not have been worth while if the greater part of it had been liable to annual alteration.

[1]This is the usual story, but the historians in an endeavour to reconcile discordant tradition may have read back into early times the institutions of their own day. *See* E. Pais, *Ricerche sulla Storia,* etc. Serie iv. (1921), 265 *seq.*

The change from republic to empire did not immediately m any difference, and the praetors continued to issue their ec (though we may doubt whether they ever made changes witl imperial or senatorial authority), but in the long run their v powers were evidently felt to be inconsistent with the empei supremacy. Hadrian consequently, in or about A.D. 131, instru the famous jurist Salvius Iulianus to revise and settle the pra rian and aedilician edicts. The changes in substance do not ap to have been of a far-reaching character, but the edict as rev was henceforward made unalterable except by the emperor h self.

The relationship between *ius honorarium* and *ius civile* has o been compared with that existing in England between comi law and equity. In both cases we find, as Maine put it (*Anc Law,* p. 25) a "body of rules existing by the side of the orig civil law, founded on distinct principles, and claiming incident to supersede the civil law in virtue of a superior sanctity inhe. in these principles," and in both cases the resulting duality ei mously complicates the law, but, of course, when we come to de the comparison no longer holds.

Responsa Prudentium.—The force attributed to professic opinions of a certain type was another peculiar feature of Roman system, and one which contributed in no small meas to its success, for it was the "learned lawyers" (*prudentes*) whom the moulding of the law into a coherent system was re due.

Originally, according to an entirely credible tradition, law considered the special province of the *pontifices* (*see* PONTIFE who seem to have regarded it as a mystery to be exploited in interests of their order. Their monopoly was however bro down, according to legend, in 304 B.C., by Gn. Flavius, a cl of Appius Claudius Caecus, who is said to have stolen from master and made public, a list of *legis actiones* (*i.e.,* forms words which had to be followed exactly in the conduct of l suits), thereafter known as the *ius Flavianum.* The first knc legal treatise, called the "cradle of the law" by Pomponius, is *Tripertita* of Sextus Aelius Paetus Catus (consul 198 B.C.) wh contained the text of the XII. Tables, the *interpretatio* put u it by the jurists and the *legis actiones.* Probably the last part identical with the *ius Aelianum* which, according to Pompon was a collection of *legis actiones* like the earlier *ius Flavian*

It is plain in any case that from about 300 B.C. onwards th came into existence a class of men who made the study of the their special interest. These *iuris consulti* or *iuris prudentes* w not professional lawyers in the modern sense, but men of r who sought by giving free legal advice to obtain popularity advancement in a public career. The *responsa* (answers) wh they delivered to those who consulted them were of gre weight than are our modern "opinions of counsel" because person who actually decided a case under the Roman system procedure was not, as with us, a trained lawyer, but a lay *iuc* who did not, like our jurymen, have a judge to direct him points of law. Augustus empowered certain jurists to g *responsa* with the emperor's authority, and this practice perhaps by insensible degrees, to the view that the *iudex* bound to abide by the *responsum* of a jurist who had recei this *ius respondendi.* Gaius at any rate mentions a rescript Hadrian which laid down that *responsa* were binding if th agreed, and that if they disagreed, the *iudex* could decide for h self which to follow. (*See* Wlassak, *Die klassische Prozessforn* p. 45.)

The practice of conferring the *ius respondendi* appears to h fallen into disuse about the end of the third century A.D. when classical period was over, but in the meanwhile, *responsa* h certainly come to be regarded as binding not only for the c for which they were originally given, but also as precedents future cases, and, further, authority gradually came to be attach to the other writings of those jurists who had the emperor's p ent. The "law of citations," an imperial enactment of 426, u mately laid down that only the works of five jurists, Papini Paul, Gaius, Ulpian and Modestinus, might be cited and, subj to some provisos which are obscure, the works of authors quot

by these five. If the authorities cited disagreed, the majority was to be followed; if numbers were equal, the side on which Papinian stood was to prevail; if he was silent, the *iudex* might please himself.

For the long succession of jurists reference must be made to the individual articles, but mention must be made here of the two "schools," the Sabinians (or Cassians) and the Proculians, into which they were divided in the early empire. Labeo (died between A.D. 10 and A.D. 22), one of the greatest figures in the history of jurisprudence, was the founder of the Proculians (who, however, took their name from a successor, Proculus); Capito, that of the Sabinians (so called from Massurius Sabinus, who was given the *ius respondendi* by Tiberius). What principles, if any, divided these schools, is unknown, though a number of controversies on particular points are preserved, especially in Gaius' Institutes. It is probable, though by no means certain, that there were teaching establishments or societies of some sort in connection with the "schools," for otherwise the list of "heads" given by Pomponius would be difficult to explain. The distinction does not seem to have survived the Antonine age; for Gaius, a Sabinian, is the last jurist of whom we know that he belonged to one or other of the schools.

Constitutiones Principum.—Neither Augustus nor his immediate successors expressly assumed legislative power, and yet Gaius, writing about A.D. 160, can say "there has never been any doubt that what the emperor lays down has the force of law." Ulpian, indeed, refers the validity of constitutions to the so-called *lex regia,* passed at the beginning of each emperor's reign; and there is indeed in the only surviving example of such a *lex* (the *lex de imperio Vespasiani* line 17 *seq., see* Bruns *Fontes* p. 202) a clause conferring such wide powers on the emperor that legislation might be deemed to be included. Nevertheless it is now generally held that this was not the original meaning of the clause and that the emperor's legislative power is a gradual growth. The chief forms of imperial legislation were:—(*a*) *Edicta, i.e.,* proclamations which the emperor, like other magistrates, might issue; but whereas the other magistrates were confined to their own spheres, the sphere of the emperor was in fact unlimited. (*b*) *Mandata, i.e.,* instructions to subordinates, especially provincial governors. (*c*) *Rescripta,* written answers to officials or others who have consulted the emperor, in particular on a point of law. In such cases the rescript lays down the point of law applicable and, since the emperor is supreme, the rule may be a new one. (*d*) *Decreta, i.e.,* decisions of the emperor sitting as a judge. Here too the emperor may lay down a new rule.

The Earlier Collections of Constitutions and the Legislation of Justinian.—The growth of legal literature and especially of imperial constitutions created a need for works of reference which made itself felt long before Justinian, and a beginning was made, almost certainly in Diocletian's day, by a collection of constitutions known as the *codex Gregorianus,* which was followed by the *codex Hermogenianus,* perhaps also dating in its original form from Diocletian. Both collections were unofficial, but their compilers must have had official countenance, for they clearly had access to the imperial archives. The *Gregorianus* contained constitutions from Hadrian to Diocletian, the *Hermogenianus* almost exclusively those of Diocletian's time; later constitutions attributed to it were probably only added in subsequent editions. It was clearly intended to supplement the *Gregorianus.* Unlike these two, the *codex Theodosianus* was an official work compiled by a commission appointed under Theodosius II. and Valentinian III., it was given the force of law as from Jan. 1, 439. Constitutions from the time of Constantine the Great onwards were, with very few exceptions, not to be valid unless contained in it. For the earlier imperial legislation the older *codices* still had to serve. Nearly the whole of the *codex Theodosianus* has been preserved, whereas we only have fragments of the others. Theodosius had also planned a collection which would include juristic literature as well as imperial legislation, but this never came to fruition until it was taken up again by Justinian.

Justinian's Legislation.—(*See* also JUSTINIAN I.) Justinian's main object was, as he himself expresses it, to clear the path of legal authorities of the tangles with which it had become overgrown during the course of centuries, and he set about the task almost immediately on ascending the throne. It must be noted however that he was no mere codifier, but also the author of much new legislation, some of which was of the utmost importance for the later development of law. The emperor was no doubt largely responsible himself for the work undertaken, but it would probably not have been possible to carry it through but for the genius of his chief minister, Tribonian, who was clearly the leading spirit throughout the work. The course of legislation was as follows:—

(1) *The Old Codex.*—In Feb. 528, a commission of ten members including Tribonian (who, however, was not president) was appointed to compile a new collection of imperial constitutions which was to supersede the older ones entirely and, of course, to include legislation subsequent to the Theodosian. The commissioners were to cut out repetitions and contradictions and had large powers of alteration for this purpose. The work was rapidly done and published in April 529, with the force of law as from the 16th. It has not survived as it was later superseded.

(2) *The "Fifty Decisions."*—Justinian, probably partly with a view to facilitating the work of compiling the Digest, issued a number of constitutions settling matters on which the writings of the classical jurists disagreed and abolishing finally some institutions and distinctions which had ceased to be of practical importance. Some 90 constitutions of this character are known to us, but a collection of 50 seems to have been made and published separately. Its exact date cannot be determined.

(3) *The Digest.* (*Digesta or Pandectae*).—Instructions were given on Dec. 15, 530, to Tribonian to form a commission to collect excerpts from the works of the jurists. The collection was to serve practical purposes and consequently everything obsolete or superfluous was to be cut out and, where necessary to bring the matter up to date, alterations were to be made in the text. The excerpts were to be arranged in fifty books and the books into titles according to the subject matter, and the whole was to include all that it was necessary to know of juristic as opposed to imperial law. The compilers were definitely instructed not to adopt the summary methods of the "law of citations" but where the authorities disagreed, to choose what they thought best for themselves. The commission, consisting of 16 members in addition to Tribonian, rapidly completed their task and the Digest was published on Dec. 16, 533, with the force of law as from Dec. 30. Thenceforth no reference might be made to any other text for juristic law. Justinian gives us some idea of the work involved when he says that 2,000 books consisting of 3,000,000 lines were read and that this number was then reduced to 150,000 lines. The Digest is the most important of Justinian's works, for in it are preserved the writings of the classical jurists who were really responsible for the greatness of Roman law, and the "inscription" at the head of each quotation enables us to see from which jurist and from which work it is taken. But of course as evidence for the classical law quotations must be used with care, for the compilers made considerable use of their powers of alteration; much ingenuity, especially within the last 50 years, has gone to the discovery of their "interpolations."

The Institutes.—The revision of the law by Justinian was accompanied by a detailed scheme for the reform of legal education in the universities of Constantinople and Berytus, and one of the requirements of this scheme was a new book to be used for elementary instruction instead of the Institutes of Gaius which had for centuries been the standard work. While the Digest was still unpublished therefore orders were given to Tribonian and two professors to compile a manual for this purpose, and the Institutes were published on Nov. 21, 533, and given the force of law. The work is based on Gaius' Institutes, from which a great part is copied literally, as well as on other elementary works of the classical period; occasional references to imperial legislation are added. It is in fact almost as much a compilation as the Digest, but the references to the authors quoted are omitted and the whole made to read like a lecture delivered by the emperor to his students.

The New Code (*Codex Repetitae Praelectionis*).—The 50 decisions and the many other new constitutions promulgated since 529 necessitated a revision of the old codex and Tribonian, together with four others, was instructed shortly after the publication of the Digest, to prepare a new edition. This was published on Nov. 16, 534, and given the force of law as from Dec. 29.

The Novels.—Although the new code completed Justinian's scheme for providing a collection of authoritative legal texts, he did not cease to introduce new legislation. In all 175 laws published after 534 are known and these are called *Novellae Constitutiones* or Novels. Nearly all are in Greek, which was becoming more and more the official as well as the spoken language of the Byzantine Empire. Justinian never made any official compilation of them, but three private collections have come down to us, and the Novels, together with the Institutes, the Digest and the (new) Code together form what is known as the *Corpus Iuris Civilis.*

THE LAW OF PERSONS

I. **Slavery.**—"The main distinction in the law of persons," says Gaius, "is that all men are either free or slaves." The slave according to Roman law was in principle a human chattel who could be owned and dealt with like any other piece of property. As a piece of property the slave was not only at the mercy of his owner, but rightless, and (apart from criminal law) dutyless. This is the principle, but if the slave was, in law, a thing, he was, in fact, a man, and this fact produced modifications of the principle. In particular, a slave might be manumitted and would then become in most cases not only free but a citizen.

II. **Citizenship.**—This was of importance for the purposes of private law, because certain parts of private law applied only to citizens (*ius civile*). The general rule was that, if the status of the parents differed, the child followed that of the father, if the union was one recognized as marriage by Roman law; otherwise that of its mother, but a *lex Minicia* of republican times enacted that in cases of unrecognized unions between citizens and foreigners the child should always follow the inferior parent. The great extension of the citizenship by Caracalla in A.D. 212 reduced the importance of this part of the law.

III. **Family.**—(a) *Patria potestas.* The chief characteristic of the Roman family is the famous *patria potestas* which the father exercised over his children and over his more remote descendants in the male line, whatever their age might be, as well as over those brought into the family by adoption—a very common practice at Rome. This meant originally not only that he had control over the persons of his children, amounting even to a right to inflict capital punishment, but that he alone had any rights in private laws. Thus any acquisitions made by a child under power became the property of the father. The father might indeed allow a child (as he might a slave) certain property (*peculium*) to treat as his own, but in the eye of the law it continued to belong to the father. In classical times there were already modifications of the system; the father's power of life and death had shrunk to that of slight chastisement, and the son could bind his father by contract with a third party within the same strict limits as applied to slaves and their masters. Sons too could keep as their own what they earned as soldiers (*peculium castrense*) and even make wills of it. In Justinian's day the position as regards property had changed considerably; what the father gave to the son still remained in law the father's property, but the rules of *peculium castrense* had been extended to many sorts of professional earnings (*pec. quasi castrense*) and in all other sorts of acquisitions (*e.g.*, property inherited from the mother) the father's rights were reduced to a life-interest (usufruct). At all times *Patria potestas* ceased normally only with the death of the father, but the father might voluntarily free the child by *emancipation*, and a daughter ceased to be under her father's *potestas* if she was married in such a way as to come under the *manus* of her husband.

(b) *Marriage.*—There were two types of marriage known to the law, one with *manus* and one without, but the former was rare already in the late republic and had disappeared long before Justinian's day. *Manus* was the autocratic power of the husband over the wife, corresponding to *patria potestas* over the sons, and it might result in any of three ways:—

(1) by *confarreatio*, a religious ceremony confined to patricians.

(2) by *coemptio*, a type of *mancipation* (*see* below) which was originally no doubt the Roman form of marriage by purchase; it was purely secular.

(3) *usus;* if a woman lived with a man as his wife for a year, he acquired *manus* over her by a kind of prescription. The XII. Tables had already provided that this might be prevented if the woman absented herself for a space of three nights during the year (*usurpatio trinoctii*). *Usus* was already quite obsolete in classical times.

It may be that at one time marriage with *manus* was the only form of union recognized as marriage at all, but by the time of the XII. Tables this was apparently no longer the case, for it is clear that the *usurpatio trinoctii*, though it prevented *manus*, left the marriage subsisting, so that it was possible to be married without *manus*.

In any case marriage without *manus* was by far the more common in all periods of which we have any real knowledge. It was formed (provided the parties were above the age of puberty and if under *potestas* had their fathers' consent) simply by the beginning of conjugal life with the intention of being married, and this was normally evidenced by the bringing of the bride to the bridegroom's house. It was however legally independent of all ceremonies whether pagan or Christian which might accompany it, and of consummation. The wife remained under her father's *potestas* if he were still alive, if he were dead, she continued (so long as guardianship of women continued) to have the same guardian as before marriage. It was necessary that both spouses should be citizens, or if one was not, that he or she should have *conubium*, the right given to some non-Romans of contracting a Roman marriage. The chief importance of this was that if a Roman contracted a union with a foreign woman, the children would not be in his *potestas* unless she had *conubium*. In marriage without *manus* the property of the spouses remained entirely distinct, and even gifts between husband and wife were invalid. It was usual however for a dowry to be given to the husband on the marriage by the woman or her father; this originally became the indefeasible property of the husband, but in classical times already the wife could recover it if the marriage ended by divorce or by the husband's death, and by Justinian's legislation it had always to be returned to the wife or her heirs.

Divorce was always possible at the instance of the husband in cases of marriage with *manus*, and in marriage without *manus* it was free to either party to put an end to the relationship at will; a letter of *repudium* was usual, but any manifestation of intention to end the relationship made clear to the other party and accompanied by actual parting was all that was legally necessary (*see* E. Levy, *Der Hergang bei der römischen Ehescheidung*). The Christian emperors imposed penalties on those who divorced without good reason, but the power of the parties to end the marriage by their own act was not taken away. *Concubinatus* was recognized in the empire as a sort of morganatic marriage, differing from marriage only by the different intentions of the parties, and excluding marriage, for a man could not have both a wife and a concubine. Constantine first enacted that the children of such unions might be legitimated by the subsequent marriage of their parents, a rule which the mediaeval civil law extended to all illegitimate children.

(c) *Guardianship.*—(1) Of children. Persons under the age of puberty (14 for males, 12 for females) needed *tutores* if they were not under *patria potestas*. Such tutors could be appointed under the will of the *pater familias;* failing such appointment the guardianship went to the nearest agnates (*see* p. 453 "Succession") until Justinian gave it to the next of kin whether agnatic or cognatic; if there were no qualified relation the magistrates made an appointment.

(2) Of women. Originally all women not under *patria potestas* or *manus* needed *tutores*, who were appointed in the same way as those for children. In classical times already this *perpetua tutela mulierum* was little more than a burdensome technicality and it had long disappeared from Justinian's law.

(3) Of lunatics and spendthrifts. Originally such persons were placed under the *cura* of their agnates; later, magistrates appointed curators.

(4) Of minors. Originally children were considered adult when of the age of puberty, but, by a long development, it became usual for those above puberty and under 25 to have *curatores* who were always magisterially appointed.

PROPERTY AND POSSESSION

The most striking thing to an English lawyer accustomed to the complexities of English real property law is the absence of any fundamental distinction between the treatment of land and the treatment of movables. Both can, in the law as we know it, be owned absolutely by individuals, though there may have been a time at Rome as elsewhere when land was subject to communal ownership of some sort. This conception of absolute ownership (*dominium*) is also characteristically Roman, as opposed to the relative idea of ownership as the better right to possession which underlies the Germanic systems, which also, originally, underlay that of Rome. This can be seen by comparing the form of a *vindicatio* (the claim of an owner out of possession) under the *legis actio* system of procedure with that which it later assumed under the formulary system. In the earlier system the plaintiff first makes his assertion of ownership ("I say that this thing is mine") and then the defendant makes a similar assertion. Finally, the thing goes to the one whose assertion is based on the better right. Under the later system there is no assertion by the defendant at all; the *iudex* is instructed to condemn the defendant if it appears to him that the thing belongs to the plaintiff, otherwise to absolve the defendant. Hence, unless the plaintiff makes good his title absolutely, the defendant, though he may have no title at all, remains in possession.

A great part of what the jurists have to say on the subject of property comes under the heading "methods of acquiring ownership." These were divided into two classes according as they fell under the *ius civile* or the *ius gentium*.

I. **Methods of the Ius Civile** (a) *Mancipatio.*—This was a ceremonial conveyance needing for its accomplishment the presence of the tranferor and transferee, five witnesses (Roman citizens of full age) a pair of scales, a man to hold them (*libripens*) and an ingot of copper. The transferee grasped the thing and said: "I assert that this thing is mine by Quiritarian law; and be it bought to me with this piece of copper and these copper scales." He then struck the scales with the ingot which he handed to the transferor "by way of price." Clearly this was, as Gaius says, a "symbolical sale," and the relic of a real sale. Originally, when money was unknown, the price in uncoined copper had been really weighed out to the vendor. When this became unnecessary there was still a pretence of weighing, but the price was paid separately, and the form could be used as a conveyance where it was not intended that a price should be paid at all, *e.g.*, because the transferor was making a gift to the transferee.

(b) *In Iure Cessio.*—This was a conveyance in the form of a lawsuit. The transferee claims before the magistrate that the thing is his, and the transferor who is the defendant, admits the claim. The magistrate then adjudges the thing to the transferee.

(c) *Usucapio.*—According to the XII. Tables, two years' continuous possession gave title in the case of land, one year in the case of movables. In the developed law, possession must have begun in good faith, the thing must not be one which has been stolen (even though the possessor himself is quite innocent of the theft) or occupied by violence (this applies especially to land, which could not be stolen) and the possession must have had a justifiable beginning (*iustus titulus*). *Usucapio*, being an institution of the *ius civile* was possible only to citizens, but Justinian fused it with a similar institution (*praescriptio longi temporis*) which had grown up in the provinces. Under his system, three years were required for movables, 10 or 20 for land.

II. **Methods of the Ius Gentium** (a) *Occupatio.*—Ownerless things, provided they are capable of private ownership (not, e.g., *res sacrae*, such as temples) became the property of the first person to take possession of them. This applies *e.g.*, to game, and to articles which have been abandoned or left unattended by their owners.

(b) *Accessio.*—If an accessory thing belonging to A was joined to a principal one belonging to B, the ownership in the whole went to B, *e.g.*, if A's purple be used to dye B's cloth, the dyed cloth belongs wholly to B. By far the most important application of this rule is expressed by the maxim *superficies solo cedit*, *i.e.*, whatever is built on land becomes part of the land and cannot be separately owned.

(c) *Specificatio.*—If A made a thing out of material belonging to B the Proculians held that ownership went to A, the Sabinians, that it remained in B. Justinian adopted a famous "middle opinion," according to which B retained ownership if reconversion to the original condition was possible (a bronze vase can be melted down), A obtained ownership if it was not (wine cannot be reconverted into grapes).

(d) *Thesauri Inventio.*—The final rule as regards treasure trove was that if it were found by a man on his own land, it went to him; if on that of another, half went to the finder, half to the landowner.

(e) *Traditio, i.e.*, simple delivery of possession with the intention of passing ownership. This was the method of conveyance of the *ius gentium*. It sufficed to pass full Quiritarian ownership of *res nec mancipi*, but not of *res mancipi* (land in Italy, slaves, beasts of draft and burden, and certain rustic servitudes) for which either *mancipatio* or *in iure cessio* was necessary. If therefore A sold and merely delivered a slave to B, A remained at civil law owner of the slave until usucapion had taken place. The praetor however devised methods of protecting B's possession in such a way that A's title became valueless, and B was said to have the thing *in bonis*. From this phrase later writers coined the expression "bonitarian" ownership. Already before Justinian's day *mancipatio* and *in iure cessio* had become obsolete and Justinian took the final step of abolishing the theoretical distinction between Quiritarian and "bonitarian" ownership.

Forms of Property in Land Other Than Ownership.—The ordinary leaseholder according to Roman law had no protection beyond a contractual right against his landlord, and he could not assign his tenancy, but there were two kinds of tenure which, under the praetorian system, obtained protection against third parties as well, and became assignable. These were *superficies* and *emphyteusis;* the former resulting from building leases granted for a long term or in perpetuity, the latter from similar agricultural leases. Both appear to have first originated in grants by the State, or municipalities. Under *emphyteusis* the grantee did not become owner, though he enjoyed a *jus in re aliena* hardly distinguishable from ownership.

Servitudes.—(a) *Praedial servitudes* (*i.e.*, easements or *profits à prendre*) were divided into two categories, rustic and urban, according as they served the need of agricultural land or of buildings. Thus rights of way and of water are usually classed as rustic, while rights to light, to view or to support were urban. Praedial servitudes could only be appurtenant, *i.e.*, they could not exist except as additional advantages attached to the ownership of a piece of land (the "dominant tenement").

(b) *Personal Servitudes.*—The law of Justinian's day brought under the heading of servitudes also the rights of *usufructus* and *usus*. Usufruct was the right to use and take the fruits (*e.g.*, crops) of a thing and corresponded to our life-interest. *Usus* was a more restricted right, also not extending beyond the life of the holder, merely to the use of a thing; thus the usuary of a house could live in it himself but could not let it, as that would be equivalent to taking the fruits.

Possession.—Implied in the absolute conception of ownership is a sharp distinction between ownership and possession. The civil law did not protect possession as such, but one of the most important parts of the praetorian system was constituted by the *interdicta* (special types of remedy) which protected an existing possession irrespective of its rightfulness, *i.e.*, anyone wishing to interfere with it must bring an action and prove his title. If he interfered on his own authority, the praetor would see that the original state of affairs was restored.

OBLIGATIONS

Obligations were classified by the jurists into two main categories, according as they arose from delict (tort) or contract: the remaining obligations the Byzantines placed under the headings of quasi-contract and quasi-delict.

I. **Delict.**—The XII. Tables already show the law in a state of transition from the system of private vengeance to that in which the state insists on the acceptance of compensation instead of vengeance by the person wronged and fixes its amount. Thus in the case of assault (*iniuria*) if one man broke another's limb, talion was still permitted, *i.e.*, the person wronged could inflict the same injury as he had received, but in other cases there were fixed money penalties, *e.g.*, 25 *asses* for a blow. Theft involved a penalty of twice the value of the thing stolen, unless the thief was caught in the act (*furtum manifestum*) in which case he was flogged and "adjudged" to the person wronged.

In classical times, praetorian reforms had substituted a fourfold penalty in the case of *furtum manifestum* and penalties for *iniuria* (which now included defamation and insulting behaviour) were assessed in each case by the court. The law of damage to property was regulated by a statute (*lex Aquilia*) dating from the republic, but later than the XII. Tables, much extended by interpretation and by the praetor, and praetorian actions lay for a number of new delicts of varying importance.

II. **Contract.**—At the time of the XII. Tables a law of contract can hardly be said to have existed, though we know of an institution called *nexum* of which hardly anything can be said with certainty except that it was a kind of loan so oppressive in character that it might result in the debtor's complete subjection to the creditor. It was obsolete long before classical times. The contracts of classical law were divided into four classes, literal, verbal, real and consensual. The literal contract was a type of fictitious loan formed by an entry in the creditor's account book; it was comparatively unimportant, and obsolete in Justinian's day. The verbal contract or *stipulatio* was of great importance, for it provided a form in which any agreement (provided it was lawful and possible) might be made binding by the simple method of reducing it to question and answer, *e.g.*, "do you promise to pay me ten thousand sesterces?"—"I promise." Originally it was absolutely necessary that the words should be spoken, but it may be said (technicalities apart) that by Justinian's day a written memorandum of such a contract would be binding, even though in fact there had been no speaking at all. If an agreement was not clothed in the form of a stipulation, it must, to be valid, fall, according to its content, under one of the types of real, or consensual contracts. A real contract is one which needs for its conclusion (in addition to the consent of the parties) that some thing should be transferred from one party to the other and that the obligation arising should be for the return of the thing transferred. The real contracts are *mutuum* (loan, *e.g.*, of money), *commodatium* (loan, *e.g.*, of a horse), deposit and pledge. Consensual contracts need no element for their formation except agreement—whether expressed in words or otherwise—between the parties, and though there were only four such known to the law, these were the most important in ordinary life—*emptio venditio* (sale), *locatio conductio* (hire of things or services and also giving out jobs to be done), *societas* (partnership) and *mandatum* (agency). In Justinian's day it was further a principle that in any case of reciprocal agreement, *e.g.*, an agreement for exchange (which was not sale), if one party had performed, he could bring an action to enforce performance by the other ("innominate contract").

SUCCESSION AT DEATH

I. **Testamentary Succession.**—That wills existed already at the time of the XII. Tables is certain, and it is highly probable that the form used was still that mentioned by Gaius as the oldest, the will made publicly in the assembly of the *curiae* (*testamentum comitiis calatis*), with the will made before the people drawn up for battle (*testamentum in procinctuas*) as a variant. It may be however that the mancipatory will (*testamentum per aes et libram*) had already been invented. This began as an expedient for effecting the purposes of a will in an emergency, when the other forms were impossible, and consisted in the use of mancipation to convey the estate of the dying man to a kind of trustee (*familiae emptor*) who then distributed it in accordance with the testator's instructions. By the end of the republic, however, the older forms had disappeared, the mancipation had become a mere formality and the instructions of the testator, which were now contained in a written document, constituted a true will, operative only at death and revocable at any time during the testator's lifetime by the making of a new will. In post-classical times the mancipation had ceased to be necessary and the commonest form of will was the *testamentum tripertitum*, needing for its completion the seals of seven witnesses and the signatures of the witnesses and of the testator. In classical times the praetor had already given effect in most cases to a document sealed by seven witnesses.

The first requirement of any Roman will of historical times was the appointment of one or more *heredes*. A *heres* is a universal successor, *i.e.*, he takes over the rights and duties of the deceased (in so far as they are transmissible at all) as a whole. On acceptance, the heir becomes owner where the deceased was owner, creditor where he was creditor and debtor where he was debtor, even though the assets were insufficient to pay the debts. It was thus possible for an inheritance to be *damnosa, i.e.*, to involve the heir in loss. Until Justinian's day this consequence could only be avoided by not accepting the inheritance, but Justinian made one of his most famous reforms by introducing the *beneficium inventarii, i.e.*, the heir who, within a certain time after the acceptance made an inventory of the deceased's assets, need not pay out more than he had received. In addition to appointing an heir, the testator might also leave legacies, *i.e.*, particular gifts which are a burden on the heir. Freedom of testation was, however, not complete, a man being obliged to leave a certain proportion of his property to his children and, in some cases, to ascendants, and brothers and sisters.

II. **Intestate Succession.**—The history of intestate succession consists broadly in the gradual supersession of a purely agnatic system (*i.e.*, one which takes account of relationship through males exclusively) by a cognatic system (in which relationship is traced indifferently through males or females). The agents in the change were first the praetors and afterwards imperial legislation.

By the XII. Tables those first entitled were the *sui heredes* of the deceased, *i.e.*, those who were in his *potestas* or *manus* when he died and became free from power at his death. Failing these, the nearest agnatic relation (or relations, if there were several of the same degree) succeeded, and, if there were no agnates, the members of the *gens* (clan) of the deceased. Praetorian reforms placed emancipated children on an equality with *sui* and gave to the nearest cognates, or failing such, to the surviving spouse (in marriage without *manus*) rights of succession in the absence of agnates; gentile succession became obsolete probably in the first century A.D. Even under this system it will be seen that a woman would not succeed to a child of hers if any agnate (*e.g.*, a paternal uncle) were alive, nor a child to its mother if there were any agnate of hers. Both these cases were dealt with before the end of the classical period, the former by the *Sc. Tertullianum* (under Hadrian) which gave certain rights of succession to mothers who had the *ius liberorum* (*i.e.*, had borne three children) and the latter by the *Sc. Orphitianum* of A.D. 178, which gave to children the first right to succeed to their mothers. Succeeding emperors made many changes but it was not until Justinian's day that the cognatic system completely triumphed. By Novel 118, completed by Novel 127, a new system was introduced, the principal features of which were the following: Descendants had the first claim, and failing these, a composite class consisting of ascendants, brothers and sisters of the full blood, and children of deceased brothers and sisters. Next came brothers and sisters of the half blood and finally the nearest cognate or cognates if there were several in the same degree.

Husband and wife were not mentioned, but their old (praetorian) rights were kept alive in the absence of any of the above

categories. Justinian also gave to the poor widow a right to one quarter of her husband's estate unless there were more than three children, in which case she shared equally with them. If, however, the heirs were her own children by the deceased, she only received the usufruct (life interest) in what she took.

PROCEDURE

The earliest form of procedure known to have existed is that of the *legis actiones;* this was superseded by the formulary system, which in its turn, gave way to *cognitio extraordinaria.* Characteristic of both the earlier systems is the division into two stages, a preliminary one before the jurisdictional magistrate (*in iure*) and the actual trial before the *iudex.* The object of the first stage is to arrive at an issue, which under the *legis actio* system has to be achieved by the speaking of set forms of words by the parties and sometimes, at least, by the magistrate. Thus in a *vindicatio* (*v. supra*) each party, when making his assertion of ownership grasps the thing in dispute and lays a wand on it, after which the magistrate intervenes and says "Let go both of you." So formal was the procedure that a plaintiff who made the slightest mistake lost his case. For this state of affairs the formulary system provided a remedy. It superseded the older system, so Gaius tells us, as a result of the *lex Aebutia* (date much disputed, perhaps between 149 and 126 B.C.), and two *leges Iuliae* (of Augustus). Between the *lex Aebutia* and the *leges Iuliae* the two systems were both in use.

Under the new procedure the issue was formulated in written instructions (*formula*) to the *iudex,* couched in the form of an alternative, *e.g.,* "If it appear that the defendant owes the plaintiff ten thousand sesterces the *iudex* is to condemn the defendant to pay the Plaintiff ten thousand sesterces; if it does not so appear, he is to absolve him." A draft of the *formula* was probably prepared by the plaintiff before he came into court, but there could be no trial until it was accepted by the defendant; for there was always a contractual element about a lawsuit under both older systems. Pressure could, however, be exercised by the magistrate on a defendant who refused to accept a *formula* of which the magistrate approved, just as a plaintiff could be forced to alter a *formula* of which the magistrate disapproved, by the magistrate's refusal to give his order to the *iudex* to decide the case unless the alteration were made.

The process by which the *cognitio extraordinaria* took its place was gradual, and was accomplished in the provinces earlier than in Rome. Briefly, the new system meant that the magistrate used his administrative powers, always large, for the purpose of settling disputes. He could command, and thus if one man brought a complaint against another before him, he could investigate the matter and give the order he thought fit. As imperially appointed officers who had no *iurisdictio* in the old sense, superseded republican magistrates, so this administrative process became more common. The result is that the old contractual element in procedure disappears, as well as the old division into two stages. Justice is now imposed from above by the state, not, as originally, a kind of voluntary arbitration supervised by the state.

BIBLIOGRAPHY.—Among the chief modern text-books are:—W. W. Buckland, *A Text-book of Roman Law from Augustus to Justinian* (Cambridge, 1921), and (shorter) *A Manual of Roman Law* (Cambridge, 1925); P. F. Girard, *Manuel élémentaire de droit romain* (7th ed., Paris, 1924); R. Sohm, *Institutionen des römischen Rechts* (17th ed., Munich and Leipzig, 1926) (English translation of 9th edition by Ledlie, Oxford, 1901). For Sources and History see *e.g.,* P. Krüger, *Geschichte der Quellen und Literatur des röm. Rechts* (2nd ed., Munich and Leipsic, 1912); T. Kipp, *Geschichte der Quellen des röm. Rechts* (4th ed., Leipsic, 1919); B. Kübler, *Geschichte des röm. Rechts* (Leipsic, 1925); G. Cornil, *Droit romain, aperçu historique sommaire* (Brussels, 1921); E. Costa, *Storia del diritto romano privato* (2nd ed., Turin, 1925); J. Muirhead, Historical Introduction to the Private Law of Rome, 3rd ed., London, 1916. In Holtzendorff's *Enzyklopädie der Rechtswissenschaft,* Vol. 1 (2nd ed. of revised version, Munich and Leipsic, 1915); O. Lenel's article on history and sources (*Geschichte u. Quellen des röm. Rechts*) and E. Rabel's on the private law of classical times (*Grundzüge des röm. Privatrechts*) are both authoritative and contain full references to modern literature. (H. F. J.)

ROMANOFF DYNASTY, the rulers of Russia from 1613 to 1917. The last direct descendant of the earlier dynasty of Rurik, Tsar Theodor, son of Ivan (John) the Terrible, died in 1598. After him the throne was occupied first by his brother-in-law, Boris Godunov, then by an adventurer claiming to be a son of Ivan the Terrible (usually known as the false Demetrius). After his murder, in 1606, Prince Basil Shuiski was proclaimed tsar, but was dethroned four years later. The faction which was in power offered the crown to Vladislas, son of the king of Poland A Polish army advanced to support his claim. Another faction brought in a Swedish army to fight the Poles. In the meantime two more men sprang up in succession, both pretending to be Demetrius, miraculously saved from death. The country was in confusion and civil war till Minin, a tradesman from Nijni-Novgorod, joined hands with Prince Pojarski, one of the generals who had proved himself an efficient soldier. They formed an army and took Moscow in Oct. 1612; they then sent messengers all over the country urging the people to choose representatives who would assemble in Moscow to elect a new ruler. On Feb. 21, 1613, Michael Romanoff was unanimously proclaimed tsar.

The Romanoffs were not of Rurik's stock, nor were they even of very ancient lineage. They descended from a German nobleman who had emigrated to Moscow early in the 14th century. His fifth son, nicknamed Koshka (the Cat), became head of the family of Koshkins, many of whom were prominent at the court of Moscow in the 14th and 15th centuries. Early in the 16th century one of them, whose first name was Roman, called himself Romanoff. His daughter, Anastasia, was Ivan the Terrible's first wife; it was her son, Theodor, who was the last tsar of the Rurik dynasty. As Ivan the Terrible had no high opinion of his son's mental powers, he appointed a council of noblemen to transact business for his successor, and Anastasia's brother, Nikita, was chairman of this council. He made himself very popular by his constant defence of common people's rights, and one of his sons, Theodor, was celebrated for his learning and refined manners. Boris Godunov, fearing the popularity of the Romanoffs, had obliged Theodor and his wife to divorce and to become monk and nun. It was their son, Michael, who was elected tsar in 1613.

Theodor's monastic name was Philarete. After Boris Godunov's death Philarete became metropolitan of Rostov. At the time of his son's election to the throne, he was a prisoner in Poland. Michael was only 16 years old, and was living with his mother in a convent. His personal reputation played a minor part with those who chose him, as in their eyes he was the lawful heir, being nephew to the last tsar descending from Rurik. His name had been often mentioned in those years of civil war as the only one on which all shades of opinion might meet. A popular rumour asserted that when Tsar Theodor was dying, he appointed his cousin Theodor Romanoff (now the monk Philarete) as his successor, but Godunov stepped in and prevented the tsar's will being fulfilled. As Philarete had taken monastic vows, he could not ascend the throne; besides the *boyars* thought Michael, a mere boy, would be a more manageable sovereign. His election was no doubt due to the general striving after legitimacy, which was satisfied by his close relationship to the extinct dynasty. Three years later his father returned to Moscow and was made patriarch; he then reigned jointly with his son and up to his death in 1633 all State documents bore Philarete's signature on a par with Michael's.

The main work of the Romanoff dynasty was to extend Russia up to her natural geographical limits, and to turn her into a European State from the semi-Asiatic one she had become after being under Tatar rule. Though this policy is usually connected with the name of Peter the Great, it was actually started by his grandfather and unswervingly pursued by his successors down to the 20th century. But though the general trend of Russia's internal and international development progressed along the same lines for three centuries, various undercurrents predominated at certain times and are characteristic of definite epochs. Those epochs, into which the history of the Romanoff dynasty may be divided for purposes of study, correspond fairly exactly with the customary division by centuries. The first epoch, when Moscow

was the only important centre and when the general intercourse with western Europe was nearly as limited as in previous days, corresponds to the 17th century, as it lasted not only till 1689, when Peter the Great became sole ruler, but more exactly till the end of 1698, when, after his first journey abroad, he began transacting State business himself. The second period, down to the death of Paul I., corresponds to the whole of the 18th century, during which Russia, with St. Petersburg as principal centre, gradually became a European country and reached the shores of all the seas bordering on the Russian plain. The third period, from the accession of Alexander I., in 1801, down to the overthrow of the dynasty in 1917, marks the highest point of Russia's activity as a European Power. Whatever territorial enlargements were acquired in this period were in Asia and mostly due to the necessity of reaching a natural and easily defensible frontier on the Asiatic continent, whereas most of the Government's energies were devoted to the work of internal progress, both economic and educational.

I. THE 17TH CENTURY

The state of chaos to which the country had been reduced in the first years of the 17th century, set a hard task to the new dynasty. The pervading poverty, insecurity and disorder required protracted and patient labours before the country could overcome its weakness and disorganization. All the first tsars of the Romanoff house came to the throne at such an early age that no personal guidance could be expected from any one of them for a long time. Michael, and his son Alexis, were both tsars at 16; Alexis's eldest son Theodor, at 14; Peter the Great at 10. Therefore the actual work of government was always in the hands of a council. The first three tsars never took any decision without its having been discussed by this council, but favouritism and intrigue naturally influenced the choice of its members, and all through the century continual popular risings aimed at the exclusion of one *boyar* or another, to whose predominance or to whose cupidity common gossip attributed the calamities of the day. In order to disarm public opinion the Government was constantly convening assemblies of deputies from the whole land—sometimes to discuss a special question, sometimes for submitting all pending business to their decisions. In those assemblies, called *zemski sobor,* the permanent *boyar* council represented the nobles; in addition came deputies from the clergy and from "all the land," both towns and villages. The first nine years of Michael's reign *sobors* sat in Moscow almost uninterruptedly; three more were called together in 1632, 1637 and 1642; in the first eight years of Tsar Alexis's reign there were five *sobors.* Those of later days, between 1653 and 1682 became mere commissions for elaborating points of law and had no positive authority. The Government had become stronger and had built up an efficient staff of agents of its own. On the other hand the *sobor* of 1648–49 had promulgated a code of laws, which was commonly followed and did not require further commissions to enforce universality.

Wars of the New Dynasty.—A great part of the country's strength was wasted in attempts to counteract the encroachments effected by the neighbouring powers on its territory during the period of anarchy. Out of the first 70 years of the new dynasty's rule, 30 were spent in wars against Poland and Sweden. Russia got back Smolensk and Seversk, which had been seized by the Poles, and annexed Kief and part of Little Russia, east of the Dnieper, owing to a rising against Poland of the Cossack hetman, Bogdan Khmelnitski, whom Moscow after long hesitations decided to back. But the effort required for obtaining those advantages did not allow of an equal amount being spent in the direction of the Baltic, where Sweden had put Russia's weakness to profit and had annexed a large area of land. The wars against Sweden led to no result in the 17th century, and Russia had to wait for Peter the Great in order to regain what she had lost in the north-west.

Down south, where since the 15th century a separate State, the khanate of Crimea, had arisen under Turkey's protectorate, the first Romanoffs waged no regular wars; but the danger of Tatar incursions demanded the building up of defences which slowly advanced into the Steppe, for when outposts gradually became prosperous towns, they required in turn a new line of forts to protect them. At the end of the 16th century the Crimean Tatars had twice raided the country up to the very walls of Moscow; 100 years later the fortified line of defence was already 400 m. south of the capital. But the farther Russia spread down in that direction the clearer it became that no peaceful agreement was possible so long as the Black sea was not reached, and that would have meant war with Turkey, a much too formidable opponent at that stage. A cossack hetman, Doroshenko, went to war with the Turks, applied to Moscow for help and was eventually supported; but this adventure merely led to a disastrous peace (1681) by which Western Ukraine had to be surrendered to Turkey. It took 100 years more, and all the energy of Catherine II. and of Potemkin to reverse the situation.

Taxation Reforms.—The finances of the country at the beginning of the new dynasty's rule were perhaps in a still more disastrous condition than any other branch of public service. The main spring of former revenue, taxation of cultivated land, was no more adequate owing to so many fields having been abandoned during the years of anarchy. Besides, those peasants who returned to their devastated villages were often successful in defrauding the State of their taxes. The Government was obliged gradually to work out a new system, that of taxing no more the land, but the landowner, not the "field," but the "house," as owing to the vast expanse of Russia and Siberia, where runaways could always escape with ease from official supervision, taxation of communal land laid too heavy and too iniquitous a burden on the thrifty agriculturists, whereas the lazy ones paid nothing. The same occurred with large landowners; they were responsible for the taxes due from peasants who were settled on their land, besides being obliged to come forward with a fixed number of soldiers in case of war. In order that they should be able to fulfil their obligations the peasants were gradually attached to the soil; and thus a serfdom arose which lasted up to 1861 and practically transformed the peasants into slaves.

Religious Matters.—The administration of the Church was at first entirely in the hands of Philarete, who was elected patriarch in 1616. Till his death, in 1633, he was the actual sovereign, and in ecclesiastical matters his power was absolute. In 1652 the patriarchal see was again occupied by a strong personality, Nikon. Tsar Alexis called him his "particular friend" and gave him a free hand in the reforms he undertook. He revised and corrected the texts of prayer books, the mss. of which had been disfigured by ignorant scribes, and abolished ceremonial practices for which no authority existed. But his activity met with strong opposition, due in most part to Nikon's tactlessness, and led to a schism, *Raskol.* Its followers, *Raskolniki,* are still numerous. Nikon's opposition to secular legislation about monastic property, and his efforts to place his own authority above that of the tsar, eventually made Alexis alter his attitude towards him. He then retired to a convent and refused to perform his duties. For nearly ten years the tsar ruled the Church in his stead, till a council was convened which deposed Nikon and appointed a new patriarch. The danger of having a man next to himself who might succeed in usurping such a measure of power, made Peter the Great abolish the Russian patriarchate.

A curious feature of the first Romanoffs is that notwithstanding their efforts to rule in accordance with the people's wishes, and though each of them in turn manifested a total lack of personal ambition, circumstances so imperiously demanded a strong hand that autocracy was evolved and imposed upon a succession of totally ungrasping autocrats. This general leaning of the country towards a firm rule prepared the way for Peter the Great's activities.

II. THE 18TH CENTURY

The salient figures among the Romanoffs of the 18th century are those of Peter the Great and of Catherine II. With Peter, Russia reached the Baltic sea after 20 years' war against Sweden; with Catherine, her southern frontier, after two wars against Turkey, came down to the Black sea, whereas, on the west, owing

to the partition of Poland, and the annexation of Courland, she came in contact with the Germanic confederation. Two brilliant episodic wars; that of the empress Elizabeth against Frederick the Great, when Russian troops occupied Berlin, and that of Paul I., against the French in Italy and Switzerland, were brought on by political alliances and led to no tangible results. Sweden's two attempts (1741 and 1788) to regain by a sudden attack some of her lost advantages nearly led to Russia spreading further over south-east Finland. Though the conquest of Finland was based neither on historical nor on ethnographical considerations, it became necessary for the security of St. Petersburg, which was founded early in the 18th century and gradually became the seat of government. Two attempts at advance in Central Asia remained fruitless; Peter the Great's conquest of the southern border of the Caspian in 1723 was annulled by the empress Ann in 1732 when the annexed provinces of Mazanderan and Ghilan were handed back to Persia. As for Peter the Great's attempt to seize Khiva and liberate the Russians who were there in bondage, the whole of his army perished in the desert.

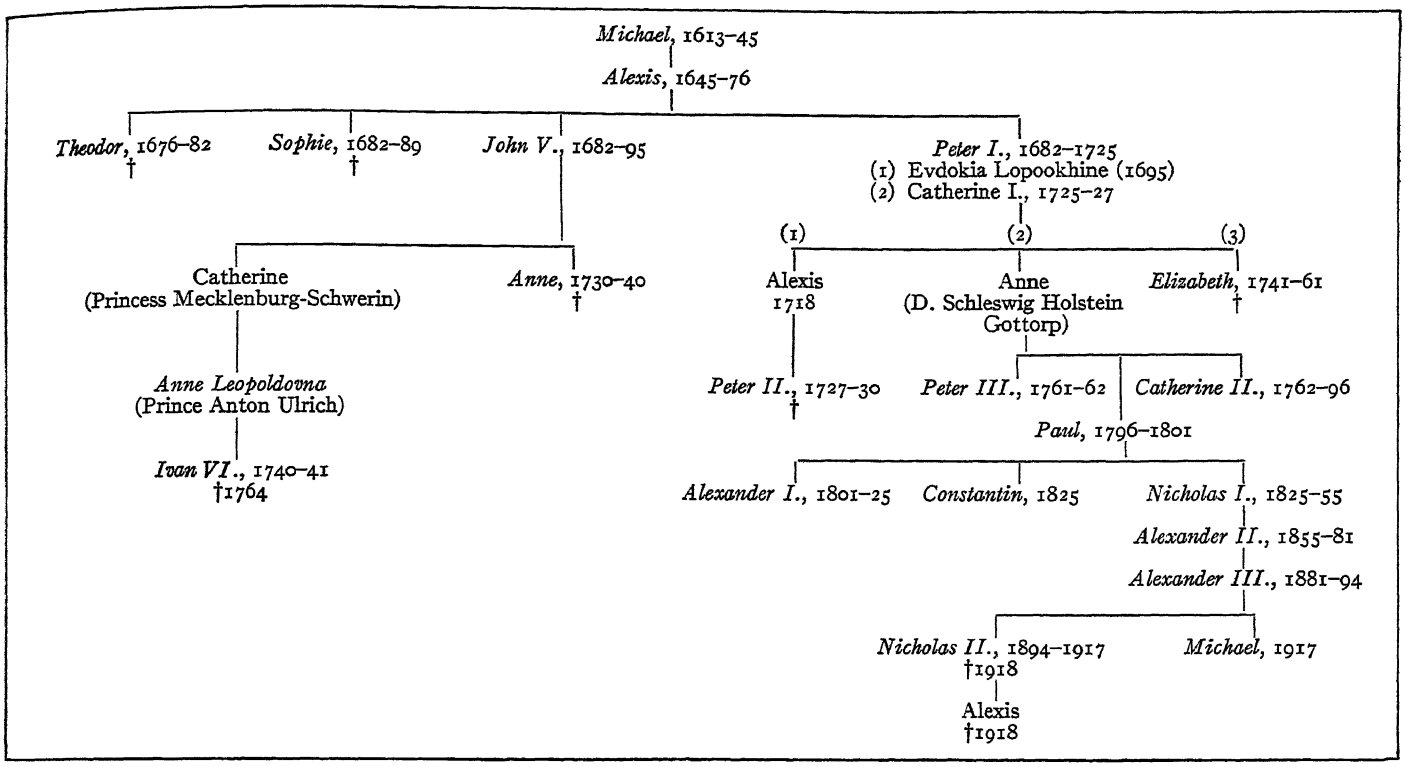
Reforms of Peter the Great.—Peter the Great's decision to turn Russia into a Western Power demanded a complete upheaval of existing conditions. The emperor (he assumed this title in 1721 at the close of the Swedish war) carried through his reforms against a stubborn resistance of the greater part of the nation, with hardly any efficient supporters to back him. The whole of his tremendous energy was aimed at making Russia strong, and at opening her to the influence of Western science and art. He started alone in the field, and the motto he chose for his seal during his journey abroad in 1697 is most characteristic; "I am of those who must be taught and am seeking for teachers." The work he performed between 1699 and his death in 1725 is astounding. He created an army and a fleet, transformed the country's culture by putting it on a secular instead of a religious basis, made the acquisition of riches and honour dependent upon services to the State instead of birthright, and enforced justice and legality independently of the persons concerned; he developed the natural resources of the country by encouraging industries, and opened schools and obliged his subjects to travel abroad so as to learn from other nations; he fought against ancient customs and costumes, which kept the people tied up in an atmosphere where any innovation was deemed impure, manifested absolute religious tolerance and encouraged the building of Roman Catholic and Protestant churches for the foreigners whom he invited to Russia, and dragged Russian women out of oriental seclusion; he tried every branch of knowledge himself and strove to impart all he knew to his subjects; he instituted a senate, supreme court of law and highest organ of administration and offices for all branches of public service; he founded a newspaper, opened a theatre, bought works of art, made some himself, ordered geographical maps, and sent naturalists to explore Siberia. Three weeks before his death, and already in ill-health and pain, he wrote instructions for Captain Behring, commissioning him to find out whether Asia and America were separated by a sea. He composed a multitude of laws, taught people how to build houses, erect stoves, extinguish fires, bridle horses, shave beards, pray in church, and generally how to behave under every probable circumstance. Catherine II. was wont to say that whenever she saw the necessity of a new regulation she first ordered a search to be made in Peter the Great's archives, where she invariably found a draft of what she had been pondering over. He not only set a marvellous example of what personal energy can accomplish, but he was also the first to put forward the idea of "citizen" or "servant of his country," as being the highest aim of a man's activity. The real motto of his reign is contained in the order of the day he addressed to his soldiers on the eve of the battle of Poltava, the turning point in his struggle against Charles XII. of Sweden: "As for Peter, remember that life is of no value to him unless Russia lives in happiness and glory," and this formula became the leading principle of all the most representative members of his dynasty. He never hesitated to sacrifice even his only son when he saw he would undo his father's work and lead a life of ignorant self-indulgence. Later in the century Catherine II. also seized every opportunity of showing that all her life and energies were devoted to the service of the country. Her grandsons, Alexander I. and Nicholas I., and her great grandson, Alexander II., proclaimed the same rule and symbolized it by always sleeping on camp-beds, with a soldier's great coat for a blanket, so as not to forget that they were ever ready to go where their duties might claim them. In this respect Peter the Great was ahead of his times, not only in Russia, but in Europe, since the first Western sovereign who prided himself on being the servant of his people was Frederick II., nearly half a century later. Peter's daughter, Elizabeth (1741–61) was also a pioneer in her way when she abolished capital punishment (1744), which from then on was not practised in Russia except in retribution for attempts to overthrow the existing order of government. She also opened a fine arts academy. The short reigns of Peter the Great's immediate successors, his widow and his grandson, during which favourites ruled in their stead, prompted a group of political men to offer the throne in 1730 to Ann, a niece of the great reformer's, but on the condition that she signed a promise to take no steps without the approval of a council of eight men (themselves) and this council would recruit its members by free election. Ann signed the paper and then, backed by the guards, destroyed it as soon as she reached Moscow for her coronation. That was the only attempt made in the 18th century for limiting autocracy in Russia.

The two 18th century sovereigns of the Romanoff dynasty whose political activity was not regulated by their sense of duty, but merely by their personal whims, Peter III. and Paul I. rapidly became so unpopular, that conspiracies at once arose which did away with them, the first after six months, the second after four years rule. The one law of Peter III.'s which it was not possible to abrogate was that which freed the members of the nobility from being obliged to serve the country, an obligation which was the only justification of the privileges they enjoyed.

Liberalism Under Catherine II.—The 34 years of Catherine II.'s reign produced a fundamental change in all paths of life. Liberal ideas, those of the French encyclopaedists, became the foundation of her reforms. She convened a commission for preparing a new code of laws and composed instructions to guide this assembly in its labours. The fundamental principles she propounded were mostly taken from the works of Montesquieu and Beccaria, but though the author of this treatise was an empress, Louis XV.'s Government forbade the sale of the French edition as being too liberal. Catherine accomplished a vast number of reforms tending to economic prosperity and encouraging certain manifestations of local self-government. She did a great deal for art, protected artists and formed the nucleus of a collection which, under the name of the "Hermitage museum," is well known all over the world, and has been a powerful instrument of culture in Russia.

III. THE 19TH CENTURY

The beginning of the century saw the last of Russia's expansion in Europe, as the annexation of the Swedish province of Finland took place in 1809. The changes which occurred in the redistribution of parts of Poland and of Bessarabia, in the first half of the century, partook more of the character of frontier rectifications than conquest. Russia's territorial acquisitions of the century were mostly in Asia. In 1801 the kingdom of Georgia was annexed to Russia, and that led to a gradual absorption of Transcaucasia, the last part of which was pacified in 1864. Central Asia (or Russian Turkistan with Bokhara and Khiva), that perpetual hotbed of raids and stronghold of the slave trade, was conquered between 1830 and 1876, with the addition of the Turkoman steppe in 1831. But Russia's advance to the Black sea had opened up a new question, that of the Straits (Dardanelles and Bosphorus), for, without a free passage into the Mediterranean, the Black sea was of small commercial value. Catherine II. had obtained from Turkey the right of protection over Turkish subjects of the Orthodox faith. This new principle, akin to the more modern idea of "spheres of influence," originated the efforts of the Romanoffs for the liberation of Slav nationalities from Turk-



ish rule; Russia participated in the war for the independence of Greece and bore the greater part of the burden in those which eventually led to the creation of Rumania, Bulgaria, Serbia and Montenegro. The same policy brought on the Crimean War, which was disastrous for Russia and bared her weakness, even in military matters, before the eyes of the world. For ever since the Napoleonic wars Russian military prestige had been on a high level. Paul I.'s admiration for Prussian discipline and uniforms was inherited by his sons, and under their personal guidance the art of military parades reached such perfection that it often concealed important drawbacks of organization. The staunch qualities of the Russian soldier had left a durable impression in Europe from the time of the Napoleonic wars, but the Crimean War led to a general revaluation of Russian methods, both inside the country and abroad.

Conservatism of Later Romanoffs.—However, the main characteristics of the Romanoffs' rule in the 19th and early 20th century is undoubtedly the opposition to the principles of revolution which had triumphed in France. When Alexander I. was confronted with them, as personified by Napoleon, he was beaten, then pretended to yield till his forces were ready for a second and triumphant struggle. He realized so well the true meaning of his victory that, though the halo of "liberator of Europe" put him in a situation in which he would hardly have met with a refusal on any point, he never turned Napoleon's downfall to any merely material advantage for Russia. All he had gone through; the disasters of Jena and Austerlitz, the humiliations of Tilsit and Erfurt, the fire of Moscow, the entry into Paris, the Congress of Vienna, he used all that to enhance Russia's prestige and to create a situation where his own voice would carry most weight against revolutionary propaganda. The Holy Alliance was the only harvest he sought to reap for having led his army from Moscow to Paris.

Growth of Revolutionary Sentiment.—But this moral comfort was of short duration, and the emperor very soon perceived that he and his allies were unable to cope with the tide. Moreover, in his own country a vast conspiracy was formed, of which he was aware in the last weeks of his life, though he took no steps against it. A military revolt was organized the very moment his brother and successor came to the throne (Dec. 1825), and though it was suppressed in the course of one day, the danger he had undergone left its imprint on the whole of Nicholas I.'s mind and behaviour. After 1848, when most European Governments gave way to political reform, the emperor of Russia remained almost the sole bulwark of legitimacy. His son, Alexander II., understood that however well the principles of his ancestors might have been adapted to the requirements of his country, they had to be exercised in conformity with the spirit of the times, and he effected a number of important reforms, such as abolition of serfdom, new courts of law with participation of a jury, local self-government (*zemstvo*) conscription for the army, education for the masses, etc. But the enemies of tsardom used these liberal measures merely as a broader basis for revolutionary propaganda, and this at once became so strong that it led to the murder of the emperor (1881).

His son, Alexander III., proclaimed his allegiance to reaction; the Constitution his father had elaborated and would have granted had he lived a few days longer, was forgotten, and a police régime was instituted which appeared to stifle a recrudescence of revolutionary activities but in reality drove them into underground channels. Outwardly, the country was quiet and prosperous. The political alliance with France, which was the personal achievement of the emperor, created an era of peace and permitted the whole force of the nation to be devoted to economic development. The building of railroads, without which no modern State can live, was bound in Russia, owing to her vast expanse, to be protracted over a much longer period than in other European countries; this work was, however, pushed on in gigantic strides; the trans-Siberian railway (due to the emperor's personal initiative) being the most notable achievement in this branch.

The last Romanoff emperor, Nicolas II., came to the throne at the age of 26, and strove to continue his father's work along the same lines. He succeeded in creating a wonderful economic prosperity. His desire to obtain a strong footing on the Pacific, and thereby to prompt the development of Eastern Siberia, led to a war with Japan (1904), which ended in disaster. A revolution broke out, and though it was suppressed by rapid and forceful measures, the emperor attempted to pacify the land by granting constitutional rights (Oct. 1905). This, however, was done but half-heartedly, and led to incessant misunderstandings between the Government and the people's representatives.

Final Success of Revolution.—Propaganda was already strong, and every liberal concession, instead of quieting public opinion, gave fresh opportunities of carrying it on. The emperor,

while well-intentioned, was scarcely strong enough in character to withstand the forces of unrest which from 1905 on became yearly more active. At last, Russia's participation in the World War and the emperor's wish to unite all classes in one effort against the enemy, cleared the ground for propaganda in the army; it was especially active in the hospitals, which were largely in the hands of volunteers. The general discontent and uneasiness produced by several years of war were put to use and a spark was sufficient for bringing on a general conflagration in the midst of which the last Romanoff emperor descended from the throne with chivalrous dignity. The three centuries of the Romanoffs' rule correspond to a period of expansion and brilliancy such as Russia had not hitherto known. (M. PAL.)

BIBLIOGRAPHY.—P. V. Dolgorukov, *Notice sur les principales familles de la Russie* (2nd ed. Berlin, 1858); H. H. Munroe, *Rise of the Russian Empire* (1900); K. Waliszewski, *La derniere des Romanovs* (1902); R. N. Bain, *The First Romanovs* (1905); K. Waliszewski, *Les origines de la Russie* (1909); R. J. Kerner, *Slavic Europe, a bibliography* (Cambridge, 1918); and E. A. Walsh, *Fall of the Russian Empire* (1928).

ROMANONES, ALVARO DE FIGUEROA Y TORRES, COUNT DE (1863–), Spanish politician, born in Madrid, Aug. 1, 1863. He was president of the Madrid municipality, cabinet minister and home secretary (1905), before thrice taking office as prime minister—in Nov. 1912; from Dec. 1915 to April 1917, and from Dec. 3, 1918, to April 15, 1919. He was minister of justice, Dec. 1922–Sept. 1923, and after Primo de Rivera's *coup d'état* in that month, he published in defence of the parliamentary parties *Las Responsabilidades Políticas del Antiguo Régimen de 1875 a 1922* (1924).

ROMANOS, called *ὁ μελῳδός*, Greek hymn-writer, was born at Emesa (Homs) in Syria. He resided in Constantinople during the reign of the emperor Anastasius, probably the first emperor of that name (491–518). Having officiated as a deacon in the church of the Resurrection at Berytus, he removed to Constantinople. According to the legend, when he was asleep in the church of Cyrus, the Virgin appeared to him and commanded him to eat a scroll. On awaking (it was Christmas Day), he immediately mounted the pulpit, and gave fourth his famous hymn on the Nativity. Romanos is said to have composed more than 1,000 similar hymns or *contakia* (Gr. *κοντάκιον*, "scroll"). The MS. of the hymns, written by his own hand, was said to have been preserved in the church of Cyrus, in which he was buried and celebrated as a saint on the 1st of October.

Editions: J. B. Pitra, *Analecta Sacra*, i. (1876), containing 29 poems, and *Sanctus Romanus Veterum Melodorum Princeps* (1888), with three additional hymns from the monastery of St. John in Patmos. *See* also Pitra's *Hymnographie de l'Église grècque* (1867); C. Krumbacher, *Geschichte der byzantinischen Literatur* (1897); and HYMNS.

ROMAN RELIGION. The Roman people were in origin a small community of agricultural settlers, which gradually won its way to the headship first of Latium, then of Italy and finally of a European empire. Its religion, which was always marked by an absence of dogmatism and a readiness to adopt foreign ideas, has therefore a shifting and ever widening character, which tends to obscure the original essentials; the genuine Roman religion becomes gradually buried or fossilized in formal observance. The careful analysis of survivals in literature and monumental remains, and in particular of the extant calendars, has enabled scholars, using the comparative method, to make good progress in separating the elements due to different periods and influences.

Survivals.—Broadly speaking, the religion of the early agriculture settlement was arrested at the stage of Animism. It had passed beyond the primitive stages of magic and Fetishism or "Animatism," which regards natural objects as themselves divine and the source of power, and had not yet entered the stage of Anthropomorphism, which recognizes "gods" (*dei*) as personal and independent beings; it is in essence a worship of "spirits" (*numina*) which are thought of as dwelling in external objects or localities. But it is in a state of transition. There are still traces of the earlier attitude in the recognition of the sacredness of stones, such as the *silex* (flint) which played a prominent part in the ceremonial of treaty-making, the *lapis* used in the rain-making ritual and the boundary-stones (*termini*) which marked the limits of properties. The sacred character of trees again is seen in the *ficus Ruminalis* (fig tree) and the *caprificus* (wild fig) of the Campus Martius and in the oak of *Iuppiter Feretrius*, on which the *spolia opima* were hung after a victory; and the sacred animals, such as Mars' wolf, later regarded as the attributes of deities, may themselves have been originally the objects of worship. At the other end of the scale at least two of the *numina* seem already to have developed the character of anthropomorphic *dei: Iupiter* the sky-god, possibly an inheritance from the time before the Greek and Roman stocks had separated, and Mars, god alike of agriculture and war, and possibly in origin the "spirit" of growth in crops, cattle and the young warriors.

Animism.—But notwithstanding survivals and anticipation, Animism is the true background of the Roman religion, which might be described as a polydemonism or more exactly in Latin phraseology as a "multinuminism." The "spirits" worshipped were primarily local in character: in the house they had their focuses of activity at the door, the hearth and the store-cupboard, in the countryside on hill-tops, in groves, in streams and springs. To this conception Roman religion added a characteristic or peculiar development in a kind of "Higher Animism" which associated the "spirit" not only with visible objects, but with states and actions in the life of the individual and the community: function is added to locality. Every "spirit" had thus in either a local or temporal sense or in both, its own sphere of action. The "spirits" were not conceived of in any anthropomorphic or theomorphic shape: their sex was often indeterminate (*sive mas, sive femina*, "whether male or female" was a frequent formula of prayer), they had no form of sensuous representation, nor did they need a home to dwell in: statue and temple were alien to the spirit of Roman religion. Nor could they have a personal history or relation to one another: there was no Roman mythology. But in their individual spheres they could influence the fortunes of men, and men could enter into relations with them. The primary attitude of men to the spirits was one of fear, expressed in the conception of *religio*, the sense of awe or "anxiety" in the presence of a superhuman power. But the practical mind of the Roman soon gave this relation a legal turn, and later the *ius divinum*, which regulated the dealings of men with the divine powers became a department of the *ius publicum*, the general body of civil law. The act of worship was a kind of contract: the "spirits," if they were given their due, were bound to make a return to man, and the object of worship and festival was to place them under this obligation and so to secure the *pax deum* (a state of peace between gods and men).

Ritual.—In such a religion exactness of ritual must play a large part—so large, indeed, that many modern critics have been misled into regarding the Roman religion as a mere network of formalities without any background of genuine religious feeling. This formalism shows itself in many ways. It was necessary in the first place to make quite certain that the right deity was being addressed: hence it was well to invoke all the spirits who might be concerned, and even to add a general formula to cover omissions. Place, again, was an essential element even in the conception of the *numen*, and was therefore all-important in ritual. So, too, was the character of the offering: male victims must be sacrificed to male deities; female victims to goddesses; white animals were the due of the *di superi*, the gods of the upper world, black animals of the gods below; the more rustic *numina*, such as Pales (q.v.), should be given milk and millet cakes rather than a blood-offering. All-important, too, was the order of ceremonial and the formula of prayer: a mistake or omission or an unpropitious interruption might vitiate the whole ritual, and though such misfortunes might occasionally be expiated by the additional offering of a *piaculum*, in more serious cases the whole ceremony had to be recommenced from the beginning.

Household Worship.—In the original agricultural community, the unit both from the legal and religious point of view was not the individual but the household. The household was thus at once the logical starting-point of religious cult, and throughout

Roman history the centre of its most real and vital activity. The head of the house (*paterfamilias*) was the natural priest and had control of the domestic worship: he was assisted by his sons as acolytes (*camilli*) and deputed certain portions of the ritual to his wife and daughters and even to his bailiff (*vilicus*) and his bailiff's wife. The worship was offered to the spirits indwelling in the sacred places of the round hut in which the family lived. Janus, the god of the door, came first in the prayer-formulae, though unfortunately we know but little of his worship in the household, except that it was the concern of the men. To the women was committed the cult of the "blazing hearth," Vesta, the natural centre of the family life, and it is noticeable that even Ovid (*Fast.*, vi. 291–92) describes Vesta as "nought but the living flame." The Penates (q.v.) were the *numina* of the store-cupboard, at first vague and animistic, but later on, as the *deus*-notion was developed, individualized by selection from the other divinities of household or state religion.

Lar and Genius.—To these *numina* of the sacred places must be added two other important conceptions, that of the *lar familiaris* and the *genius*. The *lar familiaris* has sometimes been regarded as the embodiment of all the family dead and his cult as a consummation of ancestor-worship, but a more probable explanation regards him as one of the *lares* (q.v.; *numina* of the fields worshipped at the *compita*, the places where properties marched) who had special charge of the house or possibly of the household servants (*familia*); for it is significant that his worship was committed to the charge of the *vilica*. The *genius* was originally the "spirit of developed manhood," the *numen* which is attached to every man and represented the sum total of his powers and faculties as the *iuno* does of the woman; each individual worshipped his own *genius* on his birthday, but the household-cult was concerned with the *genius* of the *paterfamilias*. In the ordinary religious life of the family there was a more direct connection with morality and a truer religious sense than in any other part of the Roman cult. The family meal was sanctified by the offering of a portion of the food to the household *numina:* the chief events in the individual life, birth, infancy, puberty, marriage, were all marked by religious ceremonial in some cases of a distinctively primitive character. The dead, too, though it is doubtful whether in early times they were actually worshipped, at any rate had a religious commemoration as in some sense members still of the family.

From the life of the household we may pass to the outdoor occupations of the fields, where the early Roman settler met with his neighbours to celebrate in religious ceremonies the various stages of the agricultural year. Here we have a series of celebrations representing the occupations of the successive seasons, addressed sometimes to *numina* who developed later on into the great gods of the State, such as Jupiter, Mars or Ceres, sometimes to vaguer divinities who remained always indefinite and rustic in character, such as Pales and Consus. Sometimes again, as in the Lupercalia (q.v.) the attribution was so indefinite that it is hard to discover who was the special deity concerned; at other festivals, such as those of the Robigalia and the Meditrinalia, the worship seems at first to have been addressed generally to any interested *numina* and only later to have developed a specific deity of its own. Roughly we may distinguish three main divisions of the calendar year, the festivals of spring, of the harvest and of winter. (1) In the spring (it must be remembered that the old Roman calendar began the year with March) we have ceremonials of anticipation and prayer for the crops to come: prominent among them were the *Fordicidia*, with its symbolic slaughter of pregnant cows, addressed to Tellus, the *Cerealia*, a prayer-service to Ceres for the corn-crop, and the most important of the rustic celebrations of lustration and propitiation, the *Parilia*, the festival of Pales. To these must be added the *Ambarvalia* (q.v.), the lustration of the fields, a movable feast (and therefore not found in the calendars) addressed at first to Mars in his agricultural character (*see* MARS). (2) Of the harvest festivals the most significant were the twin celebrations on Aug. 21 and 25 to the divinity-pair Consus and Ops, who were both concerned with the storing of the year's produce, and two vintage festivals, the *Vinalia Rustica* and the *Meditrinalia*, connected with Jupiter. (3) The winter festivals were less homogeneous in character, but we may distinguish among them certain undoubtedly agricultural celebrations, the *Saturnalia* (connected with the sowing of the next year's crop), and a curious repetition of the harvest festivals to Consus and Ops.

State Religion.—In passing to the religion of the State we enter on a later period and a more developed form of society. The loose aggregation of agricultural households gives place to the organized community with new needs and new ideals. Thus we find two prominent notes of the State influence, firstly, the adaptation of the old ideas of the household and agricultural cults to the broader needs of the city-community, especially to the new necessities of internal justice and war against external enemies; and secondly the organization of informal worship into a consistent system. Adaptation proceeded at first naturally enough on the lines of analogy. As Janus was in the household the *numen* of the door, so in the State he was associated with the great gate near the corner of the forum: the Penates had their analogy in the *Di Penates populi Romani Quiritium* by whom the magistrates took their oath on entering office, the *lar familiaris* in the *Lares Praestites* of the community, and the *genius* in the new notion of the *Genius populi Romani* or *Genius urbis Romae*. But the closest and most striking analogy is seen in the cult of Vesta. The Vesta of the State was in fact the king's hearth, standing in close proximity to the *Regia*, the king's palace; the Vestal Virgins, who had charge of the sacred fire, were the "king's daughters," and as such even in republican times were in the legal power of the *pontifex maximus*. But adaptation meant also the widening of old conceptions under the influence of reflexion. Thus, since the door is used for the double purpose of entrance and exit, the Janus of the State was represented as *bifrons* ("two-faced"): the thought of the door as the first part of the house to which one comes produces the more abstract idea of Janus as the "god of beginnings," in which character he had special charge of the first hour of the day, the calends of the month and the first month of the year in the later calendar. But development proceeded also on broader lines. Jupiter in the rustic-cult was a sky-god concerned mainly with the wine festivals and associated with the sacred oak on the Capitol. Now he developed a twofold character: as the receiver of the *spolia opima* he became associated with war, especially in the double character of the stayer of rout (*Stator*) and the giver of victory (*Victor*). As the sky-god again he was appealed to as the witness of oaths in the special capacity of *Dius Fidius*. In these two conceptions, justice and war, lie the germs of the later idea of Jupiter as the embodiment of the life of the Roman people, both in their internal organization and in their external relations. In much the same manner the agricultural character of Mars became submerged by his functions as war-god. Finally, we must notice, as the sign of the union of two settlements, the inclusion of the Colline deity, Quirinus, apparently the Mars of the originally rival community. In these three deities, Jupiter, Mars, Quirinus, we have the great triad of the earliest stage of the State religion.

Organization showed itself in the fixing of the annual calendar of festivals, the development of the character and functions of the priesthood and in a new conception of the legal relation of the gods of the State. The State now approached the gods through its duly appointed representatives, the magistrates and priests, and the private citizen was required to do no more on festival days than observe a ceremonial abstinence from work. The State religion had thus less direct connection with morality and the religious sense than the worship of the household, but it had its ethical value in a sense of discipline and a consecration of the spirit of patriotism.

External Influences.—The later stages represent not the spontaneous development of the genuine Roman religion, but its alteration and supersession by new cults and ideas introduced from foreign sources. Three periods may be recognized: (1) from the end of the regal epoch to the second Punic War—the period of contact with the peoples of Italy; (2) from the second Punic War to the end of the Republic—the period of contact with

Greece and the Orient; (3) the imperial epoch, opening with a revival of old religious notions and later marked by the official worship of the deified emperors and the wide influence of oriental cults.

Italian Influence.—By the end of the regal period Rome was a really developed city-state. There was a large artisan class, excluded from the old patrician *gentes* and therefore from the State cult. At the same time the beginnings of commerce had opened relations with neighbouring peoples. The consequence was the introduction of certain new deities, the *di novensides*, from external sources, and the birth of new conceptions of the gods and their worship. We may distinguish three main influences:—

(*a*) *Etruria.*—The last three kings of Rome were Etruscans and Etruscan influence under their rule was strong. From Etruria came Minerva, who, as the goddess of handicraft and protectress of the artisan guilds, was established in a temple on the Aventine. Soon a new Etruscan triad, Jupiter, Juno and Minerva, was enshrined on the Capitol in a magnificent new temple built by Etruscan workmen and decorated in the Etruscan manner. In this temple the deities were represented by images.

(*b*) *Latium.*—Secondly, in war and peace Rome formed relations with her neighbours of Latium, and, as a sign of the Latin league which resulted, the cult of Diana was brought from Aricia and established on the Aventine in the *commune Latinorum Dianae templum;* about the same time the temple of *Iuppiter Latiaris* was built on the Alban mount, its resemblance in style to the Capitoline temple pointing to Rome's hegemony. Latin cults were introduced even inside the *pomoerium*, the old city limits, the worship of Hercules, which came from Tibur in connection with commerce, was established at the Great Altar in the *forum boarium*, and the Tusculan cult of Castor as the patron of cavalry found a home close to the *forum Romanum*.

(*c*) *Magna Graecia.*—Later on contact with the cities of Magna Graecia brought about the wide-reaching introduction of the Sibylline books. They came from Cumae and were placed in the Capitoline temple under the care of a special commission; their "oracles," which were referred to in time of great national stress, recommended the introduction of foreign cults. In this way were brought to Rome the Greek triad Demeter, Dionysus and Persephone, who were identified with the old Roman divinities Ceres, Liber and Libera, Apollo, Mercury, and Aesculapius Dis and Proserpina, with their strange chthonic associations and night ritual. With new deities came new modes of worship: the "Greek ritual" in which, contrary to Roman usage, the worshipper's head was unveiled, the *lectisternium* (q.v.), an elaborate form of the "banquet of the gods" and the *supplicatio*, an appeal to the gods in which the whole people took part. In this period, then, we find first a legitimate extension of cults corresponding to the needs of the growing community and secondly a religious restlessness and a consequent tendency to more dramatic forms of worship.

Foreign Influence.—The two chief notes of the next period were superstition and scepticism: both the populace and the educated classes lost faith in the old religion, but they supplied its place in different ways. The disasters of the early part of the second Punic War revealed an unparalleled religious nervousness: portents and prodigies were announced from all quarters, it was felt that the divine anger was on the State, yet there was no belief in the efficacy of the old methods for restoring the *pax deum*. Accordingly recourse was had, under the direction of the Sibylline books, to new forms of appeal for the divine help, the general vowing of the first fruits (*Ver sacrum*) and the elaborate Greek *lectisternium* after Trasimene in 217 B.C., and the human sacrifice in the forum after Cannae in the following year. The same spirit continues to show itself in the introduction of Greek deities and their ready identification with gods of the old religion. Thus we hear of temples dedicated to Iuventas = Hebe (191 B.C.), Diana = Artemis (179 B.C.), Mars = Ares (138 B.C.), and find even the Bona Dea (q.v.) identified with a Greek goddess of women, Damia. At the same time cult statues are made in which the identified Greek type is usually adopted without change, with such curious results as the representation of the *Lares* under the form of the Dioscuri. But more far-reaching still was the order of the Sibylline books in 206 B.C. for the introduction of the worship of the *Magna Mater* (*see* GREAT MOTHER OF THE GODS) from Pessinus and her installation on the Palatine in 191 B.C.: the door was thus opened to the wilder and more orgiastic cults of Greece and the Orient.

Oriental Deities.—After *Magna Mater* came the secret cult of Bacchus, which had to be suppressed by decree of the senate in 186 B.C., and later on the cults of Ma of Phrygia, and the Egyptian Isis were established. In all these more emotional rituals, the populace sought expression for religious feelings which were not satisfied by the formal worship of the older deities. Meanwhile a corresponding change was taking place in the attitude of the educated classes owing to the spread of Greek literature. The knowledge of Greek legends set poets and antiquarians at work on the task of creating a Roman anthropomorphic mythology. In this way grew up the "religion of the poets," whose falseness and shallowness was patent even to contemporary thinkers. But more important was the influence of philosophy, which led soon enough to a general scepticism among the upper classes.

Scepticism.—In the last century of the Republic the two later Greek schools of Epicureanism and Stoicism laid hold on Roman society. The influence of Epicureanism was wholly destructive to religion, but not perhaps very widespread: Stoicism became the creed of the educated classes and produced attempts at a reconciliation of popular religion with philosophy. Since, however, the former was regarded as untrue in itself, but a presentation of truth suited to the popular mind, the way was opened for statecraft to use religion as its tool.

The result was twofold. Worship passed into formalism and formalism into disuse. Some of the old cults passed away altogether, others survived in name but were wholly devoid of inner meaning. The old priesthoods came to be regarded as tiresome restrictions on political life and were neglected: from 87 to 11 B.C. the office of *flamen Dialis* was vacant. On the other hand religion passed into the hands of the politicians: cults were encouraged or suppressed from political motives, the membership of the colleges of pontifices and augurs was sought for its social and political advantages, and augury was debased till it became the mere tool of the politician. Little survived but the household cult, protected by its own genuineness and vitality.

Imperial Religion.—The Augustan revival was largely political, a part of his plan for the general renaissance of Roman life focused no longer on the abstract notion of the State, but on the persons of an imperial house. He saw, however, that no revival could be effective which did not appeal to the religious sentiments of the populace. It was thus his business to revitalize the old forms with a new and more vigorous content. His new palace on the Palatine was to be the centre of the new popular religion. With this object he consecrated there his new temple of Apollo (28 B.C.), whom he had adopted as his special patron at Actium, and transferred to its keeping the Sibylline books, thus marking the new headquarters of the Graeco-Roman religion. Similar in purpose was his institution of the Secular Games (*eudi saeculares*) in 17 B.C Horace's hymn written for the festival is a good epitome of Augustus's religious intentions. Further he established a new shrine of Vesta Augusta within the palace. Still more marked was the building of a great temple at the end of his new forum to Mars Ultor—Mars, the ancestor of the Julian family now to be worshipped as the avenger of Caesar's murderers. He also erected on the spot where Caesar's body had been cremated in the Forum a permanent temple to his adopted father, under the definitely religious title of *divus Iulius*. No doubt he also did much generally to revive the ancient cults: he rebuilt, as he tells us himself, 82 temples which had fallen into disrepair, he re-established the old priesthoods and filled once more the office of *flamen Dialis*. But religious feeling was now to be mainly diverted to the reigning house, and this project was aided by the natural prominence in the palace of the cult of the *genius* of the emperor himself. As the palace cults became national, the worship of the *genius* was bound to spread, and

ultimately Augustus sanctioned its celebration at the *compita* (crossways) together with the worship of the old *lares*. But here he and the wiser of his successors drew the line, and though under oriental influence divine honours were paid to the living emperor outside Italy, they were never permitted officially in Rome.

With this last period the story of the genuine Roman religion draws to a close. For, though the form of the old cults was long preserved, the vital spirit was almost gone. In the popular mind the many exciting oriental cults held undisputed sway; and with the more educated a semi-religious philosophy gave men a clearer monotheistic conception and an idea of individual relations with the divine in prayer. It was with these elements (fiercely antagonistic because so closely allied in character) that the battle of Christianity was really fought, and though, after its official adoption, the old religion lingered on as "paganism" and died hard at the end, it was really doomed from the moment when the Augustan revival had taken its irrecoverable bias in the direction of the emperor-worship.

BIBLIOGRAPHY.—W. Warde Fowler, *The Roman Festivals of the Period of the Republic* (1899); *The Religious Experience of the Roman People* (1911); *Roman Ideas of Deity* (1914); *Roman Essays and Interpretations* (1920); W. R. Halliday, *Lectures on the History of Roman Religion* (1922); H. J. Rose, *Primitive Culture in Italy* (1926); A. de Marchi, *Il Culto privato di Roma Antica* (Milan 1903); G. Boissier, *La Religion romaine d'Auguste aux Antonins* (1891); *La fin du Paganisme* (1891). F. Cumont, *Orientic Religions in Roman Paganism* (English translation); J. Toutain, *Les Cultes Païens dans l'Empire romain* (1907). *See* further: GREEK RELIGION; ETRURIA; RELIGION, and articles on the deities, festivals and priestly colleges.

(C. B.)

ROMANS, EPISTLE TO THE. The occasion of this New Testament epistle is revealed in i.8f, xv. 14f. St. Paul had finished his mission in Greece and was on his way to Jerusalem with the proceeds of the collection made by his churches for the poor Christians in Judaea. Casting about for a new sphere, he turns to the extreme West of the Mediterranean, to Spain, where evidently no one had preached the gospel. On his way to Spain, after settling the business at Jerusalem, he proposes to visit the Christians at Rome. This corresponds to the situation outlined in Acts xx. 2f; it is probable, though not certain, that the apostle wrote the epistle from Corinth or on his way from Corinth eastward, *i.e.*, after the Corinthian epistles. What is certain is that he takes this opportunity of stating his gospel in its width and range of appeal. In the light of his experience and in view of the fresh propaganda which he contemplated in the Western Empire, his aim is to reiterate the principles of the Christian religion as he preached it. There was an appropriate note in such an epistle being sent to Christians at the capital of the Empire. Besides, the apostle was not confronted here as, *e.g.*, in Galatia, with any attacks upon himself by the Jewish Christian party in the Church. Hence the breadth of view and the comparative absence of controversial references. He sets himself to put forward what he regards as vital Christianity rather than to counteract any policy of his opponents at Rome, and this vital Christianity is stated in its relations to the older Jewish religion, with the object of persuading the Roman Christians, most of whom seem to have been Gentile converts, that the hopes and promises of God as revealed in the Christian gospel rest upon His previous revelation to Israel, although they go far beyond that. The two main errors before his mind seem to have been a tendency to throw over the earlier revelation and a tendency on the part of Jews to depreciate Christianity as morally inferior to Judaism. The epistle therefore is more of a treatise than any other; it does not ignore the Roman Christians, but it is not written with them constantly in view, since their local situation offered no particular problems. But, while it is a tract, it does not contain any compendium of Christianity; topics like the sacraments, eschatology, and the resurrection, for example, are not discussed as they are in the First Epistle to the Corinthians. The predominating motive of the epistle is the desire to propound the faith as a faith for all men, which has its roots in the earlier revelation of God to the Jews and yet goes far beyond that. He pours out his very soul in expounding the glory of the gospel as the final and all-embracing revelation of God for mankind; every now and then the argument glows with passion, and the exposition thrills with the writer's joy in expressing convictions which had become for him living powers and hopes.

The outline of the epistle is as follows. After apologizing for his inability to visit the Roman Christians before now, he promises to visit them, bringing "some spiritual gift" to this world-famous church of the capital. Meantime he explains the gospel of which he is so proud, endeavouring to stir up his readers to a sense of its wonder and strength. Such is the theme of the first five chapters, God's "righteousness" or salvation for faith offered in Jesus Christ to all men, apart from national restrictions. To be right with God, to enjoy His fellowship and favour, is a position which is His gift. Both pagans and Jews have hitherto missed it, but in Jesus Christ (iii. 21f) it is now brought within reach of all men, as they believe. Not that faith and revelation had been absent from the earlier history of God's people; the apostle shows that this was implicit in the religious experience of Abraham (iv.). Only, it required the divine revelation in Christ to overcome the sin of man, which had weakened the race hitherto (v. 1f). From a philosophy of history he is now passing to the deeper experience of religion, and the magnificent sweep of the next passage (vi.–viii.) shows how this faith embodies the power of receiving and realising the gift of God, since it invests man with the divine Spirit, which is the sole guarantee of a sound life in the present and of a secure life in the future.

Reverting to history, he now (ix.–xi.) faces the problem of the Jewish nation's antipathy to the gospel, seeking to reconcile this with the justice and promises of God in the Old Testament. God is not to blame for such unbelief, he argues. And, with patriotic pathos, he hopes it will not be final; the rejection of Christ by the Jews, he contends, is merely partial and temporary. But part of his interest is to prevent Gentile Christians from depreciating their relation to God's earlier revelation in Israel and from disparaging the historical link between themselves and the saving purpose of God in the world. All men are equally under the sweep of God's marvellous mercy, he concludes, in an impassioned outburst (xi. 25–36).

Such an experience of the divine mercy brings obligations in its train, however, and these are now outlined (xii.–xiii.) as they bear upon the conduct of Christians as members of the Church, of society, and of the State; love is the supreme law, and as the Day of the Lord is near, there is no time for indulgence in vice. "It is high time to wake up." But, instead of dwelling on this motive, he proceeds to apply the law of Christian love to one special problem of contemporary ethic, viz., the strain set up between the narrower and the more liberal parties over total abstinence and vegetarianism (xiv.–xv. 13), pleading for consideration on the part of the liberal majority, and finally calling on all alike to glorify God for His mercy to them in Jesus Christ.

Such is the outline of the epistle as a whole. It is not unfair to suggest that faith dominates the first part (i.–v.), hope the second (vi.–viii., ix.–xi.), and love the third (xii.–xv.), though none of the three is ever isolated entirely from the others. The epilogue (xv. 14–33) reverts to the situation noted in the opening paragraph; the apostle tells them of his plans and asks for their prayers.

The sixteenth chapter seems to contain a note intended for a different audience. It is possible that the apostle may have known a number of Christians who had found their way to Rome, but the probability is that the first part of this chapter (1–16, 1–20, or 1–23), represents a letter of commendation for Phoebe, addressed to the church at Ephesus. The number of personal references and the unusual wealth of detail point to some community with which St. Paul was more familiar than he could be with the Roman church. Ephesus answers this requirement better than almost any other sphere; besides, the sharp warning against errorists in verses 17–20 applies to Ephesus at this period (1 Cor. xvi. 8–9, Acts xx. 29f) better than to what we know of the Roman church, for it is improbable that the apostle meant the words to be a vague warning against something that might happen in the future. For these reasons many editors and critics detach xvi.

from the original Roman epistle.

The tone and style of xvi. 25–27 suggest also that it is an editorial addition, later than St. Paul. Indeed in some early copies of the epistle during the second century it is found after xiv. 23, perhaps in editions drawn up for reading in worship. This is merely one of a number of textual phenomena, which are discussed fully in Lake's *The Earlier Epistles of St. Paul* (pp. 335f), in Lightfoot's *Biblical Essays*, in Zahn's *Einleitung in das Neue Testament* (section 22), in Westcott and Hort's *Greek New Testament* (appendix), and in the present writer's *Introduction to the Literature of the New Testament* (pp. 134f), as well as by the critical editors. Some early editions of Romans seem to have omitted the words "in Rome" at i. 7 and 15. Unless this was due to a desire to make the epistle a catholic document, or to Marcion's revision, it may point to the fact that there were more than one edition of the epistle. Lake, for example, argues on textual grounds that Paul himself wrote an edition, without "in Rome," consisting of i. i.–xiv. 23, xvi. 25–27, as a companion letter to Galatians, and that later he edited the epistle as we have it for the special purpose of instructing the Roman church. Others, like Renan (*St. Paul*, pp. 461f), think of two editions, the first (i.–xiv., xvi. 1–20) intended for Asia or Ephesus, the second for Rome—a hypothesis which assumes a variety of forms. But it is not easy to suppose that the apostle ever left xiv. 23 with xvi. 25–27 as a self-contained letter, even if the doxology be accepted as Pauline. It is fairly clear that the canonical epistle represents an edited form of the original, and one natural hypothesis is that the original ended with xv., whilst xvi. 1f contains an addition. As Deissmann points out, the papyri supply numerous analogies for a "letter of commendation plunging at once *in medias res* and beginning with 'I commend' " (*Light from the Ancient East*, p. 235); and if Tertius wrote both, the smaller letter might be put in the wake of the larger, as the canonical editors drew upon the copybook in which both were preserved. The mechanical conditions for such a practice are discussed in Gregory's *Canon and Text of the New Testament* (pp. 319f).

It is no longer necessary to discuss theories that the whole epistle is a later forgery: Schmiedel's examination of this aberration (in *Hibbert Journal* i. 532f) sufficiently indicates the impossibility of taking such views seriously. Nor is it needful to criticize the theories which attribute xv.–xvi. in whole or part to some later hand, much less the idea, voiced recently by H. Delafosse (*L'epître aux Romains, traduction nouvelle, avec introduction, notes et commentaire*, Paris, 1926), that the canonical Romans represents an originally Pauline letter which was first edited by Marcion and then catholicized. The epistle as it stands was known early to writers of the second century like Justin and Polycarp, possibly even to Ignatius; indeed traces of it are to be found in the epistle of Clemens Romanus, which lies within the last decade of the first century, at the very latest (*see* for an even earlier date, G. Edmundson's *The Church of Rome in the first Century*, 1913, pp. 14f, etc).

Bibliography.—The ablest editions of modern days are those by B. Weiss in Meyer's *Commentary* (9th edition, 1899), R. A. Lipsius in the *Handcommentar* (1892), Sanday and Headlam (*International Critical Commentary*, 5th ed. 1905), Denney (*Expositor's Greek Testament*, 1901), Lietzmann in his own *Handbuch* (1906), Parry (*Cambridge Greek Testament*, 1912), E. Kühl (1913), P. Lagrange (Paris, 1916), and Hauck in Zahn's *Commentar* (1925), although the older work of men like Godet (1879, Eng. Tr. 1888) and E. H. Gifford (in the *Speaker's Commentary*, 1881) deserves attention still for its delicate exegesis. Lightfoot's posthumously published notes do not go beyond vii. 25 (*Notes on Epistles of St. Paul*, 1895), but we have Hort's invaluable *Romans and Ephesians* (1895) for a study of the general data of the epistle, as well as the chapters in Kirsopp Lake's *The Earlier Epistles of St. Paul*, Liddon's *Explanatory Analysis* (1893), Pfleiderer's *Primitive Christianity* (vol. i. pp. 211f), G. Semeria's *Il pensiero di S. Paolo nella lettera ai Romani* (Rome, 1903), and J. Drummond's article in the *Hibbert Journal* (1913, pp. 787f). The critical movements are chronicled by C. Clemen in his *Paulus* (i. pp. 85f, ii. 238f), and by A. Robertson (Hastings' *Dictionary of the Bible*, iv. 295f) and C. W. Emmett (*Dictionary of the Apostolic Age*, ii. 408f). The first chapter of Matthew Arnold's *St. Paul and Protestantism* discusses Romans, and Sievers has just published an edition in rhythmical form, in the first volume of his *Paulinische Briefe, klanglich untersucht und herausgegeben* (Leipzig, 1926). (J. Mof.)

ROMANSHORN, an important commercial town in the Swiss canton of Thurgau, on the west shore of the lake of Constance. By rail it is 51½ m. N.E. of Zürich. In 1920 its population was 6,474, mostly German-speaking, while there were 4,535 Protestants and 1,898 Roman Catholics. Originally a small fishing village, it belonged to the abbot of St. Gall from 1432 to 1798, when it became part of the canton of Thurgau. In 1856 the railway from Romanshorn to Zürich was opened, and this vastly increased the commercial importance of Romanshorn. Its position on the lake helps to make it the centre of a great transit trade, chiefly in corn and timber, and it has many industrial establishments.

ROMANS-SUR-ISÈRE, a town of south-eastern France, in the department of Drôme, 12½ m. N.E. of Valence on the railway to Grenoble. Pop. (1926) 15,041. Romans stands on a height on the right bank of the Isère, a bridge uniting it with Bourg-de-Péage (pop. 5,510) on the other side of the river. The present parish church belonged to an abbey founded in 837 by St. Bernard, bishop of Vienne.

Romans has a tribunal of commerce. Its industries include tanning, leather-dressing and shoe-making, distilling and oil-refining.

ROMANUS, the name of four East Roman emperors.

Romanus I. (Lecapenus), who shared the imperial throne with Constantine VII. (*q.v.*) and exercised all the real power from 919 to 944, was admiral of the Byzantine fleet on the Danube when, hearing of the defeat of the army at Achelous (917), he resolved to sail for Constantinople. Soon after the marriage of his daughter Helena to Constantine he was crowned colleague of his son-in-law. His reign, which was uneventful, except for an attempt to check the accumulation of landed property, was terminated by his own sons, Stephen and Constantine, who in 944 compelled him to become a monk. He died in 948.

Romanus II. succeeded his father Constantine VII. in 959 at the age of twenty-one, and died—poisoned, it was believed, by his wife, Theophano—in 963. He was a pleasure-loving sovereign, but showed judgment in the selection of his ministers. The great event of his reign was the conquest of Crete by Nicephorus Phocas.

Romanus III. (Argyrus), emperor 1028–1034, was an undistinguished Byzantine patrician, who was compelled by the dying emperor, Constantine IX. to marry his daughter Zoe and to become his successor. He showed great eagerness to make his mark as a ruler, but was mostly unfortunate in his enterprises, and in his endeavour to relieve the pressure of taxation disorganized the finances of the state. In 1030 he resolved to retaliate upon the incursions of the Moslems on the eastern frontier by leading a large army in person against Aleppo, but sustained a serious defeat at Azaz near Antioch, after which he never recovered popularity. His early death was supposed to have been due to poison administered by his wife.

See J. B. Bury in the *English Historical Review* (1889), pp. 53–57; G. Schlumberger, *L'Épopée byzantine* (Paris, 1905), iii. pp. 56–158.

Romanus IV. (Diogenes), emperor 1068–1071, had risen to distinction in the army, when he was convicted of treason against the sons of Constantine X. He was pardoned, however, by the empress Eudocia, whom he subsequently married. After his coronation he carried on three successful campaigns against the Saracens and Seljuk Turks; in a fourth he was disastrously defeated by Alp Arslan on the banks of the Araxes and taken prisoner. After releasing himself by the promise of a large ransom and the conclusion of a peace, he turned his arms against the pretender Michael VII., but was compelled after a defeat to resign the empire and retire to the island of Prote, where he soon died in great misery. It was during this reign that, by the surrender of Bari (1071), the Byzantine empire lost its last hold upon Italy.

See J. J. C. Anderson in the *Journal of Hellenic Studies* (1897), pp. 36–39. On all the above *see* also J. B. Bury's edition of Gibbons, *Decline and Fall of the Roman Empire*.

ROMANY LANGUAGE. The strongest proof that the gypsies came originally from India is found in their language.

For all its dialects are clearly Indo-Aryan, that is to say, modifications of the language from which have sprung all the Aryan languages of modern India and Ceylon, and of which Sanskrit, with its oldest document the Ṛgveda, is the literary expression. Moreover, gypsy is not only derived from the same original source as the other Aryan languages of India, but must for many centuries after the Vedic age have shared their development within or near the borders of India. For in general it shows the phonetic and grammatical changes which the Indian languages as a whole did not reach long before the beginning of the Christian era.

Dialectical Position.—The question in which dialect-group of these languages gypsy had its origin has been much discussed. One school holds that it belongs to the north-western and especially to the Dardic, which comprises certain dialects of the Hindu Kush and includes also the more important Kashmiri. These languages, in some respects more conservative than those further in India, have kept certain features of the old Sanskrit sound-system unchanged, *e.g.*, the preservation of two or more sibilants (*ś, ṣ, s*) or of an *r* preceded by a consonant. The gypsy dialects also show some of these peculiarities. But the preservation by descendants of characteristics that existed in the parent language is not proof that they have any specially close relationship (other than common origin). The existence of the same early innovations in both is proffered by those who hold that gypsy belonged originally to a more central group of dialects, of which a typical modern representative in India is Hindi. It is with these it shares its earliest sound-changes. Gypsy does not, however, share other later innovations of the central group which had set in or were setting in at the time of Aśoka (*c.* 250 B.C.). They must, therefore, have severed their relations with this group before that date. The word *rom*, "Gypsy man," south-east European *ṛom*, Armenian Gy. *lom*, Palestinian Gy. *dōm*, is the same word as the Skt. *ḍomba-*, "a low caste of dancers and singers," from whom the *Ḍōms* of India also derive their name. It is probable that wandering tribes, perhaps of the same character as some of the criminal tribes of modern India, speaking a central dialect, made their way to the north-west (probably western Panjab or Peshawar district) before the middle of the 3rd century B.C. There, among speakers of the north-western dialect-group, they stayed until, at some time before the 9th century A.D., they left India behind them in a migration which spread them all over western Asia, Europe and even America.

Dialects.—It is not known whether the gypsies left India in one or several separate migrations or whether there were even at that time marked dialectical variations in the language they spoke. But at the present day there are at least three distinct groups of dialects, the Asiatic, the Armenian, and the European. One of the most noticeable differences lies in the treatment of the original voiced aspirates of Sanskrit. The Asiatic dialects have either preserved these or, losing the aspiration, have reduced them to simple voiced sounds; the European and Armenian dialects, on the other hand, have changed them to surd aspirates: Skt. *bh, dh, gh* become Asiatic *b, d, g*, but Armenian and European *ph, th, kh* (*p', t', k'*). Thus we find Skt. *bhrātā* "brother," *dhūmáḥ* "smoke," *ghṛtám* "melted butter" in Eur. Gy. *p'ral, t'uv, k'il*, in Pal. Gy. *bar, dif, gir*.

To-day there is considerable dialectical variation even within a single group such as the European, dating probably from the time of separation within Europe itself. These dialects differ according to locality and to the degree in which they have been influenced by surrounding languages. In this respect they may vary from the comparatively pure Indian idiom of, for example, some of the Balkan gypsies or even of the gypsies of Wales, to mere jargons consisting of a framework of the local language, for example, English, in which a certain portion of the vocabulary is replaced by gypsy words.

Sounds.—The vowel-system rests on that of Sanskrit. As in all Middle Indian dialects Skt. *ai* and *au* have become *ē* and *ō* (*e.g.*, Arm. Gy. *tel*, "oil," from *tailám; mol*, "price," from *maulyam*). In the European dialect Skt. *a* in an open syllable appears as *e*, but in an originally closed syllable as *a*, which is also the representative of Skt. *ā: merel*, "dies," *rak'el*, "keeps," *manuš*, "man", from *márate, rákṣati, mānuṣáḥ*.

In the consonant-system, the chief innovation is the change of the voiced aspirates already mentioned. Of the surd aspirates, *ph* appears to remain (*p'al*, "board" from Skt. *phálaḥ*); *ch* loses its aspiration in west European gypsy (W. Eur. *čin-*, "to cut," S. E. Eur. *č'in-* from Skt. *chinná-*); *kh* perhaps becomes a spirant *χ* (*χanro*, "sword" from Skt. *khaṇḍakaḥ*). Intervocalic consonants, as in all other descendants of Sanskrit, are weakened. The gutturals and palatals disappear altogether; the cerebrals remain as *r* (S. E. Eur. *ṛ*), the labials partly as *v*, the dentals as *l* in the European and Armenian dialects and as *r* in the Asiatic.

Sanskrit	Gypsy	Sanskrit	Gypsy
yūkā "louse"	*ǰuv* id.	*ágataḥ* "came"	*alo* id.
sūcī "needle"	*suv* id.	*vijanati* "bears young"	*benel* id.
kīṭáḥ "insect"	*kiri* "ant"	*biḍālaḥ* "cat"	*blāri* (Syr.) id.
sthāpáyati "places"	*t'ovel* id.	*píbati* "drinks"	*piel* id.
yuvatíḥ "young woman"	*ǰuvel* id.	*hṛdayam* "heart"	*yilo* id.
	ǰūār (Syr.)		*ḫri* (Syr.)

Assimilation of consonant-groups has occurred generally, with the exception of *r* preceded by a stop and of sibilants followed by dental or cerebral stops (except in the Armenian dialect). Thus

Sanskrit	Gypsy
dugdhām "milk"	*t'ud* (from *duddhaṁ*), Arm. *lut'*.
bhrātā "brother"	*p'ral* id., Arm. *p'al*, Syr. *bar*.
hástaḥ "hand"	*vast*, Syr. *ḫāšt*, Arm. *at'*.

Grammar.—In grammar, too, the main structure of the better preserved dialects rests upon its Sanskrit original. The declension of the noun is based on two cases—a direct (descended from the Sanskrit nominative and accusative) and an oblique (descended from the Sanskrit genitive) to which various postpositions can be added.

	Sanskrit	Prakrit	Gypsy
Sing. nom.	*cōráḥ* (*-ō*)	*cōrō*	} *čor*
acc.	*cōrám*	*cōraṁ*	
gen.	*cōrásya*	*cōrassa* (*-asa*)	*čores*
Plur. nom.	*cōráḥ*	*cōrā*	*čor*
gen.	*cōrāṇām*	*cōrāṇaṁ*	*čoren*

The verb is built up of the old present stem, of which the indicative, the imperative and the participle still survive, and of the past participle, which alone or combined with auxiliaries forms past tenses.

		Sanskrit	Gypsy
Present indicative:	Sing.	*rákṣāmi*	*rak'av*
		rákṣasi	*rak'es*
		rákṣati	*rak'el*
	Plur.	*rákṣāmasi*	*rak'as*
		rákṣathana	*rak'en*
		rákṣanti	*rak'en*

The opposition between present stem and past participle, though in most cases the latter has been remodelled on the former, still survives in a few verbs:

Skt. *márate* "dies" : *mṛtáḥ* "dead" = Gy. *merel* : *mulo*.
" *yáti* "goes" : *gatáḥ* "gone" = " *ǰal* : *gelo*.

Gypsy has preserved the Sanskrit numerals 1 to 6, 10, 20, 100. But 7, 8, 9 and higher numbers are borrowed—by Asiatic generally from Persian, by European from Greek—or are formed by various methods of addition or multiplication from existing numerals.

The borrowing of vocabulary has been extensive. The first examples can be dated back to the time when, leaving the central group of dialects in India, the gypsies sojourned among the speakers of the north-western group. Indeed, the borrowed words of a gypsy dialect disclose the itinerary of its migrations. When in the dialect of the gypsies of Wales we find borrowed words from Persian, Armenian, Greek, Rumanian, Bulgarian, Serbian, Czech, German, French and English, we may assume that at some time or other the ancestors of this particular group passed through the countries where these languages were spoken. The form in which the words appear may give some clue as to the date when they were borrowed. The most numerous source

for the European dialects is Greek, a fact which accords with the long stay the gypsies appear to have made in the Eastern empire.

BIBLIOGRAPHY.—G. F. Black, *A Gypsy Bibliography* (1913, bibl.); *Journal of the Gypsy Lore Society* (from 1888); J. Sampson, *The Dialect of the Gypsies of Wales* (1925, bibl.), invaluable for the study of any gypsy dialect; R. L. Turner, *Position of Romani in Indo-Aryan* (1927); R. A. S. Macalister, *Language of the Nawar* (1914); F. N. Finck, *Sprache der armenischen Zigeuner* (1907); A. G. Paspati, *Les Tchinghianés de l'empire ottoman* (1870); R. von Sowa, *Die Mundart der slovakischen Zigeuner* (1887), *Wörterbuch des Dialekts der deutschen Zigeuner* (1898); B. C. Smart and H. J. Crofton, *The Dialect of the English Gypsies* (1875); F. Miklosich, *Mundarten der Zigeuner Europa's* (1872–80); Albert Thomas Sinclair, "An American Romani Vocabulary," comp. and ed. by George F. Black, *New York Pub. Lib. Bull.*, vol. xix., pp. 727–738 (1915). (R. L. T.)

ROMBLON, a municipality (with administration centre and 27 *barrios* or districts), capital and port of the province and island of Romblon, Philippine Islands, about 187 m. from Manila. It has a deep well sheltered harbour which makes it one of the best ports south of Luzon. Pop. (1918), 10,467. It is a port of call from Manila. Much copra is exported. Romblon is famous for its beautiful *buri* mats. The language spoken is a dialect of Bisayan.

ROME, a province of modern Italy, forming a part of the district of Latium (Lazio) (*q.v.*).

ROME, the capital of the kingdom of Italy, lies on the Tiber river, 17m. north-east from its mouth on the Mediterranean. It was the capital of the ancient Roman republic and of the Roman empire and became very early the headquarters of the Christian Church. With a longer record of continuous political and religious importance than any other city it is unique for its antiquarian interest. In the following account the general subject of Rome is treated broadly under two aspects, themselves subdivided. These are: (1) the topography and growth of the city of Rome, the evolution of which is traced from the earliest times to the present, and (2) Roman history, *i.e.*, the political and social history of the Roman republic, empire, the mediaeval commune, and briefly the modern Rome.

THE ANCIENT CITY

The primitive city of Rome stood not in the Tiber valley, but on the ridges—so-called hills—of the Latin plain that jut unevenly into the valley. During the empire the city encroached more and more on the lower level till it covered the whole of the Campus Martius that lay in the wide bend of the river opposite the Vatican hill. These ridges, like the whole Latin plain, consisted of volcanic ash, partly cemented into hard tuff, which had, during a long series of eruptions in the Alban hills, filled an inland lake and built up an uneven plateau. In drilling wells outside of Rome's gates the following strata, enumerated from top to bottom, are usually pierced: several layers of brownish ash or tuff, a stratum of cappellaccio or friable grey tufa mixed with alluvial sediment, sand and gravel of the former lake bottom, and finally pliocene clay. Where erosion has not been very active the volcanic deposit near Rome rises to about 100 feet. Nearer the Alban hills it is far deeper. Here and there drilling also encounters hardened streams of lava that flowed from the craters from time to time. The Appian way lies partly upon a tongue of hard lava that flowed northwards during one of the last eruptions, not long before historic times.

The First Settlements.—On the part of Latium covered by the ash deposits we have as yet no convincing proofs of human settlements prior to the early iron age (about 1000 B.C.), whereas on the calcareous areas of Latium—on the Sabine and Volscian hills—which this ash did not reach, numerous remains even of Neolithic settlements have been found. It would seem that the site of Rome (and its neighbourhood on the south and east) was not an attractive place for settlement until about 1,000 years before our era, and the cause may well have been the activity of the Alban volcanoes. The first settlers coming from north of the Tiber seem to have taken possession first of the Alban hills and then of the Roman "hills." They were apparently shepherd and agricultural peoples of the "Italic" branch of the Indo-European race, related to the Villanovans (*q.v.*) who were settling in southern Etruria at the end of the second millennium B.C. The highest and safest points (the Palatine hill, probably the Capitoline and the outjutting spurs of the Esquiline) seem to have been chosen for the first communities. The graves of these early people that have been found in the Sepulcretum at the edge of the Forum show that they were a cremating folk that possessed the same kind of utensils and pottery that have been found in the Alban cemeteries. About the 8th century a related people, which however buried their dead, came in from the older settlements of the Sabine hills and built their straw huts on the Esquiline and Quirinal ridges. In the 6th century Etruscan princes seem to have conquered the whole of Latium. They soon organized these communities (which had apparently coalesced to some extent) into a city, and, bringing it into connection with the rapidly growing Etruscan cities north of the river, laid the foundations of a flourishing principality. Before they were driven out, about 500 B.C., a large temple had been built to Jupiter, Juno and Minerva on the Capitoline, a stone wall had been raised enclosing all the hill communities, and the forum valley had been drained so that the area could be used as a common market place.

In early Rome ordinary dwellings were straw huts or straw-thatched adobe huts, while temples and public buildings were erected in the Etruscan manner to suit the materials of the vicinity. The Capitoline temple, for instance, had walls of volcanic tuff well coated with stucco to hide the ugliness of the material. The ceiling beams which supported a tile roof were probably held up by a cantilever brace. The roof of the portico rested on four tuscan columns of wood or stuccoed tufa. The wooden architraves were covered with figured terra-cotta slabs that provided some adornment and protection for the beams. The pediment figures were also of terra-cotta. Because of the absence of good building stone the Etruscans early developed for architectural adornment a dignified plastic art in terra-cotta, and its artistic qualities can now be appreciated in the splendid Apollo-figure recently discovered in Veii, a few miles north of Rome. This Etruscan method of building sufficed for the city till Greek artists were brought to Rome in the second century B.C. The building of stone bridges and aqueducts during the 2nd century popularized the use of the stone arch. The concrete dome which became so striking an element in later Roman construction was not used to good effect till the latter part of the 1st century of the empire when the art of making reliable concrete had been fully developed.

Materials.—Since public buildings were frequently rebuilt and enlarged it is difficult to assign the present remains to their proper epoch, and the accounts of early Roman architecture do not by any means agree as to dates. It is only by careful observation of the materials[1] used that we can assign the remains of the republican period to their approximate periods. Before the Gallic fire in 387 B.C. practically the only stone used was the soft grey volcanic tufa called cappellaccio, the principal source of which was the quarry at the foot of the Capitoline where the Mamertine prison now stands. This is a very poor weathering stone so that it was regularly protected by a coat of stucco when used above ground. After the Gallic fire, when Rome had gained possession of the Veientian quarries of Grotta Oscura near the Tiber some 10m. north of the city, the yellowish grey tufa of that region came into popular use. This stone was as easily worked as the native one, and being more uniform in texture was cut into larger blocks of 2x2 feet. The massive fortification walls of Rome were largely rebuilt of this material during the 4th century, as were many of the public structures that had been destroyed by the Gauls. For rough work some very ugly volcanic stone, full of inclusions of black scoria, was also used for a while. This was also found in southern Etruria, and the blocks that were used at Rome and Ostia may have come from the abandoned walls of Fidenae, north of Rome. The grey tufa of Grotta Oscura was the favourite building stone of the city for over 200 years, while the scoria-filled stone was soon abandoned.

These materials also weathered poorly and proved too weak for

[1]Middleton, *The Remains of Ancient Rome* (1892); Lanciani, *Ruins and Excavations* (1897); Delbrück, *Hellenistische Bauten* (1907); Van Deman, *The Date of Concrete Monuments* (1912); Frank, *Roman Buildings of the Republic* (1924).

heavy loads. Hence in the 3rd century architects went to the Alban hills for the stronger dark grey tufa (*Lapis Albanus, peperino*) when in search for architrave beams and heavy column drums. The Tullianum, Rome's first prison, which required a very hard stone, seems to be the first structure built of this material. It probably was constructed about 250 B.C., certainly not in the regal period as has been supposed. All the large temples built during the 2nd century B.C. used peperino for points of great stress and weight. At the Gabine lake, an old volcanic crater which was nearer Rome, a tufa somewhat rougher than peperino, but equally strong, was then brought into use. This Gabine stone (*Lapis Gabinus, sperone*) was freely employed in massive walls for a century or more, but its use was limited by the fact that it would not yield to ornamental cutting. Both of these stones were costly because of the heavy transportation charges. Hence during the 2nd century experiments were made with the brown tufas nearer Rome. As can still be seen, the hills of Rome had an abundant supply of this brown tufa lying above the cappellaccio, but these hills were now so well covered with buildings that quarrying inside the city was impracticable. South of the Janiculum, on Mt. Verde, a quarry was opened and used for several buildings of the second century and of the early decades of the first. The Mt. Verde stone is hard, close-grained, but too brittle for heavy burdens, and was seldom used after Sulla's day. The brown tufa from the Anio river just above Rome proved to be very strong and uniform, in fact an excellent material except for its ugly appearance. After the fine arches of the Aqua Marcia were built of it in 144 B.C., it remained because of its durability and cheapness the favourite stone for ordinary ashlar masonry for two centuries. This Anio tufa is now to be found in the ruins of more than half of the buildings of the forum. During the 2nd century B.C. two very important discoveries of materials were made. The travertine deposits at Bagni on the road to Tivoli were found. This is a limestone of recent formation caused by the deposit of the carbonate of lime from the hot springs that arise at that point. Since the ground was level and covered with vegetation the splendid deposit had for centuries lain unobserved. The stone being rather soft when at first exposed is easily sawed and worked. It soon hardens under exposure. The Romans used it at first with some hesitation, but by Caesar's day they had learned to appreciate its good qualities. During the early empire it was freely used, as may be seen in the massive walls of the Colosseum. Recently this stone has been exported in large quantities to America.

Unfortunately for the aesthetic qualities of Roman architecture the process of making a cheap and durable, though ugly, concrete was discovered at about the same time. Since good sand is difficult to find near Rome, volcanic ash (*pozzolana*), which lies in abundance everywhere in Latium, was substituted. This ash is of course a crushed dehydrated slag, and it was eventually found that if the ash was taken from deep pits where rain-water had not destroyed its qualities it would mix with lime into a very firm hydraulic cement. By adding a filler of tufa fragments a very cheap and durable concrete could thus be made. Concrete was first used freely in the foundations and podia of the temple of Concord in 120 B.C. and the temple of Castor in 117 B.C., but it is found even earlier in a part of the platform that was constructed in front of Castor several years before. This platform probably belongs to the Gracchan period. Concrete however came into free use in superstructures only in the age of Caesar, when marble was imported in such abundance that it could be used as a veneer for ugly concrete walls. The great importance of concrete for Roman architecture lay in the fact that during the empire, when Rome required very extensive structures, domes and vaults of immense span could be built of this material. During the empire most of the heavy walls were constructed of concrete because of its cheapness and durability. They were usually faced with brick or with marble slabs. The bricks when used were generally triangular with one angle stuck into the concrete; the marble slab veneering was usually held in place by iron clamps.

Though the art of making good terra-cotta ware was known in primitive Rome, and roof-tiles of terra-cotta of excellent quality had freely been used for six centuries before Augustus' day, bricks were not burned at Rome for use in wall-construction during the republic. Immense heaps of fragments of broken roof-tiles had however accumulated, and the Augustan architects began to use these fragments in facing concrete walls. When this supply gave out, triangular bricks were made for the same purpose—during the reign of Claudius—and when, after the great fire of Nero's day, a vast programme of rebuilding followed, brick yards turned out an immense quantity of material for the facing of concrete walls. This material continued to be used freely through imperial times.

Marble was very expensive and relatively few buildings were made of solid marble; but for veneering, for columns, entablatures and decorative members large quantities of marble were imported. A few wealthy nobles had imported marble columns for their porticoes before Caesar's day. While Caesar was governor of Cisalpine Gaul his architects and engineers began to import to Rome Carrara marble, found in that province. The architects of Augustus developed the Numidian quarries of Simitthu, which yielded a variety of yellow and cream coloured marbles of great beauty (giallo antico). The transportation costs were very heavy since it had to be brought 100m. over land before it was loaded on ships. Its use was largely confined to decorative purposes. The pavonazzetto of Synnada, 200m. inland from Smyrna in Asia Minor, also came into use, as well as the greenish cipollino of Euboea, the marbles of Pentelicon, Hymettus and Paros, and the red granites of Aswan in Egypt. During the empire architects vied with each other in attaining new colour effects with contrasting veneers, and the Christian basilicas and churches of Rome which are decorated with the marbles stripped from Roman buildings are rich with stones that the emperors had imported from all parts of the world. Besides those mentioned we may name the products of quarries of Chios (called *Africano*), Thasos (*porta santa*), Laconia (*rosso antico* and *nero antico*), Thessaly (*verde antico*), and the alabasters and porphyries of Egypt.

Early Town Walls.—Tradition speaks of very early fortifications around the Palatine and Capitoline hills. These may have been earthen mounds bearing a fence of stakes. There is no doubt that a stone wall was constructed of cappellaccio blocks around the whole city at the time of the Etruscan kings. This wall was almost wholly rebuilt after the Gallic fire (387 B.C.) with the stronger Grotta Oscura stone, and later strengthened and improved from time to time with better materials. This so-called Servian wall (at first not including the Aventine) was nearly 6km. long. It began at the Tiber near the present Ponte Rotto, had two gates between the Tiber and the Capitoline hill, skirted the Capitoline on its west side (where a few blocks of the 4th-century wall are visible), then proceeded across the valley to the edge of the Quirinal hill. A small gate (perhaps an embrasure for artillery) is still visible inside the Palazzo Antonielli, but this consists of Anio tufa and must date from about the time of the first civil war. The fragment of wall seen in the via Nazionale just above is of Grotta Oscura stone belonging to the 4th century. From this point the wall followed the edge of the Quirinal hill north-eastwards for over a mile to the porta Collina. At the via Finanze may be seen a well preserved portion in cappellaccio. Because of the material this part has usually been assigned to the 6th century, but the fine workmanship and battering would rather indicate a 4th century reconstruction. From the Porta Collina the wall turned southwards across the level plateau to the porta Esquilina, a distance of about a mile. Here the city was especially exposed to attack and the wall was not only made with special care in the 4th century but was later frequently strengthened and repaired. In constructing this portion a moat 30ft. deep and 100ft. wide was dug and the earth of this excavation was used for an agger about 40ft. thick. The stone wall itself that stood behind the moat and supported the mound was about 10ft. thick and more than 30ft. high and was made of Grotta Oscura stone. The inner side of the agger was supported by a lower cappellaccio wall. The numerous quarry marks found in the section near the railway station are probably those of the Etruscan workmen of the 4th century, while those found at Piazza Fanti seem to belong to the repairs of the second Punic War. The Gabine and Monte Verde stones of the reconstructed

Viminal gate may belong to the time of the Social War, while the concrete work and Anio stone at Piazza Macao seem to be a part of the repairs made during the Catilinarian Rebellion or the civil war.

The original wall skirted the Palatine hill on the south side and ran directly to the river. Here several portions of the 4th-century wall, built in Grotta Oscura tufa and the scoriated Fidenae stone, have been found, but at the south-west corner of the hill a fragment of the original 6th-century wall in cappellaccio blocks may still be seen. During the 4th century the Aventine was also included in the fortifications. The large wall on the Via di porta S. Paulo, however, was repaired with Anio stone and a concrete backing during the Sullan period, and near the gateway arched openings for the placement of defensive artillery were neatly constructed.

Streets.—It is doubtful whether Rome had paved streets before the 2nd century B.C. The earliest pavement that has been found is that of the street which ascends the Capitoline hill from the forum. It was laid in 174 B.C. The few remains of it still visible at the side of the temple of Saturn are hard rough lava blocks full of leucitic crystals. This lava was brought from beyond Civita Castellana and was preferred to the native lava of the Appian Way because the crystals furnish a rough surface which is essential on a steep roadway. During the 1st century B.C. most of the streets were paved with large polygonal lava blocks neatly fitted and (at times) set in a concrete bedding and curbed with travertine. Outside of the city some of these pavements are still in use after 2,000 years of wear.

Bridges and Drains.—The first bridges of Rome were laid on wooden piles. In 179, stone piers were built for the Aemilian bridge (the *ponte rotto*). In the period between Gracchus and Sulla, architects had learned to make strong arches and then the Aemilian and the Mulvian bridges were constructed of splendid stone arches. The Fabrician bridge, contracted for apparently during Cicero's consulship, with two vast arches, is still in use. The first large sewer which drained the forum and cattle market seems to have been an open channel lined with cappellaccio masonry. It was covered over early in the republic. The magnificent Cloaca Maxima which opens out near the Palatine bridge and was in use till some 30 years ago was, to judge from its free use of Gabine stone, not constructed till the latter part of the 2nd century B.C. During the empire the whole city was as thoroughly drained with well-built sewers as any modern city.

Aqueducts.—Before 312 B.C. the city depended upon wells and springs for its water supply. In that year Appius Claudius, the censor, constructed an underground aqueduct 7m. in length to supply water to the poor of the crowded sections of the city. Forty years later the Anio Vetus was added. In 144 the Aqua Marcia was laid bringing an abundant supply of excellent water from high in the Sabine hills 44m. away. Where it crossed the lower plain outside of Rome the conduit was raised on splendid arches so as to bring the water to the top of the Capitoline hill. Some of these arches are still standing near Porta Furba; and the city of Rome is still using the springs that supplied the Aqua Marcia. Augustus, Claudius and later emperors enlarged the water supply, laid an extensive system of leaden pipes in the streets and built numerous fountains, till in Trajan's day the city was generously supplied with pure water.

THE FORUM[1]

In the early days the valley between the Palatine hill and the Capitoline was marshy ground with an open pool, the Lacus Curtius, near the centre, another near the west end, the Lacus Servilius, which caught the spring waters of the Capitoline hill, and another, the Lacus Juturnae at the base of the Palatine. On the lower slope of the Capitoline hill, on a protruding ledge of rock, were altars to Saturn and to Vulcan, and between them a speaker's platform. On the corresponding lower slope of the Palatine was the shrine of Vesta with the house of the vestals near by and the office of the pontifex maximus. Below the Esquiline was an extensive burial ground. When the marsh was drained and the three springs walled in the central part became an open market place—*forum*—which was soon lined with two rows of shops (*tabernae*), while the north-west corner was laid off for open-air town-meetings (the *comitium*), and a speaker's platform was early constructed between the *comitium* and the forum. Without regard for chronology we shall briefly mention the more important buildings of the forum of which there are remains, beginning at the Tullianum on the north-west corner.

The *Tullianum*[2] ("Mamertine prison") took the place, as death-chamber, of the older quarry caverns that here ran deep into the Capitoline hill. It was apparently built in the 3rd century B.C. Alban stone—the hardest material available—was used. The chamber was a truncated cone, about 12ft. high. It originally had a ceiling of oak beams, and could be entered only from a trap-door above. In the 2nd century an arc of the circle was cut away to make room for the road in front, and a straight wall of Grotta Oscura stone was built in its place. About 100 B.C. an upper vaulted chamber of Mt. Verde and Anio stone was constructed above the Tullianum, and later the lower chamber was given a horizontal stone vault. Finally, in the reign of Tiberius, a massive façade of travertine was built on the forum front. This is the chamber where noted prisoners like Jugurtha, the Catilinarian conspirators and Vercingetorix were kept before execution. It could never have been a well-house, as has been supposed, since the floor is actually above the republican level of the *comitium*. The present floor is about 6ft. above the original, if Sallust's measure of its depth is correct.

On the south of the Tullianum are the remains of the *Temple of Concordia*.[3] The original temple was erected to the deified abstraction of Concord in 366 to mark the temporary peace in the class conflict between the patricians and plebeians. The temple was rebuilt, partly with the earlier materials, and enlarged by the aristocratic consul Opimius in 120 B.C., to mark the end of the Gracchan class contests. The rededication to Concord was however considered an insult by the defeated Gracchans. Here Cicero delivered two of his Catilinarian speeches, using the temple for his addresses not only because he wished to remind the people of his programme of *concordia ordinum* but also because of the suggestive proximity of the place to the death-chamber. Tiberius rebuilt the temple in marble to commemorate the Concord of the Augustan régime. This new temple had a large portico and entrance on the forum side and the concrete base of this comes forward nearly to the Vulcanal. Portions of the elaborately carved cornice and of some of the capitals and bases are still to be seen in the corridor of the Tabularium. The temple was one of the most richly decorated at Rome and became a veritable museum of precious works of art. The corner of the podium nearest the prison originally belonged to the *senaculum*—a gathering place of senators—but was incorporated in the enlarged portico of this later temple.

Below the steps of the temple of Concord may be seen the remains of a very old *Altar of Vulcan* cut in the native cappellaccio, and near by several cuttings in the rock which give evidence of an early cemetery here. Passing the *Arch of Septimius Severus*, a work of pleasing proportions though covered with confused reliefs of a decadent and boastful art, we reach the remains of the old *Rostra*, the scene of Rome's legislative struggles from the time of the *Twelve Tables* till Caesar. It is the birthplace of modern democracy. In the centre of the mass may be seen a few of the old steps that may belong to the platform of the decemviral times. The name rostra derived from the iron rams taken as trophies from the warships of Antium (338 B.C.) and fastened on the back of the platform (on the forum side). The outer steps of Mt. Verde stone on the side of the Comitium and the circular rear wall of concrete lined with reticulate blocks belong to a rebuilding of the Sullan period.

Between the rostra and the Arch lies a *black stone* pavement that marks a sacred area uncovered in the excavations of 1899.

[1] Jordan, *Topographie*, i.; Lanciani, *Ruins and Excavations;* Huelsen (Carter, tr.), *The Roman Forum*, with references to the reports of the excavators: Carlo Fea, Rosa, Fiorelli, Lanciani, Boni, et al.; Thédenat, *Le Forum Romain;* Lugli, *La Zona Archeologica di Roma.*

[2] Frank, *Roman Buildings of the Republic*, 39 ff.

[3] Rebert and Marceau, in *Memoirs of Amer. Acad. in Rome*, v. 53.

The layer of gravel which covered this area as well as the pre-Sullan rostra shows that the sacred area was abandoned and covered up when the Sullan rostra were built. The objects found beneath the black stone are a 6th-century inscription of very great importance, though so much damaged that no line is complete, a truncated cone which probably supported a statue, a double base which, according to Varro, supported two figures of lions, presumably such as Etruscans placed in front of important tombs, and a great many votive objects of different periods—now to be seen in the forum museum. Some of these objects were found in their original setting, others had been removed here and buried as being too sacred to destroy at the time when the rostra were rebuilt.

The inscription is cut on stone imported from Etruscan territory, and since the lettering is too archaic for the 4th century, when Rome captured the region from which it came, we must assume that it was brought here during the Etruscan period, *i.e.*, before 509 B.C. The "black stone" was supposed by the Romans to mark the tomb of Romulus, of Faustulus or of Hostilius. The riddle has not yet been solved.

The *Curia* or senate chamber, which stands in the comitium, is the debased structure of Diocletian's day, much altered and converted into a church. The first senate house (attributed to the king Hostilius) stood farther back, leaving room for a large comitium between the Curia and the rostra. The original bronze doors of Diocletian's Curia may now be seen at the end of the nave of the Lateran basilica.

Crossing the narrow street, the *Argiletum,* which led into the Forum from the north, we come to the extensive remains of the *Basilica Aemilia.* This was a covered hall in which court could be held when the weather was too inclement for sessions in the open forum. When building it in 179 B.C. Aemilius Lepidus and Fulvius Nobilior also rebuilt the row of public shops (*tabernae novae*) and included these under the same roof with a covered arcade in front. There was a hasty reconstruction by Aemilius Lepidus in 79. About the year 54 when Caesar planned his basilica along the opposite side of the forum at a higher level he lent large sums to Aemilius Paullus to reconstruct the Aemilian basilica at a corresponding level and in an appropriate style. This rebuilding, frequently interrupted, was not completed for 20 years. The foundations now visible are chiefly of this period, though the shop walls reveal materials of all three periods. Augustus later provided money for lavish repairs and decorations after the structure had been damaged by fire. Most of the splendid marble decorations now to be seen date from the Augustan period, deriving partly from the Doric façade, partly from the interior porticoes decorated with Ionic and Corinthian columns.

East of this basilica stands the temple which Antoninus Pius built in honor of his deified wife *Faustina.* After the emperor's death his name was added to the inscription. The columns are of the expensive and garish Carystian stone (*cipollino*) from Euboea, the walls are of peperino, a good fire-proof material, and were of course faced with marble slabs. The frieze has a charming design of griffins grouped in pairs around a candelabrum.

In front of this temple are the remains of the *Regia,* one of the oldest buildings of Rome. It may have been the office of the early kings, and certainly was of the pontifex maximus throughout the republic. The cappellaccio podium of the main quadrangle may well date from the fifth century. Professor Huelsen, who excavated the site, has drawings of a decorated terracotta slab from its frieze which belonged to the 5th-century structure. The rear wall, however, contains materials of a reconstruction, probably made in 148 B.C., when the place was damaged by fire. In this building were kept the important pontifical records and lists of magistrates which provided the skeleton of facts that historians eventually used in writing the story of the early republic. And because of this historical association, Domitius Calvinus, when rebuilding the house in 36 B.C. in marble, had a complete list of magistrates and of triumphs inscribed on its walls. Some remains of these inscriptions, called Capitoline Fasti, are now preserved in the Capitoline museum. The few architectural remains that lie near by reveal the fact that even as late as 36 B.C. marble cutting was still very crude.[1] The pontifex himself had his home in the *domus publica,* the foundations of which, as it was when Caesar lived there, may still be seen a few yards to the south-east of the regia.

The extensive *House of the Vestals,*[2] as it appeared in the late empire, has many of its walls intact. They date from several rebuildings and additions made at various times during the empire. A few of the Vestal statues and honorary inscriptions remain, but not on their original locations, since all were found in a confused heap ready for the limekiln. Of the small republican structure there are few remains except the simple mosaic floor visible at a low level near the entrance. The foundation of the round shrine of Vesta is visible between this Atrium and the Regia, and near by are remains of the marble entablature cut in the decadent workmanship of Septimius' day.

Between the Regia and the open space of the forum stands the podium of the *Temple of Divus Iulius* which Augustus erected to the deified Caesar (dedicated 29 B.C.). This site was chosen because Caesar's body was burned upon a speaker's platform at this place (probably the *tribunal Aurelianum*). The spot had first been marked by an altar, the foundations of which may still be seen.

Augustus in building the temple respected the altar, indenting the portico so that the steps of the temple rose at the sides of the altar. Hence the strange ground-plan. This temple was the first striking proof at Rome of the acceptance of the theory of "Divine rights" of Rome's princes. Foundation walls of heavy masonry built outside of the concrete mass now visible supported the walls of the temple. The temple itself was an Ionic hexastyle building of marble, the columns being about ten and a half metres high. The interior was very richly decorated with imported works of art, but the architectural decoration of the entablature, fragments of which are still to be seen on the south side, was rather crude, as was all such work at Rome during the period. A few feet south of this temple there still exist the foundations of the *Arch of Augustus* erected only ten years later. Fragments of the marble decoration of this arch may be seen lying at the nearby corner of the Regia. Though somewhat too graceful and delicate for the purpose of a triumphal arch those carvings are done with a care which shows a remarkable advance in such work during the ten years after the construction of the temple of Divus Iulius.

The famous *temple of Castor and Pollux,*[3] which still has three Pentelic columns erect with a part of the entablature, is the most prominent ruin of the Forum. The first temple on the site was built in the Tuscan style early in the republic (484 B.C.) to the divinities of the Greek cavalry who aided the Romans at the battle of Lake Regillus. Since these gods were adopted as the patron-deities of the Roman knights, the temple became the official meeting place of the knights and wealthy business men of Rome, and these took some interest in maintaining it. They used its coffers for safety deposits, and its basement offices for the protection of standard weights and measures and for an assay-laboratory for the testing of coins and metals. It thus came to be Rome's "Bureau of Standards." The cappellaccio blocks which may be seen in the podium remain from the first structure, while those found in a small room under the front stairway belonged to an early speaker's platform not directly connected with the first temple. Much of the inner core of concrete belongs to a reconstruction made by Caecilius Metellus in 117 B.C., while the rest of the concrete, as well as the heavy masonry, are a part of the reconstructed temple built by Tiberius in A.D. 6. The splendid Pentelic columns seem, however, to belong to a reconstruction of Hadrian's day, though of this we are not yet certain. This last temple was Corinthian, octostyle and peripteral, with 11 columns on each side, the whole measuring about 30x50 metres. No temple at Rome reveals finer decorative workmanship.

Along the west side of this temple runs the vicus Tuscus which leads to a very large brick structure behind Castor. This has long been called the *temple of Augustus,* though the brick-work belongs chiefly to the Flavian period and no traces of an earlier temple

[1] Töbelmann-Fiechter, *Römische Gebälke;* p. 8 (1923).
[2] Van Deman, *Atrium Vestae* (1909).
[3] *Memoirs Amer. Acad. in Rome,* V. p. 79.

have been found. The suggestion has also been made that it was intended as an audience chamber by Domitian.[1] There are serious objections to both hypotheses. East of this massive structure one enters the remains of the mediaeval church, *S. Maria Antica,* directly from the area of the Lacus Iuturnae. It contains frescoes—interesting to students of early Christian art, from the 7th, 8th and 9th centuries.[2] What the building was before Christian times is still a matter of dispute: older authorities assumed that it was a library, though it has not the usual form of a Roman library. A more recent suggestion is that it was the *Atrium Minervae* where the records of honourable dismissal of legionaries were kept. The impluvium, part of which is visible, belonged to the palace which Caligula had built here as an extension of his Palatine residence.

West of the vicus Tuscus, in the forum, are the confused remains of the *Basilica Iulia.* Caesar first built this on the site of the small basilica Sempronia, dedicating it in 46 B.C. To gain the necessary space he removed the shops which lined the Via Sacra of the Forum, and built in their place a row of shops all along the rear colonnade of his basilica. The whole was a vast structure designed to serve as a set for the four lower civil courts as well as for a market place. After a fire Augustus rebuilt it with lavish adornments of Oriental marbles, but later rebuildings after fires in the 3rd and 4th centuries left little of these structures to be seen. The modern excavators attempted to outline the ground plan by erecting bases of brick and marble fragments, but succeeded only in confusing the evidence of the structure found. An accurate reconstruction is no longer possible. The old *praetor's tribunal,* which stood in the forum in front of the Basilica Iulia, has now quite disappeared, but the remains of an inscription in honour of Naevius Surdinus, praetor, cut into the pavement blocks of the forum reveals the location. It was merely a low platform large enough to seat judges and jury, and was unprotected except for a canopy over the praetor's seat. The place was seldom used after the larger basilicas were built to house the courts, but it was here that the principles of Roman law were first formulated.

West of the Basilica Iulia, beyond the narrow street that was called the *vicus Iugarius,* stands a large part of the old *temple of Saturn.* The ugly granite columns with a portion of the entablature belong in part to a hasty reconstruction of the 4th century A.D.[3] (a part of one column is even inverted). The inscription recording the final restoration avoids mention of the pagan god, and the building was then in secular use. Some fragments of the cornice are remains of the republican temple of 42 B.C.—from the period of crude stone-carving—while others are later work done on the same design. On the interior facing of the frieze may be seen some good decorative slabs that were actually filched from Trajan's forum for this hasty patchwork. The podium has not a little of the splendid travertine masonry of Plancus' temple of 42 B.C. The only remains of the original temple of the early republic (497 B.C.) are the few cappellaccio blocks visible in the podium (at the very base of the east side), and in the crude wall in front of the temple—remains apparently of the original altar. The low drain-vault that appears near the latter—also early work—carries a shelf on which was found a shallow trough, apparently the runnel constructed to carry away the blood of the victims sacrificed on the altar. Saturn was an early agrarian divinity, but since his temple stood not far from the senate house, the senators—who knew that temples alone might escape looting in times of war—began to store State moneys in this temple. It thus became the official Aerarium or State treasury at Rome.

West of the temple of Saturn stands the colonnade of the *Dei Consentes,* the 12 chief gods whose images were represented at public festivals, according to an imported Greek rite. The older parts of the structure belong to the 3rd century B.C., when the rite was introduced at Rome. The cult never received much attention. Between this and the temple of Concord is seen the podium of the *Vespasian Temple,* on which three fine Corinthian columns still stand. Titus began to build this temple to his deified father and after his death it was completed by Domitian. The well carved frieze and cornice are good examples of Flavian workmanship.

Finally at the very head of the market place are the remains of the *Rostra* built by Caesar and Augustus. What we see is a semicircular approach in travertine steps from the area of Concord to the platform, and, on the forum side, the front foundation in tufa blocks (partly restored). The timber platform extending from the one to the other was at first supported by travertine posts standing upright, a few of which are still visible. When these proved too weak brick piers were added. The fragment of a fine wall of tile seen on the inside seems to be Augustan, and is one of the earliest instances of brick (broken-tile) masonry of Rome. It was removed in large part during the empire and the foundation which it lined was cut back into a semicircle to make room for a small chamber. The tufa wall on the forum side was originally faced with marble and to this wall were attached the beaks of ships (rostra) brought from the old platform of the comitium. The platform held numerous statues, and in the older concrete mass of Caesar's period we may discern separate concrete bases which probably supported such statues. The interesting marble balustrades that now stand near the centre of the forum, decorated with excellent representations of political and sacrificial scenes, were probably made for this platform in Trajan's day.

East of the forum along the *Via Sacra* in its course over the *Velia* the excavations have left many problems unsolved. Between the street and the Palatine there are remains of many residences of the republican period. The foundations of old shops along the street—it was the jeweller's street—are probably of the Gracchan era. After Nero's fire the emperor covered the whole area with one vast commercial hall with an imposing portico of travertine arches along the street.[4] Owing to faulty construction this building had to be strengthened later with brick-lined concrete piers which are now seen everywhere throughout the building. North of the Via Sacra, beyond Faustina's temple, stands the church of Cosmas and Damianus, which seems to have been the *temple of the Penates.*[5] In front of this, later used as entrance to it, is an ugly round temple not yet identified with certainty.

Beyond the narrow street is the massive *Basilica of Constantine* (almost completed by Maxentius) which Michelangelo and Bramante studied for their plans of Saint Peter's, and which has influenced the architects of more than one structure in England and America. This basilica first had its entrance at the east end with its apse at the west. Constantine's architect built a portico at the centre of the south wall on the street, and made a tribunal against the north wall opposite this new entrance. Of the immense marble monolith columns (brought from the sea of Marmora) one is still standing in the piazza in front of S. Maria Maggiore. The plan is that which had been developed for the central halls of Roman baths rather than for the earlier basilicas. The four enormous piers, for instance, bear the weight on the interior, whereas in the Basilica Iulia, which is only a third as large, 74 pillars are used. The material of this immense basilica was sumptuous to a degree, but the decorative carving reveals the tasteless exaggerations and lack of practised artistry of Constantine's day.

At the top of the Velia stands the tasteful *arch of Titus,* as restored by Valadier more than a century ago. It commemorates the capture of Jerusalem, A.D. 70, and is decorated with two of the best reliefs that Roman art produced; the triumphal quadriga with the Dea Roma entering the city, and the floats that bore the chief objects of booty.

PALATINE HILL

The Palatine hill,[6] according to tradition, was the site of the earliest settlement at Rome. Since the "hut of Romulus" stood

[1]Delbrück, *Jahrbuch des Instituts* (1921).
[2]Rushforth, *Papers of the British School at Rome,* i. (1902); Wilpert, *Mosaiken und Malerien;* M. Avery, in *Art Bulletin* (1925).
[3]Töbelmann-Fiechter, *Röm. Gebälke,* p. 65 (1923).
[4]Van Deman, in *Memoirs Am. Acad.* vol. v.
[5]Whitehead, "The Church of S.S. Cosma e Damiano," *Am. Jour. Arch., 1927.*
[6]Haugwitz, *Der Palatin* (1901); Jordan-Huelsen, *Topographie* (1907); Lugli, *La Zona Archeologica di Roma* (1924); Platner, *Topography and Monuments of Ancient Rome* (1911); Huelsen, *The Forum and the Palatine* (with bibliography and illustrations, 1928).

on the southern brow of the hill above the *Scalae Caci*, farthest removed from the forum, that side was presumably the aristocratic quarter in the early day. Fragments of good terra-cotta revetments of temples and palaces of the 5th and 6th centuries B.C. have been found in this area, two large cisterns of early workmanship, and cappellaccio blocks of an early town wall. After the second Punic War many of the nobles are incidentally mentioned as living on the Palatine, especially on the northern brow of the hill, which overlooks the forum. In Cicero's day the Clivus Victoriae, the street which ran near the crest of the hill above the house of the vestals, was lined with palaces of important men, *e.g.*, Cicero, Catullus, Crassus, Metellus Celer, Scaurus and several members of the Claudian family. During the empire a large part of the hill was gradually covered by the expanding imperial palace. Augustus' first palace arose south of the centre on property confiscated from republican nobles. The Claudian emperors, especially Tiberius and Caligula, built extensively on the old properties of the family at the north-west corner. Nero enlarged the Augustan palace, connecting it with the Tiberian structure. Vespasian abandoned the Palatine palace for more modest quarters, but Domitian moved into the Augustan structure, enlarging it with magnificent State apartments and public halls. Septimius Severus finally threw out on massive substructures a vast complex of wings toward the south-east corner of the hills with a lofty façade on the Appian Way. As early as Augustus' day the word *palatium* began to be used to designate the imperial palace.

We begin the topographical survey at the very south-west corner of the hill, where there may be seen a portion of the regal fortifications in grey tufa, as well as a large section of the 4th century town wall built in Grotta Oscura and Fidenae stone. Turning eastwards we pass apartments of the Antonine period, perhaps those of the imperial guard. Ascending the hill by the old *Scalae Caci* we reach the confusion of walls that mark one of Rome's most venerated sites. From the area of Cybele's temple a few steps, made of brown tufa (2nd century B.C.), lead down to the stone platform on which the rethatched *hut of Romulus* apparently stood in Cicero's day. The stone water-trough around the platform indicates that the building above was incapable of bearing its own water-gutter. South of this, and at a lower level, the native rock of the hill has borings that seem to mark the position of poles that supported an early straw hut. Then are found a few stones of the 4th-century fortification, and immediately beyond an early inhumation grave. This is probably a grave of the very early period, since its position proves that it was there before the wall was built. The 4th-century urn found in it may have been placed there for expiation when the grave was disturbed by the builders of the wall. Here then we have actual remnants of the primitive settlement though much confused by later builders. The two cisterns near by probably belong to the same community. The one near the house of Livia has an interesting corbelled vault.

The concrete foundation overgrown with ilexes near by is a part of the *temple of Cybele* or *Magna Mater*, first built soon after the second Punic War. Here the first oriental cult gained entrance to Rome, and the orgiastic rites practised here probably inspired Catullus' remarkable poem, the *Attis*. The concrete podium and the peperino fragments from its stuccoed entablature date from a rebuilding in 111 B.C. Augustus' architects who reconstructed it in A.D. 3 seem to have used much of the old material, which they restuccoed in a new design. This temple became very important in the empire, being considered the "mother church" of a widely extended cult.

East of this temple area is the *house of Livia*, the wife of Augustus. Its very low level is due to the desire of later emperors to preserve this house intact when the other palaces about it were being raised on lofty substructures. It was built about 50 B.C., and contains excellent wall paintings (now badly faded) which correspond to the "second style" of decoration at Pompeii. The house is the best preserved of Roman houses of its period. South of this house is a level platform laid over the ruins of republican houses not yet excavated. On this platform, according to a plausible conjecture,[1] may have stood Augustus' first palace. The house at any rate was connected with Livia's.

The temple foundation that projects into this platform at the southern corner has recently been identified with plausible arguments as that of the great *temple of Apollo* erected by Augustus in 28 B.C.[2] (*cf.* Horace *Odes I.* 28 and Propertius' description in Bk. II. 31). The final proofs have not yet appeared. The temple, octostyle and peripteral, was of Luna marble, with Numidian columns. The acroterion represented the sun-god in his chariot, the pediment group Apollo with Artemis and Leto; the doors were covered with ivory reliefs of the defeat of the Gauls at Delphi and the death of the Niobids—two themes reminding of Apollo's power. This too became a museum of splendid works of art. Adjoining the temple area—in the space on the south-east of the temple, if the identification is correct, was the extensive portico of the Danaids into which Augustus built the first great public library of Rome.

The centre of the Palatine is occupied by the ruins of *Domitian's palace* (usually called the *domus Augustiana*) which faces northwards. At the front are the audience and public chambers: (1) a "basilica" with an apse in the rear for the emperor's tribunal, used when he acted as judge in political cases; (2) on the east of this room, the *aula* or large audience room where foreign legations were heard and meetings of the senate were held; (3) farther to the right a smaller room which is incorrectly called the *lararium*. The centre of the palace was occupied by an extensive peristyle containing a garden with an elaborate fountain. In the rear was the large dining room flanked on both sides with curious fountain-chambers. The emperor's table apparently stood on a dais at the end. All of these rooms were decorated with coloured marbles and floor mosaics, and the architectural carving reveals the exquisite designing of the Flavian architects. The large central audience chamber was roofed with concrete vaulting, the earliest example of such a vault employed on a large scale.

Under this vast palace there are buried many houses of earlier periods which have recently been excavated in part but not yet described.[3] Under the basilica one enters the segments of a large room that has not only wall paintings of the second style but also stuccoed reliefs of bold design. The masonry is not unlike that of the house of Livia. If this is not a part of Octavian's first palace it must have belonged to one of his powerful friends. The room was later abandoned for the construction of a large reservoir and finally cut through by a solid curved wall which must be a part of the foundations of Nero's palace. Deep under the lararium are five rooms of an even earlier period; the oldest frescoes and mosaics of this house point to a period of about 75 B.C. Some important family of Cicero's time lived here. Under the dining room there are remains of two previous periods of the palace, the lower rooms pertaining apparently to the reign of Claudius. The delicate decorations of a fountain-house and the very charming wall-decorations in coloured stucco plaques that resemble those of the "golden house" of Nero are as successful as anything in their kind at Rome.

Of the *Domus Tiberiana* which occupied a large part of the north-west corner of the Palatine and which is now covered with pleasing gardens very little remains but the substructures with their dark rooms. Many of these rooms have not even been excavated, and since they must have been used for servant quarters it is not likely that things of importance would be found here. Tiberius' palace did not extend to the Clivus Victoriae on the brow of the hill because this street still retained several of its republican mansions when the palace was built. Caligula seems to have connected this corner of the palace with a new wing on the forum level behind the temple of Castor. The magnificent ramp that zigzags down to the forum seems to belong to the Flavian period. The splendid arches thrown over the Clivus Victoriae to carry the palace grounds forward to the very edge of the hill above the forum are attributed to the architects of Trajan and Hadrian. These lend much to the picturesqueness of the Palatine as seen from the forum and to the long vistas over Rome when viewed

[1] Richmond, *Jour. Roman Studies* (1914).

[2] Pinza, *Bull. Com.* (1910 and 1913); Richmond, *Jour. Rom. Stud.* (1914).

[3] Lugli, *La Zona Archeologica di Roma*, pp. 202 ff.

from the platform laid over these piers.

The north-east quarter of the Palatine is still occupied by S. Sebastian and S. Bonaventura. What buildings stood there in antiquity we do not know. The south-east quarter is occupied chiefly by the so-called "hippodrome" and the substructures of Septimius' additions to the palace. The "hippodrome" (the word was sometimes used for gardens of the long oval type) seems to have been a large garden which was surrounded by high retaining walls to keep the higher portions of ground from caving in. It certainly contained fountains, trees and walks, with a portico circling the whole within the wall. Perhaps the portico roof had hanging gardens. The masonry is of the Flavian period with additions and changes of a century later. The substructures of Septimius' palace spread in several directions. The central portion contained very luxurious baths. The lofty ruins that extend along the brow of the hill were apparently substructures that supported apartments from which the emperor could view the games of the circus below, while farther south-east stood the Septizonium with its lavishly decorated façade which was to remind the African friends of Septimius on approaching Rome that one of their countrymen occupied the imperial palace. A large part of the Septizonium stood till the 16th century, when it fell a prey to the greed of Sixtus V. (1588).

THE CAPITOLINE HILL

The Capitoline hill,[1] which in ancient times could be approached only from the forum, had in the regal period a fort (*arx*) on the northern height, an area sacred to Jupiter on the southern height and a wooded asylum on the depression that lay between these two. In the area sacred to Jupiter the last of the kings built a magnificent Etruscan temple with three cellas to the triad Jupiter, Juno and Minerva, and this, officially called the temple of Jupiter Optimus Maximus, was ready for dedication the first year of the republic, 509 B.C. The foundations of this temple have long been known, and when in 1919 the German embassy, which stood upon it, was torn down to make place for an enlargement of the Capitoline museum the old walls were excavated and measured. (*Notizie degli Scavi,* 1919.) These foundations, built of the native cappellaccio, are now visible at two corners, and prove that though masonry was still fairly crude in technique, the original temple was built on the magnificent scale that it had in imperial restorations, about 60x50 metres. Since it was the largest temple in existence in Italy in that day we may conclude that the tradition was not far from correct which held that Rome was a large and wealthy city under the Etruscan princes. The first temple was probably, like the foundations, built of native tufa and covered with a white stucco. The porch was probably supported in four wooden columns set wide apart, and the wooden architraves were in Tuscan fashion covered with painted terra-cotta slabs. A few fragments which may possibly belong to the early temple have been found and placed in the museum near by. On the roof was placed a quadriga of Jupiter in terra-cotta made by the artists of Veii, probably by the same school of artists which created the splendid Apollo now to be seen in the Villa Giulia museum. This old temple, with its decorations renewed from time to time, stood until it was burned in 83 B.C. After various rebuildings it was reconstructed in marble with Pentelic columns by Domitian, and the surviving marble fragments of the entablatures that are in the museum give some idea of the magnificence of this Flavian temple. This marble structure was hexastyle with three rows of columns across the front and a row on each side.

Of the Arx and the temple of Juno Moneta later built thereon all traces have been hidden by the church of Ara Coeli and the recent monument to Victor Emmanuel II. The *Tabularium,* the gaunt walls of which command the view of the forum, has so frequently been altered in rebuilding the rooms of the modern council chamber of Rome that little but the rear remains intact. It was erected after the Sullan fire, which destroyed the Capitoline temple, to serve as a fireproof hall of records for the State. Gabine stone was employed for the exterior walls because it was known not to suffer from fire. The ceilings of the rooms were domed with concrete and an arcade of round and flat arches was developed far beyond the usual architectural customs of the day to avoid the use of inflammable material. It is probably the first attempt at a hall of records that was to be absolutely impervious to the accidents of the elements, and the attempt was successful as the present condition of the store-chambers proves.

[1]Rodocanachi, *Le Capitole romain,* 1904; Platner, *Ancient Rome,* p. 291.

THE IMPERIAL FORA[2]

The Julian Forum.—Julius Caesar set aside a large part of the moneys which he derived from Gallic booty for the relief of the overcrowded forum. Thus he moved the comitium to the new *saepta* farther north, and built in the forum the large basilica mentioned above. His most extensive building, however, was a new forum enclosure with high walls and numerous shops lining the walls north of the old forum. In the via delle Marmorelle there are remains of the portico and walls ingeniously constructed of the three varieties of stone best adapted to the requirements. This wall was veneered with marble. Beneath, not now visible, are the remains of several of the shops built of tufa and vaulted with concrete. In the centre of the forum Caesar erected a marble temple to Venus Genetrix, the "ancestress" of the Gens Iulia. This temple he vowed at the battle of Pharsalus, doubtless intending that it should be a visible reminder of his own exalted claims. The forum itself was planned in 54 B.C. but not yet fully completed at Caesar's death in 44.

Forum Augusti.—Augustus completed the forum of his predecessor and built a larger one on adjacent ground chiefly for the purpose of enclosing a *temple to Mars Ultor* which he vowed at Philippi, 42 B.C. To protect the temple from fire he raised a massive wall of Gabine and Alban stone about the area. This wall, one of the most imposing now at Rome, rises 100ft. high. On the outside the great blocks were left rustic, while on the inside, where it was faced with marble, two rows of niches were cut to hold statues and honorary tablets to the noted heroes of Roman history. The statues have disappeared but many fragments of the tablets have been found. The area in front of the temple and on its north side was excavated in 1925–27 and revealed fragments enough of the entablature to ensure complete drawings of the whole structure. The marble decoration was of the best that the Augustan age could produce. The temple proves to be octostyle with a row of columns on each side while the rear of the cella stands solidly against the massive enclosure wall.

Forum Vespasiani.—The next imperial forum to be built was that of Vespasian, through the area of which the Via Cavour now runs. In its centre he constructed a magnificent temple to Peace, which is frequently mentioned for its library and its large collection of works of art—among them statues of Phidias and Lysippus. No part of this structure is now visible. Between the forum of Augustus and that of Vespasian lay the long and narrow area of the lower Argiletum about forty metres wide in which Domitian began to build a forum to contain a small *temple of Minerva.* Since Nerva completed and dedicated it, the structure bore his name, but the decorative work is all of the luxurious style of the Flavian period. Two of the columns of the handsome colonnade still remain with a part of the entablature. Its frieze is in bold relief representing the story of Arachne and other themes suitable for the adornment of a precinct sacred to the goddess of arts and crafts. No portion of the temple of Minerva is now visible but the whole area will probably soon be excavated.

Forum Traiani.—The *forum of Trajan,* north-west of the Augustan group, was a large complex of open areas and buildings, including the spacious forum proper enclosed with a portico, the basilica Ulpia, the two library buildings, the column of Trajan, and, an addition of Hadrian, the massive temple of Trajan. Since the valley was too narrow for all these structures the opposing slopes of the Capitoline and Quirinal hills were cut back, and when necessary heavy retaining walls of concrete and brick erected, a part of which still remain. The forum proper had its stately entrance in the form of a triumphal arch near the forum

[2]Platner, *Ancient Rome,* p. 274 (1911), with earlier bibliography.

of Augustus. Its area is rectangular, 116 metres wide and 95 metres long. The large hemicycle against the Quirinal which is now being excavated served as a retaining wall of the Forum. The corresponding one on the opposite side has disappeared. The forum was of course open to the sky, but was surrounded by a very beautiful marble portico backed by a masonry wall. Many fragments of this portico may be seen lying about in the area. Next to the forum proper stood the basilica, which far surpassed the earlier ones in magnificence. A double row of 96 Corinthian columns supported the upper arcade that bore the roof. The nave was 25 metres wide; the apses at the end have been destroyed. North of this judgment hall were the two wings of the library, a rendezvous of literary men and students. In the area between these was built the column of Trajan[1] which is still standing. This column is 100ft. high and is covered with reliefs arranged in a spiral band representing the events of Trajan's two campaigns in Dacia. This is apparently the first column which was decorated in this manner, and the reliefs are made with such fidelity to fact as to be our best document for the history of the wars. Since the porticoes of the library rose on both sides, the reliefs could then be seen from near at hand. Nothing now remains of the great temple of Trajan which Hadrian erected north of the column.

FORUM BOARIUM AND CAMPUS MARTIUS

Between the Capitoline and the well known church of S. Maria in Cosmedin is an area which in early Rome was used as a cattle market, though during the empire it was as thickly populated as it is now. In this area, near the river, are found two republican temples for which the original names have not yet been discovered. The rectangular temple, usually called the *Temple of Fortuna,* was freed from mediaeval additions in 1923 and conservatively restored. It is exceedingly interesting as showing the type of building used at Rome in the late republic before Caesar and Augustus began to reconstruct Rome's temples in marble. It is an Ionic tetrastyle pseudo-peripteral temple of pleasing proportions, though small, measuring only 20x12 metres. The walls are of Anio tufa as are also the imbedded columns except those at the corners. These latter, as well as the free columns of the portico, all the capitals, the entablature of the porch and the facing of the podium are of travertine. The whole was covered with white stucco and the stucco of the frieze was neatly moulded into low reliefs of ox-skulls and garlands. The careful distribution of these materials points to the period of about 70–50 B.C. The round temple near by stands on a foundation of the 3rd or 4th century B.C., but the marble temple itself seems to belong to the Augustan period. It would be a graceful temple if the entablature and roof could be restored as well as several of the capitals which have apparently been replaced by alien material. It is of course not a temple of Vesta, but its true name is not known. Huelsen has suggested "Portunus."

The double-arched *Ianus quadrifrons* which stands over the Cloaca Maxima, is of late date and of ugly proportions. The extensive remains that are found in and under S. Maria in Cosmedin apparently belong to the public granary as it was in Cicero's day. Under the church of *S. Nicola in Carcere* near the Piazza Montanara are seen the foundations of three temples that stood beside the vegetable market outside the ancient Porta Carmentalis. These seem to be—from north to south—the temples of Janus, Juno Sospita, and Spes, originally built respectively in 260, 194 and 258 B.C. Most of the materials now visible belong to the rebuildings of *c.* 90 B.C. (Janus), 90 B.C. (Juno Sospita) and 31 B.C. (Spes). For the architectural history of the republic they are very important. Farther north on the site of S. Maria in Campitelli stood the famous old *temple of Apollo* where the sibylline books were kept and near which, on the slope of the Capitoline, Rome's early plays were given at the games of Apollo. The temple was first built in the early republic (431 B.C.) but the extensive remains now to be seen under the church seem to belong to the reconstruction of 179 B.C.[2] Because of the association of this district with early dramatic performances Augustus constructed a very large theatre near by (first used, when still incomplete, in 17 B.C.) which he named in honour of his nephew Marcellus. A large part of the semicircular façade is still standing and when it has been cleared of its ugly shops and superstructure —excavations are in progress—it will be one of the most imposing ruins of ancient Rome. The exterior consisted of three series of open arcades, the lower one being decorated with engaged columns of the Doric order, the middle with Ionic ones, the third with Corinthian pilasters. The theatre seated about 10,000 spectators and had a stage of the enormous proportion of 80x20 metres.

North of this theatre may be seen the portal of the extensive Porticus of Octavia (originally the Porticus of Metellus) which enclosed large temples of Juno and Jupiter. The whole was originally built in the 2nd century B.C., but all the remains now visible belong to the debased art of the Septimian period. Within may be seen, rising above shabby walls, a column and capital of one of the great temples. North-east of this lay the extensive *Circus Flaminius* built before the second Punic war as a place to hold the plebeian games. Fragments of the supporting walls may be seen in the basements of several houses on the Via d. Bottege Oscure, but these all belong to a rebuilding of about 50–30 B.C. A few hundred feet to the north-west of this circus, Pompey built his massive theatre in 55 B.C., the first permanent theatre of Rome. This was about the same size as the Marcellus theatre and its stage was even longer. Considerable remains of it are to be found under the shops east of the Campo dei Fiori.

Farther north, in the old Campus Martius is the Pantheon,[3] a structure which Hadrian built to replace the earlier temple of Agrippa and Domitian. This round temple was one of the boldest of old Roman structures, having a brick and concrete dome with a diameter of 43½ metres without support except on the walls of the temple. The dome itself was built of narrowing circles of brick on which were laid several layers of concrete which hardened into one firm mass so that there is no lateral thrust on the walls. The walls of the rotunda are also of brick-faced concrete with solid brick arches running through the mass to aid in carrying the weight over the niches while the mass was solidifying. The portico is a rectangular structure, most of whose columns belong to Hadrian's time. Some of the repairs of its entablature seem to be of a later period. The large inscription on its front generously credits the building to Agrippa while the smaller one mentions the repairs of Septimius. Nothing is said of the actual builder, but the brick stamps and the style of work prove that Hadrian should have the chief credit. The exterior was of course faced with marble slabs, and the sumptuous decoration of the interior—originally even more elaborate—will give some idea of how lavish the whole building must have been. The temple was dedicated by Agrippa to the divinities of the Julian house, and the name was intended to convey the idea of "all-holy." Of other notable buildings in this region we may mention the *temple of Hadrian,* the walls of which have been incorporated in the Borsa, or stock exchange; the *Mausoleum of Augustus* which has till recently served as a concert hall, called the Augusteo, and the *tomb of Hadrian,* on the right bank of the Tiber, rebuilt during the middle ages into a fort called the Castel Sant' Angelo.[4]

The *Colosseum,*[5] or more correctly, the *Amphitheatrum Flavium,* was begun by Vespasian on the low ground that Nero had used for a lake in the centre of his imperial villa. It was used for hunts, sham battles, gladiatorial shows and races, and the arena could be flooded for sham naval battles. The façade consists of three series of 80 arches decorated in the three orders as were the theatres of Pompey and Marcellus, and rises 48½ metres. Stone masonry in travertine lined with tufa supports the heavier outer portion, while the vaulting of the arcades and the inner bowl consist of concrete. The seats were of marble and could hold about 50,000 spectators. The building which is elliptical measures

[1] Cichorius, *Die Trajans-Säule* (1896); Lehmann-Hartleben, *Die Trajans-Säule* (1926).
[2] Frank, *Roman Buildings of the Republic,* p. 133.
[3] Ashby's revision of Anderson and Spiers, *Architecture of Rome,* p. 78.
[4] Pierce in *Journal Rom. Studies* (1925).
[5] Ashby, *The Architecture of Ancient Rome,* p. 93.

188 metres in length and 156 metres in width, while the arena measures 86x54 metres. It was apparently the largest amphitheatre in the Roman world.

Near by stands the well proportioned *Arch of Constantine* which however is largely constructed of materials taken from previous arches. The only sculpture upon it that belongs to Constantine's day is the very narrow frieze rudely carved in a band about its centre. The other reliefs were taken from structures of the second century and in the use of these the imperial portraits were rechiselled to represent Constantine. North-east of the Colosseum one may enter several rooms of the *golden house* of Nero,[1] or rather the private apartments of that emperor. The rooms have been to some extent preserved because the walls were later used as substructions for a part of Trajan's baths built at a higher level. Many of the rooms of the palace have recently been excavated and reveal much damaged frescoes and stucco reliefs which represent the best work of its kind at Rome for the period of Nero. It was here, as graffiti on the walls indicate, that several of the Renaissance painters borrowed themes and designs for the arabesque and "grotesque" decoration so popular when the loggia of the Vatican was decorated.

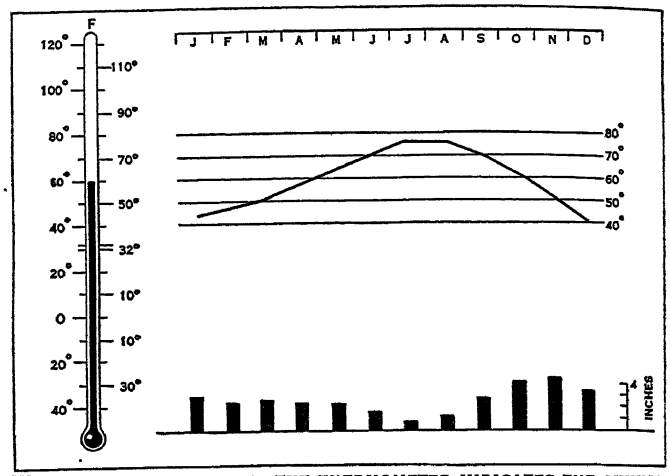
Several of the massive *Thermae* (Baths) of ancient Rome are still among the most conspicuous ruins of the city. The first large structure of this type was the one built by Agrippa in 20 B.C. south of the Pantheon. Little now remains of this. More may be seen of the ruins of those constructed by Titus and Trajan (on the grounds of Nero's *Domus Aurea*), by Caracalla on the edge of the Aventine and by Diocletian (part of which is now used for the national museum). Since these buildings contained, besides the baths, playgrounds, gymnasia, clubrooms and auditoria for immense crowds, the architects who constructed them had to employ all the arts and sciences at their disposal. The central building of Caracalla's baths covers an area of 270,000sq.ft.; and the central hall has a clear space of 183x79ft. It is roofed with a solid concrete intersecting barrel vault that rests chiefly on four massive piers and rises 108ft. from the pavement. It was while solving the problems of such construction that the Roman architects made those contributions to their art which have been most frequently studied by recent architects. The baths of Diocletian have suffered more from time, but the church of S. Maria degli Angeli has preserved two of its great halls. Here may be seen in their most advanced use at Rome good examples of flying and rectangular buttresses, a careful system of thrusts and counter thrusts and of ribbed quadripartite vaulting. A large number of the smaller rooms are used by the Museo delle Terme.

Finally the *Subterranean Basilica*[2] discovered near Porta Maggiore in 1917 has proved to be not only one of the best preserved of ancient buildings but one of the most important for the interpretation of Roman life. Though it seems to have been built before the middle of the 1st century A.D. it has the regular basilican form with nave, apse and two aisles. It was built wholly underground apparently for the purposes of a secret religious sect. The ceilings of the nave, the apse and the aisles are richly adorned with excellent stucco reliefs, the interpretation of which has proved as difficult as would be the explanation of the biblical illustrations of a mediaeval cathedral if we had no copies of the Bible. The most generally accepted view is the one proposed by Cumont, that this basilica was the temple of a Neo-Pythagorean congregation which practised mystic rites of initiation that were not approved of by the imperial authorities, and that the reliefs in question pertain to myths and rites which had been given a symbolic interpretation in the Neo-Pythagorean ritual. But quite apart from their meaning, they now give us the best conception possible of the beauty of Roman interior decoration for the 1st century of the empire. (*See* Rivoira, *Roman Architecture*, p. 204.)

(T. F.)

THE MODERN CITY

In the middle ages the population of Rome had dwindled to twenty or thirty thousand inhabitants, who lived huddled together about the strongholds of the barons, and the modern city grew slowly upon the exiguous foundation of a mediaeval town. The first plan for modernizing and improving Rome was that of Pope Julius II., who aimed at the enlargement of the lower city on both sides of the Tiber. Following him, Sixtus V. did his best to develop the upper part of the city by laying out the Via Sistina, from the Trinità dei Monti to S. Maria Maggiore and Porta S.



WEATHER GRAPH OF ROME. THE THERMOMETER INDICATES THE ANNUAL MEAN TEMPERATURE. THE CURVE SHOWS THE MONTHLY MEAN TEMPERATURE AND THE COLUMNS, THE MONTHLY PRECIPITATION

Giovanni. A plan of improvements was made, under the direction of Mgr. de Merode, during the reign of Pius IX.; and, although only very partially executed, has served as a basis for later efforts.

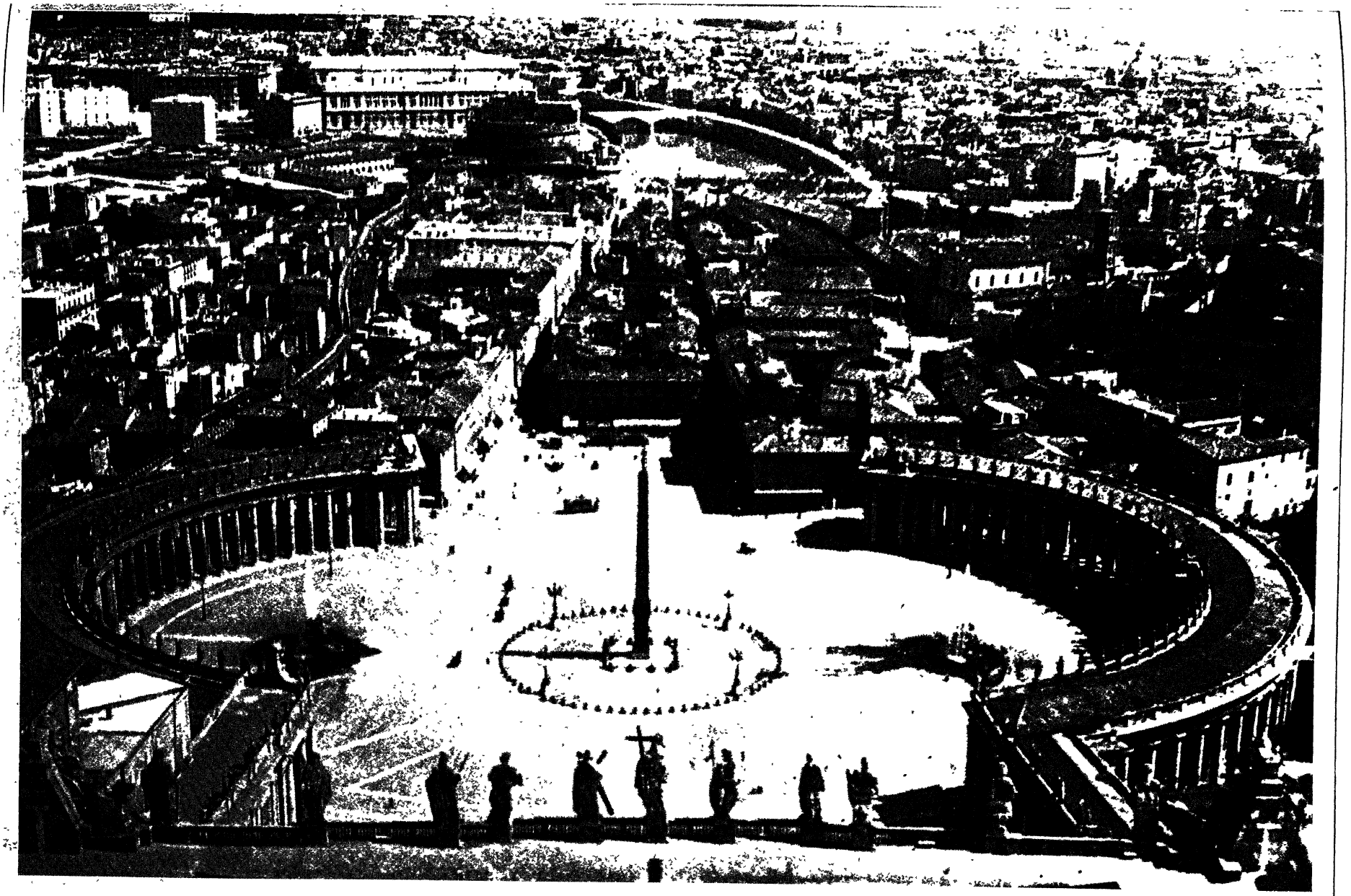
Great changes in the municipal and social conditions followed the occupation of the city by the Italians (Sept. 20, 1870), and the rapid increase of population due to immigration from other parts of Italy. In a rush of land-speculation, trees and fine villas were unfortunately destroyed. As soon as political circumstances admitted, the municipality set to work.

Two principal problems presented themselves. The more important was the confinement of the Tiber in such a manner as to render impossible the serious floods which had from time to time inundated the city, often causing great damage to property and rendering the lower streets more or less impassable. There were floods which almost reached the level of the first storey near San Carlo in the Corso, and it was common to see the great Piazza Navona and the neighbourhood of the Pantheon full of water for days together during the winter. The interruption of traffic can be imagined, and the damage to property was serious. The other urgent matter was one of which the government of Pius IX. had been partially aware, namely, the necessity for opening better thoroughfares between different parts of the city.

It is necessary to distinguish between the work carried out by the municipality, and that which was done in the way of private speculation. The first was on the whole good, and has proved enduring; the second was in many cases bad, and resulted in great loss. As soon as the opening of such streets as the Via Nazionale and the Via Cavour, the widening and straightening of the Via dell' Angelo Custode, now the Via del Tritone Nuovo, and similar improvements, such as the construction of new bridges over the Tiber, had demonstrated that the value of property could be doubled and quadrupled in a short time, and as soon as the increase of population had caused a general rise in rents, owners of property awoke to the situation of affairs, and became as anxious as they had at first been disinclined to improve their estates by wholesale building.

The most important work executed by the government with the assistance of the municipality was the construction of the embankments along the Tiber. Though damaged by the great flood of December 1900, their truly Roman solidity saved the city from the disastrous consequences of a wide inundation. It is impossible not to admire them, and not to feel respect for a people able to carry out such a plan in such a manner and in so short a time, in

[1] Weege, *Das Goldene Haus, Jahrb. des Arch. Inst.* p. 127 (1913).
[2] Carcopino, *La Basilique Pythagoricienne* (1927); for illustrations see *Memoirs Amer. Acad.* iv. (1924).

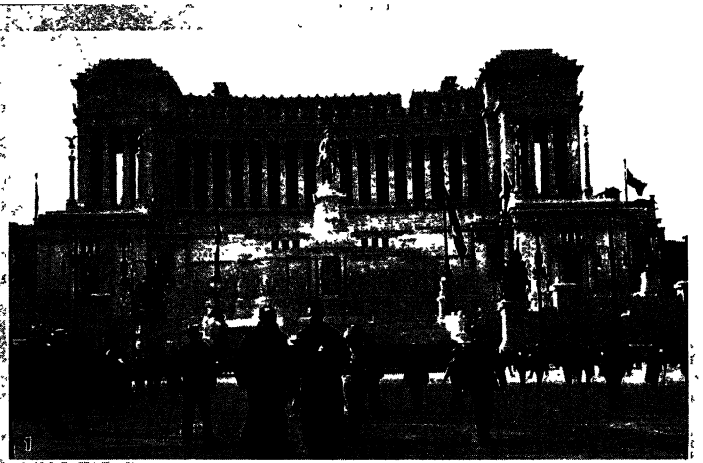


PHOTOGRAPH, UNDERWOOD PRESS SERVICE

VIEW FROM THE DOME OF ST. PETER'S

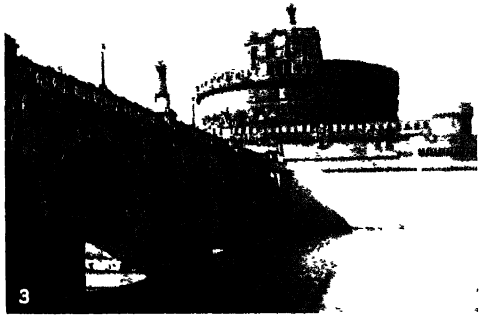
In the foreground is the piazza San Pietro enclosed by a quadruple colonnade, designed by Bernini (1656–67). The obelisk in the centre was brought from Heliopolis by the Emperor Caligula in the 1st century A.D. to be erected in his circus; it was moved to its present site in 1586. The large circular building on the bank of the Tiber (centre, left) is the Castle of S. Angelo, which was begun by Hadrian as a mausoleum for himself and his successors, and which later became the mediaeval citadel of Rome

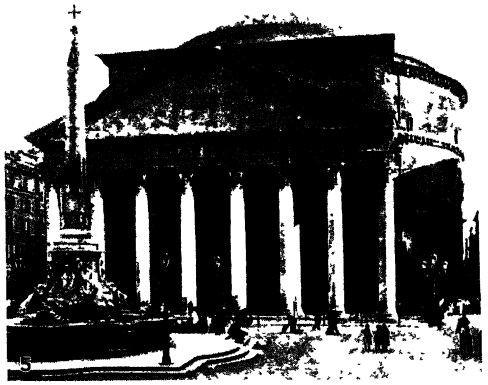
ROME

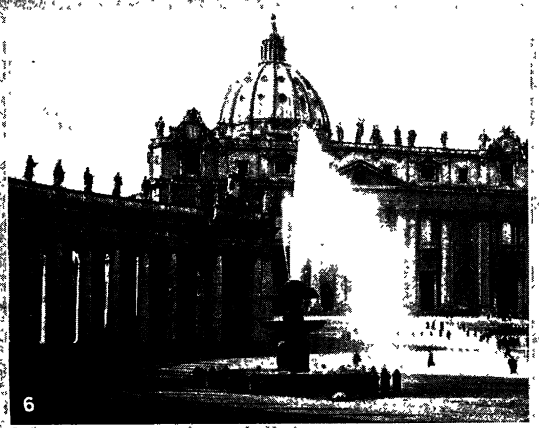












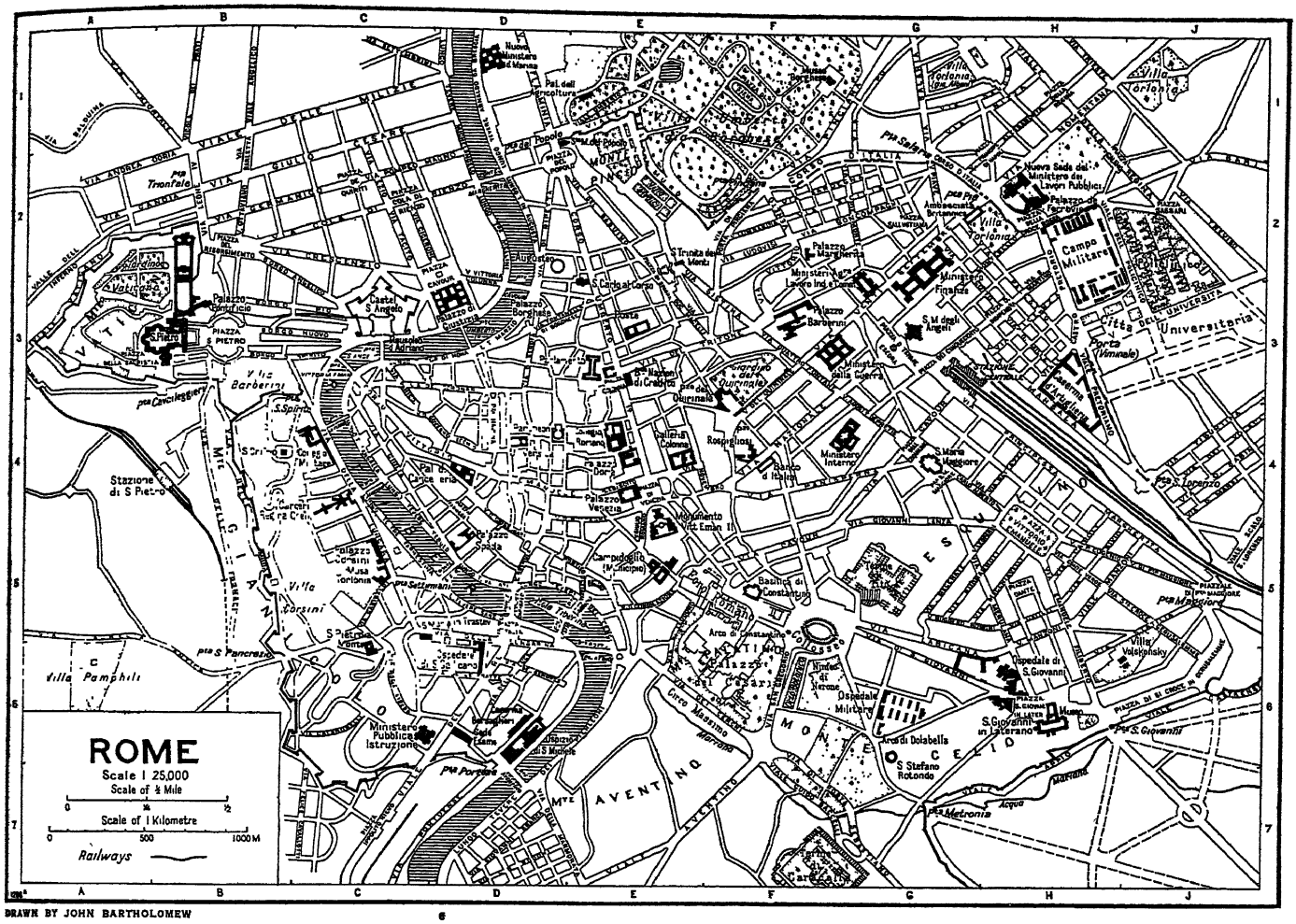




BY COURTESY OF (3, 4) THE ITALIAN TRAVEL BUREAU, LONDON; PHOTOGRAPHS, (1, 6, 7, 8) UNDERWOOD PRESS SERVICE, (2, 5) TOPICAL PRESS AGENCY

MONUMENTS AND BUILDINGS OF ANCIENT AND MODERN ROME

1. Monument of Victor Emmanuel II, begun in 1885, dedicated in 1911, in commemoration of the achievement of Italian unity. Designed by Giuseppe Sacconi. 2. Part of the Vatican and the Pope's private gardens as seen from the terrace. 3. Bridge and Castle of S. Angelo on the right bank of the Tiber (*See also* Plate I.). 4. The Appian Way, showing part of the ruins of the Claudian Aqueduct, originally 46½ miles long, begun by Caligula in A.D. 38 and finished by Claudius, A.D. 52. 5. The Pantheon, built by Hadrian, and consecrated as a Christian church in 609. 6. St. Peter's church and piazza. 7. A small circular Corinthian temple erroneously called the "Temple of Vesta," situated on the left bank of the Tiber, near the foot of the Aventine hill. It is now thought to have been the temple of Portunus, god of harbours. 8. Ruins of the Roman Forum, looking southeast. In the background, beyond the Forum, is the Colosseum



the face of such great difficulties. But so far as the life of the city was concerned, the cutting of new streets and the widening of old ones produced a more apparent immediate result. The opening of such a thoroughfare as the Via Nazionale now named in part Via Cesare Battisti, and in part Via Quattro Novembre could not but prove to be of the greatest value. It begins at the Piazza delle Terme, in which the principal railway station is situated, and connects the upper part of the city by a broad straight road, and then, by easy gradients, with the Forum of Trajan, the Piazza dei Santi Apostoli and the Piazza di Venezia, whence, as the Corso Vittorio Emanuele, it runs through the heart of the old city, being designed to reach St. Peter's by a new bridge of the same name opened in 1911 near the bridge of S. Angelo. It is true that, in order to accomplish this, the Villa Aldobrandini had to be partially destroyed but this is almost the only point which lovers of beauty can regret, and in compensation it opened to full view the famous palace of the Massimo family, the imposing church of S. Andrea della Valle, and the noble pile of the Cancelleria, one of the best pieces of architecture in Rome. Another great artery is the Via Cavour, which was intended to connect the railway station with the south-western part of Rome, descending to the Forum, and thence turning northwards to reach the Piazza di Venezia on the east side of the monument to Victor Emanuel II. It was proposed again (1928) to extend the Via Cavour to the Piazza. Rome is now divided clearly into two parts, the old and the new, of which the old is incomparably the more artistic and the more beautiful, as it will always remain the more interesting. A tunnel under the Quirinal Hill connects the north end of the old city, the Corso, Babuino, etc., and the upper part of modern Rome, including the former Via Nazionale and the Esquiline. A causeway and bridge unites the Pincio with the Villa Borghese, or, as it is now called, the Villa Umberto Primo. In 1911 zoological gardens were arranged in the grounds of the Villa and a fine collection of modern Italian art was opened in the Palazzo delle Belle Arti, to the west of the Villa.

The Policlinico, on the Macas, is one of the finest hospitals in Europe. It is on part of the large site, east and south of the Castro Pretorio, requisitioned by the Government for building a new University, and bringing together various institutions scattered about the city. Of this scheme the hospital forms part. The military hospital is on the Coelian. In 1910 in honour of the jubilee of the unity of Italy, the formation of an archaeological park, extending from the Via Appia to the foot of the Aventine and almost to the Aurelian Wall, was approved by the Parliament. It contains the Baths of Caracalla. Among the important modern buildings are the Cassa del Risparmio, in the Corso; the Palazzo Negroni, near the Piazza Nicotia, the Chamber of Deputies, with its principal front on the new Piazza del Parlamento and the Palace of Justice, near the castle of St. Angelo. It was proposed in 1922 to make the barracks and storerooms of the Castle of St. Angelo into a topographical museum. In the same year a museum of antiquities from the Forum was arranged in a building adjoining the church of Santa Francesca Romana; and the Museo Petriano, containing objects connected with the foundation and development of St. Peter's was opened in 1925.

Municipal Administration.—After 1870, those who remained loyal to Pius IX. took no part whatever in public affairs, and the municipal administration was entirely in the hands of the monarchists. The expression "nè eletti nè elettori," meaning that Catholics are to be neither voters nor candidates, which came to be regarded as a sort of rule of the party, was invented at that time by an epigrammatic journalist, and it seems at first to have been applied also to municipal matters, whereas it was later understood to refer only to parliamentary elections. Leo XIII. encouraged the formation of a Catholic party in the municipal administration, and the municipal government then drifted largely into the hands of Catholics. In the year preceding the present régime the three democratic parties, known as the monarchist,

socialist and republican, united to form a popular coalition, and succeeded in completely excluding the conservative, aristocratic and Catholic elements. Prior to 1926 there was a municipal or Communal Council chosen by the electors and a Syndic (Mayor) drawn by the Municipal Council from its members. In all Italian communes except Rome and Naples there has been substituted for these a *Podestà*, but Rome itself has a governor.

Population.—The population in 1870 was 226,022, by 1901 it had reached 462.743 (communal population). It therefore more than doubled in thirty years. The increase, however, did not take place at a regular rate, owing to the changes in the rates of immigration and emigration. In 1925 the population had reached 767,983 an almost as rapid increase as during the earlier period 1870–1901. There are in the city population many military and ecclesiastical officials.

Climate and Hygiene.—Rome is mild and sunny, but the variation in temperature between day and night is very great. December to February appear to be the coldest months, the thermometer then averaging 47°; the greatest heat, which averages 75°, is felt in July and August. The surrounding Campagna is still not all habitable during the summer, though the dangerous malaria has been much checked by the planting of numerous eucalyptus trees. A remarkable instance of the effect produced upon the marshy soil by these plantations may be studied at the Trappist monastery of the Tre Fontane, situated on the Via Ardeatina, about 4 m. from Rome. Whereas in former times it was almost always fatal to spend the whole summer there, the monks have so far dried the soil by means of the eucalyptus that they reside in the monastery throughout the year. The municipality has made strenuous efforts, attended with marked success, to reduce the mortality due to malaria. The hygienic conditions of Rome itself have greatly improved, largely through the ceaseless efforts of Commondatore Baccolli, a distinguished man of science, who repeatedly held office in the Italian Ministry. Ninety per 1,000 deaths occurred in 1871 from typhoid (the so-called "Roman fever"), but the average has now fallen to a low constant. Since the introduction of compulsory vaccination deaths from smallpox may be said not to occur at all. The death rate in (1928) averaged about 19 per 1,000.

Charities and Education.—A great number of small charitable institutions for children and old people have been founded, which are organized on the most modern principles, and in many of these charitable persons of the upper classes give their individual assistance to the poor. There are also private hospitals for diseases of the eye, in which poor patients are lodged and treated without payment. There are two hospitals entirely maintained by private resources, where infants are treated whose mothers fear to send them to a public hospital, or in cases refused by the latter as not being serious enough for admission. Of course, the numbers of the poor greatly increased with the growth of population, especially after the failure of building speculations between 1888 and 1890, though great efforts were made by the municipality to send all persons then thrown out of employment back to their homes. One of the difficulties under which Rome labours is that while it attracts the population of the country, as other capitals do, it possesses no great mechanical industries in which the newcomers can be employed. Efforts to create small industries in the populous quarters of the poor met with little success. Before 1870 a society was formed, which has since greatly developed as an intelligent private enterprise, to provide the poor with sanitary tenements; but its success is much hampered by the absence of employment, which again is partly due to the heavy taxation of small industries. A number of trade schools are also maintained by private funds, such as the Instituto degli Artigianelli, managed by the Fratelli della Dottrina Cristiana, and the Ricovero pei Fanciulli Abbandonati (home for friendless children), which is under lay management and has flourishing work shops. The character of official charities has certainly improved in principle, so far as their educational and moral scope are concerned, for whereas in former times the limited number of the poor made individual and almost paternal relief possible, that form of charity had a pauperizing influence. If anything, the present tendency is to go too far in the opposite direction, and to require too many formalities before any relief is granted; and while the union of the principal charities under a central management on advanced theories improved the methods of administration, it destroyed numerous small sources of immediate relief on which the poor had a traditional right to count, and was in that way productive of hardship. At the same time, however, mutual benefit societies (*società di mutuo soccorso*) have been organized in great numbers by the different crafts and professions, and are chiefly distinguishable by the political parties to which they belong. It is characteristic of the modern Roman people that the most widely different elements subsist without showing any signs of amalgamating, yet without attacking each other. Some of these societies have an exclusively clerical character, others are merely conservative, some consist of monarchists, and some of avowed republicans.

Popular education is principally in the hands of the municipality, but besides the public schools there are numerous religious institutions attended by the children of the lower classes; they follow the curriculum prescribed by the government, and are under the constant supervision of municipal inspectors, both as regards their teaching and their hygiene. The pope also expends large sums in the maintenance of the people's schools, managed entirely by laymen, and also under government inspection. For education of the higher grade, besides the regular lyceums and gymnasiums, there are many private schools similarly designated from which pupils can present themselves for the regular government examinations. The University of Rome was established in 1265 and in the session 1924–25 there were 4,500 students. There is also a Higher Institute of Economic and Commercial Education founded in 1906 with some 2,000 students. Rome has also an Engineering college, a Women's Training college and a School of Architecture. The State regulates public education and maintains either entirely or in conjunction with the municipality public schools of every grade. (X.)

ANCIENT HISTORY

I. THE BEGINNINGS OF ROME

The limestone ridges that border Latium contain numerous remains of stone age settlements, and one has even been found on Monte Mario within 3m. of the Vatican in the old volcanic stratum that borders the right bank of the Tiber. On the left bank, however, within the area that was in prehistoric times subject to rains of volcanic ash from the Alban craters there are very few traces of human habitation before the iron age.[1] Perhaps the activity of the volcanoes kept migrants from settling there during the bronze age. The oldest settlements so far discovered within this peculiar region seem to be those of the Alban hills, between Grotta Ferrata and Albano. Here several groups of cremating people belonging apparently to the so-called Villanova[2] (*q.v.*) branch of the Indo-Europeans came down from Tuscany and settled, about the end of the 2nd millennium B.C. In the early part of the 1st millennium they spread here and there over the Latin plain as far at least as Antium on the sea and the Palatine hill on the Tiber. In the primitive cemetery of the Forum 40 graves have so far been excavated. The deepest and earliest were cremation burials containing the same kind of pottery and personal ornaments as those of the Alban hills. Later, possibly in the 8th century, the rite of inhumation began to take the place of cremation here as on the Alban hills, at Antium, at Veii and at Falerii north of the Tiber. It is generally assumed that Sabine people from the central mountains were at this time pressing into Latium in large enough groups to become in several towns the dominating element. Whether further excavations will prove that this rite replaced cremation in all the primitive burial places at Rome is very doubtful. The fact that cremation again became the orthodox rite during the Roman republic would incline us to assume that cremation survived in some cemeteries that have not yet been discovered.

Early Institutions.—By the 7th century we may assume that

[1]Von Duhn, *Italische Gräberkunde*, 392 (1924); Antonielli, in *Bull. Palet. Ital.*, 161 (1924).

[2]Randall-MacIver, *Villanovans and Early Etruscans* (1925); *Iron Age in Italy* (1927).

the Palatine, the Capitoline, the Esquiline and the Quirinal hills had compact settlements of "Villanovan" and Sabine farmers and shepherds. These two groups were closely related in culture, language and religion. Philology proves that the bearers of the Latin language (probably the cremating group) and those who spoke the Sabellic dialects had not been separated very many centuries, and that they had been one people before entering Italy over the Alps. Several of their deities—Jupiter, Mars, Juno, Minerva and others—were also a common inheritance, and were worshipped by both peoples with rites that knew nothing of anthropomorphism. That it was a religion peculiarly adapted to an agricultural people we learn from the oldest calendar of festivals, which was drawn up before the Etruscans came to Rome. (W. Warde-Fowler, *The Religious Experience of the Roman People* [1911], 92.) Their political and social organizations were also of the same kind. The property-owning males constituted the "town-meeting" and the army. They elected the annual leaders (usually two "praetors" or "consuls") who summoned and conducted the meetings, held the elections and directed the army. The consuls must consult a smaller group of elders (senators), heads of important families, in all matters of public interest. Without the approval of the elders no proposal was put before the commons. For purposes of transacting business the commons of a town were usually divided into ten wards called *curiae*. That Rome had 30 instead of ten seems therefore to indicate that Rome was a union of three settlements already organized into regular polities before the city government was formed. In taking possession of the country, these people had settled in village groups, usually upon some hill which could be defended, and which gave access to a good spring of water or a stream. Most of the land near each village was apparently divided into private holdings, though it also seems probable that some land was left undivided for community grazing. Sacred land, used for the support of the cult, was also set apart at a very early period. These villages were independent and autonomous within the tribe. A tribal organization, however, existed, which supported a tribal cult on the Alban mount. This tribal organization was kept alive by an annual religious festival, and it had a presiding officer whose duty it was in time of danger to summon the forces of the different communities to common action. Since both the Villanovan and the Sabine communities shared in these democratic customs they coalesced readily in such a large tribal organization.

Finally both peoples long retained the institutions of a very strong patriarchal organization. Women, children and slaves were subject to the *potestas* of the family patriarch. He gave the members of his household in marriage, assigned the properties—there are but shadowy traces of clan-ownership, and testamentary rights are highly developed—and he, with his family council, meted out punishment for crimes committed within the family, and in the earlier day at least, directed the vendetta of the family against those who had committed a wrong against him or his. While the villages were still small, there were few opportunities for community action, whether judicial or legislative, so long as the patriarchal customs were respected.

City States.—At an early day these numerous communities belonging to a wide-spread tribe began to aggregate to a few favoured centres where cities grew up. Such cities soon overshadowed the villages and endangered the existence of the Latin tribal organizations. It is likely that raids from across the Tiber and from the Sabine and Volscian hills emptied the more exposed villages that could not well be fortified, drove the populace to more defensible villages, and in the case of places like Praeneste, strongly situated near the natural road between Etruria and Campania, trade of a lucrative kind also attracted settlers. It was in this way that some six city-states gradually grew up in Latium to take the place in each case of several villages. The growth of such cities in these circumstances naturally required stronger and more efficient governments, a better army organization, the building of walls or at least defensible earthen mounds with protecting pickets.

Kings.—At Rome the coalescing of three villages with their 30 curiae may date from the 8th century B.C. And here, since the threats of Etruscan raiders from Veii and Caere added much to the difficulty of governing communities that are not wholly homogeneous, elective princes holding office for life seem for a while to have displaced the customary annual magistrates. Tradition held that of these early princes Romulus (*q.v.*), Hostilius and Ancus Marcius were Latins, but that Titus Tatius (the prince of a Sabine group) and Numa Pompilius (*q.v.*) were Sabine in origin, while Tarquinius Priscus was said to be the son of a Corinthian adventurer who had first settled in Tarquinium and married an Etruscan woman, and Servius Tullius was an Etruscan chief by the name of Mastarna.

There is nothing unreasonable in this tradition, and since the art of writing was already known, the names may well have survived from early times on inscriptions of public buildings, treaties and tombs. The tradition regarding Servius Tullius was at least derived from Etruscan documents of an early date. (*See* the speech of the Emperor Claudius, Dessau, *Ins. Lat. Sel.*, 212.) History, however, need not take seriously the numerous legends preserved by Livy regarding the wars and deeds of these kings. Villages near Rome which naturally dwindled to insignificance under the attractive power of a neighbouring city left traces of themselves in abandoned walls; and picturesque legends grew up to account for their annihilation, but most of them had decayed several centuries before history was written.

Etruscan Kings.—The Etruscan (*see* ETRURIA) house of the Tarquins seems to be more tangible. Tradition places their rule in the latter half of the 6th century B.C., at a time in fact when we know that Etruscan princes were making conquests southward as far as Capua, when Etruscan art and Greek objects of art carried by Etruscans came into Rome as they did into Praeneste, Velitrae, Ardea, Satricum[1] and other Latin towns, when Rome received a stone ring-wall enclosing a remarkably large area and ceased to use the Forum cemetery for burial—since that now was included within the ring—and when Rome's rulers began to reach out for the control of the larger part of Latium.

The Etruscan adventurers, employing methods like those of the Normans who ruled the Sicilian cities in the 12th century, had come by sea to govern and exploit the unorganized communities of the Villanovans some two centuries before. Different families had secured control of most of the districts of Tuscany, had fortified their various cities, trained their subjects into effective armies as well as into obedient tenants and serfs, had developed farming by improved methods of planting, draining and irrigation, had exploited the copper and iron mines of Etruria and organized a flourishing industry in metal work with which they attracted Phoenician and Greek traders and had even entered actively into maritime commerce.[2]

Whether the Tarquins actually seized Rome by force or migrated to Rome and secured control by political devices we do not know. Under them Rome and Latium underwent very remarkable changes. An extensive wall[3] of almost 6m. was built to enclose an area that would readily house 200,000 inhabitants living in low small houses. There could hardly have been so many inhabitants when the enclosure was made; and indeed the walls, in order to make use of natural escarpments and to include outlying shrines, probably took in many undeveloped tracts. We cannot be sure that the regal wall extended as far out as the so-called Servian wall, despite the existence of very old remains in the gardens of the "Villa Spithoever." Tombs of the 4th century within the area seem to prove at least that the sacred *pomerium* did not extend so far, even if the fortifications did. Nevertheless the regal city was remarkably large when compared with other Italian cities, and its size points to a builder who was intent upon extensive projects of development. The Tarquins certainly opened the city to the currents of Mediterranean commerce now being attracted westward by Etruscan prosperity. Tradition plausibly holds that a port was used at the mouth of the Tiber as early as the 6th century; Greek and Etruscan articles came

[1] Della Seta, *Museo di Villa Giulia*, i., 235 (1918).
[2] D. Randall-MacIver, *The Etruscans* (1927).
[3] *Papers of the American Academy in Rome*, iii., 112 (1924).

o the city, Greek and Etruscan artisans were at work on the ublic buildings, and it is not unlikely that some of the industries hat prospered in Etruria were enticed to Rome.

A strong army was also organized. Tradition attributes the egal army of nearly 20,000 men to Servius, who came from Etruria and doubtless employed the same methods as other Etruscan princes. Of these, 9,800 belonged to the "first class" of property holders, the rest to the other four classes; that is to say, all of the "first class" men were liable to army service, but



FROM FRANK, "HISTORY OF ROME" (CAPE)

MAP SHOWING INVASIONS OF ANCIENT ITALY, WITH APPROXIMATE DATES

nly a diminishing proportion of the lower classes. In any nodern industrial city where 10,000 males of military age con- titute the highest 20% of taxpayers one would have to assume population of at least 500,000 souls, or 100,000 male citizens; nd that would be a very large population for a city with a ural territory of only about 500sq.m. (320,000ac.). It must, owever, be remembered that in early Latium the proportion of roperty owners was large, that the Latin communities had con- isted chiefly of farmers practising hoe-culture to whom 5–10ac. vould not only suffice for a family but would require all its nergies for cultivation. In the rural area, at least, property was nore evenly divided than would be the case in an industrial ommunity to-day, so that the 9,800 soldiers of the first class eed not imply as large a population as it might to-day. Con- idering the extent of the city walls and the intensive cultivation f the Latin soil, we may accept for the last years of the regal eriod the tradition of the army of 193 centuries (19,300 men), nd conjecture an urban population of about 200,000 and a rural opulation of about the same size. That the Latin country was t that time intensively cultivated we may well believe, when we ecall the long underground drainage channels which were driven hrough the tufa on the Alban slopes to carry off torrential rain vaters in order to save the surface soil from erosion. Such ex- ensive work of salvage would not have been undertaken unless land had been very much in demand and the population much more dense than in historical times.

The Etruscan princes were also vigorous conquerors, bent on extending their power throughout Latium. Tradition, reported by Livy and Dionysius, dwells long on their wars of conquest with Veii, Latin towns like Gabii, Aricia, Ardea and the Volscians as far as Tarracina. That this tradition happens to be fairly correct we may conclude from the facts that the region below Velitrae was particularly submitted to agricultural development (Frank, *Economic History of Rome,* 8 and 35, 2nd ed. 1927), that the colony of Cora existed at the founding of the first Latin league, and that the terms of the first treaty between Carthage and Rome, signed in 509, prove that the principality developed by Tarquin extended as far as Tarracina. This famous treaty recorded by Polybius (III. 22–3) is our oldest genuine document of Roman history. It was signed with the new republic of Rome immediately after the Etruscans had been banished and doubtless to a large extent reiterated the provisions of the previous treaty which the Tarquins had signed when in control of Rome. In the first sections it assumes that the free Romans would continue commerce on the seas to the extent that the Tarquins had, and it therefore makes an effort to safeguard the Punic trade monopoly at Punic ports. That proved to be a needless precaution, for the Romans abandoned the seas soon after they fell out of touch with Etruscan enterprise. A paragraph of the second part of the treaty reveals how far the ambitions of Etruscan Rome had advanced. It reads, "The Carthaginians shall do no injury to the people of Ardea, Antium, Laurentum, Circeii, Tarracina, nor any other people of the Latins that are subject to Rome. From those townships of Latium which are not subject to Rome they shall hold their hands; and if they shall take one they shall deliver it unharmed to the Romans." If, as seems to be the case, these clauses remain standing from Tarquin's last treaty with Carthage, they indicate that Tarquin had conquered at least the towns named, and that such towns as Pometia and Satricum, which are not mentioned, are considered within the sphere of Rome's natural interests, so that even if Carthage in some dispute should attack them she must deliver them to Rome. Needless to say the Roman republic which signed this treaty could not long entertain such ambitions, inherited for the time from Tarquin. Rome discovered within a few years that she had to release the Latins from subjection in order to win their support in her struggle with the returning Etruscans.

The terms of this treaty reveal how powerful Rome had become under the Tarquins and explain to us the resources that could pay for the building of a wall of 6m. and the power that could muster and employ an army of 20,000 men. They also help us to picture the resources that were expended in a very aggressive building programme. The temple to Jupiter which Tarquin nearly completed on the Capitoline hill stood on a lofty stylobate more than 20ft. high and measured about 200ft. x 185ft. None of the flourishing Etruscan cities with all their commercial prosperity had any temple comparable to this. Tarquin also moved the Diana cult from Aricia to Rome so as to make Rome the religious centre of the Latin communities of the Alban hills, and to Diana he built a famous temple on the Aventine. To the Etruscan period are also attributed several Fortuna temples—since soothsaying was particularly in favour with the Etruscans. Then in the first years of the republic there were built several temples begun by the Tarquins or vowed in the vigorous spirit of enterprise that the Tarquins had instilled; the large temple of Saturn below the Capitoline, the temple of Mercury—the god of commerce—behind the Palatine, the temple of Ceres nearby, and the splendid temple of Castor in the Forum. Not till two centuries later did the republic spend so much energy and money in public buildings, for with the expulsion of the Etruscans Rome became again a rural market place.

The effects of the Etruscan régime were widespread, though it apparently did not last more than about a century—if we are right in dating the last of the Forum burials about 600 B.C. In the Etruscan Government the senate had been retained, though virtually stripped of power, and the assembly was probably never

summoned by the last Tarquin. A large industrial class must have come into existence in the city in the regal period, for even though the walls were raised by forced citizen-labour as tradition held, the increase in trade at the Roman market, the manufacture of the elaborate decorations for the new buildings, the service of a luxurious court, the provisioning and equipping of a large army would require much skilled labour. In some of the regions of Latium taken by force it is probable that the natives were reduced to serfdom as had been the custom in various parts of Etruria. The long and expensive drainage canals that are found between the Alban hills and the sea are not explicable in a system of small free farmers. In that region at least there must have been one or more strong lords who commanded much labour and capital. Whether the prince retained the land as a royal domain or assigned it as fiefs to favourites we have no means of knowing, and we must also admit that no conclusive evidence survived in Roman custom of the servile system which is frequently posited for this period.

This foreign régime also accounts for certain changes in rites, customs and institutions that were more or less lasting. The Etruscans had usually accepted the Italic deities from their subjects, but having come from the East and imbued with anthropomorphic conceptions they made representations of these deities in bronze or terra-cotta and built temples for them. Since such representations were usually derived from figures of Greek gods this process not only localized and gave human form to the Italic deities, but syncretized them with definite Greek gods regarding whom there existed a mythology. In this respect therefore the intervention of the Etruscans completely revolutionized the ideas of the younger generation of Romans. The Etruscans also lent their influence to the growing custom of inhuming the dead, and, for a while at least, to the interment of costly adornments with the body. Since the Etruscan burial rites—brought from Asia—were definitely connected with beliefs of the survival of the *genius* in a state of happiness or suffering, the Italic ideas of future existence were thus permanently altered, even though the Republican Government when restored tried to abolish funeral adornments and encourage a return to the Italic burial customs. That the Latin language was not displaced at Rome even in official regal inscriptions is proved by the survival of the famous "stele" of the forum, which is written in Latin though on an Etruscan stone and containing a reference to the king.

Expulsion of the King.—Near the end of the 6th century the Etruscan usurpers were ejected and a republican government formed with a restoration of annual elective magistrates, an advisory senate of nobles and a timocratic popular assembly. The traditional date is 509 B.C., but since the chronology adopted by later writers is a reconstruction from consular lists and from the marks made every year on the doorposts of the Capitoline temple, and since a discrepancy of a few years existed between these two records, we must not insist upon exact dates. Livy attributes the revolt against the Tarquins to a general objection to forced labour on public buildings and in the last instance to the wrong done to Lucretia by a son of the king. That tradition should have kept an accurate and adequate explanation of causes for several hundred years is not plausible, but in view of the evidence of archaeology and of institutional survivals we cannot doubt that Etruscan princes held Rome for a while and that they were ejected with a restoration of native rule.

II. THE REPUBLIC

Period A: 509–265 B.C.—(*a*) **The Struggle Between the Orders.**—The Tarquins apparently did not at once acquiesce in the results of the revolution. Securing the aid of friends in Etruscan cities and also in some Latin towns like Tusculum, still held by friendly princes, they attacked Rome again and again. An Etruscan tradition mentions a temporary victory by Lars Porsenna of Clusium by which he was able to disarm Rome for a while; and as late as 499 there was a famous battle at Lake Regillus in which the Romans won a decisive victory over Etruscan and some Latin forces, and the general on that occasion vowed the temple to Castor in recognition of aid received from Greek cavalry. Rome also had trouble with the Latin cities, for the new Government attempted to take over the hegemony of the Latin towns that had been subjected by the Tarquins, while these Latin towns also wished a restoration of independence. Rome's wars with the Etruscans made it impossible to enforce her claims over the Latins, and consequently she had to come to terms with them. The independent league of Latin towns[1] consisting of Tibur, Tusculum, Aricia, Lanuvium, Ardea, Pometia and Cora, formed in order to resist Rome's pretensions, soon (*c.* 493) entered into a defensive alliance with her (the *foedus Cassianum*), and this new league made enough progress at once so that Signia and Norba were settled as common Latin colonies. But the Volscian towns of Antium, Satricum, Velitrae and Tarracina fell away from Latin connections.

The Government.—The new Government of Rome was more nearly an aristocracy than the old native Italic Governments. During the regal period with its great prosperity, its immigration of labourers, its partial imposition of serfdom, and grants of fiefs and privileges, class distinctions had come into existence. The favoured elders, selected by position, influence and favour for seats in the senate, were now considered a caste apart from the rest and they and their descendants were called patricians (*q.v.*). Since this group seems to have led the revolution and formed the new Government it is not strange that they imposed the requirements that patricians alone could hold the magistracies and priesthoods and interpret the laws, and that no resolution of the popular assembly should be binding unless ratified by the patrician senators. And when the more influential of the plebeians were enrolled as senators these *conscripti* apparently were not allowed to participate in the ratification of laws. Economic changes added to the disagreement between the classes. With the departure of the king and his court Rome fell out of the current of sea-going commerce, if we may judge from the evidence of excavations. For a while also trade relations with Etruria were cut off. Building construction which had flourished also soon came to an end. Furthermore when Rome had to surrender her hegemony not only over the Volscians of southern Latium but also over all the towns of central Latium, the profits that had flowed into the city from those regions ceased. There must have been much poverty and a large number of unemployed. And since the laws still permitted imprisonment and under certain conditions enslavement for debts, there arose among the poorer plebeians a demand for political rights with which to win some relief from economic distress. There were still in the vicinity several primitive Latin villages with their old town meetings which reminded the Romans of the old democratic government that had existed before the Etruscan invasion.

In the domain of external politics the 5th century was largely devoted to a reconquest by the league of the parts of Latium which were lost to the Volsci and Aequi during the distressing years of warfare with the Etruscans. In internal politics the plebeians made some progress during the century in their battle for recognition. What the plebeians first asked for was the right to elect advocates (tribunes of the people) who should have the right to prevent arbitrary arrest, and to speak for them in court when arrested. This seems to have been an attempt to find a remedy against harsh debtor-laws, and a substitute for the king who had listened to such appeals. The historians say that the plebeians were not granted this request until they had seceded to Mons Sacer when called upon for service against the Volsci. The fact that the privilege was granted by a sacred agreement which also invoked a curse upon any who impeded a tribune in the performance of his duty gives evidence that the measure rested upon a solemnly sworn compact between the orders. The story of the political strike is therefore plausible. There may at first have been four tribunes, one for each city tribe; but before the time of the decemvirs there were ten, and this remained henceforth the standing number.

It would be difficult to find a parallel to the tribunate anywhere. The tribune never became, strictly speaking, a magistrate of the Roman people. His one prerogative in the early day was

[1]Rosenberg, in *Hermes*, 159 (1919).

to protect individual plebeians against summary arrest by patrician officials and he must exercise this function in person and within the city. That he was sacrosanct and absolutely protected in the performance of his duty clearly points to the intention that in this one function he was to be as efficient a protector of the oppressed individual as the absolute monarch had been. Such powers could hardly be kept from abuse, and in time the tribunes became powerful individuals who could intervene in almost any department of state.

Since the tribunes were elected annually by the plebeians it was only natural that the plebeian assembly—which met by local groups or tribes—might remain to discuss policies and instruct the tribunes by resolution. In 471, if Livy is correct, a law was passed (the lex Publilia) which recognized the plebeian tribal assemblies as lawful, and authorized the tribunes to propose and carry resolutions in such assemblies. These resolutions (plebiscites) had of course only such force as plebeian influence gave them, but the time was to come when the plebeians were the most powerful element of the state, and when the law-making body dared not long resist the demands of plebiscites.

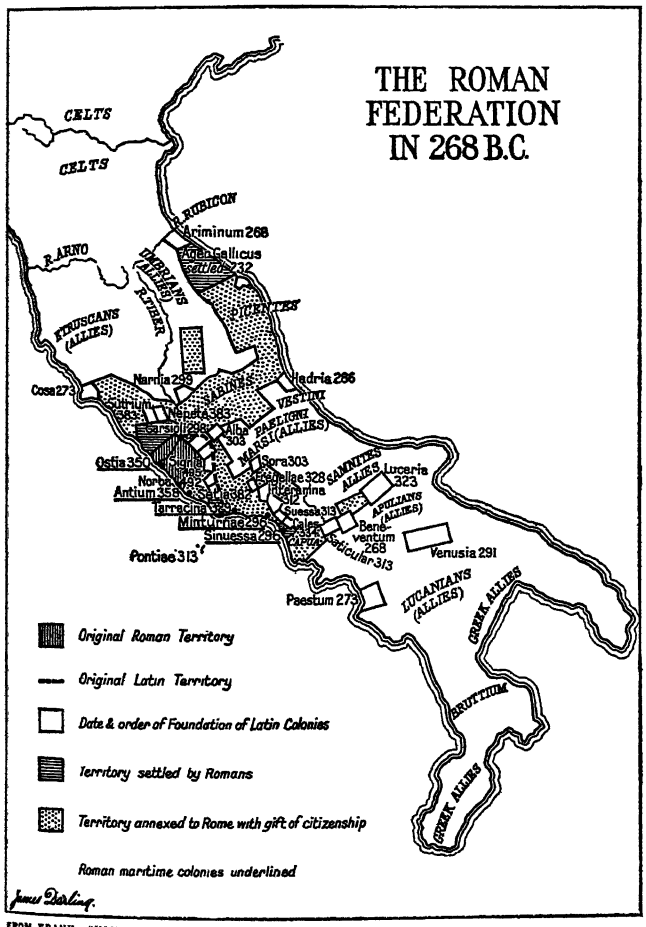
The Twelve Tables.—The plebeians now had advocates in court, but the tribunes were hampered by the fact that court judgments were rendered according to unwritten custom preserved from father to son within a narrow group of learned patricians. It therefore became apparent that the customary law must be codified and posted. After many years of discussion a law was passed substituting for the while a board of ten patricians in place of the two consuls and authorizing this board of ten to frame and publish a code of laws to be binding upon all. The *decemviri* worked on this code in 451 and 450, when it was inscribed and posted in the Forum. These "XII. tables" were in no sense a reform or a liberalizing of old custom. They recognized the prerogatives of the patrician caste and of the patriarchal family, the validity of enslavement for unpaid debt and the interference of religious custom in civil cases. That they reveal a remarkable liberality for their time in respect to testamentary rights and to contracts is probably not due to any alteration brought in by the *decemviri,* but rather to the progress that had been made in commercial customs in the Roman Forum in the days of prosperity and vigorous trade. The gist of this code has survived in quotations and is now the historian's safest index of the state of Rome's culture in the 5th century. (T. F.)

Constitutional Changes.—The *decemviri,* who had incurred much opposition because of their autocratic administration of Rome, were deposed at the demand of the plebeians who seceded to the Janiculan Hill and made a formal demand that the former Government be restored. The assemblies accordingly met and elected consuls and tribunes again. But the plebeian assembly went farther and demanded certain reforms in the constitution. These demands were embodied in the very important Valerio-Horatian laws passed by the popular (centuriate) assembly in 449. These laws granted or reaffirmed the inviolability of the tribunes, the right of every citizen to carry his appeal to the assembly in cases of death sentences, and finally enacted that plebiscites passed by the plebeian assembly should be placed before the senate and if ratified by the *patres* should be recognized as law. Only a few years after the Valerio-Horatian legislation came the *lex Canuleia,* itself a *plebiscitum* (445 B.C.), by which mixed marriages between patricians and plebeians were declared lawful, and the social exclusiveness of the patriciate broken down. In the same year with this measure, and like it in the interests primarily of the wealthier plebeians, a vigorous attack commenced on the patrician monopoly of the consulate, and found this stronghold of patrician ascendancy the conflict raged until the passing of the Licinian laws in 367. The original proposal of the tribune Gaius Canuleius, in 445, that the people should be allowed to elect a plebeian consul was evaded by a compromise. The senate resolved that for the next year, in the stead of consuls, six military tribunes with consular powers should be elected, and that the new office should be open to patricians and plebeians alike. The consulship was thus for the time saved from pollution, as the patricians phrased it, but the growing strength of the *plebs* is shown by the fact that in 50 years out of the 78 between 444 and 366 they succeeded in obtaining the election of consular tribunes rather than of consuls. Despite, however, these discouragements, the patricians fought on. Each year they strove to secure the creation of consuls rather than consular tribunes, and failing this strained every nerve to secure for their own order at least a majority among the latter. Even the institution of the censorship (435), though rendered desirable by the increasing importance and complexity of the census, was, it is probable, due in part to their desire to discount beforehand the threatened loss of the consulship by diminishing its powers. Other causes, too, helped to protract the struggle. Between the wealthier plebeians, who were ambitious of high office and the poorer, whose minds were set rather on allotments of land recently taken from Veii, there was a division of interest of which the patricians were not slow to take advantage, and to this must be added the pressure of war. The death struggle with Veii and the sack of Rome by the Gauls absorbed for the time all the energies of the community. In 377, however, two of the tribunes, G. Licinius Stolo (*see* LICINIUS STOLO, GAIUS) and L. Sextius, came forward with proposals which united all sections of the *plebs* in their support. Their proposals were as follows: (1) that consuls and not consular tribunes be elected; (2) that one consul at least should be a plebeian; (3) that the priestly college, which had the charge of the Sibylline books, should consist of ten members instead of two, and that of these half should be plebeians; (4) that no single citizen should hold in occupation more than 500ac. of the common lands, or pasture upon them more than 100 head of cattle and 500 sheep; (5) that interest already paid on debts should be deducted from the principal, and the remainder paid off in three years. The last two proposals were obviously intended to meet the demands of the poorer plebeians, and to secure their support for the first half of the scheme. Ten years of bitter conflict followed, but at last, in 367 B.C., the Licinian rogations became law, and one of their authors, L. Sextius, was created the first plebeian consul. For the moment it was some consolation to the patricians that they not only succeeded in detaching from the consulship the administration of civil law, which was entrusted to a separate officer, *praetor urbanus,* to be elected by the *comitia* of the centuries, with an understanding apparently that he should be a patrician, but also obtained the institution of two additional aediles (*aediles curules*), who were in like manner to be members of their own order. With the opening of the consulship, however, the issue of the long contest was virtually decided, and the next 80 years witnessed a rapid succession of plebeian victories. Now that a plebeian consul might preside at the elections, the main difficulty in the way of the nomination and election of plebeian candidates was removed. The proposed patrician monopoly of the new curule aedileship was almost instantly abandoned. In 356 the first plebeian was made dictator; in 350 the censorship, and in 337 the praetorship was filled for the first time by plebeians; and lastly, in 300, by the *lex Ogulnia,* even the sacred colleges of the pontiffs and augurs, the old strongholds of patrician supremacy, were thrown open to the *plebs.* The patricians lost also the control they had exercised so long over the action of the people in assembly. The *patrum auctoritas,* the sanction given or refused by the patrician senators to laws and to elections, had hitherto been a powerful weapon in their hands. But in 339 a law of Q. Publilius Philo, a plebeian dictator, enacted that this sanction should be given beforehand to laws enacted in the *comitia centuriata,* and a *lex Maenia* of uncertain date extended the rule to elections in the same assembly. Henceforward the *patrum auctoritas* sank into a meaningless form, though as such it still survived in the time of Livy. From 287 onwards it is certain that measures passed by the *plebs,* voting by their tribes, had the full force of laws without any further conditions whatsoever. The legislative independence of the plebeian assembly was secured, and with this crowning victory ended the long struggle between the orders.

(*b*) **Conquest of Italy.**—Twelve years after the passing of the *lex Hortensia,* King Pyrrhus, beaten at Beneventum, withdrew from Italy, and Rome was left mistress of the peninsula.

The steps by which this supremacy had been won have now to be traced.

The expulsion of the Tarquins from Rome, followed as it seems to have been by the emancipation from Etruscan supremacy of all the country between the Tiber and the Liris, entirely altered the aspect of affairs. North of the Tiber the powerful Etruscan city of Veii, after a vain attempt to restore the Tarquins, relapsed into an attitude of sullen hostility towards Rome, which, down to the outbreak of the final struggle in 407, found vent in constant and harassing border forays. The Sabines recommenced their raids across the Anio; from their hills to the south-east the Aequi pressed forward as far as the eastern spurs of the Alban range, and ravaged the low country between that range and the Sabine mountains; the Volsci overran the coast-lands as far as Antium, established themselves at Velitrae and even wasted the fields within a few miles of Rome. But the good fortune of Rome did not leave her to face these foes single-handed, and it is a significant fact that the history of the Roman advance begins, not with a brilliant victory, but with a timely alliance. According to Livy, it was in 493, only a few years after the defeat of the prince of Tusculum at Lake Regillus, that a treaty was concluded between Rome and the Latin communities of the Campagna. The alliance was in every respect natural. The Latins were the near neighbours



FROM FRANK, "HISTORY OF ROME" (CAPE)

MAP SHOWING GROWTH OF THE ROMAN FEDERATION UP TO 268 B.C.

and kinsmen of the Romans, and both Romans and Latins were just freed from Etruscan rule to find themselves as lowlanders and dwellers in towns face to face with a common foe in the ruder hill tribes on their borders. The exact terms of the treaty cannot, any more than the precise circumstances under which it was concluded, be stated with certainty (*see* LATIUM), but two points seem clear. There was at first a genuine equality in the relations between the allies; Romans and Latins, though combining for defence and offence, did so without sacrificing their separate freedom of action, even in the matter of waging wars independently of each other. But, secondly, Rome enjoyed from the first one inestimable advantage. The Latins lay between her and the most active of her foes, the Aequi and Volsci, and served to protect her territories at the expense of their own. Behind this barrier Rome grew strong, and the close of the Aequian and Volscian wars left the Latins her dependents rather than her allies. Beyond the limits of the Campagna Rome found a second ally, hardly less useful than the Latins, in the tribe of the Hernici, in the valley of the Trerus, who had equal reason with the Romans and Latins to dread the Volsci and Aequi, while their position midway between the two latter peoples made them valuable auxiliaries to the lowlanders of the Campagna.

Capture of Veii.—During the period 449–390 there is an unmistakable development of Roman power on all sides. In southern Etruria the capture of Veii (396) virtually gave Rome the mastery as far as the Ciminian forest. Sutrium and Nepete, "the gates of Etruria," became her allies and guarded her interests against any attack from the Etruscan communities to the north, while along the Tiber valley her suzerainty was acknowledged as far as Capena and Falerii. On the Anio frontier we hear of no disturbances from 449 until some ten years after the sack of Rome by the Gauls. In 446 the Aequi appear for the last time before the gates of Rome. After 418 they disappear from Mt. Algidus, and in the same year the communications of Rome and Latium with the Hernici in the Trerus valley were secured by the capture and colonization of Labicum. Successive invasions, too, broke the strength of the Volsci, and in 393 a Latin colony was founded as far south as Circeii. In part, no doubt, these Roman successes were due to the improved condition of affairs in Rome itself, consequent upon the great reforms carried between 450 and 442; but it is equally certain that now, as often afterwards, fortune befriended Rome by weakening, or by diverting the attention of, her opponents. In particular, her rapid advance in southern Etruria was facilitated by the heavy blows inflicted upon the Etruscans during the 5th century B.C. by Celts, Greeks and Samnites. By the close of this century the Celts had expelled them from the rich plains of what was afterwards known as Cisalpine Gaul, and were even threatening to advance across the Apennines into Etruria proper. The Sicilian Greeks, headed by the tyrants of Syracuse, wrested from them their mastery of the seas, and finally, on the capture of Capua by the Samnites in 423, they lost their possessions in the fertile Campanian plain. These conquests of the Samnites were part of a great southward movement of the highland Sabellian peoples.

Sack of Rome by the Gauls.—But in 390, or more probably 389, the Roman advance was for a moment checked by a disaster which threatened to alter the course of history in Italy, and which left a lasting impress on the Roman mind. In 391 a Celtic horde left their newly won lands on the Adriatic, and, crossing the Apennines into Etruria, laid siege to the Etruscan city of Clusium (Chiusi). Thence, provoked, it is said, by the conduct of the Roman ambassadors, who, forgetting their sacred character, had fought in the ranks of Clusium and slain a Celtic chief, the barbarians marched upon Rome. On July 18, 390 B.C., only a few miles from Rome, was fought the disastrous battle of the Allia. The defeat of the Romans was complete, and Rome lay at the mercy of her foe. But in characteristic fashion the Celts halted three days to enjoy the fruits of victory, and time was thus given to put the Capitol at least in a state of defence. The arrival of the barbarians was followed by the sack of the city, but the Capitol remained impregnable. For seven months they besieged it, and then in as sudden a fashion as they had come they disappeared. The Roman chroniclers explain their retreat in their own way, by the fortunate appearance of M. Furius Camillus with the troops which he had collected, at the very moment when famine had forced the garrison on the Capitol to accept terms. More probably the news that their lands across the Apennines were threatened by the Veneti, coupled with the unaccustomed tedium of a long siege and the difficulty of obtaining supplies, inclined the Celts to accept readily a heavy ransom as the price of their withdrawal. But, whatever the reason, it is certain that they retreated, and, though during the next 50 years marauding

bands appeared at intervals in the neighbourhood of Rome, and even once penetrated as far south as Campania (361–360), the Celts never obtained any footing in Italy outside the plains in the north which they had made their own.

Annexation of Southern Etruria.—Nor, in spite of the defeat on the Allia and the sack of the city, was Rome weakened except for the moment by the Celtic attack. The storm passed away as rapidly as it had come on. The city was hastily rebuilt, and Rome dismayed the enemies who hastened to take advantage of her misfortunes by her undiminished vigour. Her conquests in southern Etruria were successfully defended against repeated attacks from the Etruscans to the north. The creation in 387 of four new tribes (Stellatina, Sabatina, Tromentina and Arnensis) marked the final annexation of the territory of Veii and of the lands lying along the Tiber valley. The addition of these tribes, containing Roman settlers as well as Veientines, increased the number and influence of the plebeian group. A few years later Latin colonies were established at Sutrium and Nepete for the more effectual defence of the frontier, and finally, in 353, Caere (*q.v.*) signed a treaty of peace for 100 years[1].

Next to the settlement of southern Etruria, the most important of the successes gained by Rome between 390 B.C. and 343 B.C. were those won against her old foes the Aequi and Volsci, and her old allies the Latins and Hernicans. The Aequi indeed, already weakened by their long feud with Rome, and hard pressed by the Sabellian tribes in their rear, were easily dealt with, and after the campaign of 389 we have no further mention of an Aequian war until the last Aequian rising in 304. The Volsci, who in 389 had advanced to Lanuvium, were met and utterly defeated by Camillus, the conqueror of Veii, and this victory was followed up by the gradual subjugation to Rome of all the lowland country lying between the hills and the sea as far south as Tarracina. Latin colonies were established at Satricum (385), at Setia (379), and at Antium and Tarracina some time before 348. In 358 two fresh Roman tribes (Pomptina and Publilia) were formed in the same district.

Reorganization of the Latin League.—Rome had now nothing more to fear from the foes who a century ago had threatened her very existence. The lowland country, of which she was the natural centre, from the Ciminian forest to Tarracina, was quiet, and within its limits Rome was by far the strongest power. But she had now to reckon with the old and faithful allies to whose loyal aid her present position was largely due. The Latini and Hernici had suffered severely in the Aequian and Volscian wars; it is probable that not a few of the smaller communities included in the league had either been destroyed or been absorbed by larger states, and the independence of all alike was threatened by the growing power of Rome. The sack of Rome by the Celts gave them an opportunity of reasserting their independence, and we are consequently told that this disaster was immediately followed by the temporary dissolution of the confederacy, and this again a few years later by a series of actual conflicts between Rome and her former allies. Between 383 and 358 we hear of wars with Tibur, Praeneste, Tusculum, Lanuvium, Circeii and the Hernici. But in all Rome was successful. In 382 Tusculum was fully incorporated with the Roman state by the bestowal of the full franchise; in 358, according to Livy and Polybius, the old alliance was formally renewed with the Latini and the Hernici. We cannot, however, be wrong in assuming that the position of the allies under the new league was far inferior to that accorded them by the treaty of Spurius Cassius. Henceforth they were the subjects rather than the equals of Rome, a position which it is evident that they accepted much against their will, and from which they were yet to make one last effort to escape.

First Samnite War.—Rome had won her supremacy from the Ciminian forest to the Liris as the champion of the comparatively civilized communities of the lowlands against the rude highland tribes which threatened to overrun them, and so, when her legions first crossed the Liris, it was in answer to an appeal from a lowland city against invaders from the hills. While she was engaged in clearing Latium of Volsci and Aequi, the Sabellian tribes of the central Apennines had rapidly spread over the southern half of the peninsula. Foremost among these tribes were the Samnites, a portion of whom had captured the Etruscan city of Capua in 423, the Greek Cumae in 420, and had since then ruled as masters over the fertile Campanian territory. But in their new homes the conquerors soon lost all sense of relationship and sympathy with their highland brethren. They dwelt in cities, amassed wealth, and inherited the civilization of the Greeks and Etruscans whom they had dispossessed; above all, they had before long to defend themselves in their turn against the attacks of their ruder kinsmen from the hills, and it was for aid against these that the Samnites of Campania appealed to the rising state which had already made herself known as the bulwark of the lowlands north of the Liris, and which with her Latin and Hernican allies had scarcely less interest than the Campanian cities themselves in checking the raids of the highland Samnite tribes.

The Campanian appeal was listened to. Rome with her confederates entered into alliance with Capua and the neighbouring Campanian towns, and war was formally declared (343) against the Samnites. While to the Latins and Hernicans was entrusted apparently the defence of Latium and the Hernican valley against the northerly members of the Samnite confederacy; the Romans themselves undertook the task of driving the invaders out of Campania. After two campaigns the war was ended in 341 by a treaty, and the Samnites withdrew from the lowlands, leaving Rome the recognized suzerain of the Campanian cities which had sought her aid.

The Latin War.—There is no doubt that the check thus given by Rome to the advance of the hitherto invincible Sabellian highlanders not only made her the natural head and champion of the low countries, south as well as north of the Liris, but also considerably added to her prestige. Carthage sent her congratulations, and the Etruscan city of Falerii voluntarily enrolled herself among the allies of Rome. Of even greater service, however, was the fact that for 15 years the Samnites remained quiet, for this inactivity, whatever its cause, enabled Rome triumphantly to surmount a danger which theatened for the moment to wreck her whole position. This danger was nothing less than a desperate effort on the part of nearly all her allies and dependents south of the Tiber to throw off the yoke of her supremacy. The way was led by her ancient confederates the Latini, whose smouldering discontent broke into open flame directly the fear of a Samnite attack was removed. From the Latin Campagna and the Sabine hills the revolt spread westwards and southwards to Antium and Tarracina, and even to the towns of the Campanian plain, where the mass of the inhabitants at once repudiated the alliance formed with Rome by the ruling class. The struggle was sharp but short. In two pitched battles the strength of the insurrection was broken, and two more campaigns sufficed for the complete reduction of such of the insurgent communities as still held out. The revolt crushed, Rome set herself deliberately to the task of re-establishing on a new and firmer basis her supremacy over the lowlands, and in doing so laid the foundations of that marvellous organization which was destined to spread rapidly over Italy, and to withstand the attacks even of Hannibal. The old historic Latin league ceased to exist, though its memory was still preserved by the yearly Latin festival on the Alban Mount. Most if not all of the common land of the league became Roman territory; five at least of the old Latin cities were compelled to accept the Roman franchise (Livy viii. 14; Lanuvium, Aricia, Nomentum, Pedum and Tusculum) and enter the pale of the Roman State. The rest, with the Latin colonies, were ranked as Latin allies of Rome, but on terms which secured their complete dependence upon the sovereign city. The policy of isolation, which became so cardinal a principle of Roman rule, was now first systematically applied. No rights of *conubium* or *commercium* were any longer to exist between these communities. Their federal councils were prohibited, and all federal action independent of Rome forbidden.

In Campania and the coast-lands connecting Campania with Rome, a policy of annexation was considered safer than that of alliance. Of the two frontier posts of the Volsci, Antium and

[1] For the status of Caere, see *Klio* xi., 377.

Velitrae, the former was constituted a Roman colony, its long galleys burnt and their prows set up in the Forum at Rome, while the walls of Velitrae were razed to the ground, its leading men banished beyond the Tiber, and their lands given to Roman settlers. Farther south on the route to Campania, Fundi and Formiae were, after the precedent set in the case of Caere, declared Roman and granted the civil rights of Roman citizenship, while lastly in Campania itself the same status was given to Capua, Cumae and the smaller communities dependent upon them[1]. During the ten years from 338 to 328 the work of settlement was steadily continued. Tarracina, like Antium, was made a Roman colony. Privernum, the last Volscian town to offer resistance to Rome, was subdued in 330, part of its territory allotted to Roman citizens, and the state itself forced to accept the Roman franchise. Lastly, to strengthen the lines of defence against the Sabellian tribes, two colonies with the rights of Latin allies were established at Cales (334) and at Fregellae (328). The settlement of the lowlands was accomplished. As a single powerful and compact state with an outer circle of closely dependent allies, Rome now stood in sharp contrast with the disunited and degenerate cities of northern Etruria, the loosely organized tribes of the Apennines, and the decaying and disorderly Greek towns of the south.

Second Samnite War.—The strength of this system was now to be tried by a struggle with the one Italian people who were still ready and able to contest with Rome the supremacy of the peninsula. The passive attitude of the Samnites between 342 and 327 was no doubt largely due to the dangers which had suddenly threatened them in South Italy. But the death of Alexander of Epirus, in 332, removed their only formidable opponent there, and left them free to turn their attention to the necessity of checking the steady advance of Rome. In 327, the year after the ominous foundation of a Roman colony at Fregellae, a pretext for renewing the struggle was offered them. The Cumaean colony of Palaepolis had incurred the wrath of Rome by its raids into her territory in Campania. The Samnites sent a force to defend it, and Rome replied by a declaration of war. The two opponents were not at first sight unequally matched, and had the Sabellian tribes held firmly together the issue of the struggle might have been different. As it was, however, the Lucanians to the south actually joined Rome from the first, while the northern clans, Marsi, Vestini, Paeligni and Frentani, after a feeble and lukewarm resistance, subsided into a neutrality which was exchanged in 304 for a formal alliance with Rome. An even greater advantage to Rome from the outset was the enmity existing between the Samnites and the Apulians, the latter of whom from the first joined Rome and thus gave her a position in the rear of her enemy and in a country eminently well fitted for maintaining a large military force. These weaknesses on the Samnite side were amply illustrated by the events of the war.

After several years of partial success, the Romans were thoroughly defeated at Caudine Forks (321) and, in order to save their captured army, were compelled to sign a dishonourable treaty of peace. Rome, however, continued to strengthen her connections with the Lucanians and Apulians, settling a Latin colony at Luceria (320), and to draw the net of alliances more closely by winning over the Vestini and Frentani, north and east of Samnium. The Samnites accordingly, finding that peace was more dangerous than war, renewed hostilities in 316, by making a series of desperate efforts to break through the lines of defence which protected Latium and Campania. Sora and Fregellae on the upper Liris were captured by a sudden attack; the Ausones in the low country near the mouth of the same river were encouraged to revolt by the appearance of the Samnite army; and in Campania another army, attracted by rumours of disturbance, all but defeated the Roman consuls under the very walls of Capua. But these efforts were unavailing. Sora and Fregellae were recovered as quickly as they had been lost, and the frontier there was strengthened by the establishment of a colony at Interamna. The Ausones were punished by the confiscation of their territory, and Roman supremacy further secured by the two colonies of Suessa and Pontia (312). The construction of the famous Via Appia, the work of the censor Appius Claudius Caecus, opened a safe and direct route to Campania, while the capture of Nola deprived the Samnites of their last important stronghold in the Campanian lowlands. The failure of these attempts broke the courage even of the Samnites. Their hopes were indeed raised for a moment by the news that Etruria had risen against Rome (310), but their daring scheme of effecting a union with the Etruscans was frustrated by the energy of the Roman generals. Five years later (305) the Romans revenged a Samnite raid into Campania by an invasion of Samnium itself. Arpinum on the frontier was taken, and at last, after a 22 years' struggle, the second Samnite War was closed by a renewal of the ancient treaty with Rome (304).

The six years of peace which followed (304–298) were employed by Rome in still further strengthening her position. Already, two years before the peace, a rash revolt of the Hernici had given Rome a pretext for finally annexing the territory of her ancient allies. The tribal confederacy was broken up, and all the Hernican communities, with the exception of three which had not joined the revolt, were incorporated with the Roman State as municipia, with the civil rights of the Roman franchise. Between the Hernican valley and the frontiers of the nearest Sabellian tribes lay what remained of the once formidable people of the Aequi. In their case, too, a revolt (304) was followed by the annexation of their territory, which was marked in this case by the formation there (301) of two Roman tribes (Aniensis and Teretina). Not content with thus carrying the borders of their own territory up to the very frontiers of the Sabellian country, Rome succeeded (304) in finally detaching from the Sabellian confederacy all the tribes lying between the north-east frontier of Latium and the Adriatic sea. Henceforward the Marsi, Paeligni, Vestini, Marrucini and Frentani were enrolled among the allies of Rome, and not only swelled her forces in the field but interposed a useful barrier between her enemies to the north in Etruria and Umbria and those to the south in Samnium, while they connected her directly with the friendly Apulians. Lastly, as a security for the fidelity at least of the nearest of these allies, colonies were planted in the Marsian territories at Alba Fucentia (303) and at Carsioli (298). A significant indication of the widening range of Rome's influence in Italy, and of the new responsibilities rapidly pressing upon her, is the fact that when in 302 the Spartan Cleonymus landed in the territory of the Sallentini, far away in the south-east, he was met and repulsed by an Italic and Roman force.

Third Samnite War.—Six years after the conclusion of the treaty which ended the second Samnite War, news arrived that the Samnites were harassing the Lucanians. Rome at once interfered to protect her allies. Samnium was invaded in force, the country ravaged and one stronghold after another captured. Unable any longer to hold their own in a position where they were hedged round by enemies, the Samnite leaders turned as a last hope to the communities of northern Etruria, to the free tribes of Umbria and to the once dreaded Celts. With a splendid daring they formed the scheme of uniting all these people with themselves in a last desperate effort to break the power of Rome.

For some 40 years after the final annexation of southern Etruria (351 B.C.) matters had remained unchanged in that quarter. Sutrium and Nepete still guarded the Roman frontier; the natural boundary of the Ciminian forest was still intact; and up the valley of the Tiber, Rome had not advanced beyond Falerii, a few miles short of the most southerly Umbrian town Ocriculum. But in 311, on the expiry, apparently, of the long truce with Rome, concluded in 351, the northern Etruscans, alarmed no doubt by the rapid advances which Rome was making farther south, rose in arms and attacked Sutrium. The attack, however, recoiled disastrously upon the heads of the assailants. A Roman force promptly relieved Sutrium, and its leader, Q. Fabius Rullianus, without awaiting orders from home, boldly plunged

[1] For the controversy as to the precise status of Capua and the "equites Campani" (Livy viii. 14), *see* Beloch, *Ital. Bund*, 122 seq.; *idem*, *Campanien*, 317; Mommsen, *Staatsr.* iii. 574; Frank, *Roman Imperialism*, 41.

into the wilds of the Ciminian forest, and crossing them safely swept with fire and sword over the rich lands to the north. Then turning southwards he met and utterly defeated the forces which the Etruscans had hastily raised in the hopes of intercepting him at the Vadimonian lake. This decisive victory ended the war. The Etruscan cities, disunited among themselves, and enervated by long years of peace, abandoned the struggle for the time, paid a heavy indemnity and concluded a truce with Rome (309–08). In the same year the promptitude of Fabius easily averted a threatened attack by the Umbrians, but Rome proceeded nevertheless to fortify herself in her invariable fashion against future dangers on this side, by an alliance with Ocriculum, which was followed ten years later (299) by a colony at Narnia, and an alliance with the Picentes, whose position in the rear of Umbria rendered them as valuable to Rome as the Apulians had proved farther south.

Fourteen years had passed since the battle on the Vadimonian lake, when the Samnites appeared on the borders of Etruria and called on the peoples of northern Italy to rise against the common enemy. Their appeal, backed by the presence of their troops, was successful. The Etruscans found courage to face the Roman legions once more; a few of the Umbrians joined them; but the most valuable allies to the Samnites were the Celts, who had for some time threatened a raid across the Apennines, and who now marched eagerly into Umbria and joined the coalition. The news that the Celts were in motion produced a startling effect at Rome, and every nerve was strained to meet this new danger. While two armies were left in southern Etruria as reserves, the two consuls, Q. Fabius Maximus Rullianus and P. Decius Mus the younger, both tried soldiers, marched northwards up the valley of the Tiber and into Umbria at the head of four Roman legions and a still larger force of Italian allies. At Sentinum, on the farther side of the Apennines, they encountered the united forces of the Celts and Samnites, the Etruscans and Umbrians having, it is said, been withdrawn for the defence of their own homes. The battle that followed was desperate, and the Romans lost one of their consuls, Decius, and more than 8,000 men. But the Roman victory was decisive. The Celts were annihilated, and the fear of a second Celtic attack on Rome removed. All danger from the coalition was over. The Etruscan communities gladly purchased peace by the payment of indemnities. The rising in Umbria, never formidable, died away, and the Samnites were left single-handed to bear the whole weight of the wrath of Rome. During four years more, however, they desperately defended their highland homes, and twice at least, in 293 and 292, they managed to place in the field a force sufficient to meet the Roman legions on equal terms. At last, in 290, the consul M. Curius Dentatus finally exhausted their power of resistance. Peace was concluded, and it is significant of the respect inspired at Rome by their indomitable courage that they were allowed to become the allies of Rome, on equal terms and without any sacrifice of independence.

Between the close of the third Samnite War and the landing of Pyrrhus in 281 B.C. we find Rome engaged, as was her wont, in quietly extending and consolidating her power. In southern Italy she strengthened her hold on Apulia by planting on the borders of Apulia and Lucania the strong colony of Venusia. In central Italy the annexation of the Sabine country (290) carried her frontiers eastwards to the borders of her Picentine allies on the Adriatic. Farther east, in the territory of the Picentes themselves, she established colonies on the Adriatic coast at Hadria and Castrum (285–283). North of the Picentes lay the territories of the Celtic Senones stretching inland to the north-east borders of Etruria, and these too now fell into her hands. Ten years after their defeat at Sentinum (285–284) a Celtic force descended into Etruria, besieged Arretium and defeated the relieving force despatched by Rome. In 283 the consul L. Cornelius Dolabella was sent to avenge the insult. He completely routed the Senones. Their lands were annexed by Rome, and a colony established at Sena on the coast. This success, followed as it was by the decisive defeat of the neighbouring tribe of the Boii, who had invaded Etruria and penetrated as far south as the Vadimonian lake, awed the Celts into quiet, and for more than 40 years there was comparative tranquillity in northern Italy.

Pyrrhus.—In the south, however, the claims of Rome to supremacy were now to be disputed by a new and formidable foe. At the close of the third Samnite War the Greek cities on the southern coast of Italy found themselves once more harassed by the Sabellian tribes on their borders, whose energies, no longer absorbed by the long struggles in central Italy, now found an attractive opening southwards.

The city of Thurii appealed to Rome for protection, and the plebeian assembly at Rome—recently given full legislative powers by the Hortensian law—voted to send the consul Fabricius to aid the Greeks. The consul easily routed the barbarians and established a garrison in the city. Thurii thus accepted Rome's suzerainty. The Tarentines, who claimed to be the protectors of the Greeks in Italy, were offended at the course taken by Thurii, and rightly feared that Rome's advance to the sea would soon compel all the cities of Magna Graecia to acknowledge the dominance of Rome's influence. While the Tarentines were debating whether to protest, several Roman ships (presumably of the *socii navales*), bound for the Adriatic colonies of Rome, appeared off the harbour of Tarentum. Since the Romans had long before signed a treaty that no Roman ships of war should sail east of the Lacinian cape, the Tarentines regarded the appearance of this squadron as a hostile act, attacked it, killed the admiral and sank most of the ships. Rome, desiring peace, asked for reparations without making a hostile demonstration, but the democratic party in Tarentum, bent upon asserting the independence and power of their city, engaged King Pyrrhus of Epirus to come to their aid and, in reliance upon his forces, declared war upon Rome (281).

King Pyrrhus (*see* PYRRHUS), whose timely appearance seemed for the moment to have saved the independence of Tarentum, was the most brilliant of the military adventurers whom the disturbed times following the death of Alexander the Great had brought into prominence. High-spirited, generous and ambitious, he had formed the scheme of rivalling Alexander's achievements in the East, by winning for himself an empire in the West. He aspired not only to unite under his rule the Greek communities of Italy and Sicily, but to overthrow the great Phoenician state of Carthage—the natural enemy of Greeks in the West, as Persia had been in the East. Of Rome it is clear that he knew little or nothing; the task of ridding the Greek seaports of their barbarian foes he no doubt regarded as an easy one; and the splendid force he brought with him was intended rather for the conquest of the West than for the preliminary work of chastising a few Italian tribes, or securing the submission of the unwarlike Italian Greeks. He defeated the Roman consul, M. Valerius Laevinus, on the banks of the Liris (280), and gained the support of the Greek cities as well as that of numerous bands of Samnites, Lucanians and Bruttians. But, to the disappointment of his new allies, Pyrrhus showed no anxiety to follow up his advantage. His heart was set on Sicily and Africa, and his immediate object was to come to terms with Rome. But though he advanced as near Rome as Anagnia (279), nothing could shake the resolution of the senate, and in the next year (278) he again routed the legions at Asculum (Ascoli), but only to find that the indomitable resolution of the enemy was strengthened by defeat. He now crossed into Sicily, where, though at first successful, he was unable to achieve any lasting result. Soured and disappointed, Pyrrhus returned to Italy (276) to find the Roman legions steadily moving southwards, and his Italian allies disgusted by his desertion of their cause. In 275 the decisive battle of the war was fought at Beneventum. The consul M. Curius Dentatus, the conqueror of Samnium, gained a complete victory and Pyrrhus, unable any longer to face his opponents in the field, and disappointed of all assistance from his allies, retreated in disgust to Tarentum and thence crossed into Greece.

A few years later (272) Tarentum was surrendered to Rome by its Epirot garrison; it was granted a treaty of alliance, but its walls were razed and its fleet handed over to Rome. In 270 Rhegium also entered the ranks of Roman allies, and finally in 269 a single campaign crushed the last efforts at resistance in Sam-

nium. Rome was now at leisure to consolidate the position she had won. Between 273 and 263 three new colonies were founded in Samnium and Lucania—Paestum in 273, Beneventum in 268, Aesernia in 263. In central Italy the area of Roman territory was increased by the full enfranchisement (268) of the Sabines, and of their neighbours to the east, the people of Picenum. To guard the Adriatic coast, colonies were established at Ariminum (268), at Firmum and at Castrum Novum (264), while to the already numerous maritime colonies was added that of Cosa in Etruria.

Rome the Mistress of Italy.—Rome was now the undisputed mistress of Italy. The limits of her supremacy to the north were represented roughly by a line drawn across the peninsula from the mouth of the Arnus on the west to that of the Aesis on the east. Beyond this line lay the Ligurians and the Celts; all south of it was now united as "Italy" under the rule of Rome.

But the rule of Rome over Italy, like her wider rule over the Mediterranean coasts, was not an absolute dominion over conquered subjects. It was in form at least a confederacy under Roman protection and guidance; and the Italians, like the provincials, were not the subjects, but the "allies and friends" of the Roman people. In the treatment of these allies Rome consistently followed the maxim, *divide et impera*. In every possible way she strove to isolate them from each other, while binding them closely to herself. The old federal groups were in most cases broken up, and each of the members united with Rome by a special treaty of alliance. In Etruria, Latium, Campania and Magna Graecia the city was taken as the unit; in central Italy where urban life was non-existent, the unit was the tribe. The northern Sabellian peoples, for instance—the Marsi, Paeligni, Vestini, Marrucini and Frentani—were now constituted as separate communities in alliance with Rome. In many cases, too, no freedom of trade or intermarriage was allowed between the allies themselves. Nor were all these numerous allied communities placed on the same footing as regarded their relations with Rome herself. To begin with, a sharp distinction was drawn between the "Latini" and the general mass of Italian allies. The "Latins" of this period had little more than the name in common with the old 30 Latin peoples of the days of Spurius Cassius. With a few exceptions, such as Tibur and Praeneste, the latter had either disappeared or had been incorporated with the Roman State, and the Latins of 268 B.C. were almost exclusively the "Latin colonies," that is to say, communities founded by Rome, composed partly of allies but chiefly of men of Roman blood, and whose only claim to the title "Latin" lay in the fact that Rome granted to them some portion of the rights and privileges formerly enjoyed by the old Latin cities under the Cassian treaty. Though nominally allies, they were in fact offshoots of Rome herself, bound to her by community of race, language and interest, and planted as Roman garrisons among alien and conquered peoples. The Roman citizen who joined a Latin colony lost his citizenship—to have allowed him to retain it would no doubt have been regarded as enlarging too rapidly the limits of the citizen body; but he received in exchange the status of a favoured ally. The member of a Latin colony had the right of *commercium* and down to 268 of *connubium* also with Roman citizens. Provided they left sons and property to represent them at home, they were free to migrate to Rome and acquire the Roman franchise. In war-time they not only shared in the booty, but claimed a portion of any land confiscated by Rome and declared "public." These privileges, coupled with their close natural affinities with Rome, successfully secured the fidelity of the Latin colonies, which became not only the most efficient props of Roman supremacy, but powerful agents in the work of Romanizing Italy. Below the privileged Latins stood the Italian allies; and here again we know generally that there were considerable differences of status, determined in each case by the terms of their respective treaties with Rome. We are told that the Greek cities of Neapolis and Heraclea were among the most favoured; the Bruttii, on the other hand, seem, even before the Hannibalic War, to have been less generously treated. But beyond this we have no detailed information.

Rome, however, did not rely only on this policy. Her allies were attached as closely to herself as they were clearly separated from each other, and from the first she took every security for the maintenance of her own paramount authority. Within its own borders, each ally was left to manage its own affairs as an independent State. The badges which marked subjection to Rome in the provinces—the resident magistrate and the tribute—were unknown in Italy. But in all points affecting the relations of one ally with another, in all questions of the general interests of Italy and of foreign policy, the decision rested solely with Rome. The place of a federal constitution, of a federal council, of federal officers, was filled by the Roman senate, assembly and magistrates. The maintenance of peace and order in Italy, the defence of the coasts and frontiers, the making of war or peace with foreign Powers, were matters the settlement of which Rome kept entirely in her own hands. Each allied State, in time of war, was called upon for a certain contingent of men, but, though its contingent usually formed a distinct corps under officers of its own, its numerical strength was fixed by Rome, it was brigaded with the Roman legions, and was under the orders of the Roman consul.

The Roman State.—This paramount authority of Rome throughout the peninsula was confirmed and justified by the fact that Rome herself was now infinitely more powerful than any one of her numerous allies. Her territory, as distinct from that of the allied States, covered something like one-third of the peninsula south of the Aesis. Along the west coast it stretched from Caere to the southern borders of Campania. Inland, it included the former territories of the Aequi and Hernici, the Sabine country, and even extended eastwards into Picenum, while beyond these limits were outlying districts, such as the lands of the Senonian Celts, with the Roman colony of Sena, and others elsewhere in Italy, which had been confiscated by Rome and given over to Roman settlers. Since the first important annexation of territory after the capture of Veii (396), 12 new tribes had been formed, and the number of male citizens registered at the census had risen from 152,000 to 290,000. Within this enlarged Roman State were now included numerous communities with local institutions and government. At their head stood the Roman colonies (*coloniae civium Romanorum*), founded to guard especially the coasts of Latium and Campania. Next to these eldest children of Rome came those communities which had been invested with the full Roman franchise, such, for instance, as the old Latin towns of Aricia, Lanuvium, Tusculum, Nomentum and Pedum. Lowest in the scale were those which had not been considered ripe for the full franchise, but had, like Caere, received instead the *civitas sine suffragio*, the civil without the political rights. Their members, though Roman citizens, were not enrolled in the tribes, and in time of war served not in the ranks of the Roman legions but in separate contingents. In addition to these organized town communities, there were also the groups of Roman settlers on the public lands, and the dwellers in the village communities of the enfranchised highland districts in central Italy.

The administrative needs of this enlarged Rome were obviously such as could not be adequately satisfied by the system which had done well enough for a small city State with a few square miles of territory. The old centralization of all government in Rome itself had become an impossibility, and the Roman statesmen did their best to meet the altered requirements of the time. The urban communities within the Roman pale, colonies and *municipia*, were allowed a large measure of local self-government. In all we find local assemblies, senates and magistrates, to whose hands the ordinary routine of local administration was confided, and, in spite of differences in detail, *e.g.*, in the titles and numbers of the magistrates, the same type of constitution prevailed throughout. But these local authorities were carefully subordinated to the higher powers in Rome. The local constitution could be modified or revoked by the Roman senate and assembly; and the local magistrates, no less than the ordinary members of the community, were subject to the paramount authority of the Roman consuls, praetors and censors. In particular, care was taken to keep the administration of justice well under central control. The Roman citizen in a colony or *municipium* enjoyed, of course, the right of appeal of the Roman people in a capital

case. We may also assume that from the first some limit was placed to the jurisdiction of the local magistrate, and that cases falling outside it came before the central authorities. But an additional safeguard for the equitable and uniform administration of Roman law, in communities to many of which the Roman code was new and unfamiliar, was provided by the institution of prefects (*praefecti iuri dicundo*), who were sent out annually, as representatives of the Roman praetor, to administer justice in the colonies and *municipia*. To prefects, moreover, were assigned the charge of those districts within the Roman pale where no urban communities, and consequently no organized local government, existed. In these two institutions, that of municipal government and that of prefectures, we have already two of the cardinal points of the later imperial system of government.

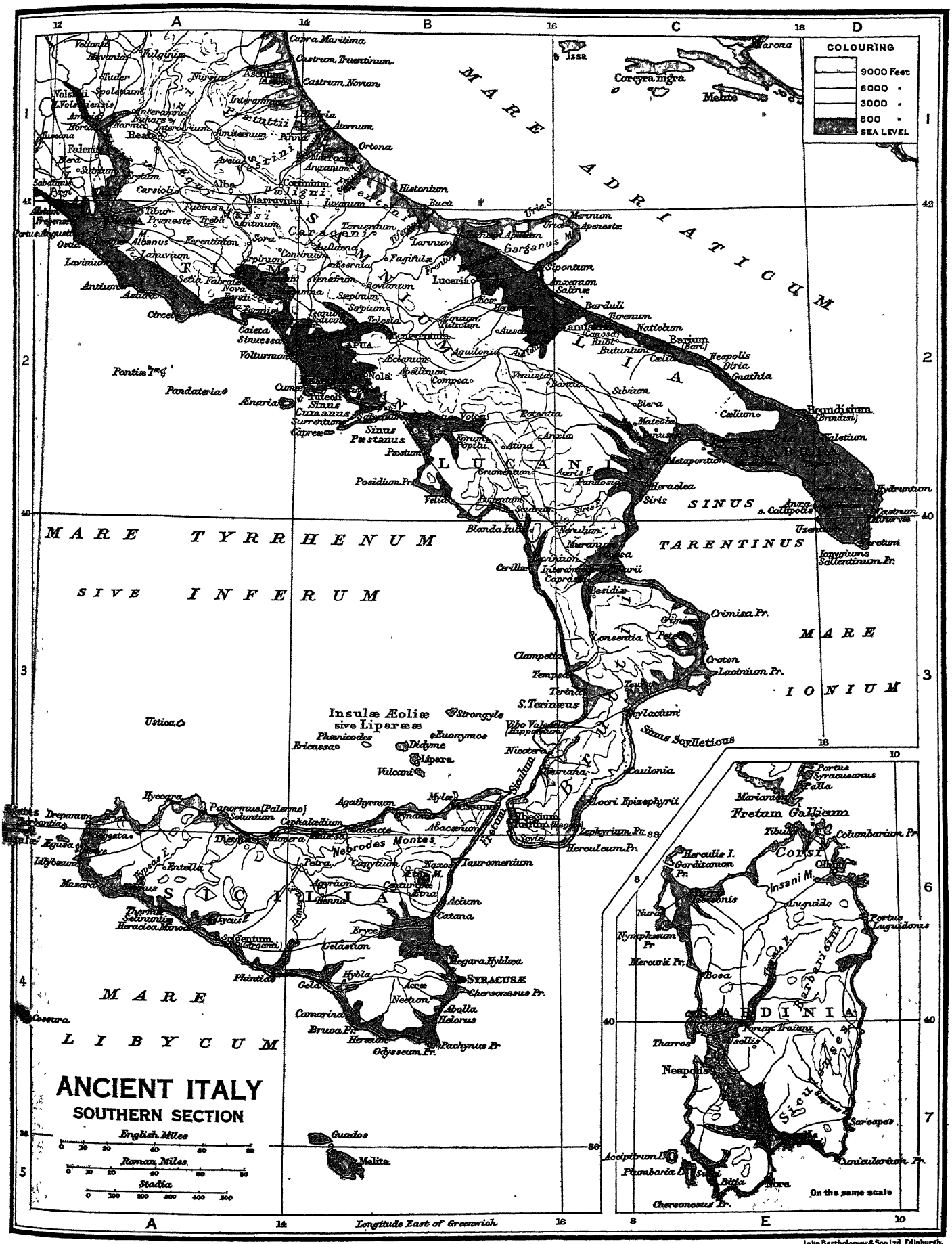
Lastly, the changes which the altered position and increased responsibilities of Rome had effected in her military system tended to weaken the intimate connection between the Roman army in the field and the Roman people at home, and thus prepared the way for that complete breach between the two which in the end proved fatal to the republic. It is true that service in the legion was still the first duty and the highest privilege of the fully qualified citizen. But this service was gradually altering in character. Though new legions were still raised each year for the summer campaigns, this was by no means always accompanied, as formerly, by the disbandment of those already on foot, and this increase in the length of time during which the citizen was kept with the standards had, as early as the siege of Veii, necessitated a further deviation from the old theory of military service—the introduction of pay. Moreover, while in the early days of the republic the same divisions served for the soldier in the legion and the citizen in the assembly, in the new manipular system, with its three lines, no regard was paid to civic distinctions, but only to length of service and military efficiency, while at the same time the more open order of fighting which it involved demanded of each soldier greater skill, and therefore a more thorough training in arms than the old phalanx. One other change resulted from the new military necessities of the time, which was as fruitful of results as the incipient separation between the citizen and the soldier. Under the early republic, the chief command of the legions rested with the consuls of the year. But, as Rome's military operations increased in area and in distance from Rome, a larger staff became necessary, and the inconvenience of summoning home a consul in the field from an unfinished campaign became intolerable. The remedy found, that of prolonging for a further period the imperium of the consul, was first applied in 327 B.C. in the case of Q. Publilius Philo, and between 327 and 264 instances of this *prorogatio imperii* became increasingly common. This proconsular authority, originally an occasional and subordinate one, was destined to become first of all the strongest force in the Republic, and ultimately the chief prop of the power of the Caesars.

Period B: Rome and the Mediterranean States, 265–146 B.C.—(*a*) *Conquest of the West.*—Though marked out by her geographical position as the natural centre of the Mediterranean, Italy had hitherto played no active part in the Mediterranean politics, but, now that she was for the first time united, it was felt throughout the Mediterranean world that a new Power had arisen, and Rome, as the head and representative of Italy, found herself irresistibly drawn into the vortex of Mediterranean affairs. Egypt sought her alliance, and Greek scholars began to interest themselves keenly in the history, constitution and character of the Latin republic which had so suddenly become famous. But Rome looked naturally westwards rather than eastwards. The western coasts of the peninsula were the most fertile and populous and wealthy; and it was in this direction that the natural openings for Italian commerce were to be found. It was, however, precisely on this side that Rome had serious ground for anxiety. Carthage was now at the height of her power. Her outposts were threateningly near to Italy in Sardinia and in Sicily, while her fleets swept the seas and jealously guarded for the benefit of Carthage alone the hidden treasures of the West. In the east of Sicily, Syracuse still upheld the cause of Greek independence against the hereditary foe of the Greek race; but Syracuse stood alone, and her resources were comparatively small. What Rome had to fear was the establishment, and that at no distant date, of an absolute Carthaginian domination over the western seas—a domination which would not only be fatal to Italian commerce, but would be a standing menace to the safety of the Italian coasts.

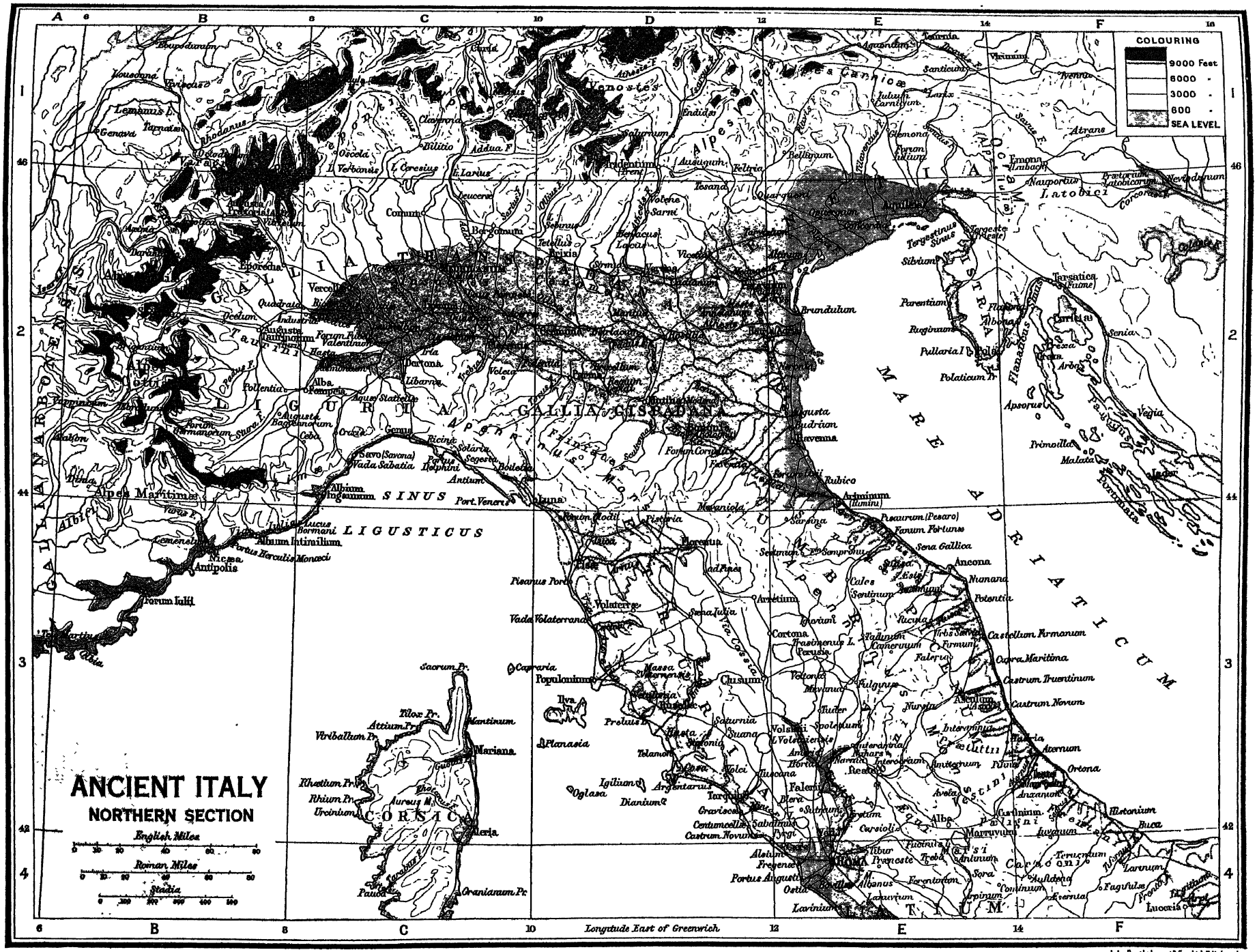
First Punic War, 265–241.—It was above all things essential for Rome that the Carthaginians should advance no farther eastwards. But in 265 Rome was threatened with the establishment of Carthaginian rule at Messana, within sight of the Italian coast. The intervention of both powers in a quarrel between the Mamertines, a body of Campanian mercenaries who had occupied Messana, and Hieron II. of Syracuse, led to the outbreak of war between Rome and Carthage in 264 B.C. The military history of the struggle which followed is treated in the article PUNIC WARS; it will suffice to note here that the war lasted until 241 B.C., when the Carthaginians were compelled to cede Sicily and the Lipari islands to Rome, and to pay an indemnity of 3,200 talents (about £800,000).

The struggle was one in which both Rome and Carthage were serving an apprenticeship in a warfare the conditions of which were unfamiliar to both. The Roman legions were foes very unlike any against which the Carthaginian leaders had ever led their motley array of mercenaries, while Rome was called upon for the first time to fight a war across the sea, and to fight with ships against the greatest naval power of the age. The chief dangers for Carthage lay obviously in the jealousy exhibited at home of her officers abroad, in the difficulty of controlling her mercenary troops, and in the ever-present possibility of disaffection among her subjects in Libya—dangers which even the genius of Hannibal failed finally to surmount. Rome, on the other hand, was strong in the public spirit of her citizens, the fidelity of her allies, the valour and discipline of her legions. What she needed was a system which would make a better use of her splendid materials than one under which her plans were shaped from day to day by a divided senate, and executed by officers who were changed every year, and by soldiers most of whom returned home at the close of each summer's campaign.

The interval between the first and second Punic Wars was employed by both Rome and Carthage in strengthening their respective positions. The eastern end of Sicily was still left under the rule of Hieron as the ally of Rome, but the larger western portion of the island became directly subject to Rome, and a temporary arrangement seems to have been made for its government, either by one of the two praetors, or possibly by a quaestor. Sardinia and Corsica had not been surrendered to Rome by the treaty of 241, but three years later (239), on the invitation of the Carthaginian mercenaries stationed in the islands, a Roman force occupied them; Carthage protested, but, on the Romans threatening war, she gave way, and Sardinia and Corsica were formally ceded to Rome, though it was some seven or eight years before all resistance on the part of the natives themselves was crushed. In 227, however, the senate considered matters ripe for the establishment of a separate administration in her oversea possessions. In that year two additional praetors were elected; to one was assigned the charge of western Sicily, to the other that of Sardinia and Corsica, and thus the first stones of the Roman provincial system were laid. Of at least equal importance for the security of the peninsula was the subjugation of the Celtic tribes in the valley of the Po. These, headed by the Boii and Insubres and assisted by levies from the Celts to the westward, had in 225 alarmed the whole of Italy by invading Etruria and penetrating to Clusium, only three days' journey from Rome. Here, however, their courage seems to have failed them. They retreated northwards along the Etruscan coast, until at Telamon their way was barred by the Roman legions returning from Sardinia to the defence of Rome, while a second consular army hung upon their rear. Thus hemmed in, the Celts fought desperately, but were completely defeated and the flower of their tribesmen slain. The Romans followed up their success by invading the Celtic territory. The Boii were easily reduced to submission. The Insubres, north of the Pó, resisted more obstinately, but by 222 the war was over,



John Bartholomew & Son, Ltd. Edinburgh.


COLOURING
9000 Feet
6000 "
3000 "
600 "
SEA LEVEL
ANCIENT ITALY
NORTHERN SECTION
English Miles
Roman Miles
Stadia
MARE ADRIATICUM
MARE TYRRHENUM
SINUS LIGUSTICUS
GALLIA CISALPINA
APENNINUS
ALPES MARITIMAE
CORSICA
ROMA
LATIUM
Longitude East of Greenwich
John Bartholomew & Son, Ltd. Edinburgh.

and all the tribes in the rich Po valley acknowledged the supremacy of Rome. The conquered Celts were not enrolled among the Italian allies of Rome, but were treated as subjects beyond the frontier. Two colonies were founded to hold them in check—Placentia (218) and Cremona in the territory of the Insubres—and the great northern road (Via Flaminia) was completed as far as the Celtic border at Ariminum.

On the Adriatic coast the immediate interests of Rome were limited to rendering the sea safe for Italian trade. It was with this object that, in 229, the first Roman expedition crossed the Adriatic, and inflicted severe chastisement on the Illyrian pirates of the opposite coast. This expedition was the means of establishing for the first time direct political relations between Rome and the states of Greece proper, to many of which the suppression of piracy in the Adriatic was of as much importance as to Italy. Alliances were concluded with Corcyra, Epidamnus and Apollonia; and embassies explaining the reasons which had brought Roman troops into Greece were sent to the Aetolians, the Achaeans and even to Athens and Corinth. Everywhere they were well received, and the admission of the Romans to the Isthmian games (228) formally acknowledged them as the natural allies of the free Greek states against both barbarian tribes and foreign despots. Meanwhile Carthage had acquired a possession which promised to compensate her for the loss of Sicily, Sardinia and Corsica. The genius of her greatest citizen and soldier, Hamilcar Barca, had appreciated the enormous value of the Spanish peninsula, and conceived the scheme of founding there a Carthaginian dominion which should not only add to the wealth of Carthage, but supply her with a base of operations for a war of revenge with Rome. The conquest of southern and eastern Spain, begun by Hamilcar (236–228) and carried on by his kinsman Hasdrubal (228–221), was completed by his son Hannibal, who, with all his father's genius, inherited also his father's hatred of Rome, and by 219 the authority of Carthage had been extended as far as the Ebro (*see* SPAIN, *History*). Rome's ancient ally Massilia (mod. Marseilles) was especially disturbed by these advances, for she had trading posts on the coast of Spain which would become unprofitable if Carthage conquered the whole of the interior and drew the commerce of the peninsula southwards to the Punic ports. Furthermore, since Carthage forbade Massiliot traders to make use of the straits of Gibraltar, Massiliot trade in British tin would be endangered if Carthage succeeded in reaching southern Gaul. From the fact that Marseilles lent her whole navy to Rome when the war broke out we may assume that her envoys were active in reporting the advance of Carthage in Spain and in interpreting that advance as aimed at Rome. Rome finally was induced to act. A defensive alliance was signed with Saguntum, a seaport of Spain which was still independent, and Hasdrubal was asked to promise that Carthage should not carry her arms beyond the Ebro river (226).

Second Punic War, 218–211.—But these precautions were of no avail against the resolute determination of Hannibal, with whom the conquest of Spain was only preliminary to an attack upon Italy, and who could not afford to leave behind him in Spain a state allied to Rome. In 219, therefore, disregarding the protests of a Roman embassy, he attacked and took Saguntum, an act which, as he had foreseen, rendered a rupture with Rome inevitable, while it set his own hands free for a further advance.

For the details of the war which followed, the reader may be referred to the articles PUNIC WARS; HANNIBAL; and SCIPIO. From the outbreak of hostilities until the crowning victory of Cannae in 216 Hannibal's career of success was unchecked; and the annihilation of the Roman army in that battle was followed by the defection of almost the whole of southern Italy, with the exception of the Latin colonies and the Greek coast towns. In 215, moreover, Philip V. of Macedon formed an alliance with Hannibal and threatened to invade Italy; in 214 Syracuse revolted, and in 212 the Greek cities in northern Italy went over to Hannibal. But the indomitable spirit of the Romans asserted itself in the face of these crushing misfortunes. In 212 Syracuse was recovered; in 211 Capua fell after a long siege which Hannibal failed to raise, even by his famous march up to the gates of Rome, and in the same year a coalition was formed in Greece against Philip V. of Macedon, which effectually paralysed his offensive action. Hannibal was now confined to Lucania and Bruttium; and his brother Hasdrubal, marching from Spain to join him, was defeated and slain on the river Metaurus (207). The war in Italy was now virtually ended, for, though during four years more Hannibal stood at bay in a corner of Bruttium, he was powerless to prevent the restoration of Roman authority throughout the peninsula. Sicily was once more secure; and finally in 206, the year after the victory on the Metaurus, the successes of the young P. Scipio in Spain (211–206) were crowned by the complete expulsion of the Carthaginians from the peninsula. On his return from Spain Scipio eagerly urged an immediate invasion of Africa. The senate hesitated; but Scipio gained the day. He was elected consul for 205, and given the province of Sicily, with permission to cross into Africa if he thought fit. Voluntary contributions of men, money and supplies poured in to the support of the popular hero; and by the end of 205 Scipio had collected in Sicily a sufficient force for his purpose. In 204 he crossed to Africa, where he was welcomed by the Numidian prince Massinissa, whose friendship he had made in Spain. In 203 he twice defeated the Carthaginian forces, and a large party at Carthage were anxious to accept his offer of negotiations. But the advocates of resistance triumphed.

Hannibal was recalled from Italy, and returned to fight his last battle against Rome at Zama, where Scipio, who had been continued in command as proconsul for 202 by a special vote of the people, won a complete victory. The war was over. The Roman assembly voted that the Carthaginian request for peace should be granted, and entrusted the settlement of the terms to Scipio and a commission of ten senators. Carthage was allowed to retain her territory in Africa; but she undertook to wage no wars outside Africa, and none inside without the consent of Rome. She surrendered all her ships but ten triremes, her elephants, and all prisoners of war, and agreed to pay an indemnity of 10,000 talents in 50 years. The Numidian Massinissa (*q.v.*) was rewarded by an increase of territory, and was enrolled among the "allies and friends" of the Roman people.

The West Under Roman Rule.—The battle of Zama decided the fate of the West. The power of Carthage was broken and her supremacy passed to Rome. Henceforth Rome had no rival to fear westward of Italy, and it rested with herself to settle within what limits her supremacy should be confined and what form it should take. In Sicily the former dominions of Hieron were at once united with the western half of the island as a single province, and in Spain, after nine years of a provisional Government (206–197), two provinces were in 197 definitely established, and each, like Sicily, assigned to one of the praetors for the year, two additional praetors being elected for the purpose. But here the resemblance between the two cases ends. From 201 down to the outbreak of the Slave War in 136 there was unbroken peace in Sicily, and its part in the history is limited to its important functions in supplying Rome with corn and in provisioning and clothing the Roman legions. The governors of the two Spains had very different work to do from that which fell to the lot of the Sicilian praetors. The condition of Spain required that year after year the praetors should be armed with the consular authority, and backed by a standing force of four legions, while more than once the presence of the consuls themselves was found necessary. Still, in spite of all difficulties, the work of pacification proceeded. To M. Porcius Cato (consul, 195) and to Tiberius Sempronius Gracchus (praetor and pro-praetor, 180–179), father of the two tribunes, is mainly due the credit of quieting the Celtiberian tribes of central Spain, and the government of Gracchus was followed by 30 years of comparative tranquillity. The insurrection headed by Viriathus in 149 was largely caused by exactions of the Roman magistrates themselves, while its obstinate continuance down to the capture of Numantia, in 133, was almost as much the result of the incapacity of the Roman commanders. But the re-settlement of the country by Scipio Africanus the younger in that year left all Spain, with the exception of the highland Astures and Cantabri in the north-west, finally and tranquilly subject to

Rome.

Third Punic War, 153–146.—In Africa there was no question at first of the introduction of Roman government by the formation of a province (*see* AFRICA, ROMAN). Carthage, bound hand and foot by the treaty of 201, was placed under the jealous watch of the loyal prince of Numidia, who himself willingly acknowledged the suzerainty of Rome. But it was impossible for this arrangement to be permanent. Every symptom of reviving prosperity at Carthage was regarded at Rome with feverish anxiety, and neither the expulsion of Hannibal in 195 nor his death in 183 did much to check the growing conviction that Rome would never be secure while her rival existed. It was therefore with grim satisfaction that many in the Roman senate watched the increasing irritation of the Carthaginians under the harassing raids and encroachments of their favoured neighbor Massinissa, and waited for the moment when Carthage should, by some breach of the conditions imposed upon her, supply Rome with a pretext for interference. At last in 151 came the news that Carthage, in defiance of treaty obligations, was actually at war with Massinissa. The anti-Carthaginian party in the senate, headed by M. Porcius Cato, eagerly seized the opportunity, and war was declared, and nothing short of the destruction of their city itself was demanded from the despairing Carthaginians. The demand was refused and in 149 the siege of Carthage begun. During the next two years little progress was made, but in 147 P. Cornelius Scipio Aemilianus, grandson by adoption of the conqueror of Hannibal, was, at the age of 37, and though only a candidate for the aedileship, elected consul and given the command in Africa. In the next year (146) Carthage was taken and razed to the ground. Its territory became the Roman province of Africa, while Numidia, now ruled by the three sons of Massinissa, remained as an allied state under Roman suzerainty, and served to protect the new province against the raids of the desert tribes (*see* CARTHAGE).

In Italy itself the Hannibalic War had been followed by important changes. In the north the Celtic tribes paid for their sympathy with Hannibal by the final loss of all separate political existence. Cispadane Gaul, studded with colonies and flooded with Roman settlers, was rapidly Romanized. Beyond the Padus (Po) in Polybius's time Roman civilization was already widely spread. In the extreme north-east the Latin colony of Aquileia, the last of its kind, was founded in 181, to control the Alpine tribes, while in the north-west the Ligurians were held in check by the colony of Luna (180), and by the extensive settlements of Roman citizens and Latins made on Ligurian territory in 173. In southern Italy the depression of the Greek cities on the coast, begun by the raids of the Sabellian tribes, was completed by the repeated blows inflicted upon them during the Hannibalic struggle. Some of them lost territory[1]; all suffered from a decline of population and loss of trade; and their place was taken by such new Roman settlements as Brundusium (Brindisi) and Puteoli (Pozzuoli). In the interior the southern Sabellian tribes suffered scarcely less severely. The Bruttii were struck off the list of Roman allies, and nearly all their territory was confiscated. To the Apulians and Lucanians no such hard measure was meted out; but their strength had been broken by the war, and their numbers dwindled; large tracts of land in their territories were seized by Rome, and allotted to Roman settlers, or occupied by Roman speculators. That Etruria also suffered from declining energy, a dwindling population, and the spread of large estates is clear from the state of things existing there in 133. It was indeed in central Italy, the home of the Latins and their nearest kinsmen, and in the new Latin and Roman settlements throughout the peninsula, that progress and activity were henceforth concentrated.

(*b*) **Rome in the East, 200–133.**—Ever since the repulse of Pyrrhus from Italy, Rome had been slowly drifting into closer contact with the eastern states. With one of the three great powers which had divided between them the empire of Alexander, with Egypt, she had friendly relations since 273, and the friendship had been cemented by the growth of commercial intercourse between the two countries. In 228 her chastisement of the Illyrian pirates had led naturally enough to the establishment of friendly relations with some of the states of Greece proper. In 214 the alliance between Philip V. and Hannibal, and the former's threatened attack on Italy, forced her into war with Macedon, at the head of a coalition of the Greek states against him, which effectually frustrated his designs against herself; at the first opportunity, however (205), she ended the war by a peace which left the position unchanged. The results of the war were not only to draw closer the ties which bound Rome to the Greek states, but to inspire the senate with a genuine dread of Philip's restless ambition, and with a bitter resentment against him for his union with Hannibal. The events of the next four years served to deepen both these feelings. In 205 Philip entered into a compact with Antiochus III. of Syria for the partition between them of the dominions of Egypt, now left by the death of Ptolemy Philopator to the rule of a boy-king. Antiochus was to take Coele-Syria and Phoenicia, while Philip claimed for his share the districts subject to Egypt on the coasts of the Aegean and the Greek islands. Philip no doubt hoped to be able to secure these unlawful acquisitions before the close of the second Punic War should set Rome free to interfere with his plans. But the obstinate resistance offered by Attalus of Pergamum and the Rhodians upset his calculations. In 201 Rome made peace with Carthage, and the senate had leisure to listen to the urgent appeal for assistance which reached her from her Eastern allies. With Antiochus indeed the senate was not yet prepared to quarrel; but with Philip the senate was ready to have a serious discussion despite the depletion of all resources. Philip had compelled Rome to give way to him in Illyricum, and he had proved by his attack on Egypt that he would prove to be a dangerous neighbour in time of peril. Furthermore philhellenism had grown very strong at Rome since Livius, Naevius and Ennius had translated scores of Greek plays for production at the Roman festivals. To the nobles who were now eagerly reading Homer, Plato and Euripides, the appeal of the old Greek cities for protection of independence, democracy and culture in Greece came to open ears. The people, to be sure, remembering all too well what they had suffered in the last war, at first rejected the senate's proposal to aid the Greeks, but the nobles, insisting that postponement would only result in a Macedonian invasion of Italy, finally secured a declaration of war (200).

Second Macedonian War, 200–197.—The war began in the summer of 200 B.C., and, though the landing of the Roman legions in Epirus was not followed, as had been hoped, by any general rising against Philip, yet the latter made no progress south of Boeotia. The fleets of Pergamum and Rhodes, now the zealous allies of Rome, protected Attica and watched the eastern coasts. The Achaeans and Nabis of Sparta were obstinately neutral, while nearer home in the north the Epirots and Aetolians threatened Thessaly and Macedonia. His own resources both in men and in money had been severely strained by his constant wars, and the only ally who could have given him effective assistance, Antiochus, was fully occupied with the conquest of Coele-Syria. It is no wonder then that, in spite of his dashing generalship and high courage, he made but a brief stand. T. Quinctius Flamininus (consul, 198), in his first year of command, defeated him on the Aous, drove him back to the pass of Tempe, and in the next year utterly routed him at Cynoscephalae. Almost at the same moment the Achaeans, who had now joined Rome, took Corinth, and the Rhodians defeated his troops in Caria. Further resistance was impossible; Philip submitted, and early the next year a Roman commission reached Greece with instructions to arrange terms of peace. These were such as effectually secured Rome's main object in the war, the removal of all danger to herself and her allies from Macedonian aggression. Philip was left in possession of his kingdom, but was degraded to the rank of a second-rate Power, deprived of all possessions in Greece, Thrace and Asia Minor, and forbidden, as Carthage had been in 201, to wage war without the consent of Rome, whose ally and friend he now became.

The second point in the settlement now effected by Rome was the liberation of the Greeks. The "freedom of Greece" was

[1] *E.g.*, Tarentum, Livy, xliv. 16. A Roman colony was established at Croton in 194, and a Latin colony (Copia) at Thurii in 193 (Livy, xxxiv. 45, 53).

proclaimed at the Isthmian games amid a scene of wild enthusiasm, which reached its height when two years later (194) Flamininus withdrew his troops even from the "three fetters of Greece"—Chalcis, Demetrias and Corinth. There is no reason to doubt that, in acting thus, not only Flamininus himself, but the senate and people at home were influenced, partly at any rate, by feelings of genuine sympathy with the Greeks and reverence for their past. It is equally clear than no other course was open to them. For Rome to have annexed Greece, as she had annexed Sicily and Spain, would have been a flagrant violation of the pledges she had repeatedly given both before and during the war; the attempt would have excited the fiercest opposition, and would probably have thrown the Asiatic as well as the European Greeks into the arms of Antiochus. But a friendly and independent Greece would be at once a check on Macedon and a barrier against aggression from the East. Nor while liberating the Greeks did Rome abstain from such arrangements as seemed necessary to secure the predominance of her own influence. In the Peloponnese, for instance, the Achaeans were rewarded by considerable accessions of territory; and it is possible that the Greek states, as allies of Rome, were expected to refrain from war upon each other without her consent.

War with Antiochus, 192–189.—Antiochus III. of Syria, Philip's accomplice in the proposed partition of the dominions of their common rival, Egypt, returned from the conquest of Coele-Syria (198) to learn first of all that Philip was hard pressed by the Romans, and shortly afterwards that he had been decisively beaten at Cynoscephalae. It was already too late to assist his former ally, but Antiochus resolved at any rate to lose no time in securing for himself the possessions of the Ptolemies in Asia Minor and in eastern Thrace, which Philip had claimed, and which Rome now pronounced free and independent. In 197–196 he overran Asia Minor and crossed into Thrace. But Antiochus was pleasure-loving, irresolute, and no general, and it was not until 192 that the urgent entreaties of the Aetolians, and the withdrawal of the Roman troops from Greece, nerved him to the decisive step of crossing the Aegean; even then the force he took with him was so small as to show that he completely failed to appreciate the nature of the task before him. At Rome the prospect of a conflict with Antiochus excited great anxiety, and it was not until every resource of diplomacy had been exhausted that war was declared, and the real weakness which lay behind the once magnificent pretensions of the "king of kings" was revealed.

Had Antiochus acted with energy when in 192 he landed in Greece, he might have won the day before the Roman legions appeared. As it was, in spite of the warnings of Hannibal, who was now in his camp, and of the Aetolians, he frittered away valuable time between his pleasures at Chalcis and useless attacks on petty Thessalian towns. In 191 Acilius Glabrio landed at the head of an imposing force; and a single battle at Thermopylae broke the courage of Antiochus, who hastily recrossed the sea to Ephesus, leaving his Aetolian allies to their fate. But Rome could not pause here. The safety of her faithful allies, the Pergamenes and Rhodians, and of the Greek cities in Asia Minor, as well as the necessity of chastising Antiochus, demanded an invasion of Asia. A Roman fleet had already (191) crossed the Aegean, and in concert with the fleets of Pergamum and Rhodes worsted the navy of Antiochus. In 190 the new consul L. Scipio, accompanied by his famous brother, the conqueror of Africa, led the Roman legion for the first time into Asia. At Magnesia ad Sipylum, in Lydia, he met and defeated the motley and ill-disciplined hosts of the great king. For the first time the West, under Roman leadership, successfully encountered the forces of the East, and the struggle began which lasted far on into the days of the emperors. The terms of the peace which followed the victory at Magnesia tell their own story clearly enough. There is no question, any more than in Greece, of annexation; the main object in view is that of securing the predominance of Roman interests and influence throughout the peninsula of Asia Minor, and removing to a safe distance the only eastern Power which could be considered dangerous. The line of the Halys and the Taurus range, the natural boundary of the peninsula eastwards, was established as the boundary between Antiochus and the kingdoms, cities and peoples now enrolled as the allies and friends of Rome. This line Antiochus was forbidden to cross; nor was he to send ships of war farther west than Cape Sarpedon in Cilicia. Immediately to the west of this frontier lay Bithynia, Paphlagonia and the immigrant Celtic Galatae, and these frontier states, now the allies of Rome, served as a second line of defence against attacks from the east. The area lying between these "buffer states" and the Aegean was organized by Rome in such a way as should at once reward the fidelity of her allies and secure both her own paramount authority and safety from foreign attack. Pergamum and Rhodes were so strengthened—the former by the gift of the Chersonese, Lycaonia, Phrygia, Mysia and Lydia, the latter by that of Lycia and Caria—as not only amply to reward their loyalty, but to constitute them effective props of Roman interests and effective barriers alike against Thracian and Celtic raids in the north and Syrian aggression in the south. Lastly, the Greek cities on the coast, except those already tributary to Pergamum, were declared free, and established as independent allies of Rome.

In a space of little over 11 years (200–189) Rome had broken the power of Alexander's successors and established throughout the eastern Mediterranean a Roman protectorate.

Third Macedonian War, 171–168.—It was in the western half of this protectorate that the first steps in the direction of annexation were taken. The enthusiasm provoked by the liberation of the Greeks had died away, and its place had been taken by feelings of dissatisfied ambition or sullen resentment. Internecine feuds and economic distress had brought many parts of Greece to the verge of anarchy, and, above all, the very foundations of the settlement effected in 197 were threatened by the reviving power and aspirations of Macedon. Loyally as Philip had aided Rome in the war with Antiochus, the peace of Magnesia brought him nothing but fresh humiliation. He was forced to abandon all hopes of recovering Thessaly, and he had the mortification to see the hated king of Pergamum installed almost on his borders as master of the Thracian Chersonese. Resistance at the time was unavailing, but from 189 until his death (179) he laboured patiently and quietly to increase the internal resources of his own kingdom, and to foment, by dexterous intrigue, feelings of hostility to Rome among his Greek and barbarian neighbours. His successor, Perseus, his son by a left-handed alliance, continued his father's work. He made friends among the Illyrian and Thracian princes, connected himself by marriage with Antiochus IV. of Syria and with Prusias of Bithynia, and, among the Greek peoples, strove, not without success, to revive the memories of the past glories of Greece under the Macedonian leadership of the Great Alexander. The senate could no longer hesitate. They were well aware of the restlessness and discontent in Greece; and after hearing from Eumenes of Pergamum and from their own officers, all details of Perseus's intrigues and preparations, they declared war. The struggle, in spite of Perseus's courage and the incapacity at the outset of the Roman commanders, was short and decisive. The sympathy of the Greeks with Perseus, which had been encouraged by the hitherto passive attitude assumed by Rome, instantly evaporated on the news that the Roman legions were on their way to Greece. No assistance came from Prusias or Antiochus, and Perseus's only allies were the Thracian king Cotys and the Illyrian Genthius. The victory gained by L. Aemilius Paulus at Pydna (168) ended the war. Perseus became the prisoner of Rome, and as such died in Italy a few years later. Rome had begun the war with the fixed resolution no longer of crippling but of destroying the Macedonian State. Perseus's repeated proposals for peace during the war had been rejected; and his defeat was followed by the final extinction of the kingdom of Philip and Alexander. Macedonia, though it ceased to exist as a single State, was not, however, definitely constituted a Roman province. On the contrary, the mistake was made of introducing some of the main principles of the provincial system—taxation, disarmament and the isolation of the separate communities—without the addition of the element most essential for the maintenance of order—that of a resident Roman governor. The four petty republics now created were each

autonomous, and each separated from the rest by the prohibition of *commercium* and *conubium*, but no central controlling authority was substituted for that of the Macedonian king. The inevitable result was confusion and disorder, resulting finally (149–48) in the attempt of a pretender, Andriscus, who claimed to be a son of Perseus, to resuscitate the ancient monarchy. On his defeat in 148 the senate declared Macedonia a Roman province, and placed a Roman magistrate at its head.

From 189 to the defeat of Perseus in 168 no formal change of importance in the status of the Greek states had been made by Rome. The senate, though forced year after year to listen to the mutual recriminations and complaints of rival communities and factions, contented itself as a rule with intervening just enough to remind the Greeks that their freedom was limited by its own paramount authority, and to prevent any single state or confederacy from raising itself too far above the level of general weakness which it was the interest of Rome to maintain. After the victory at Pydna, however, the sympathy shown for Perseus, exaggerated as it seems to have been by the interested representations of the romanizing factions in the various states, was made the pretext for a more emphatic assertion of Roman ascendancy. All those suspected of Macedonian leanings were removed to Italy, as hostages for the loyalty of their several communities, and the real motive for the step was made clear by the exceptionally severe treatment of the Achaeans, whose loyalty was not really doubtful, but whose growing power in the Peloponnese and independence of language had awakened alarm at Rome. A thousand of their leading men, among them the historian Polybius, were carried off to Italy (*see* POLYBIUS). In Aetolia the Romans connived at the massacre by their so-called friends of 500 of the opposite party. Acarnania was weakened by the loss of Leucas, while Athens was rewarded for her unambitious loyalty by the gift of Delos and Samos.

But this somewhat violent experiment only answered for a time. In 148 the Achaeans rashly persisted, in spite of warnings, in attempting to compel Sparta by force of arms to submit to the league. When threatened by Rome with the loss of all that they had gained since Cynoscephalae, they madly rushed into war. They were easily defeated, and a "commission of ten," under the presidency of L. Mummius, was appointed by the senate thoroughly to resettle the affairs of Greece. Corinth, by orders of the senate, was burnt to the ground and its territory confiscated. Thebes and Chalcis were destroyed, and the walls of all towns which had shared in the last desperate outbreak were razed to the ground. All the existing confederacies were dissolved; no *commercium* was allowed between one community and another. Everywhere an aristocratic type of constitution was established, and the payment of a tribute was apparently imposed. Into Greece, as into Macedonia in 167, the now familiar features of the provincial system were introduced—disarmament, isolation and taxation. The Greeks were still nominally free, and no separate province with a governor of its own was established, but the needed central control was provided by assigning to the neighbouring governor of Macedonia a general supervision over the affairs of Greece. From the Adriatic to the Aegean, and as far north as the river Drilo and Mt. Scardus, the whole peninsula was now under direct Roman rule.

The Roman Protectorate in Asia.—Beyond the Aegean the Roman protectorate worked no better than in Macedonia and Greece, and the quarrels and disorders which flourished under its shadow were aggravated by its longer duration and by the still more selfish view taken by Rome of her responsibilities. At one period indeed, after the battle of Pydna, it seemed as if the more vigorous, if harsh, system then initiated in Macedon and Greece was to be adopted farther east also. The levelling policy pursued towards Macedon and the Achaeans was applied with less justice to Rome's two faithful and favoured allies, Rhodes and Pergamum. The former had rendered themselves obnoxious to Rome by their independent tone. On a charge of complicity with Perseus they were threatened with war, and though this danger was averted they were forced to exchange their equal alliance with Rome for one which placed them in close dependence upon her, and to resign the lucrative possessions in Lycia and Caria given them in 189. Finally, their commercial prosperity was ruined by the establishment of a free port at Delos. With Eumenes of Pergamum no other fault could be found than that he was strong and successful; but this was enough. His brother Attalus was invited, but in vain, to become his rival. His turbulent neighbours, the Galatae, were allowed to harass him by raids. Pamphylia was declared independent, and favours were heaped upon Prusias of Bithynia. These and other annoyances and humiliations had the desired effect. Eumenes and his two successors—his brother and son, Attalus II. and Attalus III.—contrived indeed by studious humility and dexterous flattery to retain their thrones, but Pergamum (*q.v.*) ceased to be a powerful State, and its weakness, added to that of Rhodes, increased the prevalent disorder in Asia Minor. During the same period we have other indications of a temporary activity on the part of Rome. The frontier of the protectorate was pushed forward to the confines of Armenia by alliances with the kings of Pontus and Cappadocia beyond the Halys. In Syria, on the death of Antiochus Epiphanes (164), Rome intervened to place a minor, Antiochus Eupator, on the throne, under Roman guardianship. In 168 Egypt formally acknowledged the suzerainty of Rome, and in 163 the senate, in the exercise of this new authority, restored Ptolemy Philometor to his throne, but at the same time weakened his position by handing over Cyrene and Cyprus to his brother Euergetes.

But this display of energy was short-lived. From the death of Eumenes in 159 down to 133 Rome, secure in the absence of any formidable power in the East, and busy with affairs in Macedonia, Africa and Spain, relapsed into an inactivity the disastrous results of which revealed themselves in the next period, in the rise of Mithridates of Pontus, the spread of Cretan and Cilician piracy, and the advance of Parthia.

Both the western and eastern Mediterranean now acknowledged the suzerainty of Rome, but her relations with the two were from the first different. The West fell to her as the prize of victory over Carthage, and, the Carthaginian power broken, there was no hindrance to the immediate establishment in Sicily, Sardinia, Spain, and finally in Africa, of direct Roman rule. To the majority, moreover, of her western subjects she brought a civilization as well as a government of a higher type than any before known to them. And so in the West she not only formed provinces but created a new and wider Roman world. To the East, on the contrary, she came as the liberator of the Greeks; and it was only slowly that in this part of the empire her provincial system made way. In the East, moreover, the older civilization she found there obstinately held its ground. Her proconsuls governed and her legions protected the Greek communities, but to the last the East remained in language, manners and thought Greek and not Roman.

(*c*) **The Period of the Revolution (146–49 B.C.).**—In the course of little more than a century, Rome had become the supreme power in the civilized world. Although in its outward form her old constitution had undergone little change during the age of war and conquest from 265 to 146, the causes, both internal and external, which brought about its fall had been silently at work throughout. Its form was in strictness that of a moderate democracy. The patriciate had ceased to exist as a privileged caste, and there was no longer any order of nobility recognized by the constitution. The senate and the offices of state were in law open to all, and the will of the people in assembly had been in the most explicit and unqualified manner declared to be supreme alike in the election of magistrates, in the passing of laws, and in all matters touching the *caput* of a Roman citizen. But in practice the constitution had become an oligarchy. The senate, not the assembly, ruled Rome, and both the senate and the magistracies were in the hands of a class which, in defiance of the law, arrogated to itself the title and the privileges of a nobility. The ascendancy of the senate is too obvious and familiar a fact to need much illustration here. It was but rarely that the assembly was called upon to decide questions of policy, and then the proposal was usually made by the magistrate in obedience to the

express directions of the senate. In the enormous majority of cases the matter was settled by a *senatus consultum,* without any reference to the people at all. The assembly decides for war or peace, but the conduct of the war and the conditions of peace are matters left to the senate (*q.v.*). Now and then the assembly confers a command upon the man of its choice, or prolongs the *imperium* of a magistrate, but, as a rule, these and all questions connected with foreign affairs are settled within the walls of the senate-house. It is the senate which year after year assigns the commands and fixes the number and disposition of the military forces, directs the organization of a new province, conducts negotiations and forms alliances. Within Italy, though its control of affairs was less exclusive, we find that, besides supervising the ordinary current business of administration, the senate decides questions connected with the Italian allies, sends out colonies, allots lands, and directs the suppression of disorders. Lastly, both in Italy and abroad it managed the finances. Inseparably connected with this monopoly of affairs to the exclusion of the assembly was the control which in practice, if not in theory, the senate exercised over the magistrates. The latter had become what Cicero wrongly declares they were always meant to be, merely the subordinate ministers of the supreme council, which assigned them their departments, provided them with the necessary equipment, claimed to direct their conduct, prolonged their commands, and rewarded them with triumphs. It was now at once the duty and the interest of a magistrate to be *in auctoritate senatus,* "subject to the authority of the senate," and even the once formidable *tribuni plebis* are found during this period actively and loyally supporting the senate, and acting as its spokesmen in the assembly.

The Senatorial Government.—Behind both senate and magistrates, lay the whole power and influence of the new nobility. These *nobiles* were essentially distinct from the older and more legitimate patrician aristocracy. Every patrician was of course noble, but the majority of the "noble families" in 146 were not patrician but plebeian. The title had been gradually appropriated, since the opening of the magistracies, by those families whose members had held the consulship. It was thus in theory within the reach of any citizen who could win this office, and, moreover, it carried with it no legal privileges whatsoever. Gradually, however, the ennobled plebeian families drew together, and combined with the older patrician *gentes* to form a distinct order. Office brought wealth and prestige, and both wealth and prestige were liberally employed in securing for this select circle a monopoly of political power, and excluding new men. Already by the close of the period it was rare for anyone but a noble to find his way into high office or into the senate. The senate and magistrates were the mouthpieces of this order, and identified with it in policy and interest. Lastly, it must be allowed that both the senate and the nobility had to some extent justified their power by the use they made of it. It was their tenacity of purpose and devoted patriotism which had carried Rome through the dark days of the Hannibalic War. The heroes of the struggle with Carthage belonged to the leading families; the disasters at the Trasimene lake and at Cannae were associated with the blunders of popular favourites.

From the first, however, there was an inherent weakness in this senatorial government. It had no sound constitutional basis, and with the removal of its accidental supports it fell to the ground. Legally the senate had no positive authority. It could merely advise the magistrate when asked to do so, and its decrees were strictly only suggestions to the magistrate, which he was at liberty to accept or reject as he chose. It had, it is true, become customary for the magistrate not only to ask the senate's advice on all important points, but to follow it when given. But it was obvious that if this custom were weakened, and the magistrates chose to act independently, the senate was powerless. It might indeed anathematize the refractory official, or hamper him if it could by setting in motion against him a colleague or the tribunes, but it could do no more, and these measures failed just where the senate's control was most needed and most difficult to maintain—in its relations with the generals and governors of provinces abroad. The virtual independence of the proconsul was before 146 already exciting the jealousy of the senate and endangering its supremacy. Nor again had the senate any legal hold over the assembly. Except in certain specified cases, it rested with the magistrate to decide whether any question should be settled by a decree of the senate or a vote of the assembly. If he decided to make a proposal to the assembly, he was not bound except by custom to obtain the previous approval of the senate, and the constitution set no limits to the power of the assembly to decide any question whatsoever that was laid before it.

From 150, at least, onwards, there were increasing indications that both the acquiescence of the people in senatorial government and the loyalty of the magistrates to the senate were failing. The rich landowners were not only taking possession of the public lands but were buying out the small farmers. And since the Government took little interest in commerce and industry, the poor were drifting idly to the cities or migrating to the Po valley. Slaves were being brought in to do the work of citizens, and the levies for the wars, which never ceased, fell more and more upon a decreasing citizenry. Between 165 and 135 the number of citizens, which should have increased by at least 100,000, actually dropped 20,000. The populace began to object to the constant levies and to criticize the régime which seemed only to be interested in foreign policies.

It is possible that these constitutional and administrative difficulties would not have proved so rapidly fatal to the republic had not its very foundations been sapped by the changes which followed more or less directly on the conquests of the 3rd and 2nd centuries B.C. For the opening of the world to Rome, and of Rome to the world, produced a radical change in the structure of Roman society. The subjugation of the Mediterranean countries, by placing at the disposal of Rome the vast natural resources of the West and the accumulated treasures of the East, caused a rapid rise in the standard of wealth and a marked change in its distribution. The Roman State was enabled to dispense with the direct taxation of its citizens, since it derived all the revenue which it needed from the subject countries. But this wealth enticed the Romans away from a beneficial development of their own resources into a dangerous parasitism. In time generals and soldiers learned to depend upon the profits of wars, governors to provide for their estates out of illegitimate perquisites of office far away from the vigilant eyes of magistrates at home. Speculators learned to place mortgages in the provinces where interest rates were high, to profit by the protection of Rome's armies, and secure the high return of their investments from lenient governors. Roman nobles, engaged all their lives in the expensive civil and military service, unable to devote any attention to developing their own properties for a livelihood, excused their own and their fellows' exploitation of the subjects. Compelled to find leisure from financial concerns, they disregarded the needs of industry and commerce that might have employed citizens and developed the resources of Italy. Instead they acquiesced in the slave-driven culture of large estates which yielded meagre returns and begot out of war captives a body of citizens bred in servility, ignorance and hatred. Surely the great successes of the 2nd century had come too speedily.

The New Learning.—It was not only the structure and composition of Roman society that underwent a transformation. The victory of Rome in her struggle for supremacy in the Mediterranean basin had been largely due to the powerful conservative forces by which her institutions were preserved from decay. Respect for the *mos maiorum,* or ancestral custom, imposed an effective check on the desire for innovation. Though personal religion, in the deeper sense, was foreign to the Roman temperament, there was a genuine belief in the gods whose favour had made Rome great in the past and would uphold her in the future so long as she trod in the old paths of loyalty and devotion. Above all, the healthy moral traditions of early Rome were maintained by the discipline of the family, resting on the supreme authority of the father—the *patria potestas*—and the powerful influence of the mother, to whom the early training of the child was entrusted. Finally, the institution of the censorship, backed as it was by the mighty force of public opinion, provided a deterrent

which prevented any flagrant deviation from the accepted standard of morals. All this was changed by the influence of Greek civilization, with which Rome was first brought face to face in the 3rd century B.C. owing to her relations with Magna Graecia. At first the results of contact with the older and more brilliant culture of Hellas were on the whole good. In the 2nd century B.C., when constant intercourse was established with the communities of Greece proper and of Asia Minor, "philhellenism" became a passion, which was strongest in the best minds of the day and resulted in a quickened intellectual activity, wider sympathies and a more humane life. But at the same time the "new learning" was a disturbing and unsettling force. The Roman citizen was confronted with new doctrines in politics and religion, and initiated into the speculations of critical philosophy. Under the influence of this powerful solvent the fabric of tradition embodied in the *mos maiorum* fell to pieces; a revolt set in against Roman discipline and Roman traditions of self-effacement, and the craving for individual distinction asserted itself with irresistible vehemence. As it had been in the days of the "sophistic" movement at Athens, so it was now with Rome; a higher education, which, owing to its expense, was necessarily confined to the wealthier classes, interposed between the upper and lower ranks of society a barrier even more effectual than that set up by differences of material condition, and by releasing the individual from the trammels of traditional morality, gave his ambition free course. The effect on private morals may be gauged by the vehemence with which the reactionary opposition, headed by M. Porcius Cato (consul, 195 B.C.; censor, 184 B.C.), inveighed against the new fashions, and by the list of measures passed to check the growth of luxury and licence, and to exclude the foreign teachers of the new learning. It was all in vain. The art of rhetoric, which was studied through the medium of Greek treatises and Greek models, furnished the Roman noble with weapons of attack and defence of which he was not slow to avail himself in the forum and the senate-house. In the science of money-making which had been elaborated under the Hellenistic monarchies, the Roman capitalists proved apt pupils of their Greek teachers. Among the lower classes, contact with foreign slaves and freedmen, with foreign worships and foreign vices, produced a love of novelty which no legislation could check. Even amongst women there were symptoms of revolt against the old order, which showed itself in a growing freedom of manners and impatience of control, the marriage tie was relaxed, and the respect for mother and wife which had been so powerful a factor in the maintenance of the Roman standard of morals, was grievously diminished. Thus Rome was at length brought face to face with a moral and economic crisis which a modern historian has described in the words: "Italy was living through the fever of moral disintegration and incoherence which assails all civilized societies that are rich in the manifold resources of culture and enjoyment, but tolerate few or no restraints on the feverish struggle of contending appetites." In this struggle the Roman republic perished, and personal government took its place. The world had outgrown the city-state and its political machinery, and as representative government, tried in Thessaly and Macedonia, was out of the question in a heterogeneous empire, no solution of the problem was possible save that of absolutism. But a far stronger resistance would have been opposed to political evolution by the republican system had not public morals been sapped by the influences above described. Political corruption was reduced to a science for the benefit of individuals who were often faced with the alternatives of ruin or revolution; there was no longer any body of sound public opinion to which, in the last resort, appeal could be made; and, long before the final catastrophe took place, Roman society itself had become, in structure and temper, thoroughly unrepublican.

The Gracchi, 133–121.—The first systematic attack upon the senatorial government is connected with the names of Tiberius and Gaius Gracchus (*qq.v.*) and its immediate occasion was an attempt to deal with no less a danger than the threatened disappearance of the class to which of all others Rome owed most in the past. The small landholders throughout the greater part of Italy were sinking deeper into ruin under the pressure of accumulated difficulties. The Hannibalic war had laid waste their fields and thinned their numbers, nor when peace returned to Italy did it bring with it any revival of prosperity. The heavy burden of military service still pressed ruinously upon them, and in addition they were called upon to compete with the foreign corn imported from beyond the sea, and with the foreign slave-labour purchased by the capital of wealthier men. Farming became unprofitable, and the hard laborious life with its scanty returns was thrown into still darker relief when compared with the stirring life of the camps with its opportunities of booty, or with the cheap provisions, frequent largesses and gay spectacles to be had in the large towns. The small-holders went off to follow the eagles to try fortune in some province, or swell the proletariat of the cities, and their holdings were left to run waste or merged in the vineyards, olive-yards and above all in the great cattle farms of the rich, and their own place was taken by slaves. The evil was worst in Etruria and in southern Italy; but everywhere it was serious enough to demand the earnest attention of Roman statesmen. Of its existence the Government had received plenty of warning in the declining numbers of able-bodied males returned at the census, in the increasing difficulties of recruiting for the legions, in servile outbreaks in Etruria and Apulia, and between 200 and 160 a good deal was attempted by way of remedy. In addition to the foundation of 20 colonies, there were frequent allotments of land to veteran soldiers, especially in Apulia and Samnium. In 180, 40,000 Ligurians were removed from their homes and settled on vacant lands once the property of a Samnite tribe, and in 160 the Pomptine marshes were drained for the purpose of cultivation. But these efforts were only partially successful. The colonies planted in Cisalpine Gaul and in Picenum flourished, but of the others the majority slowly dwindled away, and two required recolonizing only eight years after their foundation. The veterans who received land were unfitted to make good farmers; and large numbers, on the first opportunity, gladly returned as volunteers to a soldier's life. Moreover, after 160 even these efforts ceased, and with the single exception of the colony of Auximum in Picenum (157) nothing was done to check the spread of the evil, until in 133 Tiberius Gracchus, on his election to the tribunate, set his hand to the work.

The remedy proposed by Gracchus amounted in effect to the resumption by the State of as much of the "common land" as was not held in occupation by authorized persons and conformably to the provisions of the Licinian law, and the distribution in allotments of the land thus rescued for the community from the monopoly of a few. It was a scheme which could quote in its favour ancient precedent as well as urgent necessity. Of the causes which led to its ultimate failure something will be said later on; for the present we must turn to the constitutional conflict which it provoked. The senate from the first identified itself with the interests of the wealthy occupiers, and Tiberius found himself forced into a struggle with that body, which had been no part of his original plan. He fell back on the legislative sovereignty of the assembly; he resuscitated the half-forgotten powers of interference vested in the tribunate in order to paralyse the action of the senatorial magistrates, and finally lost his life in an attempt to make good one of the weak points in the tribune's position by securing his own re-election for a second year. But the conflict did not end with his death. It was renewed on a wider scale and with a more deliberate aim by his brother Gaius, who on his election to the tribunate (123) at once came forward with a vast programme of legislation. He shrewdly began by weakening the influence of the senate. Since his followers had every reason to dread the *senatus consultum ultimum*, the senate's chief weapon of attack against opponents, his first plebiscite reasserted the "right of appeal." He then destroyed the senate's prerogative to assign the provinces to its partisans, took away the jury panels from the senators, and also claimed for the assembly the right to assign public contracts and to control the budget so far as it desired. Thus the senate lost control of the gifts by which it cajoled and the lashes by which it compelled obedience. Very early also he gave doles of grain to the poor. This later led to great evils, but it must have been instituted as a temporary

measure since he intended soon to distribute the needy in colonies. The evils of the dole must be accredited to the senate which stopped the colonization and did not have the courage to stop the dole. The jury panels he now made up of knights instead of senators. Gracchus wished, it seems, to give official recognition through civil service to men of business, in whom he had great faith. He would thus widen the group interested in public concerns and build up an influential order as a balance to the old nobility. Later it proved a disadvantage that publicans could sit in judgment over provincial governors who had to hold the publicans in check, but this difficulty could hardly have been foreseen since publicans did not yet have provincial contracts. In order to secure larger returns from the Asiatic province, recently inherited by Rome, Gracchus permitted the knights to form corporations of limited liability (such corporations were otherwise prohibited) with the privilege of taking contracts to gather and dispose of the Asiatic tithe. The advantages would be that the State would receive in advance the sums bid, would not have to build up a large taxing bureau in order to get all that was due, and the taxpayers could pay the tithe in kind according to the yield of each year. Since this system had not been tried before by Rome, its inherent evils were probably not yet known. In time it led not only to harsh exactions because of collusion between governors and publicans, but also to costly exploitation, because the publicans lent money to delinquents at high rates and engaged generally in unseemly speculation. Gracchus used the money in such public works as the assembly at his bidding authorized. The colonies which Gracchus founded—it was only the beginning of a large project—were well selected. Two were planted in southern Italy where many allotments had recently been made to small farmers—at Tarentum and Scylacium. For these, men specially selected for their capacity were chosen. Then 6,000 hardy farmers were sent to the province of Africa which had been lying desolate for a generation, and which had had to depend upon the Punic city of Utica for its harbour and its praetorian residence. Not even then did the senate comprehend its duty to its provincials, but cancelled the colonial charter, though it dared not cancel the allotments. And now though Gracchus lost his re-election to the tribunate he attempted his last great reform of giving the franchise to the Latins in order that the democracy might rest on a wider and sounder basis. Since Caesar, who took many suggestions from Gracchus, later proposed to extend balloting through Italy by local polls, it is not unlikely that Gracchus had that in view. That would finally have removed democratic legislation from the control of the urban crowd. Be that as it may, the attempt to broaden the franchise failed, not this time because of senatorial opposition but because of the selfishness of the voters who did not wish to diminish their own prerogatives. Gracchus lost his influence, and soon after when a riot arose the senate declared martial law and summoned Gracchus to the bar of the senate. He refused to recognize a procedure which the assembly had outlawed the year before. The senate insisting on the legality of its course ordered his arrest and in the riot which ensued he was slain.

The agrarian reforms of the two Gracchi had little permanent effect. Even in the lifetime of Gaius the clause in his brother's law rendering the new holdings inalienable was repealed, and the process of absorption recommenced. In 118 a stop was put to further allotment of occupied lands, and finally, in 111, the whole position of the agrarian question was altered by a law which converted all land still held in occupation into private land. The old controversy as to the proper use of the lands of the community was closed by this act of alienation. The controversy in future turns, not on the right of the poor citizens to the State lands, but on the expediency of purchasing other lands for distribution at the cost of the treasury.

But, though the agrarian reform failed, the political conflict it had provoked continued, and the lines on which it was waged were in the main those laid down by Gaius Gracchus. The sovereignty of the assembly continued to be the watchword of the popular party, and a free use of the tribunician powers of interference and of legislation remained the most effective means of accomplishing their aims.

Marius, 118–100.—Ten years after the death of Gaius the *populares* once more summoned up courage to challenge the supremacy of the senate; but it was on a question of foreign administration that the conflict was renewed. The course of affairs in the client state of Numidia since Micipsa's death in 118 had been such as to discredit a stronger government than that of the senate. In defiance of Roman authority, and relying on the influence of his own well-spent gold, Jugurtha had murdered both his legitimate rivals, Hiempsal and Adherbal, and made himself master of Numidia. The declaration of war wrung from the senate (112) by popular indignation had been followed by the corruption of a consul (111) and the crushing defeat of the proconsul Albinus. On the news of this crowning disgrace the storm burst, and on the proposal of the tribunes a commission of enquiry into the conduct of the war was appointed. But the popular leaders did not stop here. Q. Caecilius Metellus, who as consul (109) had succeeded to the command in Numidia, was an able soldier but a rigid aristocrat; and they now resolved to improve their success by entrusting the command instead to a genuine son of the people. Their choice fell on Gaius Marius (*see* MARIUS), an experienced officer and administrator, but a man of humble birth, wholly illiterate, and one who, though no politician, was by temperament and training a hater of the polished and effeminate nobles who filled the senate. He was triumphantly elected, and, in spite of a decree of the senate continuing Metellus as proconsul, he was entrusted by a vote of the assembly with the charge of the war against Jugurtha (*q.v.*).

Jugurtha was vanquished; and Marius, who had been a second time elected consul in his absence, arrived at Rome in Jan. 104, bringing the captive prince with him in chains. But further triumphs awaited the popular hero. The Cimbri and Teutones were at the gates of Italy; they had four times defeated the senatorial generals, and Marius was called upon to save Rome from a second invasion of the barbarians. After two years of suspense the victory at Aquae Sextiae (102), followed by that on the Raudine plain (101), put an end to the danger by the annihilation of the invading hordes; and Marius, now consul for the fifth time, returned to Rome in triumph. There the popular party welcomed him as a leader with all the prestige of a successful general. Once more, however, they were destined to a brief success followed by disastrous defeat. Marius became for the sixth time consul; of the two popular leaders Glaucia became praetor and Saturninus tribune. But Marius and his allies were not statesmen of the stamp of the Gracchi; and the laws proposed by Saturninus had evidently no serious aim in view other than that of harassing the senate. His corn law merely reduced the price fixed in 123 for the monthly dole of corn, and the main point of his agrarian law lay in the clause appended to it requiring all senators to swear to observe its provisions[1]. The laws were carried, but the triumph of the popular leaders was short-lived. Their period of office was drawing to a close. At the elections fresh rioting took place, and Marius as consul was called upon by the senate to protect the State against his own partisans. Saturninus and Glaucia surrendered, but while the senate was discussing their fate they were surrounded and murdered by their opponents.

The popular party had been worsted once more in their struggle with the senate, but none the less their alliance with Marius, and the position in which their votes placed him, marked an epoch in the history of the revolution. The transference of the political leadership to a consul who was nothing if not a soldier was at once a confession of the insufficiency of the purely civil authority of the tribunate and a dangerous encouragement of military interference in political controversies. The consequences were already foreshadowed by the special provisions made by Saturninus for Marius's veterans, and in the active part taken by them in the passing of his laws. Indirectly, too, Marius, though no politician, played an important part in this new departure. His military reforms at once democratized the army and attached it more closely to its leader for the time being. He swept away

[1]For the *leges Appuleiae, see* SATURNINUS, L. APPULEIUS, and authorities there quoted.

the last traces of civil distinctions of rank or wealth within the legion. admitted to its ranks all classes, and substituted voluntary enlistment under a popular general for the old-fashioned compulsory levy. The efficiency of the legion was increased at the cost of a complete severance of the ties which bound it to the civil community and to the civil authorities.

The Social War.—The next important crisis was due partly to the rivalry which had been growing more bitter each year between the senate and the commercial class, and partly to the long-impending question of the enfranchisement of the Italian allies. The *publicani, negotiatores* and others, who constituted what was now becoming known as the equestrian order (*see* EQUITES), had made unscrupulous use of their control of the courts and especially of the *quaestio de repetundis* against their natural rivals, the official class in the provinces. The threat of prosecution before a hostile jury was held over the head of every governor, legate and quaestor who ventured to interfere with their operations in the provinces. The average official preferred to connive at their exactions; the bolder ones paid with fines and even exile for their courage. In 92 the necessity for a reform was proved beyond a doubt by the scandalous condemnation of P. Rutilius Rufus, ostensibly on a charge of extortion, in reality as the reward of his efforts to check the extortions of the Roman equites in Asia. The difficulties of the Italian question were more serious. That the Italian allies were discontented was notorious. After nearly two centuries of close alliance, of common dangers and victories, they now eagerly coveted as a boon that complete amalgamation with Rome which they had at first resented as a dishonour. But, unfortunately, Rome had grown more exclusive in proportion as the value set upon Roman citizenship increased. During the last 40 years feelings of hope and disappointment had rapidly succeeded each other; Marcus Fulvius Flaccus, Gaius Gracchus, Saturninus, had all held out promises of relief—and nothing had yet been done. On each occasion they had crowded to Rome, full of eager expectation, only to be harshly ejected from the city by the consul's orders. The justice of their claims could hardly be denied, the danger of continuing to ignore them was obvious—yet the difficulties in the way of granting them were formidable in the extreme, and from a higher than a merely selfish point of view there was much to be said against the revolution involved in so sudden and enormous an enlargement of the citizen body.

Marcus Livius Drusus (*q.v.*), who as tribune gallantly took up the task of reform, is claimed by Cicero as a member of that party of the centre to which he belonged himself. Noble, wealthy and popular, he seems to have hoped to be able by the weight of his position and character to rescue the burning questions of the day from the grasp of extreme partisans and to settle them peacefully and equitably. But he, like Cicero after him, had to find to his cost that there was no room in the fierce strife of Roman politics for moderate counsels. His proposal to reform the law courts excited the equestrian order and their friends in the senate to fury. The agrarian and corn laws which he coupled with it alienated many more in the senate, and roused the old anti-popular party feeling; finally, his known negotiations with the Italians were eagerly misrepresented to the jealous and excited people as evidence of complicity with a widespread conspiracy against Rome. His laws were carried, but the senate pronounced them null and void. Drusus was denounced in the senate house as a traitor, and on his way home was struck down by the hand of an unknown assassin. His assassination was the signal for an outbreak which had been secretly prepared for some time before. Throughout the highlands of central and southern Italy the flower of the Italian peoples rose as one man. Etruria and Umbria held aloof; the isolated Latin colonies stood firm; but the Sabellian clans, north and south, the Latinized Marsi and Paeligni, as well as the Oscan-speaking Samnites and Lucanians, rushed to arms. No time was lost in proclaiming their plans for the future. A new Italian State was to be formed. The Paelignian town of Corfinium was selected as its capital and re-christened with the proud name of Italica. All Italians were to be citizens of this new metropolis, and here were to be the place of assembly and the senate house. A senate of 500 members and a magistracy resembling that of Rome completed a constitution which adhered closely to the very political traditions which its authors had most reason to abjure.

Now, as always in the face of serious danger, the action of Rome was prompt and resolute. Both consuls took the field; with each were five legates, among them the veteran Marius and his destined rival L. Cornelius Sulla, and even freedmen were pressed into service with the legions. But the first year's campaign opened disastrously. In central Italy the northern Sabellians, and in the south the Samnites, defeated the forces opposed to them. And though before the end of the year Marius and Sulla in the north, and the consul Caesar himself in Campania, succeeded in inflicting severe blows on the enemy, and on the Marsi especially, it is not surprising that, with an empty treasury, with the insurgents' strength still unbroken, and with rumours of disaffection in the loyal districts, opinion in Rome should have turned in the direction of the more liberal policy which had been so often scornfully rejected and in favour of some compromise which should check the spread of the revolt, and possibly sow discord among their enemies. Towards the close of the year 90 the consul L. Julius Caesar (killed by Fimbria in 87) carried the *lex Iulia,* by which the Roman franchise was offered to all communities which had not as yet revolted; early in the next year (89) the Julian law was supplemented by the *lex Plautia Papiria,* introduced by two of the tribunes, M. Plautius Silvanus and C. Papirius Carbo Arvina, which enacted that any citizen of an allied community then domiciled in Italy might obtain the franchise by giving in his name to a praetor in Rome with 60 days. A third law (*lex Calpurnia*), apparently passed at the same time, empowered Roman magistrates in the field to bestow the franchise there and then upon all who were willing to receive it. This sudden opening of the closed gates of Roman citizenship was completely successful, and its effects were at once visible in the diminished vigour of the insurgents. By the end of 89 the Samnites and Lucanians were left alone in their obstinate hostility to Rome, and neither, thanks to Sulla's brilliant campaign in Samnium, had for the moment any strength left for active aggression.

The termination of the Social War brought with it no peace in Rome. The old quarrels were renewed with increased bitterness, and the newly enfranchised Italians themselves complained as bitterly of the restriction which robbed them of their due share of political influence by allowing them to vote only in a specified number of tribes. The senate itself was distracted by violent personal rivalries—and all these feuds, animosities and grievances were aggravated by the widespread economic distress and ruin which affected all classes. Lastly, war with Mithridates VI. had been declared; it was notorious that the privilege of commanding the force to be sent against him would be keenly contested, and that the contest would lie between the veteran Marius and L. Cornelius Sulla.

Sulla.—It was in an atmosphere thus charged with the elements of disturbance that P. Sulpicius Rufus (*q.v.*) as tribune brought forward his laws. He proposed: (1) that the command of the Mithridatic War should be given to Marius, though it had legally been assigned to the consul Sulla; (2) that the new citizens should be distributed through all the tribes; (3) that the freedmen should no longer be confined to the four city tribes; (4) that any senator owing more than 2,000 denarii should lose his seat; (5) that those exiled on suspicion of complicity with the Italian revolt should be recalled. These proposals inevitably provoked a storm, and both sides were ominously ready for violent measures. The consuls, in order to prevent legislation, proclaimed a public holiday. Sulpicius replied by arming his followers and driving the consuls from the forum. The proclamation was withdrawn and the laws carried, but Sulpicius's triumph was short-lived. From Nola in Campania, where lay the legions commanded by him in the Social War, Sulla advanced on Rome, and for the first time a Roman consul entered the city at the head of the legions of the republic. Resistance was hopeless. Marius and Sulpicius fled, and Sulla, summoning the assembly of the centuries, proposed the measures he considered necessary for the

public security, the most important being a provision that the sanction of the senate should be necessary before any proposal was introduced to the assembly. Then, after waiting in Rome long enough to hold the consular elections, he left for Asia early in 87.

Sulla had conquered, but his victory cost the republic dear. He had first taught political partisans to look for final success, not to a majority of votes in the forum or campus, but to the swords of the soldiery. The lesson was well learnt. Shortly after his departure L. Cornelius Cinna as consul revived the proposals of Sulpicius; his colleague, Gnaeus Octavius, at the head of an armed force, fell upon the new citizens who had collected in crowds to vote, and the forum was heaped high with the bodies of the slain. Cinna fled, but fled, like Sulla, to the legions. When the senate declared him deposed from his consulship, he replied by invoking the aid of the soldiers in Campania in behalf of the violated rights of the people and the injured dignity of the consulship, and, like Sulla, found them ready to follow where he led. The neighbouring Italian communities, who had lost many citizens in the recent massacre, sent their new champion men and money; while from Africa, whither he had escaped after Sulla's entry into Rome, came Marius with 1,000 Numidian horsemen. The senate had prepared for a desperate defence, but fortune was adverse, and after a brief resistance they gave way. Cinna was acknowledged as consul, the sentence of outlawry passed on Marius was revoked and Cinna and Marius entered Rome with their troops. Marius's thirst for revenge was gratified by a frightful massacre, and he lived long enough to be nominated consul for the seventh time. But he held his consulship only a few weeks. Early in 86 he died, and for the next three years Cinna ruled Rome. Constitutional government was virtually suspended. For 85 and 84 Cinna nominated himself and a trusted colleague as consuls. The state was, as Cicero says, without lawful authority. A partial registration of the newly enfranchised Italians was made, but beyond this little was done. The attention of Cinna and his friends was in truth engrossed by the ever-present dread of Sulla's return from Asia. The consul of 86, L. Valerius Flaccus (who had been consul with Marius in 100 B.C.), sent out to supersede him, was murdered by his own soldiers at Nicomedia. In 85 Sulla, though disowned by his Government, concluded a peace with Mithridates. In 84, after settling affairs in Asia and crushing Flaccus's successor, C. Flavius Fimbria, he crossed into Greece, and in the spring of 83 landed at Brundusium with 40,000 soldiers and a large following of *émigré* nobles. Cinna was dead, murdered like Flaccus by his mutinous soldiers; his most trusted colleague, Cn. Papirius Carbo, was commanding as proconsul in Cisalpine Gaul; and the resistance offered to Sulla's advance was slight. At Capua, Sulla routed the forces of one consul, Gaius Norbanus; at Teanum the troops of the other went over in a body to the side of the outlawed proconsul. After a winter spent in Campania he pressed forward to Rome, defeated the younger Marius (consul, 82) near Praeneste, and entered the city without further opposition. In north Italy the success of his lieutenants, Q. Caecilius Metellus Pius (son of Metellus Numidicus), Cn. Pompeius and Marcus Crassus, had been fully as decisive. Cisalpine Gaul, Umbria and Etruria had all been won for Sulla, and the two principal leaders on the other side, Carbo and Norbanus, had each fled, one to Rhodes, the other to Africa. Only one foe remained to be conquered. The Samnites and Lucanians whom Cinna had conciliated, and who saw in Sulla their bitterest foe, were for the last time in arms, and had already joined forces with the remains of the Marian army close to Rome. The decisive battle was fought under the walls of the city, and ended in the complete defeat of the Marians and Italians (battle of the Colline gate).

For a period of nearly ten years Rome and Italy had been distracted by civil war. Sulla (*q.v.*) was now called upon to heal the divisions which rent the State asunder, to set in working again the machinery of civil government, and above all so to modify it as to meet the altered conditions, and to fortify it against the dangers which visibly threatened it in the future. The real charge against Sulla is not that he failed to accomplish all this, for to do so was beyond the powers even of a man so able, resolute and self-confident as Sulla, armed though he was with absolute authority and backed by overwhelming military strength and the prestige of unbroken success. He stands convicted rather of deliberately aggravating some and culpably ignoring others of the evils he should have tried to cure, and of contenting himself with a party triumph when he should have aimed at the regeneration and confirmation of the whole State. His victory was instantly followed, not by any measures of conciliation, but by a series of massacres, proscriptions and confiscations, of which almost the least serious consequence was the immediate loss of life which they entailed. From this time forward the fear of proscription and confiscation recurred as a possible consequence of every political crisis, and it was with difficulty that Caesar himself dissipated the belief that his victory would be followed by a Sullan reign of terror. The legacy of hatred and discontent which Sulla left behind him was a constant source of disquiet and danger. In the children of the proscribed, whom he excluded from holding office, and the dispossessed owners of the confiscated lands, every agitator found ready and willing allies. The moneyed men of the equestrian order were more than ever hostile to the senatorial government, which they now identified with the man who cherished towards them a peculiar hatred, and whose creatures had hunted them down like dogs. The attachment which the new Italian citizens might in time have learnt to feel for the old republican constitution was nipped in the bud by the massacres at Praeneste and Norba, by the harsh treatment of the ancient towns of Etruria, and by the ruthless desolation of Samnium and Lucania. Quite as fatal were the results to the economic prosperity of the peninsula. Sulla's confiscations, following on the civil and social wars, opened the doors wide for a long train of evils. The veterans whom he planted on the lands he had seized did nothing for agriculture, and swelled the growing numbers of the turbulent and discontented. The "Sullan men" became as great an object of fear and dislike as the "Sullan reign." The *latifundia* increased with startling rapidity—whole territories passing into the hands of greedy partisans. Wide tracts of land, confiscated but never allotted, ran to waste. In many districts of Italy the free population finally and completely disappeared from the open country; and life and property were rendered insecure by the brigandage which now developed unchecked, and in which the herdsmen slaves played a prominent part. The outbreaks of Spartacus in 73, and of Catiline ten years later, were significant commentaries on this part of Sulla's work. His constitutional legislation, while it included many useful administrative reforms, is marked by as violent a spirit of partisanship, and as apparently wilful a blindness to the future. The re-establishment on a legal basis of the ascendancy which custom had so long accorded the senate was his main object. With this purpose he had already, when consul in 88, made the *senatus auctoritas* legally necessary for proposals to the assembly. He now as dictator followed this up by crippling the power of the magistracy, which had been the most effective weapon in the hands of the senate's opponents. The legislative freedom of the tribunes was already hampered by the necessity of obtaining the senate's sanction; in addition, Sulla restricted their wide powers of interference (*intercessio*) to their original purpose of protecting individual plebeians, and discredited the office by prohibiting a tribune from holding any subsequent office in the State. The control of the courts (*quaestiones perpetuae*) was taken from the equestrian order and restored to the senate. To prevent the people from suddenly installing and keeping in high office a second Marius, he re-enacted the old law against re-election, and made legally binding the custom which required a man to mount up gradually to the consulship through the lower offices. His increase of the number of praetors from six to eight, and of quaestors to 20, though required by administrative necessities, tended, by enlarging the numbers and further dividing the authority of the magistrates, to render them still more dependent upon the central direction of the senate. Lastly, he replaced the pontifical and augural colleges in the hands of the senatorial nobles, by enacting that vacancies in them should, as before the *lex Domitia* (104), be filled up by co-optation. It cannot be said that Sulla was success-

ful in fortifying the republican system against the dangers which menaced it from without. He accepted as an accomplished fact the enfranchisement of the Italians, but he made no provision to guard against the consequent reduction of the *comitia* to an absurdity, and with them of the civic government which rested upon them, or to organize an effective administrative system for the Italian communities. In fact he prevented the further registration of the new citizens by abolishing the censorship. Of all men, too, Sulla had the best reason to appreciate the dangers to be feared from the growing independence of governors and generals in the provinces and from the transformation of the old civic militia into a group of professional armies, devoted only to a successful leader, and with the weakest possible sense of allegiance to the State. He had himself, as proconsul of Asia, contemptuously and successfully defied the home Government, and he, more than any other Roman general, had taught his soldiers to look only to their leader, and to think only of booty. Yet, beyond a few inadequate regulations, there is no evidence that Sulla dealt with these burning questions, the settlement of which was among the greatest of the achievements of Augustus. One administrative reform of real importance must, lastly, be set down to his credit. The judicial procedure first established in 149 for the trial of cases of magisterial extortion in the provinces, and applied between 149 and 81 to cases of treason and bribery. Sulla extended so as to bring under it the chief criminal offences, and thus laid the foundation of the Roman criminal law.

Overthrow of the Sullan Constitution.—The Sullan system stood for nine years, and was then overthrown—as it had been established—by a successful soldier. It was the fortune of Cn. Pompey, a favourite officer of Sulla, first of all to violate in his own person the fundamental principles of the constitution re-established by his old chief, and then to overturn it. In Spain the Marian governor Q. Sertorius (*see* SERTORIUS) had defeated one after another of the proconsuls sent out by the senate, and was already in 77 master of all Hither Spain. To meet the crisis, Pompey (*q.v.*), who was not yet 30, and had never held even the quaestorship, was sent out to Spain with proconsular authority. Still Sertorius held out, until in 73 he was foully murdered by his own officers. The native tribes who had loyally stood by him submitted, and Pompey early in 71 returned with his troops to Italy, where, during his absence in Spain, an event had occurred which had shown Roman society with startling plainness how near it stood to revolution. In 73 Spartacus (*q.v.*), a Thracian slave, escaped with 70 others from a gladiators' training school at Capua. In a startlingly short time he found himself at the head of 70,000 runaway slaves, outlaws, brigands and impoverished peasants, and for two years terrorized Italy, routed the legions sent against him, and even threatened Rome. He was at length defeated and slain by the praetor, M. Licinius Crassus, in Apulia. In Rome itself the various classes and parties hostile to the Sullan system had, ever since Sulla's death in 78, been incessantly agitating for the repeal of his most obnoxious laws, and needed only a leader in order successfully to attack a Government discredited by failure at home and abroad. With the return of Pompey from Spain their opportunity came. Pompey, who understood politics as little as Marius, was anxious to obtain a triumph, the consulship for the next year (70), and as the natural consequence of this an important command in the East. The opposition wanted his name and support, and a bargain was soon struck. Pompey and with him Marcus Licinius Crassus, the real conqueror of Spartacus, were elected consuls, almost in the presence of their troops, which lay encamped outside the gates in readiness to assist at the triumph and ovation granted to their respective leaders. Pompey lost no time in performing his part of the agreement. The tribunes regained their prerogatives. The "perpetual courts" (*quaestiones perpetuae*) were taken out of the hands of the senatorial *iudices*, who had outdone the equestrian order in scandalous corruption, and finally the censors, the first since 86 B.C., purged the senate of the more worthless and disreputable of Sulla's partisans. The victory was complete; but for the future its chief significance lay in the clearness with which it showed that the final decision in matters political lay with neither of the two great parties in Rome, but with the holder of the military authority. The tribunes ceased to be political leaders and became lieutenants of the military commanders, and the change was fatal to the dignity of politics in the city. Men became conscious of the unreality of the old constitutional controversies, indifferent to the questions which agitated the forum and the curia, and contemptuously ready to alter or disregard the constitution itself when it stood in the way of interests nearer to their hearts.

Pompey, Caesar and Cicero.—When his consulship ended, Pompey impatiently awaited at the hands of the politicians he had befriended the further gift of a foreign command. He declined an ordinary province, and from the end of 70 to 67 he remained at Rome in a somewhat affectedly dignified seclusion. But in 67 and 66 the laws of Gabinius and Manilius gave him all and more than all that he expected (*see* POMPEY). By the former he obtained the sole command for three years against the Mediterranean pirates. He was to have supreme authority over all Roman magistrates in the provinces throughout the Mediterranean and over the coasts for 50m. inland. Fifteen *legati*, all of praetorian rank, were assigned to him, with 200 ships, and as many troops as he thought desirable. The Manilian law transferred from Lucullus and Glabrio to Pompey the conduct of the Mithridatic War in Asia, and with it the entire control of Roman policy and interests in the East. The unrepublican character of the position thus granted to Pompey, and the dangers of the precedent established, were clearly enough pointed out by such moderate men as Q. Lutatius Catulus, the "father of the senate," and by the orator Hortensius—but in vain. Both laws were supported, not only by the tribunes and the populace, but by the whole influence of the *publicani* and *negotiatores*, whose interests in the East were at stake.

Pompey left Rome in 67. In a marvellously short space of time he freed the Mediterranean from the Cilician pirates and established Roman authority in Cilicia itself. He then crushed Mithridates (*q.v.*), added Syria to the list of Roman provinces, and led the Roman legions to the Euphrates and the Caspian, leaving no power capable of disputing with Rome the sovereignty of western Asia. He did not return to Italy till towards the end of 62. The interval was marked in Rome by the rise to political importance of Caesar (*q.v.*) and Cicero, and by Catiline's attempt at revolution. As the nephew of Marius and the son-in-law of Cinna, Caesar possessed a strong hereditary claim to the leadership of the popular and Marian party. He had already taken part in the agitation for the restoration of the tribunate; he had supported the Manilian law; and, when Pompey's withdrawal left the field clear for other competitors, he stepped at once into the front rank on the popular side. He took upon himself, as their nearest representative, the task of clearing the memory and avenging the wrongs of the great popular leaders, Marius, Cinna and Saturninus. He publicly reminded the people of Marius's services, and set up again upon the Capitol the trophies of the Cimbric War. He endeavoured to bring to justice, not only the ringleaders in Sulla's bloody work of proscription, but even the murderers of Saturninus, and vehemently pleaded the cause of the children of the proscribed. While thus carrying on in genuine Roman fashion the feud of his family, he attracted the sympathies of the Italians by his efforts to procure the Roman franchise for the Latin communities beyond the Po, and won the affections of the populace in Rome and its immediate neighbourhood by the splendour of the games which he gave as curule aedile (65), and by his lavish expenditure upon the improvement of the Appian Way. But these measures were with him only means to the further end of creating for himself a position such as that which Pompey had already won; and this ulterior aim he pursued with an audacious indifference to constitutional forms and usages. His coalition with Crassus, soon after Pompey's departure, secured him an ally whose colossal wealth and wide financial connections were of inestimable value, and whose vanity and inferiority of intellect rendered him a willing tool. The story of his attempted *coup d'état* in Jan. 65 is probably false, but it is evident that by the beginning of 63 he was bent on reaping the reward of his exertions by obtaining from the people an extraordinary command

abroad, which should secure his position before Pompey's return; and the agrarian law proposed early that year by the tribune P. Servilius Rullus had for its object the creation, in favour of Caesar and Crassus, of a commission with powers so wide as to place its members almost on a level with Pompey himself. It was at this moment when all seemed going well, that Caesar's hopes were dashed to the ground by Catiline's desperate outbreak, which not only discredited every one connected with the popular party, but directed the suspicions of the well-to-do classes against Caesar himself, as a possible accomplice in Catiline's revolutionary schemes.

The same wave of indignation and suspicion which for the moment checked Caesar's rise carried Marcus Tullius Cicero to the height of his fortunes. Cicero (*q.v.*), as a politician, has been equally misjudged by friends and foes. That he was deficient in courage, that he was vain, and that he attempted the impossible, may be admitted at once. But he was neither a brilliant and unscrupulous adventurer nor an aimless trimmer, nor yet a devoted champion merely of senatorial ascendancy[1]. He was a representative man, with a numerous following, and a policy which was naturally suggested to him by the circumstances of his birth, connections and profession, and which, impracticable as it proved to be, was yet consistent, intelligible and high-minded. Born at Arpinum, he cherished like all Arpinates the memory of his great fellow-townsman Marius, the friend of the Italians, the saviour of Italy and the irreconcilable foe of Sulla and the nobles. A "municipal" himself, his chosen friends and his warmest supporters were found among the well-to-do classes in the Italian towns. Unpopular with the Roman aristocracy, who despised him as a *peregrinus*, and with the Roman populace, he was the trusted leader of the Italian middle class, "the true Roman people," as he proudly styles them. It was they who carried his election for the consulship (63), who in 58 insisted on his recall from exile, and it was his influence with them which made Caesar so anxious to win him over in 49. He represented their antipathy alike to socialistic schemes and to aristocratic exclusiveness, and their old-fashioned simplicity of life in contrast with the cosmopolitan luxury of the capital. By birth, too, he belonged to the equestrian order, the foremost representatives of which were indeed still the *publicani* and *negotiatores*, but which since the enfranchisement of Italy included also the substantial burgesses of the Italian towns and the smaller "squires" of the country districts. With them, too, Cicero was at one in their dread of democratic excesses and their social and political jealousy of the *nobiles*. Lastly, as a lawyer and a scholar, he was passionately attached to the ancient constitution. His political ideal was the natural outcome of these circumstances. He advocated the maintenance of the old constitution, but not as it was understood by the extreme politicians of the right and left. The senate was to be the supreme directing council, but the senate of Cicero's dreams was not an oligarchic assemblage of nobles, but a body freely open to all citizens, and representing the worth of the community. The magistrates, while deferring to the senate's authority, were to be at once vigorous and public-spirited; and the assembly itself which elected the magistrates and passed the laws was to consist, not of the "mob of the forum," but of the true Roman people throughout Italy. For the realization of this ideal he looked, above all things, to the establishment of cordial relations between the senate and nobles in Rome and the great middle-class of Italy represented by the equestrian order, between the capital and the country towns and districts. This was the *concordia ordinum*, the *consensus Italiae*, for which he laboured.

Cicero's election to the consulship for 63 over the heads of Caesar's nominees, Antonius and Catiline, was mainly the work of the Italian middle-class, already rendered uneasy both by the rumours which were rife of revolutionary schemes and of Caesar's boundless ambition, and by the numerous disquieting signs of disturbance noticeable in Italy. The new consul vigorously set himself to discharge the trust placed in him. He defeated the insidious proposals of Rullus for Caesar's aggrandizement and assisted in quashing the prosecution of Gaius Rabirius (*q.v.*). But with the consular elections in the autumn of 63 a fresh danger arose from a different quarter. The "conspiracy of Catiline" (*see* CATILINE) was not the work of the popular party, and still less was it an unselfish attempt at reform; Catiline himself was a patrician, who had held high office, and possessed considerable ability and courage; but he was bankrupt in character and in purse, and two successive defeats in the consular elections had rendered him desperate. To retrieve his broken fortunes by violence was a course which was only too readily suggested by the history of the last 40 years, and materials for a conflagration abounded on all sides. The danger to be feared from his intrigues lay in the state of Italy, which made a revolt against society and the established Government only too likely if once a leader presented himself, and it was such a revolt that Catiline endeavoured to organize. Bankrupt nobles like himself, Sullan veterans and the starving peasants whom they had dispossessed of their holdings, outlaws of every description, the slave population of Rome, and the wilder herdsmen-slaves of the Apulian pastures, were all enlisted under his banner, and attempts were even made to excite disaffection among the newly conquered people of southern Gaul and the warlike tribes who still cherished the memory of Sertorius in Spain. In Etruria, the seat and centre of agrarian distress and discontent, a rising actually took place headed by a Sullan centurion, but the spread of the revolt was checked by Cicero's vigorous measures. Catiline fled from Rome, and died fighting with desperate courage at the head of his motley force of old soldiers, peasants and slaves. His accomplices in Rome were arrested, and, after an unavailing protest from Caesar, the senate authorized the consuls summarily to put them to death.

Coalition of Pompey, Caesar and Crassus.—The Catilinarian outbreak had been a blow to Caesar, whose schemes it interrupted, but to Cicero it brought not only popularity and honour, but, as he believed, the realization of his political ideal. But Pompey was now on his way home[2], and again as in 70 the political future seemed to depend on the attitude which the successful general would assume; Pompey himself looked simply to the attainment by the help of one political party or another of his immediate aims, which at present were the ratification of his arrangements in Asia and a grant of land for his troops. It was the impracticable jealousy of his personal rivals in the senate, aided by the versatility of Caesar who presented himself not as his rival but as his ally, which drove Pompey once more, in spite of Cicero's efforts, into the camp of what was still nominally the popular party. In 60, on Caesar's return from his propraetorship in Spain, the coalition was formed which is known by the somewhat misleading title of the First Triumvirate. Pompey was ostensibly the head of this new alliance, and in return for the satisfaction of his own demands he undertook to support Caesar's candidature for the consulship. The wealth and influence of Crassus were enlisted in the same cause, and the *publicani* were secured by a promise of release from their bargain for collecting the taxes of Asia. Cicero was under no illusions as to the significance of this coalition. It scattered to the winds his dreams of a stable and conservative republic. The year 59 saw the republic powerless in the hands of three citizens. Caesar as consul procured the ratification of Pompey's acts in Asia, granted to the *publicani* the relief refused by the senate, and carried an agrarian law of the new type, which provided for the purchase of lands for allotment at the cost of the treasury and for the assignment of the rich *ager Campanus*. But Caesar aimed at more than the carrying of laws in the teeth of the senate or any party victory in the forum. An important military command was essential to him. An obedient tribune, P. Vatinius, was found, and by the *lex Vatinia* he was given for five years the command of Cisalpine Gaul and Illyricum, to which was added by a decree of the senate Transalpine Gaul also. This command not only opened to him a great military career, but enabled him, as the master of the valley of the Po, to keep an effective watch on the course of affairs in Italy.

[1] Mommsen is throughout unfair to Cicero. The best estimates of Cicero are those given by Strachan-Davidson in his *Cicero* (1894), by Prof. Tyrrell in his Introductions to his edition of Cicero's *Letters*, and by Petersson, *Cicero, a Biography* (1920).

[2] For the history of the next 18 years, the most important ancient authority is Cicero in his letters and speeches.

Early the next year the attack upon himself which Cicero had foreseen was made. P. Clodius (*q.v.*) as tribune brought forward a law enacting that anyone who had put a Roman citizen to death without trial by the people should be interdicted from fire and water. Cicero, finding himself deserted even by Pompey, left Rome in a panic, and by a second Clodian law he was declared to be outlawed. With Caesar away in his province and Cicero banished, Clodius was for the time master in Rome. But, absolute as he was in the streets, and recklessly as he parodied the policy of the Gracchi by violent attacks on the senate, his tribunate merely illustrated the anarchy which now inevitably followed the withdrawal of a strong controlling hand. A reaction speedily followed. Pompey, bewildered and alarmed by Clodius's violence, at last bestirred himself. Cicero's recall was decreed by the senate, and early in Aug. 57 in the *comitia centuriata,* to which his Italian supporters flocked in crowds, a law was passed revoking the sentence of outlawry passed upon him.

Break-up of the Coalition.—Intoxicated by the acclamations which greeted him, and encouraged by Pompey's support, and by the salutary effects of Clodius's excesses, Cicero's hopes rose high. With indefatigable energy he strove to reconstruct a solid constitutional party, but only to fail once more. Pompey was irritated by the hostility of a powerful section in the senate, who thwarted his desires for a fresh command and even encouraged Clodius in insulting the conqueror of the East. Caesar became alarmed at the reports which reached him that the repeal of his agrarian law was threatened and that the feeling against the coalition was growing in strength; above all, he was anxious for a renewal of his five years' command. He acted at once, and in the celebrated conference at Luca (56) the alliance of the three self-constituted rulers of Rome was renewed. Cicero succumbed to the inevitable and withdrew in despair from public life. Pompey and Crassus became consuls for 55. Caesar's command was renewed for another five years, and to each of his two allies important provinces were assigned for a similar period—Pompey receiving the two Spains and Africa, and Crassus Syria. The coalition now divided between them the control of the empire. For the future the question was, how long the coalition itself would last. Its duration proved to be short. In 53 Crassus was defeated and slain by the Parthians at Carrhae, and in Rome the course of events slowly forced Pompey into an attitude of hostility to Caesar. The year 54 brought with it a renewal of the riotous anarchy which had disgraced Rome in 58–57. Conscious of its own helplessness, the senate, with the eager assent of all respectable citizens, dissuaded Pompey from leaving Italy; and he accordingly left his provinces to be governed by his legates. But the anarchy and confusion only grew worse, and even strict constitutionalists like Cicero talked of the necessity of investing Pompey with some extraordinary powers for the preservation of order[1]. At last in 52 he was elected sole consul, and not only so, but his provincial command was prolonged for five years more, and fresh troops were assigned him. The rôle of "saviour of society" thus thrust upon Pompey was one which flattered his vanity, but it entailed consequences which it is probable he did not foresee, for it brought him into close alliance with the senate. In the senate there was a powerful party which was resolved to force him into heading the attack upon Caesar that otherwise they could not successfully make. It was known that Caesar, whose command expired in March 49, but who in the ordinary course of things would not have been replaced by his successor until Jan. 48, was anxious to be allowed to stand for his second consulship in the autumn of 49 without coming in person to Rome. His opponents in the senate were equally bent on bringing his command to an end at the legal time, and so obliging him to disband his troops and stand for the consulship as a private person, or, if he kept his command, on preventing his standing for the consulship. Through 51 and 50 the discussions in the senate and the negotiations with Caesar continued, but with no result. On Jan. 1, 49, Caesar made a last offer of compromise. The senate replied by requiring him on pain of outlawry to disband his legions. Two tribunes who supported him were ejected from the senate house, and the magistrates with Pompey were authorized to take measures to protect the republic. Caesar hesitated no longer; he crossed the Rubicon and invaded Italy. The rapidity of his advance astounded and bewildered his foes. Pompey, followed by the consuls, by the majority of the senate and a long train of nobles, abandoned Italy as untenable, and crossed into Greece. At the end of March Caesar entered Rome as the master of Italy. Four years later, after the final victory of Munda (45), he became the undisputed master of the Roman world[2].

Dictatorship of Caesar, 48–44.—From the very first moment when Pompey's ignominious retreat left him master of Italy, Caesar made it clear that he was neither a second Sulla nor even the reckless anarchist which many believed him to be. The Roman and Italian public were first startled by the masterly rapidity and energy of his movements, and then agreeably surprised by his lenity and moderation. No proscriptions or confiscations followed his victories, and all his acts evinced an unmistakable desire to effect a sober and reasonable settlement of the pressing questions of the hour; of this, and of his almost superhuman energy, the long list of measures he carried out or planned is sufficient proof. The "children of the proscribed" were at length restored to their rights, and with them many of the refugees who had found shelter in Caesar's camp during the two or three years immediately preceding the war; but the extreme men among his supporters soon realized that their hopes of *novae tabulae* and grants of land were illusory. In allotting lands to his veterans, Caesar carefully avoided any disturbance of existing owners and occupiers, and the mode in which he dealt with the economic crisis produced by the war seems to have satisfied all reasonable men. It had been a common charge against Caesar in former days that he paid excessive court to the populace of Rome, and now that he was master he still dazzled and delighted them by the splendour of the spectacles he provided, and by the liberality of his largesses. But he was no indiscriminate flatterer of the mob. The popular clubs and gilds which had helped to organize the anarchy of the last few years were dissolved. A strict enquiry was made into the distribution of the monthly doles of corn, and the number of recipients was reduced by one-half; finally, the position of the courts of justice was raised by the abolition of the popular element among the indices. Nor did Caesar shrink from the attempt, in which so many had failed before him, to mitigate the twin evils which were ruining the prosperity of Italy—the concentration of a pauper population in the towns and the denudation and desolation of the country districts. His strong hand carried out the scheme so often proposed by the popular leaders since the days of Gaius Gracchus, the colonization of Carthage and Corinth. Allotments of land on a large scale were made in Italy; decaying towns were reinforced by fresh drafts of settlers; on the large estates and cattle farms the owners were required to find employment for a certain amount of free labour; and a slight and temporary stimulus was given to Italian industry by the reimposition of harbour dues upon foreign goods.

The reform of the calendar (*q.v.*) completes a record of administrative reform which entitles Caesar to the praise of having governed well, whatever may be thought of the validity of his title to govern at all. But how did Caesar deal with what was after all the greatest problem which he was called upon to solve, the establishment of a satisfactory government for the empire? One point indeed was already settled. Some centralization of the executive authority was indispensable, and this part of his work Caesar thoroughly performed. From the moment when he seized the moneys in the treasury on his first entry into Rome down to the day of his death, he recognized no other authority but his throughout the empire. He alone directed the policy of Rome in foreign affairs; the legions were led, and the provinces governed, not by independent magistrates, but by his legates; and the title *imperator* which he adopted was intended to express the absolute and unlimited nature of the *imperium* he claimed, as distinct

[1]Cicero himself anticipated Augustus in his picture of a *princeps civitatis* sketched in a lost book of the *De republica,* written about this time, which was based upon his hopes of what Pompey might prove to be; *Ad Att.* viii. 11; August *De civ. Dei,* v. 13.

[2]For the Civil Wars, *see* CAESAR; CICERO; and POMPEY.

from the limited spheres of authority possessed by republican magistrates. In so centralizing the executive authority over the empire at large, Caesar was but developing the policy implied in the Gabinian and Manilian laws, and the precedent he established was closely followed by his successors. It was otherwise with the more difficult question of the form under which this new executive authority should be exercised and the relation it should hold to the republican constitution.

Caesar did not explain to the public what shape he intended ultimately to give to the new system. It could hardly have been the "perpetual dictatorship," which was decreed him by the senate after his victory at Munda (45). The dictatorship was associated with those very Sullan traditions from which Caesar was most anxious to sever himself, and the name had no value in the empire at large. It was rumoured that he intended to follow Alexander's example and at least in the eastern provinces adopt the title of king with the theocratic associations which the title bore in the East. Roman proconsuls who had served in Asia and had seen the ease with which kings ruled when not hampered by constitutions and privileged to utter decrees that were considered sacred, would well have comprehended the advantages of such divine absolutism. Caesar might readily remain in the East for some years after his Parthian campaign, and while busy reorganizing the provinces there he would inure his court and the senators in his train to accept the new *rex*. When the time was ripe he might proclaim the title at Rome, and then, being recognized as more than human and above legal restrictions, he could carry whatever reforms he desired by decree. That these rumours deserve some credit we may believe, not only because Caesar before his death accepted several "divine" honours from the senate, but also because Mark Antony, who knew Caesar's plans, pursued such a course after Caesar's death. It is not unlikely that Caesar intended some day to accept for himself the position of an absolute monarch like Alexander or Ptolemy Philadelphus[1]. But he was well aware that it would require many years of training to prepare the senate for the announcement.

The old constitution was not formally abrogated. The senate met and deliberated; the assembly passed laws and elected magistrates; there were still consuls, praetors, aediles, quaestors and tribunes; and Caesar himself, like his successors, professed to hold his authority by the will of the people. But senate, assembly and magistrates were all alike subordinated to the paramount authority of the dictator; and this subordination was, in appearance at least, more direct and complete under the rule of Caesar than under that of Augustus. For months together Rome was left without any regular magistrates, and was governed like a subject town by Caesar's prefects. At another time a tribune was seen exercising authority outside the city bounds and invested with the *imperium* of a praetor. At the elections, candidates appeared before the people backed by a written recommendation from the dictator, which was equivalent to a command. Finally, the senate itself was transformed out of all likeness to its former self by the raising of its numbers to 900, and by the admission of old soldiers, sons of freedmen and even "semi-barbarous Gauls." But, though Caesar's high-handed conduct in this respect was not imitated by his immediate successors, yet the main lines of their policy were laid down by him. These were: (1) the municipalization of the old republican constitution, and (2) its subordination to the paramount authority of the master of the legions and the provinces. In the first case he only carried farther a change already in progress. Of late years the senate had been rapidly losing its hold over the empire at large. Even the ordinary proconsuls were virtually independent potentates, ruling their provinces as they chose, and disposing absolutely of legions which recognized no authority but theirs. The consuls and praetors of each year had since 81 been stationed in Rome, and immersed in purely municipal business; and, lastly, since the enfranchisement of Italy, the *comitia*, though still recognized as the ultimate source of all authority, had become little more than assemblies of the city populace, and their claim to represent the true Roman people was indignantly questioned, even by republicans like Cicero. The concentration in Caesar's hands of all authority outside Rome completely and finally severed all real connection between the old institutions of the republic of Rome and the Government of the Roman empire. But the institutions of the republic not merely became, what they had originally been, the local institutions of the city of Rome; they were also subordinated even within these narrow limits to the paramount authority of the man who held in his hands the army and the provinces. Autocratic abroad, at home he was the chief magistrate of the commonwealth; and this position was marked, in his case as in that of those who followed him, by a combination in his person of various powers, and by a general right of precedence which left no limits to his authority but such as he chose to impose upon himself. During the greater part of his reign he was consul as well as dictator. In 48, after his victory at Pharsalia, he was given the *tribunicia potestas* for life, and after his second success at Thapsus the *praefectura morum* for three years. As chief magistrate he convenes and presides in the senate, nominates candidates, conducts elections, carries laws in the assembly and administers justice in court. Finally, as a reminder that the chief magistrate of Rome was also the autocratic ruler of the empire, he wore even in Rome the laurel wreath and triumphal dress, and carried the sceptre of the victorious imperator.

Nor are we without some clue as to the policy which Caesar had sketched out for himself in the administration of the empire, the government of which he had centralized in his own hands. The much needed work of rectifying the frontiers he was forced, by his premature death, to leave to other hands, but within the frontiers he anticipated Augustus in lightening the financial burdens of the provincials, and in establishing a stricter control over the provincial governors, while he went beyond him in his desire to consolidate the empire by extending the Roman franchise and admitting provincials to a share in the Government. He completed the Romanization of Italy by his enfranchisement of the Transpadane Gauls, and by establishing throughout the peninsula a uniform system of municipal government, which under his successors was gradually extended to the provinces.

The Second Triumvirate, 43–28.—On the eve of his departure for the East, to avenge the death of Crassus and humble the power of Parthia, Caesar fell a victim to the republican nobles; and between the day of his death (March 15, 44) and that on which Octavian defeated Antony at Actium (Sept. 2, 31) lies a dreary period of anarchy and bloodshed.

For a moment, in spite of the menacing attitude of Caesar's self-constituted representative Marcus Antonius (Mark Antony), it seemed to one man at least as if the restoration of republican government was possible. With indefatigable energy Cicero strove to enlist the senate, the people, and above all the provincial governors in support of the old constitution. But, though his eloquence now and again carried all before it in senate house and forum, it was powerless to alter the course of events. By the beginning of 43 civil war had recommenced; in the autumn Antony was already threatening an invasion of Italy at the head of 17 legions. Towards the end of October Antony and his ally M. Aemilius Lepidus coalesced with the young Octavian, who had been recently elected consul at the age of 20, in spite of senatorial opposition; and the coalition was legalized by the creation of the extraordinary commission for the "reorganization of the commonwealth" known as the Second Triumvirate. It was appointed for a period of five years, and was continued in 37 for five years more. The rule of the triumvirs was inaugurated in the Sullan fashion by a proscription, foremost among the victims of which was Cicero himself. In the next year the defeat of M. Iunius Brutus and C. Cassius Longinus at Philippi, by the combined forces of Octavian and Antony, destroyed the last hopes of the republican party. In 40 a threatened rupture between the two victors was avoided by the treaty concluded at Brundisium. Antony married Octavian's sister Octavia, and took command of the eastern half of the empire; Octavian appropriated Italy and the West; while Lepidus was forced to content himself with Africa. For the next 12 years, while Antony was indulging in

[1] E. Meyer, *Kleine Schriften* (2nd ed. i. 449).

dreams of founding for himself and Cleopatra an empire in the East, and shocking Roman feeling by his wild excesses and his affectation of Oriental magnificence, Octavian was patiently consolidating his power. Lepidus, his fellow-triumvir, was in 36 ejected from Africa and banished to Circeii, while Sextus Pompeius, who had since his defeat at Munda maintained a semi-piratical ascendancy in the western Mediterranean, was decisively defeated in the same year, and his death in 35 left Octavian sole master of the West. The inevitable trial of strength between himself and Antony was not long delayed. In 32 Antony openly challenged the hostility of Octavian by divorcing Octavia in favour of the beautiful and daring Egyptian princess, with whom, as the heiress of the Ptolemies, he aspired to share the empire of the eastern world. By a decree of the senate Antony was declared deposed from his command, and war was declared against Queen Cleopatra. On Sept. 2, 31, was fought the battle of Actium. Octavian's victory was complete. Antony and Cleopatra committed suicide (30), and the eastern provinces submitted in 29. Octavian returned to Rome to celebrate his triumph and mark the end of the long-continued anarchy by closing the temple of Janus; at the end of the next year he formally laid down the extraordinary powers which he had held since 43, and a regular Government was established.

III. THE EMPIRE

Period I.: The Principate, 27 B.C.–A.D. 284—The Constitution of the Principate.—The conqueror of Antonius at Actium, the great-nephew and heir of the dictator Caesar, was now summoned, by the general consent of a world wearied out with 20 years of war and anarchy, to the task of establishing a Government which should as far as possible respect the forms and traditions of the republic, without sacrificing that centralization of authority which experience had shown to be necessary for the integrity and stability of the empire.

The new system which was formally inaugurated by Octavian in 28–27 B.C. assumed the shape of a restoration of the republic under the leadership of a *princeps*. Octavian voluntarily resigned the extraordinary powers which he had held since 43, and, to quote his own words, "handed over the republic to the control of the senate and people of Rome." The old constitutional machinery was once more set in motion; the senate, assembly and magistrates resumed their functions; and Octavian himself was hailed as the "restorer of the commonwealth and the champion of freedom." But his abdication, in any real sense of the word, would have simply thrown everything back into confusion. Any revival of the kingly title was out of the question, and Octavian himself expressly refused the dictatorship. Nor was any new office created or any new official title invented for his benefit. But by senate and people he was invested according to the old constitutional forms with certain powers, as many citizens had been before him, and so took his place by the side of the lawfully appointed magistrates of the republic—only, to mark his pre-eminent dignity, as the first of them all, the senate decreed that he should take as an additional cognomen that of "Augustus," while in common parlance he was henceforth styled *princeps*, a simple title of courtesy, familiar to republican usage, and conveying no other idea than that of a recognized primacy and precedence over his fellow-citizens. The ideal sketched by Cicero in his *De Republica*, of a constitutional president of a free republic, was apparently realized; but it was only in appearance. For in fact the special prerogatives conferred upon Octavian gave him back in substance the autocratic authority he had resigned, and as between the restored republic and its new *princeps* the balance of power was overwhelmingly on the side of the latter.

Octavian had held the *imperium* since 43; in 33, it is true, the powers of the triumvirate had legally expired, but he had continued to wield his authority, as he himself puts it, "by universal consent." In 27 he received a formal grant of the *imperium* from the senate and people for the term of ten years, and his *provincia* was defined as including all the provinces in which military authority was required and legions were stationed. He was declared commander-in-chief of the Roman army, and granted the exclusive right of levying troops, of making war and peace, and of concluding treaties. As consul, moreover, he not only continued to be the chief magistrate of the State at home, but took precedence in virtue of his *maius imperium*, over the governors of the "unarmed provinces," which were still nominally under the control of the senate. Thus the so-called "restoration of the republic" was in essence the recognition by law of the personal supremacy of Octavian, or Augustus, as he must henceforth be called.

In 23 an important change was made in the formal basis of Augustus's authority. In that year he laid down the consulship which he had held each year since 31, and could therefore only exert his *imperium pro consule*, like the ordinary governor of a province. He lost his authority as chief magistrate in Rome and his precedence over the governors of senatorial provinces. To remedy these defects a series of extraordinary offices were pressed upon his acceptance; but he refused them all, and caused a number of enactments to be passed which determined the character of the principate for the next three centuries. First, he was exempted from the disability attaching to the tenure of the *imperium* by one who was not an actual magistrate, and permitted to retain and exercise it in Rome. Secondly, his *imperium* was declared to be equal with that of the consuls, and therefore superior to that of all other holders of that power. Thirdly, he was granted equal rights with the consuls of convening the senate and introducing business, of nominating candidates at elections, and of issuing edicts. Lastly, he was placed on a level with the consuls in outward rank. Twelve lictors were assigned to him and an official seat between those of the consuls themselves.

Tribunicia Potestas.—Thus the proconsular authority was for the time admitted within the walls of Rome; but Augustus was too cautious a statesman to proclaim openly the fact that the power which he wielded in the city was the same as that exercised in camps and provinces by a Roman military commander. Hence he sought for a title which should disguise the nature of his authority, and found it in the "tribunician power," which had been conferred upon him for life in 36, and was well suited, from its urban and democratic traditions, to serve in Rome as "a term to express his supreme position." From 23 onwards the *tribunicia potestas* appears after his name in official inscriptions, together with the number indicating the period during which it had been held (also reckoned from 23); it was in virtue of this power that Augustus introduced the social reforms which the times demanded; and, though far inferior to the *imperium* in actual importance, it ranked with or even above it as a distinctive prerogative of the emperor or his chosen colleague.

The *imperium* and the *tribunicia potestas* were the two pillars upon which the authority of Augustus rested, and the other offices and privileges conferred upon him were of secondary importance. After 23 he never held the consulship save in 5 and 2 B.C., when he became the colleague of his grandsons on their introduction to public life. He permitted the triumvir Lepidus to retain the chief pontificate until his death, when Augustus naturally became *pontifex maximus* (12 B.C.). He proceeded with the like caution in reorganizing the chief departments of the public service in Rome and Italy. The *cura annonae, i.e.*, the supervision of the corn supply of Rome, was entrusted to him in 22 B.C., and this important branch of administration thus came under his personal control; but the other boards (*curae*), created during his reign to take charge of the roads, the water-supply, the regulation of the Tiber and the public buildings, were composed of senators of high rank, and regarded in theory as deriving their authority from the senate.

Such was the ingenious compromise by which room was found for the master of the legions within the narrow limits of the old Roman constitution. Augustus could say with truth that he had accepted no office which was "contrary to the usage of our ancestors," and that it was only in *auctoritas*[1] that he took precedence of his colleagues. Nevertheless, as every thinking man must have realized, the compromise was unreal, and its signif-

[1] *See* Ramsay and Primerstein, *Mon. Antioch*, iv. 3 (1927).

icance was ambiguous. It was an arrangement avowedly of an exceptional and temporary character, yet no one could suppose that it would in effect be otherwise than permanent. The powers voted to Augustus were (like those conferred upon Pompey in 67 B.C.) voted only to him, and (save the *tribunicia potestas*) voted only for a limited time; in 27 he received the *imperium* for ten years, and it was afterwards renewed for successive periods of five, five, ten and ten years. In this way the powers of the principate were made coextensive in time with the life of Augustus, but there was absolutely no provision for hereditary or any other form of succession, and various expedients were devised in order to indicate the destined successor of the *princeps* and to bridge the gap created by his death. Ultimately Augustus associated his stepson Tiberius with himself as co-regent. The *imperium* and the *tribunicia potestas* were conferred upon him, and he was thus marked out as the person upon whom the remaining powers of the principate would naturally be bestowed after the death of his stepfather. But succeeding emperors did not always indicate their successors so clearly, and, in direct contrast to the maxim that "the king never dies," it has been well said that the Roman principate died with the death of the *princeps*.

Changes in the Constitution of the Principate.—In theory, at least, the Roman world was governed according to the "maxims of Augustus" (Suet. *Ner.* 10), down to the time of Diocletian. Even in the 3rd century there is still in name at least a republic, of which the emperor is in strictness only the chief magistrate, deriving his authority from the senate and people, and with prerogatives limited and defined by law. The case is quite different when we turn from theory to practice. The division of authority between the republic and its chief magistrate became increasingly unequal. Over the provinces the *princeps* from the first ruled autocratically; and this autocracy reacted upon his position in Rome, so that it became every year more difficult for a ruler so absolute abroad to maintain even the fiction of republican government at home. The republican institutions, with the partial exception of the senate, lose all semblance of authority outside Rome, and even as the municipal institutions of the chief city of the empire they retain but little actual power. The real government even of Rome passes gradually into the hands of imperial prefects and commissioners, and the old magistracies become merely decorations which the emperor bestows at his pleasure. At the same time the rule of the *princeps* assumes an increasingly personal character, and the whole work of government is silently concentrated in his hands and in those of his own subordinates. Closely connected with this change is the different aspect presented by the history of the empire in Rome and Italy on the one hand and in the provinces on the other. Rome and Italy share in the decline of the republic. Political independence and activity die out; their old pre-eminence and exclusive privileges gradually disappear; and at the same time the weight of the overwhelming power of the *princeps*, and the abuses of their power by individual *principes*, press most heavily upon them. On the other hand, in the provinces and on the frontiers, where the imperial system was most needed, and where from the first it had full play, it is seen at its best as developing or protecting an orderly civilization and maintaining the peace of the world.

The decay of the republican institutions had commenced before the revolutionary crisis of 49. It was accelerated by the virtual suspension of regular government between 49 and 28; and not even the diplomatic deference towards ancient forms which Augustus displayed availed to conceal the unreality of his work of restoration. The *comitia* received back from him "their ancient rights" (Suet. *Aug.* 40), and during his lifetime they continued to pass laws and to elect magistrates. But after the end of the reign of Tiberius we have only two instances of legislation by the assembly in the ordinary way[1], and the law-making of the empire is performed either by decrees of the senate or by imperial edicts and constitutions. Their prerogative of electing magistrates was, even under Augustus, robbed of most of its importance by the control which the *princeps* exercised over their choice by means of his rights of nomination and commendation, which effectually secured the election of his own nominees. By Tiberius this restricted prerogative was still further curtailed. The candidates for all magistracies except the consulship were thenceforward nominated and voted for in the senate house and by the senators, and only the formal return of the result (*renuntiatio*) took place in the assembly (Dio lviii. 20). The *princeps* himself as long as the principate lasted, continued to receive the *tribunicia potestas* by a vote of the assembly, and was thus held to derive his authority from the people.

This almost complete effacement of the *comitia* was largely due to the fact that they had ceased to represent anything but the populace of Rome, and the comparatively greater vitality shown by the old magistracies is mainly attributable to the value they continued to possess in the eyes of the Roman upper class. But, though they were eagerly sought (Plin. *Epp.* ii. 9, vi. 6), and conferred on their holders considerable social distinction, the magistrates ceased, except in name, to be the popularly chosen executive officers of the Roman State. In the administration of the empire at large they had no share, if we except the subordinate duties still assigned to the quaestor in a province. In Rome, to which their sphere of work was limited, they were overshadowed by the dominant authority of the *princeps*, while their range of duties was increasingly circumscribed by the gradual transference of administrative authority, even within the city, to the emperor and his subordinate officials.

The senate alone among republican institutions retained some importance and influence, and it thus came to be regarded as sharing the government of the empire with the *princeps* himself. It nominally controlled the administration of Italy and of the "public provinces," whose governors it appointed. It is to the senate, in theory, that the supreme power reverts in the absence of a *princeps*. It is by decree of the senate that the new *princeps* immediately receives his powers and privileges, though he is still supposed to derive them ultimately from the people. After the cessation of all legislation by the *comitia*, the only law-making authority, other than that of the *princeps* by his edicts, was that of the senate by its decrees. Its judicial authority was co-ordinate with that of the emperor, and at the close of the 1st century we find the senators claiming, as the emperor's "peers," to be exempt from his jurisdiction. But in spite of the outward dignity of its position, and of the deference with which it was frequently treated, the senate became gradually almost as powerless in reality as the *comitia* and the magistracies. The senators continued indeed to be taken as a rule from the ranks of the wealthy, and a high property qualification was established by Augustus as a condition of membership; but this merely enabled the emperors to secure their own ascendancy by subsidizing those whose property fell short of the required standard, and who thus became simply the paid creatures of their imperial patrons. Admission to the senate was possible only by favour of the emperor, both as controlling the elections to the magistracies, which still gave entrance to the curia, and as invested with the power of directly creating senators by *adlectio*, a power which from the time of Vespasian onwards was freely used. As the result, the composition of the senate rapidly altered. Under Augustus and Tiberius it still contained many representatives of the old republican families, whose prestige and ancestral traditions were some guarantee for their independence. But this element soon disappeared. The ranks of the old nobility were thinned by natural decay and by the jealous fears of the last three Claudian emperors. Vespasian flooded the senate with new men from the municipal towns of Italy and the Latinized provinces of the West. Trajan and Hadrian, both provincials themselves, carried on the same policy, and by the close of the 2nd century even the Greek provinces of the East had their representatives in the senate. Some, no doubt, of these provincials, who constituted the great majority of the senate in the 3rd century, were men of wealth and mark, but many more were of low birth; on some rested the stain of a servile descent, and all owed alike their present position and their chances of further promotion to the emperor. The procedure of the senate was as completely

[1] The *plebiscita* of Claudius, Tac. *Ann.* xi. 13, 14, and the *lex agraria* of Nerva; *Digest*, xlvii. 21, 3; Dio lxviii. 2; Plin. *Epp.* vii. 31.



DRAWN BY JOHN BARTHOLOMEW

MAP OF THE ROMAN EMPIRE A.D.


ROMAN EMPIRE
Scale. 1:14,800,000
English Miles
0 100 200 300 400 500
SARMATIA
MARE CASPIUM
PONTUS EUXINUS
MARE MEDITERRANEUM
MARE ERYTHRAEUM
ASIA
EUROPA
AFRICA
Borysthenes F.
Tanais F.
Rha F.
Dax F.
Iaxtus F.
Hypanis F.
Tyras F.
Pyretus F.
Udon F.
Alontas F.
Tanais
Olbia
Chersonesus Taurica
Panticapaeum
Phanagoria
Pityus
Dioscurias Sebastopolis
Colchis
Iberia
Albania
Lychnitis
Cyrus F.
Araxes F.
Artaxata
Armavira
Zela
Amisus
Sinope
Trapezus
Polemonium
Amasia
Comana Pontica
Nicopolis
Sebaste
Caesarea Cappadociae
Armenia minor
Caranis
Lycus
Media
Matiana L.
Amardus F.
Thospitis L.
Atropatene
Gangra
Ancyra
Galatia
Bithynia
Heraclea
Nicomedia
Chalcedon
Byzantium
Perinthus
Lysimachia
Apollonia
Abdera
Thessalonica
Thracia
Mesembria
Odessus
Callatis
Tomi
Durostorum
Tropaeum
Apulum
Sarmizegethusa
Porolissum
Brigetio
Carnuntum
Vindobona
Danube R.
Lemnos
Adramyttium
Pergamum
Lesbos
Chios
Smyrna
Ephesus
Sardes
Synnada
Iconium
Apamea
Laodicea
Hierapolis
Colossae
Lycaonia
Pisidia
Caria
Halicarnassus
Rhodus
Myra
Lycia et Pamphylia
Attalia
Selinus Trajanopolis
Cyprus
Paphos
Salamis
Tripolis
Berytus
Sidon
Tyrus
Damascus
Caesarea Ioppe
Gaza
Pelusium
Alexandria
Naucratis
Heliopolis
Memphis
Ammonium
Cyrene
Ptolemais
Creta
Gortyna
Cnossus
Athenae
Corinthus
Sparta
Thebae Diospolis
Syene
Dodecaschoenus
Nilus F.
Aegyptus
Arabia Petraea
Judaea
Hierosolyma
Jericho
Phoenice
Syria
Palmyra
Seleucia
Antiochia
Apamea
Chalcis
Beroea
Alexandria
Carrhae
Nicephorium
Edessa
Samosata
Hatra
Singara
Nisibis
Arbela
Circesium
Zaratha
Euphrates F.
Ctesiphon
Seleucia
Babylon
Tigris F.
Babylonia
Mesopotamia
Osrhoene
Sophene
Amida
Carduene
Tomaberene
Teredon
Meltene
Cappadocia
Galatia
Pontus et Bithynia
Thrace
Macedonia
Dacia
Moesia
Pannonia
Noricum
Raetia
Vindelicia
Germania
Gallia
Britannia
Hispania
Mauretania
Numidia
Africa
Aegyptus
Cyrenaica
Creta
Cyprus
Arabia
Syria
Mesopotamia
Armenia
Media
Iberia
Albania
Sarmatia
Scythia
Asia
Europa
Africa
Mare Caspium
Mare Mediterraneum
Mare Erythraeum
Pontus Euxinus

A.D. 1–300

at the mercy of the *princeps* as its composition. He was himself a senator and the first of senators; he possessed the magisterial prerogatives of convening the senate, of laying business before it, and of carrying *senatus consulta;* above all, his tribunician power enabled him to interfere at any stage, and to modify or reverse its decisions. The share of the senate in the government was in fact determined by the amount of administrative activity which each *princeps* saw fit to allow it to exercise, and this share became steadily smaller. The jurisdiction assigned it by Augustus and Tiberius was in the 3rd century limited to the hearing of such cases as the emperor thought fit to send for trial, and these became steadily fewer in number. Its control of the State treasury, as distinct from the imperial *fiscus,* was in fact little more than nominal, and became increasingly unimportant as the great bulk of the revenue passed into the hands of the emperor.

The process by which all authority became centralized in the hands of the *princeps* and in practice exercised by an organized bureaucracy was of necessity gradual; but it had its beginnings under Augustus, who formed the equestrian order (admission to which was henceforth granted only by him) into an imperial service, partly civil and partly military, whose members, being immediately dependent on the emperor, could be employed on tasks which it would have been impossible to assign to senators (*see* EQUITES). From this order were drawn the armies of "procurators"—the term was derived from the practice of the great business houses of Rome—who administered the imperial revenues and properties in all parts of the empire. Merit was rewarded by independent governorships such as those of Raetia and Noricum, or the command of the naval squadrons at Misenum and Ravenna; and the prizes of the knight's career were the prefectures of the praetorian guard, the corn-supply and the city police, and the governorship of Egypt. The household offices and imperial secretaryships were held by freedmen, almost always of Greek origin, whose influence became all-powerful under such emperors as Claudius. The financial secretary (*a rationibus*) and those who dealt with the emperor's correspondence (*ab epistulis*) and with petitions (*a libellis*) were the most important of these.

Caesar Worship.—This increase of power was accompanied by a corresponding elevation of the *princeps* himself above the level of all other citizens. The comparatively modest household and simple life of Augustus were replaced by a more than regal splendour, and under Nero we find all the outward accessories of monarchy present, the palace, the palace guards, the crowds of courtiers and a court ceremonial. In direct opposition to the republican theory of the principate, members of the family of the *princeps* share the dignities of his position. The males bear the cognomen of Caesar, and are invested, as youths, with high office; their names and even those of the females are included in the yearly prayers for the safety of the *princeps;* their birthdays are kept as festivals; the praetorian guards take the oath to them as well as to the *princeps* himself.

These honours culminate in the "imperial cult" which most definitely marks the vast distance between republican and imperial Rome. Julius Caesar, for policy's sake, had been enticed by Alexander's example to attempt the introduction of autocracy in the only form known in the ancient world. The East was accustomed to accepting commands from the semi-divine king and made no objection, and since half the population of Rome now consisted of the stock of slaves and captives the plan met with noisy applause by the lowest classes at Rome. But Brutus's dagger was the senate's answer to the proposal. Octavian, who rested his hopes of succession on the favour of Caesar's devout soldiers and on the sacred character of Caesar's last will and testament, did all in his power to canonize Julius, and built a temple to *Divus Iulius* in the Forum. This sufficed for his immediate purpose, and when he consolidated his position after Antony's defeat he wisely forbade the bestowal of divine honours upon himself within Italy while welcoming deification in Asia and Egypt where the populace could not understand why the successor of Ptolemies and Seleucid kings should not be a god. However, even in Italy the Oriental ex-slave population, very numerous everywhere, would revert to non-Roman mysticism. Here and there in Italy shrines arose and were permitted, not to Augustus, but to the "genius" of Augustus[1], and in 12 B.C the court devised an organization of ex-slaves in the towns of Italy for devotions to the Augustan *lares.* Thus the Oriental cult crept in gradually. And as the worship of Augustus by the eastern provincial communes seemed to the court to be a pleasing token of loyalty, attempts were also made officially to introduce the worship at the meetings of the provincial gatherings in Gaul, Spain and Africa. But it must be said that, except so far as Orientals took part in the worship, in the West it was and remained to the end merely lip service. As the cult was worked out for Italy after Augustus's death the emperors were deified only after death and the worship was directed to the *Divi.* But in the provinces the worship of the living ruler continued. The image of the living emperor was on the army standards and was made the object of devotion, and refusal to perform libations to it became the ugly test of treason and of heterodoxy. A few emperors, like Caligula and Domitian, attempted to invite, while living, the honours of *Divi* even in Rome, but with little success. Diocletian was the first emperor who actually brought into the very senate the worship of the emperor as it was practised all through the empire in Asiatic cities, and he had his capital in Asia.

The Frontiers.—To secure peace it was necessary to establish on all sides of the empire really defensible frontiers; and this became possible now that for the first time the direction of the foreign policy of the state and of its military forces was concentrated in the hands of a single magistrate. To the south and west the generals of the republic, and Caesar himself, had extended the authority of Rome to the natural boundaries formed by the African deserts and the Atlantic ocean, and in these two directions Augustus's task was in the main confined to the organization of a settled Roman government within these limits. In Africa the client state of Egypt was ruled by Augustus as the successor of the Ptolemies, and administered by his deputies (*praefecti*), and the kingdom of Numidia (25 B.C.) was incorporated with the old province of Africa. In Spain the hill-tribes of the north-west were finally subdued and a third province, Lusitania, established. In Gaul Augustus (27 B.C.) established in addition to the "old province" the three new ones of Aquitania, Lugdunensis and Belgica, which included the territories conquered by Julius Caesar. Towards the north the republic had left the civilized countries bordering on the Mediterranean with only a very imperfect defence against the threatening mass of barbarian tribes beyond them. The result of Augustus's policy was to establish a protecting line of provinces running from the Euxine to the North sea, and covering the peaceful districts to the south —Moesia (A.D. 6), Pannonia (A.D. 9), Noricum (15 B.C.), Raetia (15 B.C.) and Gallia Belgica. Roman rule was thus carried up to the natural frontier lines of the Rhine and the Danube. It was originally intended to make the Elbe the frontier of the empire; but after the defeat of P. Quintilius Varus (A.D. 9) the forward policy was abandoned. Tiberius recalled Germanicus as soon as Varus had been avenged; and after the peace with Maroboduus, the chief of the Marcomanni on the upper Danube, in the next year (A.D. 17), the defensive policy recommended by Augustus was adopted along the whole of the northern frontier. The line of the great rivers was held by an imposing mass of troops. Along the Rhine lay the armies of Upper and Lower Germany, consisting of four legions each; eight more guarded the Danube and the frontiers of Pannonia and Moesia. At frequent intervals along the frontier were the military colonies, the permanent camps and the smaller intervening *castella.* Flotillas of galleys cruised up and down the rivers, and Roman roads opened communication both along the frontiers and with the seat of government in Italy.

In the East, Rome was confronted with a well organized and powerful State whose claims to empire were second only to her own. The victory of Carrhae (53 B.C.) had encouraged among the Parthians the idea of an invasion of Syria and Asia Minor, while it had awakened in Rome a genuine fear of the formidable power which had so suddenly arisen in the East. Caesar was at the moment of his death preparing to avenge the death of Crassus by

[1] L. R. Taylor, in *Trans. Amer. Phil. Assn. 1920,* 116.

an invasion of Parthia, and Antony's schemes of founding an Eastern empire which should rival that of Alexander included the conquest of the kingdom beyond the Euphrates. Augustus, however, adhered to the policy which he recommended to his successors of "keeping the empire within its bounds"; and the Parthians, weakened by internal feuds and dynastic quarrels, were in no mood for vigorous action. Roman pride was satisfied by the restoration of the standards taken at Carrhae. Four legions guarded the line of the Euphrates, and, beyond the frontiers of Pontus and Cappadocia, Armenia was established as a "friendly and independent ally."

The Provinces.—Next in importance to the rectification and defence of the frontiers was the reformation of the administration, and the restoration of prosperity to the distracted and exhausted provinces. The most serious defect of the republican system had been the absence of any effective control over the Roman officials outside Italy. This was now supplied by the general proconsular authority vested in the emperor. The provinces were for the first time treated as departments of a single State, while their governors, from being independent and virtually irresponsible rulers, became the subordinate officials of a higher authority. Over the *legati* of the imperial provinces the control of the emperor was as complete as that of the republican proconsul over his staff in his own province. They were appointed by him, held office at his good pleasure, and were directly responsible to him for their conduct. The proconsuls of the senatorial provinces were in law magistrates equally with the *princeps*, though inferior to him in rank; it was to the senate that they were, as of old, responsible; they were still selected by lot from among the senators of consular and praetorian rank. But the distinction did not seriously interfere with the paramount authority of the emperor. The provinces left nominally to the senate were the more peaceful and settled districts in the heart of the empire, where only the routine work of civil administration was needed, and where the local municipal governments were as yet comparatively vigorous. The senatorial proconsuls themselves were indirectly nominated by the emperor through his control of the praetorship and consulship. They wielded no military and only a strictly subordinate financial authority, and, though Augustus and Tiberius, at any rate, encouraged the fiction of the responsibility of the senatorial governors to the senate, it was in reality to the emperor that they looked for direction and advice, and to him that they were held accountable. Moreover, in the case of all governors this accountability became under the empire a reality. Prosecutions for extortion (*de pecuniis repetundis*), which were now transferred to the hearing of the senate, were tolerably frequent during the first century of the empire; but a more effective check on maladministration lay in the appeal to Caesar from the decisions of any governor, which was open to every provincial, and in the right of petition. Finally, the authority both of the legate and the proconsul was weakened by the presence of the imperial procurator, to whom was entrusted the administration of the fiscal revenues; while both legate and proconsul were deprived of that right of requisitioning supplies which, in spite of a long series of restrictive laws, had been the most powerful instrument of oppression in the hands of republican governors. The financial reforms of Augustus are marked by the same desire to establish an equitable, orderly and economical system, and by the same centralization of authority in the emperor's hands. The institution of an imperial census or valuation of all land throughout the empire, and the assessment upon this basis of a uniform land tax, in place of the heterogeneous and irregular payments made under the republic, were the work of Augustus, though the system was developed and perfected by the emperors of the 2nd century and by Diocletian. The land tax itself was directly collected, either by imperial officials or by local authorities responsible to them, and the old wasteful plan of selling the privilege of collection to *publicani* was henceforward applied only to such indirect taxes as the customs duties. The rate of the land tax was fixed by the emperor, and with him rested the power of remission even in senatorial provinces. The effect of these reforms is clearly visible in the improved financial condition of the empire. Under the republic the treasury had been nearly always in difficulties, and the provinces exhausted and impoverished. Under the emperors, at least throughout the 1st century, in spite of a largely increased expenditure on the army, on public works, on shows and largesses, and on the machinery of government itself, the better emperors, such as Tiberius and Vespasian, were able to accumulate large sums, while the provinces showed but few signs of distress. Moreover, while the republic had almost entirely neglected to develop the internal resources of the provinces, Augustus set the example of a liberal expenditure on public works, in the construction of harbours, roads and bridges, the reclamation of waste lands and the erection of public buildings.

The Julio-Claudian Line.—Augustus founded a dynasty which occupied the throne for more than half a century after his death. The first and by far the ablest of its members was Tiberius (A.D. 14–37). He was undoubtedly a capable and vigorous ruler, who enforced justice in the government of the provinces, maintained the integrity of the frontiers and husbanded the finances of the empire, but he became intensely unpopular in Roman society, and was painted as a cruel and odious tyrant. His successor, Gaius (A.D. 37–41), generally known as Caligula, was the slave of his wild caprices and uncontrolled passions, which issued in manifest insanity. He was followed by his uncle, Claudius (A.D. 41–54), whose personal uncouthness made him an object of derision to his contemporaries, but who was by no means devoid of statesmanlike faculties. His reign left an abiding mark on the history of the empire, for he carried forward its development on the lines intended by Augustus. Client-states were absorbed, southern Britain was conquered, the romanization of the West received a powerful impulse, public works were executed in Rome and Italy, and the organization of the imperial bureaucracy made rapid strides. Nero (A.D. 54–68), the last of the Julio-Claudian line, has been handed down to posterity as the incarnation of monstrous vice and fantastic luxury. But his wild excesses scarcely affected the prosperity of the empire at large; the provinces were well governed, and the war with Parthia led to a compromise in the matter of Armenia which secured peace for half a century.

The Antonine Empire.—The fall of Nero and the extinction of the "progeny of the Caesars" was followed by a war of succession which revealed the military basis of the principate and the weakness of the tie connecting the emperor with Rome. Galba, Otho, Vitellius and Vespasian represented in turn the legions of Spain, the household troops, the army of the Rhine, and a coalition of the armies of the Danube and the Euphrates; and all except Otho were already *de facto* emperors when they entered Rome. The final survivor in the struggle, Vespasian (A.D. 69–79), was a man of comparatively humble origin, and as the principate ceased to possess the prestige of high descent it became imperatively necessary to remove, as far as possible, the anomalies of the office and to give it a legitimate and permanent form. Thus we find an elaborate and formal system of titles substituted for the personal names of the Julio-Claudian emperors, an increasing tendency to insist on the inherent prerogatives of the principate (such as the censorial power), and an attempt to invest Caesarism with an hereditary character, either by natural descent or by adoption, while the worship of the *Divi*, or deified Caesars, was made the symbol of its continuity and legitimacy. The dynasty of Vespasian and his sons (Titus, A.D. 79–81, Domitian, A.D. 81–96) became extinct on the murder of the last named, whose high-handed treatment of the senate earned him the name of a tyrant; his successor, Nerva (A.D. 96–98), opened the series of "adoptive" emperors (Trajan, A.D. 98–117, Hadrian, 117–138, Antoninus Pius, 138–161, Marcus Aurelius 161–180) under whose rule the empire enjoyed a period of internal tranquillity and good government. Its boundaries were extended by the subjugation of northern Britain by Agricola, A.D. 78–84 (*see* BRITAIN: *Roman*), by the annexation of the districts included in the angle of the Rhine and Danube under the Flavian emperors, and by the conquest of Dacia (the modern Transylvania) under Trajan (completed in A.D. 106). Trajan also annexed Arabia

Petraea and in his closing years invaded Parthia and formed provinces of Armenia, Mesopotamia and Assyria; but these conquests were surrendered by his successor, Hadrian, who set himself to the task of consolidating the empire and perfecting its defences. To him is due the system of permanent *limites* or frontier fortifications, such as the wall which protected northern Britain and the palisade which replaced the chain of forts established by the Flavian emperors from the Rhine to the Danube. The construction of these defences showed that the limit of expansion had been reached, and under M. Aurelius the tide began to turn. A great part of his reign was occupied with wars against the Marcomanni, Quadi, Sarmatians, etc., whose irruptions seriously threatened the security of Italy. Henceforth Rome never ceased to be on the defensive.

Within the frontiers the levelling and unifying process commenced by Augustus had steadily proceeded. A tolerably uniform provincial system covered the whole area of the empire. The client-states had one by one been reconstituted as provinces, and even the government of Italy had been in many respects assimilated to the provincial type. The municipal system had spread widely; the period from Vespasian to Aurelius witnessed the elevation to municipal rank of an immense number of communities, not only in the old provinces of the West, in Africa, Spain and Gaul, but in the newer provinces of the North, and along the line of the northern frontier; and everywhere under the influence of the central imperial authority there was an increasing uniformity in the form of the local constitutions, framed and granted as they all were by imperial edict. Throughout the empire again the extension of the Roman franchise was preparing the way for the final act by which Caracalla assimilated the legal status of all free-born inhabitants of the empire, and in the west and north this was preceded and accompanied by the complete romanizing of the people in language and civilization. Yet, in spite of the internal tranquillity and the good government which have made the age of the Antonines famous, we can detect signs of weakness. It was in this period that the centralization of authority in the hands of the *princeps* was completed; the "dual control" established by Augustus, which had been unreal enough in the 1st century, was now, though not formally abolished, systematically ignored in practice. The senate ceased to be an instrument of government, and became an imperial peerage, largely composed of men not qualified by election to the quaestorship but directly ennobled by the emperor. The restricted sphere of administration left by Augustus to the old magistracies was still further narrowed; their jurisdiction, for example, tended to pass into the hands of the Greek officers appointed by Caesar—the prefect of the city and the prefect of the guards. The complete organization of Caesar's own administrative service, and its recognition as a state bureaucracy, was chiefly the work of Hadrian, who took the secretaryships out of the hands of freedmen and entrusted them to procurators of equestrian rank. All these changes, inevitable, and in some degree beneficial, as they were, brought with them the attendant evils of excessive centralization. Though these were hardly felt while the central authority was wielded by vigorous rulers, yet even under Trajan, Hadrian and the Antonines we notice a failure of strength in the empire as a whole, and a corresponding increase of pressure on the imperial Government itself. The reforms of Augustus had given free play to powers still fresh and vigorous. The ceaseless labours of Hadrian were directed mainly to the careful husbanding of such strength as still remained, or to attempts at reviving it by the sheer force of imperial authority. Among the symptoms of incipient decline were the growing depopulation, especially of the central districts of the empire, the constant financial difficulties, the deterioration in character of the local governments in the provincial communities, and the increasing reluctance exhibited by all classes to undertake the now onerous burden of municipal office.

It is to such facts as these that we must look in passing a final judgment on the imperial Government, which is admittedly seen in its best and most perfect form in the Antonine period. In our review of the conditions which brought about the fall of the Roman republic, we saw that the collapse of the city-state made Caesarism inevitable, since the extension of federal and representative institutions to a heterogeneous world-empire was out of the question. The benefits which Caesarism conferred upon mankind are plain. In the first place, the Roman world, which had hitherto not been governed in the true sense of the word, but exploited in the interests of a dominant clique, now received an orderly and efficient government, under which the frightful ravages of misrule and civil strife were repaired. The financial resources of the empire were husbanded by skilled and, above all *trained* administrators, to whom the imperial service offered a *carrière ouverte aux talents;* many of these were Greeks, or half-Greek Orientals, whose business capacity formed an invaluable asset hitherto neglected. Augustus caused an official survey of the empire to be made, and a scientific census of its resources was gradually carried out and from time to time revised; thus the balance of revenue and expenditure could be accurately estimated and adjusted, and financial stability was established. The system of tax-farming was gradually abolished and direct collection substituted; commerce was freed from vexatious restrictions, and large customs-districts were formed, on whose borders duties were levied for revenue only. The Government took even more direct measures for the encouragement of industry and especially of agriculture. The most remarkable of these were the "alimentary" institutions, originally due to Nerva and developed by succeeding emperors. Capital was advanced at moderate rates of interest to Italian landowners on the security of their estates, and the profits of this system of land banks were devoted to the maintenance and education of poor children. The foundation of colonies for time-expired soldiers, who received grants of land on their discharge, contributed something to the formation of a well-to-do agricultural class; and although the system was not successful in lower Italy, where economic decline could not be arrested, there can be no doubt that central and northern Italy, where the vine and olive were largely cultivated, and manufacturing industries sprang up, enjoyed a considerable measure of prosperity. The extension of the Roman municipal system to the provinces, and the watchful care exercised by the imperial Government over the communities, together with the profuse liberality of the emperors, which was imitated by the wealthier citizens of the towns, led to the creation of a flourishing municipal life still evidenced by the remains which in districts such as Asia Minor or Tunis stand in significant contrast with the desolation which was brought about by centuries of barbaric rule. Mommsen[1] has, indeed, expressed the opinion that "if an angel of the Lord were to strike the balance whether the domain ruled by Antoninus were governed with the greater intelligence and the greater humanity at that time or in the present day, whether civilization and national prosperity generally had since that time advanced or retrograded, it is very doubtful whether the decision would prove in favour of the present."

But there is another side to the picture. During the last two centuries of the republic Rome, by introducing slaves and captives to perform the hard labour of Italy while the free population spent itself in war or lost itself in the provinces, had thoroughly changed the Italian stock. Had the change come gradually and had Rome received the newcomers into schools that might have trained them into a consistent tradition this introduction of a varied stock might perhaps have enriched the spirit of Rome. But this was not to be. Such an amalgam requires time to eliminate the products of incongruous physical mixture,[2] to unify the peoples of a dozen languages until they can comprehend each other and effectually shape common ideals, to distil and throw off the hatred, servility and unsocial hostility to the community bred by years of suffering in slavery, and in a word to create a new people homogeneous enough to act together. The invasion was so rapid and the time so short that such a process of unification never completed itself at Rome. And when Rome, which was the heart of the empire, lost its rhythm and balance, when Rome no longer had a definite culture, a certain inspiration to impart to the provinces, when Rome's religion suc-

[1] *Provinces*, i. p. 5.
[2] M. P. Nilsson, in *Hereditas* (1921), 370.

cumbed to the several mystical cults brought in by her slaves, when her moral standards yielded before a dozen incongruous traditions, and her literature lost itself in blind gropings after a bygone tradition of a freer day, the provincials in despair abandoned her guidance.

Furthermore, the empire brought into being in the provinces a new nationality, due to the partial fusion of Roman ideas with Hellenic culture, beside which other elements, saving only, as we shall see, those contributed by the Oriental religions, were insignificant.. This new nationality grew in definition through the gradual disappearance of distinctions of language and manners, the assimilating influence of commercial and social intercourse, and the extinction of national jealousies and aspirations. But the cosmopolitan society thus formed was compacted of so many disparate elements that a common patriotism was hard to foster, and doubly hard when the autocratic system of government prevented men from aspiring to that true political distinction which is attainable only in a self-governing community. It is true that there was much good work to be done, and that much good work was done, in the service of the emperors; true, also, that the *carrière ouverte aux talents* was in large measure realized. Distinctions of race were slowly but steadily effaced by the grant of citizen rights to provincials and by the manumission of slaves; and the career open to the romanized provincial or the liberated slave might culminate in the highest distinctions which the emperor could bestow. In the hierarchy of social orders—senate, *equites* and *plebs*—ascent was easy and regular from the lower grade to the higher; and the more enlightened of the emperors—especially Hadrian—made a genuine endeavour to give a due share in the work of government to the various subject races. But nothing could compensate for the lack of self-determination, and although during the first century and a half of imperial rule a flourishing local patriotism in some degree filled the place of the wider sentiment, this gradually sank into decay and became a pretext under cover of which the lower classes in the several communities took toll of their wealthier fellow-citizens in the shape of public works, largesses, amusements, etc., until the resources at the disposal of the rich ran dry, the communities themselves in many cases became insolvent, and the inexorable claims of the central Government were satisfied only by the surrender of financial control to an imperial commissioner. Then the organs of civic life became atrophied, political interest died out, and the whole burden of administration, as well as that of defence, fell upon the shoulders of the bureaucracy, which proved unequal to the task.

The Empire, 180–284.—Marcus Aurelius died in 180, and the reign of his worthless son, Commodus (A.D. 180–193), was followed by a century of war and disorder, during which nothing but the stern rule of soldier emperors saved the empire from dissolution. The first and ablest of these was Septimius Severus (193–211), whose claims were disputed by Clodius Albinus in the West, and by Pescennius Niger in the East; in these struggles rival Roman forces, for the first time since the accession of Vespasian, exhausted each other in civil war. Severus emphasized strongly the military character of the principate; he abstained from seeking confirmation for his authority from the senate, and deprived that body of most of the share in the government which it still retained; he assumed the title of proconsul in Rome itself, made the prefect of the guard the vicegerent of his authority, and heaped privileges upon the army, which, although they secured its entire devotion to his family, impaired its efficiency as a fighting force and thus weakened Rome in face of the barbarian invader. He succeeded in founding a short-lived dynasty, which ended with the attempt of the virtuous but weak Alexander (222–235) to restore the independence of the senate. This led to a military reaction, and the elevation of the brutal Maximinus, a Thracian peasant, to the throne. The disintegration of the empire was the natural result; for the various provincial armies put forward their commanders as claimants to the purple. These "tyrants," as they were called when unsuccessful, sprang up in ever-increasing numbers, and weakened Rome's power of resistance to the new enemies who were threatening her frontiers—the Alamanni and Franks, who broke through the German *limes* in 236; the Goths, who crossed the Danube in 247, raided the Balkan provinces, and defeated and slew the emperor, Decius, in 251, and the restored Persian kingdom of the Sassanidae (*see* PERSIA), whose rulers laid claim to all the Asiatic possessions of Rome and in 260 captured Antioch and made the emperor, Valerian, a prisoner. During the reign of Gallienus, the son of Valerian (260–268), the evil reached its height. The central authority was paralysed; the romanized districts beyond the Rhine were irrevocably lost; the Persians were threatening to overrun the eastern provinces; the Goths had formed a fleet of 500 sail which harried Asia Minor and even Greece itself, where Athens, Corinth, Sparta and Argos were sacked; and the legions on the frontiers were left to repel the enemies of Rome as best they could. A provincial empire was established by M. Cassianius Latinius Postumus in Gaul and maintained by his successors, M. Piavonius Victorinus and C. Pius Esuvius Tetricus. Their authority was acknowledged, not only in Gaul and by the troops on the Rhine, but by the legions of Britain and Spain; and under Postumus at any rate (259–269) the existence of the Gallic empire was justified by the repulse of the barbarians and by the restoration of peace and security to the provinces of Gaul. On the Danube, in Greece and in Asia Minor none of the "pretenders" enjoyed more than a passing success. In the Far East, the Syrian Odaenathus, prince of Palmyra (*q.v.*), though officially only the governor of the East (*dux Orientis*) under Gallienus, drove the Persians out of Asia Minor and Syria, recovered Mesopotamia, and ruled Syria, Arabia, Armenia, Cappadocia and Cilicia with all the independence of a sovereign. Odaenathus was murdered in 266. His young son Vaballathus (Wahab-allath) succeeded him in his titles, but the real power was vested in his widow Zenobia, under whom not only the greater part of Asia Minor but even the province of Egypt was forcibly added to the dominions governed by the Palmyrene prince, who ceased to acknowledge the supremacy of Rome.

Gallienus was murdered at Milan in 268, and after the brief reign of Claudius II. (A.D. 268–270), who checked the advance of the Goths, Aurelian (270–275) restored unity to the distracted empire. Palmyra was destroyed and Zenobia led a prisoner to Rome (273) and in the next year the Gallic empire came to an end by the surrender of Tetricus. Aurelian, it is true, abandoned the province of Dacia, but the defences of the Danube were strengthened, and in 276 Probus repulsed the Franks and Alamanni, who had been pressing on the Rhine frontier for some 40 years. Finally, Carus (282) recovered Armenia and Mesopotamia from the Persians and restored the frontier fixed by Septimius Severus.

The Empire at the Close of the 3rd Century.—Although any serious loss of territory had been avoided, the storms of the 3rd century had told with fatal effect upon the general condition of the empire. The "Roman peace" had vanished; not only the frontier territories, but the central districts of Greece, Asia Minor, and even Italy itself, had suffered from the ravages of war, and the fortification of Rome by Aurelian was a significant testimony to the altered condition of affairs. War, plague and famine had thinned the population and crippled the resources of the provinces. On all sides land was running waste, cities and towns were decaying and commerce was paralysed. Only with the greatest difficulty were sufficient funds squeezed from the exhausted taxpayers to meet the increasing cost of the defence of the frontiers. The old established culture and civilization of the Mediterranean world rapidly declined, and the mixture of barbaric rudeness with Oriental pomp and luxury which marked the court, even of the better emperors, such as Aurelian, was typical of the general deterioration, which was accelerated by the growing practice of settling barbarians on lands within the empire and of admitting them freely to service in the Roman army.

Period II.: The Dominate, A.D. 284–476. (a) From the Accession of Diocletian to the Death of Theodosius (A.D. 284–395).—The work of fortifying the empire alike against internal sedition and foreign invasion, begun by Aurelian and Probus, was completed by Diocletian and Constantine the Great;

whose system of government, novel as it appears at first sight, was in reality the natural and inevitable outcome of the history of the previous century. Its object was two-fold, to give increased stability to the imperial authority itself and to organize efficient administrative machinery throughout the empire. In the second year of his reign Diocletian associated Maximian with himself as colleague, and six years later (293) the hands of the two "Augusti" were further strengthened by the proclamation of Constantius and Galerius as "Caesares." Precedents for such an arrangement were to be found in the earlier history of the principate; and it divided the burdens and responsibilities of government without sacrificing the unity of the empire; for, although to each of the Augusti and Caesars a separate sphere was assigned, the Caesars were subordinate to the higher authority of the Augusti, and over all his three colleagues Diocletian claimed to exercise a paramount control. It also reduced the risk of a disputed succession by establishing in the two Caesars the natural successors to the Augusti, and it satisfied the jealous pride of the rival armies by giving them *imperatores* of their own. The distribution of power between Diocletian and his colleagues followed those lines of division which the feuds of the previous century had marked out. The armies of the Rhine, the Danube and of Syria fell to the lot respectively of Constantius, Galerius and Diocletian, the central districts of Italy and Africa to Maximian.

Diocletian's Reforms.—In the new system the imperial authority was finally emancipated from all constitutional limitation and control and the last traces of its republican origin disappeared. The emperors from Diocletian onwards were autocrats in theory as well as in practice. This avowed despotism Diocletian, following in the steps of Aurelian, hedged round with all the pomp and majesty of Oriental monarchy. The final adoption of the title *dominus,* the diadem on the head, the robes of silk and gold, the replacement of the republican salutation of a fellow-citizen by the adoring prostration even of the highest in rank before their lord and master, were all significant marks of the new régime. In the hands of this absolute ruler was placed the entire control of an elaborate administrative machinery. Most of the old local and national distinctions, privileges and liberties which had once flourished within the empire had already disappeared under the levelling influence of imperial rule, and the process was now completed. Roman citizenship had, since the edict of Caracalla, ceased to be the privilege of a minority. Diocletian finally reduced Italy and Rome to the level of the provinces: the provincial land-tax and provincial government were introduced into Italy, while Rome ceased to be even in name the seat of imperial authority.[1] Throughout the whole area of the empire a uniform system of administration was established, the control of which was centred in the imperial palace. Between the civil and military departments the separation was complete. At the head of the former were the praetorian prefects, next below them the *vicarii,* who had charge of the *dioceses;* below these again the governors of the separate provinces (*praesides, correctores, consulares*), under each of whom was a host of minor officials. Parallel with this civil hierarchy was the series of military officers, from the *magistri militum,* the *duces* and *comites* downwards. In both there is the utmost possible subordination and division of authority. The subdivision of provinces, begun by the emperors of the 2nd century, was systematically carried out by Diocletian, and each official, civil or military, was placed directly under the orders of a superior; thus a continuous chain of authority connected the emperor with the meanest official in his service. Finally, the various grades in these two imperial services were carefully marked by the appropriation to each of distinctive titles, the highest being that of *illustris,* which was confined to the prefects and to the military *magistri* and *comites,* and to the chief ministers.

There can be little doubt that on the whole these reforms prolonged the existence of the empire, by creating a machinery which enabled the stronger emperors to utilize effectively all its available resources, and which even to some extent made good the deficiencies of weaker rulers. But in many points they failed to attain their object. Diocletian's division of the imperial authority among colleagues, subject to the general control of the senior Augustus, was effectually discredited by the 20 years of almost constant conflict which followed his own abdication (305–323). Constantine's partition of the empire among his three sons was not more successful in ensuring tranquillity, and in the final division of the East and West between Valens and Valentinian (364) the essential principle of Diocletian's scheme, the maintenance of a single central authority, was abandoned. The "tyrants," the curse of the 3rd century, were far from unknown in the 4th. The system, moreover, while it failed altogether to remove some of the existing evils, aggravated others. The already overburdened financial resources of the empire were strained still further by the increased expenditure necessitated by the substitution of four imperial courts for one, and by the multiplication in every direction of paid officials. The gigantic bureaucracy of the 4th century proved, in spite of its undoubted services, an intolerable weight upon the energies of the empire.

The Division of the Empire.—Diocletian and Maximian formally abdicated their high office in 305. Nineteen years later Constantine I. the Great, the sole survivor of six rival emperors, united the whole empire under his own rule. His reign of 14 years was marked by two events of first-rate importance—the recognition of Christianity as the religion of the empire and the building of the new capital at Byzantium. The alliance which Constantine inaugurated between the Christian Church and the imperial Government, while it enlisted on the side of the State one of the most powerful of the new forces with which it had to reckon, imposed a check, which was in time to become a powerful one, on the imperial authority. The establishment of the new "City of Constantine" as a second Rome paved the way for the final separation of East and West by providing the former for the first time with a suitable seat of government on the Bosporus. The death of Constantine in 337 was followed, as the abdication of Diocletian had been, by the outbreak of quarrels among rival Caesars. Of the three sons of Constantine who in 337 divided the empire between them, Constantine the eldest fell in civil war against his brother Constans; Constans himself was, ten years afterwards, defeated and slain by Magnentius; and the latter in his turn was in 353 vanquished by Constantine's only surviving son Constantius. Thus for the second time the whole empire was united under the rule of a member of the house of Constantine. But in 355 Constantius granted the title of Caesar to his cousin Julian and placed him in charge of Gaul, where the momentary elevation of a tyrant, Silvanus, and still more the inroads of Franks and Alamanni, had excited alarm. But Julian's successes during the next five years were such as to arouse the jealous fears of Constantius. In order to weaken his suspected rival the legions under Julian in Gaul were suddenly ordered to march eastward against the Persians (360). They refused; and when the order was repeated, replied by proclaiming Julian himself emperor and Augustus. Julian, with probably sincere reluctance, accepted the position, but the death of Constantius in 361 saved the empire from the threatened civil war. Julian's attempted restoration of pagan and in especial of Hellenic worships had no more permanent effect than the war which he courageously waged against the multitudinous abuses which had grown up in the luxurious court of Constantius. But his vigorous administration in Gaul undoubtedly checked the barbarian advance across the Rhine, and postponed the loss of the western provinces; on the contrary, his campaign in Persia, brilliantly successful at first, ended in his own death (363), and his successor, Jovian, immediately surrendered the territories beyond the Tigris won by Diocletian 70 years before. Jovian died on Feb. 17, 364; and on Feb. 26, Valentinian was acknowledged as emperor of the army at Nicaea. In obedience to the wish of the soldiers that he should associate a colleague with himself, he conferred the title of Augustus upon his brother Valens, and the division of the empire was at last effected—Valentinian became emperor of the West, Valens of the East. Valentinian maintained the integrity of the empire until his death (in 375), which deprived the weaker Valens of a trusted

[1] The seats of government for Diocletian and his three colleagues were Mediolanum, Augusta Trevirorum, Sirmium and Nicomedia.

counsellor and ally, and was followed by a serious crisis on the Danube. In 376 the Goths, hard pressed by their new foes from the eastward, the Huns, sought and obtained the protection of the Roman empire. They were transported across the Danube and settled in Moesia, but, indignant at the treatment they received, they rose in arms against their protectors. In 378 at Adrianople Valens was defeated and killed, and the victorious Goths advanced eastwards to the very walls of Constantinople. Once more, however, the danger passed away. The skill and tact of Theodosius, who had been proclaimed emperor of the East by Gratian, conciliated the Goths; they were granted an allowance, and in large numbers entered the service of the Roman emperor. The remaining years of Theodosius's reign (382–395) were mainly engrossed by the duty of upholding the increasingly feeble authority of his western colleague against the attacks of pretenders. Maximus, the murderer of Gratian (383), was at first recognized by Theodosius as Caesar, and left in undisturbed command of Gaul, Spain and Britain; but, when in 386 he proceeded to oust Valentinian II. from Italy and Africa, Theodosius marched westwards, crushed him and installed Valentinian as emperor of the West. In the very next year, however, the murder of Valentinian (392) by Arbogast, a Frank, was followed by the appearance of a fresh tyrant in the person of Eugenius, a domestic officer and nominee of Arbogast himself. Once more Theodosius marched westwards, and near Aquileia decisively defeated his opponents. But his victory was quickly followed by his own illness and death (395), and the fortunes of East and West passed into the care of his two sons Arcadius and Honorius.

(b) From the Death of Theodosius to the Extinction of the Western Empire (395–476).—Through more than a century from the accession of Diocletian the Roman empire had succeeded in holding at bay the swarming hordes of barbarians. But, though no province had yet been lost, as Dacia had been lost in the century before, and though the frontier lines of the Rhine and the Danube were still guarded by Roman forts and troops, there were signs in plenty that a catastrophe was at hand.

From all the writers who deal with the 4th century we have one long series of laments over the depression and misery of the provinces.[1] To meet the increased expenditure necessary to maintain the legions, to pay the hosts of officials and to keep up the luxurious splendour of the imperial courts, not only were the taxes raised in amount but the most oppressive and inquisitorial methods were adopted in order to secure for the imperial treasury every penny that could be wrung from the wretched taxpayer. The results are seen in such pictures as that which the panegyrist Eumenius draws of the state of Gaul (306–312) under Constantine, in the accounts of the same province under Julian 50 years later, in those given by Zosimus early in the 5th century, and in the stringent regulations of the Theodosian code, dealing with the assessment and collection of the taxes. Among the graver symptoms of economic ruin were the decrease of population, which seriously diminished not only the number of taxpayers, but the supply of soldiers for the legions; the spread of infanticide; the increase of waste lands whose owners and cultivators had fled to escape the tax collector; the declining prosperity of the towns; and the constantly recurring riots and insurrections, both among starving peasants, as in Gaul, and in populous cities like Antioch. The distress was aggravated by the civil wars, by the rapacity of tyrants, such as Maxentius and Maximus, but above all by the raids of the barbarians, who seized every opportunity afforded by the dissensions or incapacity of the emperors to cross the frontiers and harry the lands of the provincials. Constantine (306–312), Julian (356–360) and Valentinian I. (364–375) had each to give a temporary breathing-space to Gaul by repelling the Franks and Alamanni. Britain was harassed by Picts and Scots from the north (367–370), while the Saxon pirates swept the northern seas and the coasts both of Britain and Gaul. On the Danube the Quadi, Sarmatae, and above all the Goths, poured at intervals into the provinces of Pannonia and Moesia, and penetrated to Macedon and Thrace. In the East, in addition to the constant border feud with Persia, we hear of ravages by the Isaurian mountaineers, and by a new enemy, the Saracens.

Even more ominous of coming danger was the extent to which the European half of the empire was becoming barbarized. The policy which had been inaugurated by Augustus himself of settling barbarians within the frontiers had been taken up on a larger scale and in a more systematic way by the Illyrian emperors of the 3rd century, and was continued by their successors in the 4th. In Gaul, in the provinces south of the Danube, even in Macedon and Italy, large barbarian settlements had been made—Theodosius in particular distinguishing himself by his liberality in this respect. Nor did the barbarians admitted during the 4th century merely swell the class of half-servile *coloni*. On the contrary, they not only constituted to an increasing extent the strength of the imperial forces, but won their way in ever-growing numbers to posts of dignity and importance in the imperial service. Under Constantine the palace was crowded with Franks. Julian led Gothic troops against Persia, and the army with which Theodosius defeated the tyrant Maximus (388) contained large numbers of Huns and Alans, as well as of Goths. The names of Arbogast, Stilicho and Rufinus are sufficient proof of the place held by barbarians near the emperor's person and in the control of the provinces and legions of Rome; and the relations of Arbogast to his nominee for the purple, Eugenius, were an anticipation of those which existed between Ricimer and the emperors of the latter half of the 5th century.

Barbaric Invasions.—It was by barbarians already settled within the empire that the first of the series of attacks which finally separated the western provinces from the empire and set up a barbaric ruler in Italy was made, and it was in men of barbarian birth that Rome found her ablest and most successful defenders. The Visigoths whom Alaric led into Italy had been settled south of the Danube as the allies of the empire since the accession of Theodosius. But, like the Germans of the days of Caesar, they wanted land for their own, and Alaric aspired to raise himself to the heights which had been reached before him by the Vandal Stilicho at Ravenna and the Goth Rufinus at Constantinople. The jealousy which existed between the rulers of the western and eastern empires furthered his plans. In the name of Arcadius, the emperor of the East, or at least with the connivance of Arcadius's minister Rufinus, he occupied the province of Illyricum, and from thence ravaged Greece, which, according to the existing division of provinces, belonged to the western empire. Thence in 396 he retreated before Stilicho to Illyricum, with the command of which he was now formally invested by Arcadius; he thus gained a base of operations against Italy. In 400 he led his people, with their wives and families, their wagons and treasure, to seek lands for themselves south of the Alps. But in this first invasion he penetrated no farther than the plains of Lombardy, and after the desperate battle of Pollentia (402 or 403) he slowly withdrew from Italy, his retreat being hastened by the promises of gold freely made to him by the imperial Government. Not until the autumn of 408 did Alaric again cross the Alps. Stilicho was dead; the barbarian troops in Honorius's service had been provoked into joining Alaric by the anti-Teutonic policy of Honorius and his ministers, and Alaric marched unopposed to Rome. The payment of a heavy ransom, however, saved the city. Negotiations followed between Alaric and the court of Ravenna. Alaric's demands were moderate, but Honorius would grant neither lands for his people nor the honourable post in the imperial service which he asked for himself. Once more Alaric sat down before Rome, and the citizens were forced to agree to his terms. Attalus, a Greek, the prefect of the city, was declared Augustus, and Alaric accepted the post of commander-in-chief. But after a few months Alaric formally deposed Attalus, on account of his incapacity, and renewed his offers to Honorius. Again they were declined, and Alaric marched to the siege and sack of Rome (410). His death followed hard on his capture of Rome. Two years later (412) his successor Ataulf led the Visigoths to find in Gaul the lands which Alaric had sought in Italy. It is characteristic of the anarchical condition of the West that Ataulf and his Goths should have fought for Honorius in Gaul

[1] Rostovtzeff, *Social and Economic History of Rome*, ch. 12.

against the tyrants and in Spain against the Vandals, Suebi and Alani; and it was with the consent of Honorius that in 419 Wallia, who had followed Ataulf as king of the Visigoths, finally settled with his people in south-western Gaul and founded the Visigothic monarchy.

It was about the same period that the accomplished fact of the division of Spain between the three barbarian tribes of Vandals, Suebi and Alani was in a similar manner recognized by the paramount authority of the emperor of the West. These peoples had crossed the Rhine at the time when Alaric was making his first attempt on Italy. A portion of the host led by Radagaisus actually invaded Italy, but was cut to pieces by Stilicho near Florence (405); the rest pressed on through Gaul, crossed the Pyrenees, and entered the as yet untouched province of Spain.

Honorius died in 423. With the single exception of Britain,[1] no province had yet formally broken loose from the empire. But over a great part of the West the authority of the emperors was now little more than nominal; throughout the major part of Gaul and in Spain the barbarians had settled, and barbarian states were growing up which recognized the supremacy of the emperor, but were in all essentials independent of his control.

The long reign of Valentinian III. (423–455) is marked by two events of first-rate importance—the conquest of Africa by the Vandals[2] and the invasion of Gaul and Italy by Attila. The Vandal settlement in Africa was closely akin in its origin and results to those of the Visigoths and of the Vandals themselves in Gaul and Spain. Here, as there, the occasion was given by the jealous quarrels of powerful imperial ministers. The feud between Boniface, count of Africa, and Aëtius, the "master-general" or "count of Italy," opened the way to Africa for the Vandal king Gaiseric (Genseric), as that between Stilicho and Rufinus had before set Alaric in motion westwards, and as the quarrel between the tyrant Constantine and the ministers of Honorius had paved the way for the Vandals, Suebi and Alani into Spain. In this case, too, land-hunger was the impelling motive with the barbarian invader, and in Africa, as in Gaul and Spain, the invaders' acquisitions were confirmed by the imperial authority which they still professed to recognize. In 429 Gaiseric, king of the Vandals, crossed with his warriors, their families and goods, to the province of Africa, hitherto almost untouched by the ravages of war. Thanks to the quarrels of Boniface and Aëtius, their task was an easy one. The province was quickly overrun. In 435 a formal treaty secured them in the possession of a large portion of the rich lands which were the granary of Rome, in exchange for a payment probably of corn and oil. Carthage was taken in 439, and in the following year the Vandal kingdom was firmly established over a wide area in the ancient Roman realm.

Eleven years later (451) Attila invaded Gaul, but this Hunnish movement was in a variety of ways different from those of the Visigoths and Vandals. Nearly a century had passed since the Huns first appeared in Europe and drove the Goths to seek shelter within the Roman lines. Attila was now the ruler of a great empire in central and northern Europe and, in addition to his own Huns, the German tribes along the Rhine and Danube and far away to the north owned him as king. He confronted the Roman power as an equal; and, unlike the Gothic and Vandal chieftains, he treated with the emperors of East and West as an independent sovereign. His advance on Gaul and Italy threatened, not the establishment of one more barbaric chieftain on Roman soil, but the subjugation of the civilized and Christian West to the rule of a heathen and semi-barbarous conqueror. But the Visigoths in Gaul, Christian and already half romanized, rallied to the aid of the empire against a common foe. Attila, defeated at Châlons by Aëtius, withdrew into Pannonia (451). In the next year he overran Lombardy, but penetrated no farther south, and in 453 he died. With the murder of Valentinian III. (455) the western branch of the house of Theodosius came to an end, and the next 20 years witnessed the accession and deposition of nine emperors.

The End.—Under the three months' rule of Maximus, the Vandals under Gaiseric invaded Italy and sacked Rome. From 456–472 the actual ruler of Italy was Ricimer, the Suebe. Of the four emperors whom he placed on the throne, Majorian (457–461) alone played any imperial part outside Italy. Ricimer died in 472, and two years later a Pannonian, Orestes, attempted to fill his place. He deposed Julius Nepos and proclaimed as Augustus his own son Romulus. But the barbarian mercenaries in Italy determined to secure for themselves a position there such as that which their kinsfolk had won in Gaul and Spain and Africa. Their demand for a third of the lands of Italy was refused by Orestes, and they instantly rose in revolt. On the defeat and death of Orestes they proclaimed their leader, Odoacer the Rugian, king of Italy. Romulus Augustulus laid down his imperial dignity, and the court at Constantinople was informed that there was no longer an emperor of the West.

The installation of a barbarian king in Italy was the natural climax of the changes which had been taking place in the West throughout the 5th century. In Spain, Gaul and Africa barbarian chieftains were already established as kings. In Italy, for the last 20 years, the real power had been wielded by a barbarian officer. Odoacer, when he decided to dispense with the nominal authority of an emperor of the West, placed Italy on the same level of independence with the neighbouring provinces. But the old ties with Rome were not severed. The new king of Italy formally recognized the supremacy of the one Roman emperor at Constantinople, and was invested in return with the rank of "patrician," which had been held before him by Aëtius and Ricimer. In Italy too, as in Spain and Gaul, the laws, the administrative system and the language remained Roman. But the emancipation of Italy and the western provinces from direct imperial control, which is signalized by Odoacer's accession, has rightly been regarded as marking the opening of a new epoch. It made possible in the West the development of a Romano-German civilization; it facilitated the growth of new and distinct states and nationalities; it gave a new impulse to the influence of the Christian Church and laid the foundations of the power of the bishops of Rome.

[1] The Roman troops were withdrawn from Britain by Constantine in 407; Mommsen, *Chron. min.* i, 465.

[2] Hodgkin vol. ii. bk. iii., chap. ii.; Gibbon ii. 400 *sqq.*; Jung, 183. The leading ancient authority is Procopius. *See* Ranke iv. (2) 285; Papencordt, *Gesch. d. Vandal, Herrschaft in Africa.*

Chronological Table of the Roman Emperors

B.C.	
27.	Augustus.
A.D.	
14.	Tiberius.
37.	Gaius.
41.	Claudius.
54.	Nero.
68, 69.	Galba. Otho. Vitellius.
69.	Vespasian.
79.	Titus.
81.	Domitian.
96.	Nerva.
98.	Trajan.
117.	Hadrian.
138.	Antoninus Pius.
161.	Marcus Aurelius.
180.	Commodus.
193.	Pertinax. Didius Iulianus. Septimius Severus.
211.	Caracalla.
217.	Macrinus.
218.	Elagabalus.
222.	Alexander Severus.
235.	Maximinus.
238.	The two Gordiani. Pupienus and Balbinus. Gordian III.
244.	Philip.
249.	Decius.
251.	Gallus.
253.	Aemilianus.
260.	Valerian. Gallienus.
268.	Claudius.
270.	Quintillus. Aurelian.
275.	Tacitus.
276.	Probus.
282.	Carus.
283.	Carinus and Numerian.
284.	Diocletian (Maximian associated with him, 286).
305.	Constantius and Galerius.
311.	Licinius. Constantine I.
324.	Constantine I.
337.	Constantine II. Constantius II. Constans.
350.	Constantius II., sole emperor.
361.	Julian.
363.	Jovian.

Division of the Empire

West	*East*
A.D.	A.D.
364. Valentinian I.	364. Valens.
375. Gratian and Valentinian II.	379. Theodosius I.
383. Valentinian II.	
	392. Theodosius I.
395. Honorius.	395. Arcadius.
423. Valentinian III.	408. Theodosius II.
455. Maximus.	450. Marcian.
455. Avitus.	
457. Majorian.	457. Leo I.
461. Severus.	
467. Anthemius.	
472. Olybrius.	
473. Glycerius.	
474. Julius Nepos.	474. Leo II.
475. Romulus Augustulus.	

For subsequent events *see* ROMAN EMPIRE, LATER.

BIBLIOGRAPHY.—I. REPUBLICAN PERIOD: *Ancient Sources.* No history of Rome was written till Fabius Pictor issued his Annals about 200 B.C. His sources were inscribed laws, treaties and *senatus consulta*, a great many of which had been preserved, the annual priestly records of important events requiring thank-offerings and atonements—tablets that contained the lists of magistrates from the early republic—family records that did not go far back, some inscriptions on public buildings, some records of early colonies and oral tradition. Recent excavations indicate that the substructure of history which he gave from the early republic is fairly sound. But the traditional account of the regal period must be considered legendary, as indeed the Roman historians assumed that it was. The early historians, Fabius, Cincius, Acilius and Postumius, were all statesmen who seem to have written with a keen sense of responsibility. Those who followed, Cato the Elder, Calpurnius Piso, Cassius Hemina, Tuditanus and Fannius (who wrote of the Gracchan period), were also well informed, and wrote chiefly regarding contemporary events. At the same time the Greek statesman, Polybius, wrote an accurate history from the time of the first Punic War, valuable portions of which have survived. After the Gracchi, historians like Gnaeus Gellius began to insert family legends into the dry annals of the early period and he was followed by diffuse and rhetorical writers like Claudius Quadrigarius and Valerius Antias who composed popular accounts with little regard for accuracy. During the same period numerous apologetic autobiographies, memoirs and political pamphlets appeared which unduly coloured later accounts of Rome. Of all that we have mentioned (except Polybius) only brief fragments are extant, but the substance of all these books went into later histories that have survived. We have two valuable pamphlets of the amateur historian Sallust, the excellent commentaries of Julius Caesar (*q.v.*), the exceedingly important correspondence of Cicero (*q.v.*) as well as many of his speeches. In the Ciceronian period much valuable antiquarian work was done by men like Varro, Pomponius Atticus, and others which aided later writers to correct the mistakes of their predecessors.

In the Augustan age the materials accumulated by previous generations were worked up by compilers whose works are in some cases preserved. The work of Livy (*q.v.*) covered the history of Rome from its foundation to 9 B.C. in 142 books; of these only 35 are preserved in their entirety, while the contents of the rest are known in outline from an epitome (*periochae*) and from the compendia of Florus and later authors. Diodorus Siculus (*q.v.*) of Agyrium in Sicily followed the earlier annalists in the sections of his *Universal History* (down to Caesar) which dealt with Roman affairs; Dionysius of Halicarnassus (*q.v.*), in his *Roman Archaeology* (published in 7 B.C.), treated early Roman history in a more ambitious and rhetorical style, with greater fullness than Livy, whose work he seems to have used. Universal histories were also written in the Augustan age by Trogus Pompeius, whose work is known to us from the epitome of Justin (2nd century A.D.), and Juba, the learned king of Mauretania. Strabo (*q.v.*), whose *Geography* is extant, was the author of a continuation of Polybius's history (to 27 B.C.). The learning of the time was enshrined in the encyclopaedia of Verrius Flaccus, of which we possess part of Festus's abridgement (2nd century A.D.), together with an epitome of Festus by Paulus Diaconus (*temp.* Charlemagne). An official list of the consuls and other chief magistrates of the republic was inscribed on the walls of the Regia (rebuilt 36 B.C.), followed somewhat later by a similar list of *triumphatores;* the former of these is known as the *Fasti Capitolini* (C.I.L.I.^{2},I. *sqq.*), since the fragments which have been recovered are preserved in the palace of the Conservatori on the Capitol.

Among writers of the imperial period who dealt with republican history the most important are Velleius Paterculus, whose compendium of Roman history was published in A.D. 30; Plutarch (*c.* A.D. 45–125), in whose biographies much contemporary material was worked up; Appian, who wrote under the Antonines and described the wars of the republic under geographical headings (partly preserved) and the civil wars in five books, and Dio Cassius (*v. infra*), of whose history only that portion which deals with events from 69 B.C. onwards is extant.

The evidence of inscriptions (*q.v.*) and coins (*q.v.*) begins to be of value during the last 150 years of the republic. A series of laws and *Senatus consulta* (beginning with the *Senatus consultum de Bacchanalibus,* 189 B.C.) throws light on constitutional questions, while the coins struck from about 150 B.C. onwards bear types illustrative of the traditions preserved by the families to which the masters of the mint (*triumviri monetales*) belonged.

MODERN AUTHORITIES.—The criticism of early Roman history begins with Giambattista Vico, 1725, and Louis de Beaufort, 1738, Niebuhr (1811–12) and Schwegler (1853–58) laid a sound foundation for the historical reconstruction of Theodore Mommsen, whose great history appeared in 1854–56. In Roman constitutional history Mommsen's *Staatsrecht* (1st ed. 1872–75) has not been superseded, though Lange's *Römische Alterthümer* (1856–71) is still serviceable. The soundest modern history of republican Rome (incomplete) is De Sanctis, *Storia dei Romani* (1907–). Heitland's *Roman Republic* (3 vols., 1909) is a fresh and independent work. Groebe's recent revision of Drumann is of value for its accumulation of references for the later period. Other briefer histories devoted to special topics are Greenidge, *History of Rome* vol. i. (for the Gracchan period); several volumes of Pais chiefly concerned with criticism; E. Meyer, *Caesars Monarchie und der Principat des Pompeius;* Homo, *L'Italie Primitive;* Holleaux, *Rome, la Grèce;* Beloch, *Römische Geschichte;* Holmes, *The Roman Republic* (chiefly military history of the late republic); Rostovtzeff, *Rome;* Frank, *Roman Imperialism* and *An Economic History of Rome;* and finally the chapters devoted to Rome in volumes vii.–ix. of the *Cambridge Ancient History.* (*See* VICO, GIOVANNI BATTISTA.)

II. IMPERIAL PERIOD: *Ancient Sources.*—The memoirs of Augustus as well as those of his contemporaries (Messalla, Agrippa, Maecenas, etc.) and successors (Tiberius, Agrippina the younger, etc.) have perished, but we possess the *Res gestae divi Augusti* inscribed on the walls of his temple at Ancyra (ed. Mommsen, 1883, Ramsay and Premerstein's *Mon. Antiochenum,* 1927, includes the fragments recently found at Antioch). Aufidius Bassus wrote the history of the civil wars and early empire, perhaps to A.D. 49, and this was continued by Pliny the Elder (*q.v.*) in 31 books, probably to the accession of Vespasian. These works and others were used by Tacitus (*q.v.*), whose *Annals* (properly called *ab excessu divi Augusti*) and *Histories,* when complete, carried the story of the empire down to A.D. 96. Pliny's correspondence with Trajan about the affairs of Bithynia, which he administered in A.D. 111–113, is of great historical value. Suetonius (*q.v.*), who was for some time secretary of state to Hadrian, wrote biographies of the emperors from Julius Caesar to Domitian. Arrian, a Bithynian Greek, wrote on Rome's policy and wars in the East. Appian (*v. supra*) dealt with the wars waged under the early empire in the closing books of his work, which have not been preserved. Dio Cassius, a Bithynian, wrote a history of Rome to the death of Elagabalus in 80 books. We possess only epitomes and excerpts of the portion dealing with events from A.D. 46 onwards, except for parts of the 78th and 79th books, in which Dio's narrative of contemporary events is especially valuable. Herodian, a Syrian, wrote a history of the emperors from Commodus to Gordian III., which as the work of a contemporary is not without value. The *Historia Augusta* (*see* AUGUSTAN HISTORIES), upon which we are obliged to rely for the history of the 3rd century A.D., consists in a series of lives of the emperors (including most of the pretenders to that title) from Hadrian to Carinus, professedly written by six authors, under Diocletian and Constantine. Modern criticism has shown that (at least in its present form) it is an unreliable compilation made in the latter half of the 4th century. The fragments of Dexippus, an Athenian who successfully defended his native town against Goths, throw much light on the barbaric invasions of the 3rd century. The most important historian of the 4th century was Ammianus Marcellinus, a native of Antioch and an officer in the imperial guard, who continued the work of Tacitus (in Latin) to the death of Valens. We possess the last 18 books of his history which cover the years A.D. 353–378. Two compendia of imperial history pass under the name of Aurelius Victor, the *Caesares,* or lives of the emperors from Augustus to Julian, and the *Epitome de Caesaribus* (not by the same author) which goes down to Theodosius I. Similar works are the *Breviarum* of Eutropius (secretary of state under Valens) and the still more brief epitome of Festus. The writings of the Emperor Julian and of the rhetoricians Libanius, Themistius and Eunapius—the last-named continued the history of Dexippus to A.D. 404—are of great value for the latter part of the 4th century A.D. They wrote as pagans, while the Christian version of events is given by the three orthodox historians Socrates, Sozomen and Theodoret, and the Arian Philostorgius, all of whom wrote in the 5th century. An imperial official, Zosimus, writing in the latter half of that century, gave a sketch of imperial history to A.D. 410; the latter part is valuable, being based on contemporary writings. The bishops Synesius and Palladius, who lived under Arcadius and Theodosius II., furnish valuable information as to their own times;

while the fragments of Priscus tell us much of Attila and the Hunnish invasions. Mention must also be made of the poets and letter-writers of the 4th and 5th centuries—Ausonius, Claudian, Symmachus, Paulinus of Nola, Sidonius Apollinaris, Prudentius, Merobaudes and others—from whose writings much historical information is derived. Cassiodorus, the minister of Theodoric, wrote a history of the Goths, transmitted to us in the *Historia Gothorum* of Jordanes (*c.* A.D. 550), which gives an account of the earlier barbaric invasions. Several chronological works were compiled in the 4th and 5th centuries. It will suffice to name the *Chronology of Eusebius* (to A.D. 324), translated by Jerome and carried down to A.D. 378, and the *Chronography of* A.D. *354,* an illustrated calendar containing miscellaneous information.

The codes of law, especially the *Codex Theodosianus* (A.D. 438) and the code of Justinian, as well as the army list of the early 5th century, known as the *Notitia Dignitatum,* possess great historical value. For the inscriptions of the empire, which are of incalculable importance as showing the working of the imperial system in its details, *see* INSCRIPTIONS; the coins (*q.v.*) also throw much light on the dark places of history in the lack of other authorities. Egyptian papyri are not only instructive as to legal, economic and administrative history, but also contribute to our general knowledge of events. (*See* especially Mitteis-Wilcken, *Chrestomatie,* 1912, and bibliography in Rostovtzeff, *Social and Economic History of Rome,* 1926.) The *Zeitschrift für Papyrusforschung,* ed. by U. Wilcken, gives an account of progress in this branch of study.

MODERN AUTHORITIES.—Tillemont's *Histoire des empereurs* (6 vols., 1690–1738), supplemented by his *Mémoires,* furnished Gibbon with material for his *Decline and Fall of the Roman Empire* (1776–78), which has never been superseded as a history of the entire imperial period, and has been rendered adequate for the purposes of the modern reader by Prof. J. B. Bury's edition (1897–1900). The history of the empire has yet to be written in the light of recent discoveries. Mommsen's fifth volume (Eng. trans., as *Provinces of the Roman Empire,* 1886) is not a narrative, but an account of Roman culture in the various provinces. H. Schiller's *Geschichte der römischen Kaiserzeit* (1883–88) is a useful handbook. Rostovtzeff's *Social and Economic History of Rome* (1926) is very valuable for its thorough sifting of inscriptions and papyri, while Dessau's *Gesch. der römischen Kaiserzeit* (1924), two volumes of which have appeared, promises to give a good survey of political history. H. S. Jones, *The Roman Empire* (1908) and Chapot, *Le Monde romain* (1927) are brief but sound and independent. For the later period we have Seeck, *Gesch. des Untergangs der antiken Welt* (6 vols., 1897–1920), Bury's *History of the Later Roman Empire* (1889), beginning from A.D. 395, and *Constitution of the Later Empire* (1910), and T. Hodgkin's *Italy and her Invaders* (8 vols., 1880–99), which tells the story of the barbaric invasions at great length. The imperial constitution is described by Mommsen in the second volume of his *Staatsrecht* (*v. supra*); divergent views will be found in Herzog's *Geschichte und System der römischen Staatsverfassung* (1884–91); the working of the imperial bureaucracy is treated by O. Hirschfeld, *Die römischen Verwaltungsbeamten* (1905). The *Prosopographia Imperii Romani,* compiled by Dessau and Klebs (1897–98), is a mine of information, as is the new edition of Pauly's *Realencyklopädie der classischen Alterthumswissenschaft* (in progress). Other useful books are: Greenidge, *Roman Public Life* (1901); Abbott and Johnson, *Municipal Administration in the Roman Empire* (1926); Dill, *Roman Society in the Last Century* (1906), Paribeni, *Trajano* (1927); Mattingly, *Roman Coins* (1928). (H. F. P.; H. S. J.; T. F.)

MEDIAEVAL HISTORY

The history of the city of Rome during the middle ages was overshadowed by the history of the papacy. The latter has left many documents; for the city there are very few, especially for the period before the 13th century. As the foundations were so ill-defined there was opportunity for historians to theorize on what the superstructure had been; and the theories were influenced by the ideas, patriotic or otherwise biased, held in the 19th century. One favourite theory was the existence of an aristocratic republic contending against the popes until overthrown by the popular revolution in 1143, when the commune arose. Of this aristocratic republic the consuls were thought to have been the heads, and the existence and functions of the senate were much discussed. This theory was held by some of the leading historians: Hegel, Gregorovius and Villari.

These views are no longer held. Some important documents have been discovered and made accessible by publication. Halphen and others whose works are cited in the bibliography have done much to elucidate the early history. Much still remains to be done, but it is probable that the analogies drawn in the past between the history of Rome and that of the other cities in Italy are misleading. The deserted Campagna surrounding the city checked any notable increase of trade or industry and prevented the establishment of gilds on the footing that elsewhere made them the basis and support of a commune. Moreover, the Campagna was unhealthy and ill-fitted for agriculture. The population of the city was very small. There was no strong middle class among its citizens, whose leaders were usually rude, illiterate nobles. Only slowly did the forces which were at work elsewhere in Italy penetrate into the city and cause the rise of a belated commune. What part was played by the memory of the traditions of republican Rome is a mooted question. The city was styled *respublica;* the titles senator, consul, prefect, occur repeatedly; but it is necessary to be on one's guard against drawing inferences from the long-continued or revived use of old terms.

Gothic and Byzantine Rule.—The removal of the seat of empire to Constantinople effected a radical change in the political situation of Rome, but the civil administration remained unaltered. The Gothic rule merely superimposed upon the Roman social order a Teutonic stratum that never penetrated beneath its surface. The senate, the principal magistrates, both provincial and municipal, the prefect of the city, and the Roman judges enforcing the enactments of the Roman law, were all preserved. Hence there was no visible change in the constitution of the city. The wars of Belisarius and Narses against the Goths (A.D. 535–555) caused terrible slaughter and devastation in Italy, and finally subjected her to Constantinople. In place of a Gothic king she was ruled at first by a pretorian prefect and later by an exarch (first mentioned in 584), who had his seat of government at Ravenna. The pragmatic sanction (554), promulgating the Justinian code, separated the civil from the military power, and, by conferring on the bishops the authority over the provincial and municipal government, soon led to the increase of the power of the Church.

Roman institutions were altered; but their original features were still to be traced, and no heterogeneous element had been introduced. The dawn of a new epoch can be dated from the invasion of the Lombards (568–572). Their conquest of a large portion of Italy reduced the inhabitants almost to slavery. But, in the unsubdued parts of the country—namely, in Ravenna, Rome and the maritime cities—a very different state of things prevailed. The necessity for self-defence and the distance of the empire, now too weak to render any assistance, compelled the inhabitants to depend solely on their own strength. In Rome we behold the rapid growth of the papal power and the continual increase of its political influence. Not only the superintendence but often the nomination of public functionaries and judges was in the hands of the popes. And the accession to St. Peter's chair of a man of real genius in the person of Gregory I., surnamed the Great, marked the beginning of a new era. By force of individual character this pope was the true representative of the city, the born defender of Church and State. His ecclesiastical authority, already great throughout Italy, was specially great in the Roman diocese and in southern Italy. The offerings of the faithful had endowed the Church with enormous possessions in the province of Rome, in Sicily, Sardinia, and other parts. The administration of this property assumed the shape of a small government council in Rome. The use made by the pope of his revenues greatly contributed to the increase of his moral and political authority. When the city was besieged by the Lombards and the emperor left his army unpaid, Gregory supplied the required funds and thus made resistance possible. And when the defence could be no longer maintained he alone, by the weight of his personal influence and the payment of large sums, induced the Lombards to raise the siege. He negotiated in person with Agilult and was recognized by him as the true representative of the city.

A prefect of Rome is not mentioned between 599 and 772, and then again there is silence until the time of the Ottos. It is impossible to say whether the office was discontinued. In the later days the prefect was an official of the pope, who had taken over the care of the aqueducts and the preservation of the city walls. There is also much doubt about the existence of a senate. We know that many senators had lost their lives in the long war. The pragmatic sanction of 554 did mention the senate, but this

was the last formal recognition of it as a governing body; and, if we may trust a despairing cry of Gregory the Great, it had disappeared, or at least was reduced to a shadow.

The popes now make common cause with the people against the Lombards on the one hand and the emperor on the other. This alliance was cemented by the religious disputes of the East and the West; for Pope Gregory II. (715–731) opposed the celebrated edict of the iconoclastic emperor Leo the Isaurian, and Venice, Ravenna, the Pentapolis and Rome took up arms against the emperor and elected dukes of their own.

Duchy of Rome.—In the midst of these warlike tumults a new constitution was being set up in Rome. In 711 the *Liber Pontificalis* makes the first mention of the duchy of Rome, and we find the people struggling to elect a duke of their own. In the early days of the Byzantine rule the territory appertaining to the city was no greater than under the Roman empire; but, partly through the weakness of the government of Constantinople, and above all through the decomposition of the provinces under the Lombards, this dukedom was widely extended; its limits were always changing in accordance with the course of events. At the beginning of the 8th century it had almost the same extent, except on the north, that the papal states had in 1860–70.

In the provinces, the administrators of church lands were important personages, and exercised both judicial and political functions. It was very natural that the heads of this vast administration resident in Rome should have a still higher standing and, in fact, from the 6th century, their power increased to such an extent that in the times of the Franks they already formed a species of papal cabinet with a share and sometimes a predominance in the affairs of the republic. The pope was thus at the head of a large administrative body and, in addition, was possessed of enormous revenues. He considered himself the real representative of the Roman republic. Gregory II. (715–731) accepted in the name of the republic the submission of other cities and protested against the conquest by the Lombards of those already belonging to Rome. The empire was now powerless in Italy, while the advance of the Lombards was becoming more and more threatening; they seized Ravenna in 751, thus putting an end to the exarchate, and next marched towards Rome, which had only its own forces and the aid of neighbouring cities to rely upon. To avoid being conquered Stephen II. (752–757) appealed to Pippin, king of the Franks, and concluded an alliance with him. The pope consecrated Pippin king of the Franks and named him *patricius Romanorum*. This title was given to Pippin as defender of the Church, for the pope styled him at the same time *defensor* or *protector ecclesiae*. And the king pledged himself not only to defend the Church but also to wrest the exarchate and the Pentapolis from the Lombards and give them to the pope. Pippin brought an army (754–755) and fulfilled his promise. The pope accepted the donation in the name of St. Peter and as the visible head of the Church. Thus in 755 central Italy broke its connection with the empire; thus was inaugurated the temporal power of the papacy.

Charles the Great.—In the years immediately succeeding the popes vacillated in their policy but it was soon apparent that their hopes must be placed on renewed aid from the Franks in order to check the constantly threatened danger from the Lombards, who were seeking to recover the territory which they had lost and also to seize Rome. Adrian I. (772–795) besought the assistance of Charlemagne, who made a descent into Italy in 773, destroyed the Lombard kingdom, and seized the iron crown. Entering Rome in 774, he confirmed the donation of Pippin. The pope was now regarded and regarded himself as master of Rome; he always spoke of Rome and the Romans as "our city," "our republic," "our people." It is true that Charlemagne held the supreme power, but this power was only occasionally exercised in Rome. The pope was most tenacious of his own authority, made vigorous protest whenever rebels fled to Charlemagne or appealed to that monarch's arbitration, and contested the supremacy of the imperial officials in Rome. Yet the pope was no absolute sovereign, nor, in the modern sense of the term, did any then exist. The Roman nobles were different from other aristocratic bodies elsewhere. Their power was chiefly derived from the high offices and large grants of money and land conferred on them by the popes. Every pope aggrandized his own kindred and friends, and these were the natural and often open adversaries of the next pontiff and his favourities. Thus the Roman nobility was powerful, divided, restless, and turbulent; the pope needed the support of an effective force for his own preservation; hence the necessity of creating an empire of the West.

Leo III. (795–816) further strengthened the ties between Charlemagne and the Church by sending the former the keys of the grave of St. Peter and the banner of Rome. Charlemagne had already joined to his office of patrician the function of high justice. The pope urged him to despatch an envoy to receive the oath of fealty from the Romans. Leo had antagonized the Romans, and during a procession had been attacked and barbarously maltreated (799). He fled to Charlemagne and returned guarded by his envoys; Charlemagne himself went to Rome in Nov. 800. As there was no one authorized to try a pope, Leo was permitted to clear himself of the charges against him by taking an oath on three altars. Then, on Christmas day, in St. Peter's, before an assemblage of Roman and Frankish lords, clergy, and people, the pontiff placed the imperial crown on Charlemagne's head and all proclaimed him emperor. Thus the new emperor was accepted by the Romans and consecrated by the pope. Yet Charlemagne was not sovereign of Rome; he possessed scarcely any regalia there, and was not in command of the army.

The death of Charlemagne in 814 was the signal for a further conspiracy of the nobles against the pope, who instantly put the ringleaders to death. He was severely blamed by the new emperor Louis for this violation of the imperial prerogative, as the emperor was determined to have his power recognized in Rome, and especially to insure that his assent must be secured for the election of a pope. To assure this he sent his son Lothair to be king of Italy, and the latter was crowned co-emperor in 823. In the following year Lothair promulgated a new constitution, to which Pope Eugenius II. (824–827) had to give his oath of adherence. The more direct power was to appertain to the pope—the supreme authority, presidency of the tribunals, and final judgment on appeal to the emperor. The new constitution also established the right of contending parties to select either the Roman or a Teutonic code for settlement of their disputes.

This is a convenient point to attempt a summary of the relations of the papacy with the City of Rome. By the donations and aid of the Franks it had become legal as well as actual ruler of the city. Charles the Great as emperor was the sovereign, but he never wished to take the place of the pope as chief of the Roman administration. The imperial *missus* of the constitution of 824 had as an associate a papal *missus*, and the two were ordered to refer all matters first to the pope; the emperor reserved a right of appeal to himself. But the power of the pope was secure only when he had outside support. At other times there was always danger that the nobles in the city would either revolt against him or, and more frequently, put in their own pope and use him for their own advantage. It must be noted, however, that the nobility as such never, before the middle of the 12th century, played a constitutional rôle in the administration of the city.

The City Officials.—The principal official was the prefect, who was the chief of police and judge in criminal matters. In civil cases he presided over the court and announced the decision, but was not himself a judge. He held his power from the pope except during periods of strife between an emperor and a pope, when the former sometimes usurped the right of appointment. Next in rank were the consuls of the Romans, or the dukes. They were nobles employed by the popes for special duties such as presiding over tribunals. Apparently the titles were applied to the same office, "duke" being used before the 11th century and "consul of the Romans" later, although in the period of transition the same man was sometimes styled both "duke" and "consul." Then there were "the seven judges," the *primicerius* and the *secundicerius*, who may be roughly described as first and under secretaries of state; the *arcarius*, or papal receiver; the *sacellarius*, or cashier;

the *protoscriniarius*, who was at the head of the papal chancery; the *primus defensor*, who was the advocate of the Church and administered its possessions; and the *nomenclator*, who pleaded the cause of widows, orphans and paupers. These men were called judges, a term then used generally for officials. (For example, the *judices de militia* were military officials and not judges at all.) These seven officials had apparently been created as need arose; the *primicerius* is mentioned in the 4th century, the *protoscriniarius* not until the ninth. They gradually ceased to be chiefs of administration and by the middle of the 11th century were thought of only as civil judges. For example, the *camerarius*, or treasurer, had taken over the duties of both the *arcarius* and *sacellarius*. In addition there were other civil judges, the *judices dativi*, who assisted the seven, but could not give judgment without the consent of some of "the seven ordinary judges." The latter were always members of the clergy; the *judices dativi* were not. For administrative purposes the city was divided into 12 districts. These 12 had succeeded the division of the city in the 6th century into 14 districts for civil administration and seven for ecclesiastical. Just when the change was made is uncertain, but Duchesne thinks it goes back to the time of the Byzantine rule. Finally it may be noted that "senator" was merely a title of honour carrying no power except when a usurping aristocrat bore the title. These statements as to the officials are based mainly on Halphen's study, which has done so much to correct former erroneous notions. Many details are still in doubt, but in general this outline applies to the period before the rise of the commune.

The fall of the Frankish empire left all Italy a prey to anarchy and torn by faction fights. The Saracens were advancing from the south, the Hungarians from the north. Anarchy was at its climax in Rome. The aristocracy gained strength and wrested fresh privileges from the pontiffs. Early in the 10th century Theophylact, who had been an official of the Sacred palace, was the chief of the Roman nobles. He was a senator, and his wife Theodora was styled "senatrix." She and her daughter Marozia were influential, and tradition has assigned to them both greater influence and more vice than can be proved by historical data. Marozia's husband was Alberic, the marquis of Spoleto. After Theophylact, Theodora and Alberic were all dead Marozia became the leader of the noble faction, and added to her power by marrying Guy, marquis of Tuscany. The pope was imprisoned by her and soon died, possibly murdered. Marozia was supreme, and raised her son to the papacy as John XI. When on Guy's death she married King Hugh of Italy (932), a revolt against her and her new husband was led by Alberic, her son; he was successful and became the ruler of the city. Of Marozia no more is heard.

Otto the Great.—Alberic, as "prince and senator of all the Romans," ruled Rome and the duchy until his death in 954. "His yoke was heavy on the Romans and on the Holy Apostolic See"; but the popes were docile and the nobles were kept in order by a stern hand. Alberic was so completely master of Rome that he may have dreamed of creating an hereditary dynasty. He gave his son the name of Octavian, and on his deathbed he made the nobles swear to elect Octavian pope at the next vacancy. The lad was then 16 years old, and the following year was elected pope with the name of John XII. His palace was the scene of scandalous licence, while his public acts were those of a tyrant. He desired to be both pope and prince, but utterly failed to be either. In 960, realizing the impossibility of maintaining his power without outside aid, he sought help from Otto I. and promised him the imperial crown. Otto vowed to defend the Church, to restore her territories, to refrain from usurping the power of the pope or the republic, and was crowned on Feb. 2, 962. Otto confirmed to the pope the territories granted by the Carolingians and even enlarged them, but he also revived the constitution of 824, by which the election of a pope required the imperial confirmation, and he reserved for himself the suzerainty over the papal territory as the Carolingians had done. John XII., finding a master in the protector he had invoked, joined the discontented nobles who were conspiring against the emperor. But the latter hastened to Rome in Nov. 963, assembled the clergy, nobles and heads of the people, and made them take an oath never again to elect a pope without his consent and that of his son. He also convoked a synod presided over by himself in St. Peter's, which judged, condemned and deposed Pope John and elected Leo VIII. (963–965), a Roman noble, in his stead. All this was done at the direct bidding of the emperor, who thus deprived the Romans of their most valued privilege, the right of choosing the pope. Moreover, Otto was hated as a foreign ruler and the clergy were resentful at the uncanonical deposition of a pope and the equally uncanonical election of a layman. On Jan. 3, 964, the Romans attacked the Vatican, where the emperor was lodged. The German knights repulsed them with much slaughter, but Otto departed in February, and John XII. returned with an army of followers and compelled the defenceless Leo VIII. to seek safety in flight. Soon afterwards Leo was deposed and excommunicated by a new synod, and many of his adherents were cruelly murdered. When on May 14, 964, John suddenly died, the Romans, amid violent struggles and tumults, elected Benedict V., and procured his consecration in spite of the emperor's veto. Otto appeared at the head of an army, besieged the city, reduced it by famine and, after holding a council which deposed Benedict, restored Leo VIII. to the papal throne.

The emperor's arbitrary exercise of power roused a long and obstinate resistance. When Leo VIII. died in 965, the imperial party elected John XIII. (965–972), who tried to create a party of nobles to offset the power of the party of Alberic. Upon this there was a general revolt. The nobles were led by Peter, prefect of Rome. The leaders of the people were 12 *decarconi*, a term of unknown derivation but probably indicating chiefs of the 12 regions. The new pope was seized and imprisoned; but the emperor quickly marched against Rome, and this was sufficient to produce a reaction which recalled the pope (Nov. 966), sent the prefect into exile and put several of the rebellious nobles to death. Shortly after the emperor sacked the city; many Romans were exiled, some tortured, others, including the 12 *decarconi*, killed.

The Crescentii.—Pope John XIII. was succeeded by Benedict VI. (973–974) and Otto I. by his son Otto II., a youth of 18. Thereupon the Romans, who had supported the election of another pope, and were in no awe of the new emperor, rose to arms under the command of Crescentius, a rich and powerful noble. They not only seized Benedict VI. by force, but strangled him in the castle of St. Angelo. The factions then successively elected popes who were either exiled or persecuted, and one of them is said to have been murdered. During this turmoil the anti-imperial party, led by Crescentius II., son of the Crescentius mentioned above, had taken possession of the government. Crescentius assumed the title of patrician and sought to imitate Alberic. Fortunately for him, the reigning pope was a detested tyrant, and the emperor Otto III. a child entirely guided by his mother. But the emperor was backed by a powerful party, and on coming to Rome in 996 was able, although only aged 15, to quell the rebellion, oust Crescentius from public life, and elect as successor to John XV. his own cousin, Gregory V. (996–999). This first German pope surrounded himself with compatriots, and by raising them to lofty posts even in the tribunals excited a revolt that drove him from the throne (Sept. 29, 996). Crescentius, being master of the castle of St. Angelo, resumed the title of patrician, expelled the German judges, reconstituted the government and created a new pope. The following year Otto III. came to Rome, and his party opened the gates to him. Although deserted by nearly all his adherents, Crescentius held the castle valiantly against its besiegers, until, on April 29, 998, he was forced to make terms, and the imperialists, violating their pledges, first put him to torture and then hurled him from the battlements.

Thus Otto III. was enabled to establish his mastery of Rome. He wished to reconstitute a Romano-Byzantine empire with Rome for his capital. Nevertheless he was German, and during his reign Germanic institutions made progress in Rome and many families of feudal barons arose. The Church made grants of lands, cities and provinces in the feudal manner, while the bishops, like feudal barons, became actual counts. Meanwhile the Roman barons were growing more and more powerful, and were neither submissive nor faithful to the emperor. On the contrary, they

resented his attitude as a master of Rome, and, when he subjected Tivoli to the Holy See, attacked both him and the pope with so much vigour as to put both to flight (Feb. 16, 1001).

By the emperor's death in Jan. 1002 the family of the Ottos became extinct; the papacy then began to decline, and the nobles, divided into an imperial and an anti-imperial party, were again predominant. They reserved to themselves the office of patrician, and, electing popes from their own ranks, obtained enlarged privileges and power. John Crescentius was elected patrician; one of his kinsmen was invested with the office of prefect, and the new pope John XVIII. (1003–09) was one of his creatures. His power lasted for ten years, until his death in 1012. Pope Sergius IV. having died the same year, the count of Tusculum compassed the election of Benedict VIII. (1012–24), one of his own kin. This pope expelled the Crescentii, changed the prefect and reserved the title of patrician for Henry II. whom he consecrated emperor on Feb. 14, 1014. He also succeeded in placing his own brother, Romano, at the head of the republic with the title of "Senator of all the Romans." The prefect still retained his authority, and the emperor was by right supreme judge; but when a violent revolt broke out the emperor only stayed to suppress it and then went to Germany in disgust. The pope, aided by his brother, conducted the government with energy; he awed the party of Crescentius and waged war against the Saracens in the south. When he died in 1024 there was a repetition of the same events that had followed the death of Alberic, and with no less fatal consequences. Benedict's brother, Romano, head of the republic, was, although a layman, elected pope. He took the name of John XIX. (1024–33), and in 1027 conferred the imperial crown on Conrad the Salic. The latter abolished the Lotharian edict of 824 and decreed that throughout Rome and its territory justice should be administered solely by the Justinian code.

The Three Rival Popes.—John XIX. was succeeded by his nephew, Benedict IX. (1033–45), whose brother became head of the republic. Thus Church and State assumed the aspect of hereditary possessions in the powerful house of the counts of Tusculum. The vices and excesses of Benedict were so monstrous that he was driven from the city and Sylvester III. elected by his opponents. Benedict still had some support and succeeded in driving out Sylvester; then, finding his position untenable, he sold the papacy to a reformer who took the name of Gregory VI. Benedict soon attempted to regain his office, and in 1045 three popes were struggling for the tiara in the midst of scandal and anarchy. The streets and neighbourhood of Rome swarmed with thieves and assassins; pilgrims were plundered; citizens trembled for their lives, and petty barons threatened the rival popes, who were obliged to defend themselves by force. This state of things lasted until Henry III. came to re-establish order. He summoned a synod which deposed the three popes, and then, with the consent of the Romans, assuming the right of election, proposed a German, Clement II., who was consecrated at Christmas 1046. Henry III. was then crowned, and also took the title of patrician.

Henry III. procured the election of four German popes in succession. But the fourth German pope, Victor II., died in 1057, and Henry III. had been succeeded in 1056 by the young Henry IV. under the regency of a weak woman, the empress Agnes. The nobles by violence and bribery brought about the election of Benedict X. The cardinals were opposed to him and, fleeing from the city, elected Nicholas II. (1059–61). This pope could only enter Rome when escorted by the troops of Godfrey of Tuscany. When Nicholas died the nobles, assisted by some Lombard bishops, elected Honorius II. and sought aid from the German king, while the cardinals chose Alexander II. (1061–73). Although supported by an armed force of Normans, the latter had to fight his way into Rome, whither Honorius II. soon followed and won a battle against the forces of Alexander II. with much slaughter. Both candidates were compelled to withdraw from the city until their claims were settled by the German court. Strife continued, but Alexander II. finally was recognized as pope and attempted to reform the church, though he had little power in the city.

At Alexander's funeral Hildebrand was seized by the crowd and acclaimed as pope. The cardinals who were favourable to him, hastened to go through the form of an election in order to give a legal warrant to what had been done by popular violence; he chose the name of Gregory VII. (1073–85) and secured recognition from Henry IV. Gregory confirmed his predecessor's decrees against simoniacal and non-celibate priests and forbade the clergy to receive investiture at the hands of laymen. As the high ecclesiastical dignitaries held much territory and were also high officials of the empire, this decree was certain to cause a fierce contest between the emperor and the pope. Some of the nobles had already shown their hostility to Gregory; at Christmas 1075 the prefect Cencius and other nobles seized Gregory while he was celebrating mass in Santa Maria Maggiore and dragged him away to imprisonment. The people were incensed at this outrage and fear of popular wrath compelled Cencius to release Gregory. About the same time Henry IV., exasperated by a letter in which Gregory had sharply rebuked him for his sins, declared Gregory deposed from the papacy, and Gregory in turn decreed the excommunication and deposition of the emperor. That monarch afterwards made submission to Gregory at Canossa (1077), then again turned against him and was again excommunicated. In 1081, with his anti-pope Clement III., he besieged Rome in vain. He was equally unsuccessful in each of the two following years, but at last forced his way into the city (March 1084) and compelled Gregory to seek refuge in the castle of St. Angelo. The emperor, as master of Rome, procured the consecration of Clement III., by whom he was crowned in turn. He then attacked and seized the capitol and assaulted the castle of St. Angelo in the hope of capturing the pope. But Robert Guiscard brought his Norman army to the rescue. Emperor and anti-pope fled; the city was taken, the pope liberated, and Rome was brutally sacked for three days by the Normans. After this Gregory, broken with grief and hated by the Romans, had to go away with the Normans and died at Salerno on May 25, 1085.

Victor III. was elected only after an interval of a year and reigned only a short time. He was consecrated in St. Peter's but was unable to maintain his position in Rome. Urban II. (1088–99), the next pope elected, also had little power in Rome, as the city was usually in the hands of the supporters of the anti-pope. It was not until 1096, when he had won prestige by preaching the crusade, that he could enter the city as its master, and even then the castle of St. Angelo was held by the followers of the anti-pope, until 1098.

Revolt Under Paschal II.—Pope Paschal II. (1099–1118) tried to rule the city through the faction of nobles who favoured him, but with little success, as the imperial party frequently had the upper hand. When Henry V. seized the pope in 1111 the people rose in his defence and forced Henry to leave the city; but under ordinary circumstances Paschal could not count on any hearty support. In 1116, when he wished to make one of the Pierleoni prefect, there was a bloody revolt and a rival was put in as prefect by the imperial partisans. Soon after this Henry V. came to Rome and Paschal had to flee. Later he returned with Norman troops but could not put down the revolt, and the opposition still held the capitol when Paschal died.

The cardinals met in haste and secretly elected Gelasius II. The election had scarcely been completed when Cencius Frangipani broke into the assembly, seized the pope and carried him bleeding to one of the Frangipani towers. As they had done when another Cencius had seized Gregory VII., the people of the 12 districts rose in their wrath and, led by the prefect (whose election Paschal had opposed), forced the Frangipani to give up their prisoner. The Frangipani fled to the emperor and he came to Rome. Gelasius had to flee to his native city of Gaeta, where he was safe under Norman protection. An anti-pope was chosen by the imperial party; but when Henry left Rome Gelasius was able to return, although the anti-pope was also in Rome and a new revolt threatened the life of Gelasius. Consequently he fled to France, where he died in 1119, having been pope a year and a few days.

Calixtus was next chosen and restored peace. The Frangipani succeeded in electing his successor Honorius II. (1124–30), who was quietly accepted by the Roman people. At his death some of

the cardinals chose Innocent II.; others, and the more numerous part, elected one of the Pierleoni, who took the name of Anaclete II. The greater part of the people now favoured the Pierleoni, and his rival, who was supported by the Frangipani, had to flee. He secured support in France and Germany, especially through the aid of Bernard of Clairvaux, and was finally recognized as pope almost everywhere except in Rome and among the Normans in Italy. Anaclete II. retained the upper hand in the city almost until the time of his death in 1138. In the following year Innocent attempted a military campaign against Roger of Sicily, but was captured by him and compelled to acknowledge his kingship, with which he had been invested by Anaclete. Humiliated, Innocent returned to Rome and there he was to suffer further humiliation.

Rise of the Commune.—Throughout upper and central Italy the cities were being organized as free and independent communes on a democratic basis. Their example was followed in the ancient duchy of Rome and almost in the immediate neighbourhood of the city. The same tendencies were at work in Rome. Gradually in the troubled times when the factions of the nobles were contending together and the papal rule was so weak, a lesser nobility had grown into power in the city, in alliance with the people, with whose interests they had much in common. They were irritated against the pope by his submission to the Normans and this irritation was greatly increased by his attitude toward Tivoli. In 1142 this city openly rebelled against the mother city, and the pope sent the Romans to subdue it. They were not only repulsed, but ignominiously pursued to their own gates. Afterwards, returning to the assault in greater numbers, they conquered the hostile town. Its defenders surrendered to the pope, and he immediately concluded a treaty of peace without consulting the people. The soldiery, still flushed with victory, were furious at this slight. They demanded the submission of Tivoli to the Roman people, as well as permission to demolish its walls and dwellings and expel its population. Innocent II. refused his consent and a revolution ensued. In 1143 the rebellious people rushed to the capitol, proclaimed the republic, reconstituted the senate, with the almost entire exclusion of the nobles, and declared the abolition of the temporal power. Just after this Innocent died.

The pontificates of the next two popes, together, lasted less than 17 months. The second, Lucius II. (1144–45), tried to withstand the revolution by seeking Norman aid and throwing himself into the arms of the feudal party, but this only precipitated the course of events. The people, after having excluded nearly all aristocrats from the senate, now placed at its head the noble Jordan Pierleoni, who had joined the revolutionary party. They named him patrician, and also conferred on him the judicial powers appertaining to the aristocratic and imperial office of prefect. The pope was requested to resign the temporal power, the regalia and every other possession and content himself with the tithes and offerings of the faithful. He indignantly refused, marched at the head of the nobles against the capitol, but was repulsed, and received a blow on the head from a stone, which is supposed to have caused his speedy death, Feb. 15, 1145. Eugenius III. was then elected (1145–53), but soon had to flee to Viterbo in quest of armed assistance, in consequence of the senate's resolve to prevent by force his consecration until he recognized the new state of things in the Eternal City.

It was at this time that Arnold of Brescia (*q.v.*) was absolved by the pope and ordered to make a pilgrimage to Rome. An arch-revolutionist, he began to preach and his eloquence brought him fame. But his influence on events has been greatly exaggerated in most accounts. The people had already formed an equestrian order, which was probably a mounted force of the lesser nobility, and also were fortifying the capitol. The revolution spread beyond the walls, several cities of the state proclaimed their independence, and the barons of the Campagna profited by the opportunity to act as independent sovereigns. Thus the whole domain of the Church was threatened with dissolution. The pope marched towards Rome with an army, but hoped to come to terms. The Romans in fact recognized his authority, and he in his turn recognized the republic. The office of patrician was abolished, and the prefect was revived. The senators received investiture from the pope, who returned to Rome at Christmas 1145.

The Commune Fully Constituted.—The commune now seems to have been fully constituted, so a short sketch will be given here of its more important features. The senate was drawn, at least in part, from the lower classes and the petty nobility, and this was the special characteristic of the new revolution. In 1144 there were 56 senators, but the number often varied. In 1151 there were 50; in 1163 only 25; in 1181 again 56, and still more in 1191. After that it was more usual to have only one or two senators and these were generally chosen from the aristocracy. From the few existing documents of the period we learn that the senators were divided into *senatores consiliarii* and ordinary senators. The former constituted a smaller council, which consulted with the head or heads of the republic on the more urgent and secret affairs of the State. The senate exercised its powers under the control of the council and parliament. The former was a deliberative assembly called together by the senate to discuss important affairs such as treaties or declarations of war. The councillors varied in number—at times nine, once as many as 84. Their advice was taken but not necessarily followed by the senate. The parliament was an assemblage of all the citizens. In it there was no discussion of the matters brought before it by the senate, but each matter was accepted or rejected by the people. Senators held office for only one year. They were elected usually by the whole people; but at times the pope was allowed to appoint an elector or electors to choose the senator or senators; in this latter case, however, the choice apparently had to be submitted to the popular assembly for ratification. The pope also was compelled to pay salaries to the senators and their officials.

The senate had usurped the right of coinage; and although by a treaty of 1188 it agreed to restore this right to the pope on condition that one-third of the money coined should be given to the senate, the pope did not take advantage of the retrocession and all the money was coined by the senate; Innocent III. even decreed that only senatorial coins should be used in the whole of the Campagna. The senate also seized for its own advantage the right of levying taxes on merchandise brought into the city. It also took over the appointment of judges, but in place of seven appointed a single Palatine judge for a term of three months. He was assisted by a *judex dativus*. Thus it is seen that while the pope still exercised certain rights he had actually lost control of the city.

The agreement with Pope Eugenius was of short duration. The revolution could not be checked; the Romans desired independence, and their spiritual lord fled to France, whence, in 1147, he proclaimed a new crusade, while the Romans were employed in demolishing Tivoli, banishing its inhabitants and waging war on other cities. Jordan Pierleoni was head of the republic, and Arnold, supported by the popular favour and the enthusiasm of the lower clergy, was preaching with even greater fervour than before. The new pope now re-entered Italy, proclaimed Arnold a schismatic, and advancing to Tusculum assembled an army in order to attack Rome. In this emergency the Romans applied to Conrad III., the first emperor of the house of Hohenstaufen; and their letters are expressive of Arnold's theories and his medley of ancient and modern, sacred and profane, ideas. "Rome," so they said, "is the fountain of the empire confided to you by the Almighty, and we seek to restore to Rome the power possessed by her under Constantine and Justinian. For this end we conquered and destroyed the strongholds of the barons who, together with the pope and the Normans, sought to resist us. These are now attacking us on all sides. Haste to Rome, the capital of the world, thus to establish thy imperial sway over the Italian and German lands." After long delay the king of the Romans replied to these appeals, stating that he would come "to re-establish order, reward the faithful and punish the rebellious." These words promised ill. In fact, Conrad had already arranged terms with the pope; but his life came to an end on Feb. 15, 1152.

Frederick Barbarossa.—He was succeeded by Frederick I., surnamed Barbarossa, who took no notice of letters urging him to come and receive the empire from the Roman people. In accord-

ance with his design of subduing all the independent cities, he made an agreement with the pope, in which he vowed to give no truce to the Romans, but subject them to their spiritual lord, whose temporal power should be restored. The pope, on his side, promised to crown him emperor. Thereupon the people again rose to arms and broke off all negotiations with Eugenius III. Frederick was in command of a powerful army, and was no friend of half measures. To increase the gravity of the situation, an English pope, Adrian IV., was elected (1154–59), who was also a man of strong and resolute temper. In fact, even before he was able to take possession of the Lateran, he requested the Romans to banish Arnold, who was directing his thunders against the papacy. These utterances increased the wrath of Adrian, who, encouraged by the knowledge that Frederick and his host were already in Italy, at last launched an interdict against Rome. It was the first time that a pope had laid an interdict on the Eternal City. This put a summary stop to the religious life of the inhabitants and men's minds were seized with terror; a fierce tumult broke out. Thereupon the senators implored pardon; but Adrian demanded the expulsion of Arnold before consenting to raise the interdict. Arnold was therefore obliged to leave Rome, and, abandoned by all, was forced to wander from castle to castle, until given up to Frederick Barbarossa and then consigned by the latter to the papal legates. The pope in his turn gave the reformer into the hands of the prefect, who hanged his prisoner, burnt his body at the stake, and cast his ashes into the Tiber.

But the Romans would not give up their commune. Their envoys went to meet Frederick near Sutri, and made an address in the usual fantastic style on the privileges of the Roman people and its sole right to confer the imperial crown. Frederick indignantly cut short their harangue, and they had to depart full of rage. He then continued his march, and, entering Rome on June 18, 1155, was forthwith crowned in St. Peter's by the pope. Thereupon the Romans rushed to arms and made a furious attack on the Leonine city and the imperial camp. A desperate battle went on throughout the day; many Romans perished by the sword or by drowning, but their fellow-citizens made such determined preparations to continue the struggle that Frederick, on June 19, hastily retreated, or rather fled, together with the pope and the cardinals. The commune still survived. Its existence was in truth favourable rather than injurious to Frederick, but he had not yet discerned that his best policy would be to support the commune against the pope. The latter, with keener acumen, made alliance with the communes of Lombardy and encouraged them in their resistance to the emperor. Adrian IV. died in 1159, and the anti-imperial party elected Alexander III. (1159–81), who energetically opposed the pretensions of Frederick, but, having to struggle with three anti-popes successively raised against him by the imperial party, was repeatedly driven into exile. During these schisms the senate quietly carried on the government, administered justice and made war on some neighbouring cities and barons. An army comprising many nobles marched against Tusculum, but found it defended by several valiant officers and a strong band of German soldiery, who, on May 29, 1167, inflicted on the Romans so severe a defeat that it is styled by Gregorovius "the Cannae of the middle ages." Shortly afterwards the emperor arrived in Rome with his anti-pope Paschal III., and Alexander had to flee. Then, at last, Frederick came to terms with the commune, recognized the senate, which accepted investiture at his hands, re-established the prefecture as an imperial office, and bestowed it on John, son of Peter di Vico. He departed hastily, as a deadly fever broke out and decimated his army.

Concord between Pope and Commune.—Meanwhile Pope Alexander continued Adrian's policy with better success, however, for the Lombard cities had now formed a league and inflicted a signal defeat on the emperor at Legnano on May 29, 1176. One of the results of this battle was the conclusion of an agreement between the pope and the emperor, the latter resigning his pretensions on Rome and yielding all that he had denied to Adrian. By the Treaty of Venice (Aug. 1, 1177), the anti-pope was forsaken, Alexander III. recognized and hailed as the legitimate pontiff and the prefect of Rome was again to be nominated by the pope, to whom the emperor restored the temporal power, acknowledging him the independent sovereign of Rome and of the ecclesiastical State. Frederick's troops accompanied the pope to Rome, where the commune was forced to make submission to him. But, proudly conscious as it still was of its strength, its surrender wore the aspect of a voluntary concession, and its terms began with these words: "It has been decreed by the council and deliberation of the whole Roman people," etc. The senators, elected yearly in November, had to swear fealty to the pope. On his return to Rome Alexander received a solemn welcome from all. He died on Aug. 30, 1181. The fact that between 1181 and 1187 there were three popes always living in exile proves that the commune was by no means crushed. On Dec. 20, 1187, Clement III. (1187–91) made a solemn agreement with the government of the capitol before coming to Rome. And this peace or *concordia* had the air of a treaty between potentates of equal importance. Rome confronted the pope from the same standpoint from which the Lombard cities had confronted the emperor after Legnano. This treaty was confirmed on the last day of May 1188 (*Anno XLIV.* of the senate). The pope was recognized as supreme lord, and invested the senators with their dignity. Almost all the old pontifical rights and prerogatives were restored to him. The pope might employ the Roman militia for the defence of his patrimony, but was to furnish its pay. The rights of the Church over Tivoli and Tusculum were confirmed; but the commune reserved to itself the right of making war on those cities, and declared its resolve to dismantle and destroy the walls and castle of Tusculum. In this undertaking the pope was to co-operate with the Romans, even should the unhappy city make surrender to him alone.

From all this it is clear that the Church had been made independent of the empire, and that the commune, despite its numerous concessions, was by no means subject to the Church. The republic had no patrician nor any other imperial magistrate and preserved its independence even as regarded the pope, who merely granted investiture to magistrates freely chosen by the people and had no legislative nor administrative power in the city. His temporal dominion was limited to his great possessions, to his regalia, to a supreme authority that was very indefinite, and to a feudal authority over the barons of the Campagna and many cities of a State that seemed ever on the point of dissolution. The senate continued to frame laws, to govern, and to administer justice. The army carried on the wars of the commune, as we see by the tragic fate of Tusculum, which was razed to the ground on April 19, 1191. In consequence, the nobles, seeing that the commune remained firmly established, began to adhere to it and succeeded in obtaining admission to the senate. In fact, whereas since 1143 plebeians and petty nobles had prevailed in its ranks, nobles of ancient descent are now found outnumbering the knights and burghers. In 1191 this state of things caused a sudden popular outbreak which abolished the aristocratic senate and gave the headship of the commune to a single senator, of unknown origin. During the two years he remained in office this personage stripped the pope of his revenues, despatched *justitiarii* even to the provinces, and with the aid of the parliament and council promulgated laws and statutes. He was overthrown by a counter-revolution; John Capoccio of the party of the nobles became senator for two years, and had been succeeded by one of the Pierleoni when, in 1197, a fresh revolution re-established a senate of 56 members, chiefly consisting of feudal barons in high favour with Henry VI., who had revived the imperial faction in Rome. But this emperor's life ended the same year, and the pope's in 1198, and the new pontiff, Innocent III. (1198–1216), began to make war on the nobles, who were again masters of the commune. Their leader was the prefect Peter di Vico. Owing to the revolution of 1143, most of the prefectorial attributes were now vested in the senate; nevertheless, Peter still retained a tribunal of police both within and without the city, and derived great strength from the vast possessions of the Vico family, in which the office of prefect now became hereditary. Very soon after this, however, the independent municipal office lost its true character. Then the popes made a point of according great pomp and dignity to this nominal

prefect, in order to overshadow the senator, who still represented the independence of the republic.

Innocent III., dissatisfied with this state of things, contrived by bribing the people to arrogate to himself the right of appointing a commissioner to elect the senator, who had to swear fealty and submission to the pope, and also that of nominating the provincial *justitiarii,* formerly chosen by the government of the capitol. This was a deadly blow to the commune, for the principal rights of the people—*i.e.,* the election of pope, prefect, and senate—were now lost. The general discontent provoked fresh revolutions, and the people made a loud outcry for a senate of 56 members; the pope, making a virtue of necessity, caused that number to be chosen by 12 *mediani* specially named by him for the purpose. Even this did not calm the popular discontent, and when, six months later, the pope again had a single senator elected the Romans rose to arms and in 1204 formed a government of "Good Men" (*Buoni Uomini*) in opposition to that created by the pope. But an amicable arrangement being concluded, the pope once more had 56 senators nominated; and when, soon after, he again reduced them to one, the people were too weary to resist (1205).

Pretensions of the Commune.—On Nov. 22, 1220, Honorius III. (1216–27) conferred the imperial crown on Frederick II., who confirmed to the Church the possession of her former States, of those bequeathed to her by Countess Matilda, and even of the March of Ancona. But it was soon seen that he sought to dominate all Italy, and was therefore a foe to be dreaded. The successor of Honorius, Pope Gregory IX. (1227–41), was speedily insulted and put to flight by the Ghibelline nobles, whose courage had revived, and the republic began to subdue the Latian cities on its own account. Peace was several times made and unmade by pope and people; but no enduring harmony was possible between them, since the former wished to subject the entire State to the Church, and the latter to escape from the rule of the Church and hold sway over "the universal land from Ceprano to Radicofani" formerly belonging to the duchy. Accordingly, the Roman people appointed judges, imposed taxes, issued coin, and made the clergy amenable to secular tribunals. In 1234 the senator Luca Savelli published an edict declaring Tuscia and Campania territories of the republic, and sent judges thither to exact an oath of obedience. He also despatched the militia to the coast, where it occupied several cities and erected fortresses; and columns were raised everywhere inscribed with the initials S.P.Q.R. The pope, unable to prevent but equally unable to tolerate these acts, fled from Rome, hurling his anathema against Savelli and his associates. The Romans sacked the Lateran and the houses of many cardinals and marched on Viterbo, but were driven back by the papal troops. The people had to make peace and submission in 1235, and were obliged to give up their pretensions of subjecting the clergy to ordinary tribunals and the urban territory to the commune. Thus matters were virtually settled on the footing established by Innocent III., thanks to the aid given to the pope by Frederick II., who had previously aided the rebellion.

Meanwhile the struggle between Frederick II. and the pope was once more renewed. The nobility was again split into a Guelph party headed by the Orsini and a Ghibelline party under the Colonna. In 1238 it was deemed advisable to elect two senators instead of one, in the hope of conciliating both factions by simultaneously raising them to power. Afterwards one only was elected, alternately an Orsini and a Colonna, then again two, and so on. But all these changes failed in their aims, since the struggle between emperor and pope exasperated party feeling in Rome. Frederick desired to emancipate the State from the Church, but he was opposed to the communal democracy, which was then the chief strength of the secular State in Italy. Thus, although he had a strong party in Rome, it seemed to dissolve at his approach, inasmuch as all feared that he might abolish the statutes and liberties of the commune. In fact, when he advanced towards Rome on the death of Gregory IX. in 1241, he was energetically repulsed by the people, and later even by Viterbo, a city that had always been faithful to him. After he had withdrawn, his adherents gained strength and put to flight his opponent, Innocent IV. (1243–54), the newly elected pope, who then from Lyons hurled an excommunication against him. On Frederick's death in Dec. 1250 the pope instantly returned to Rome with the set purpose of destroying the power of the Hohenstaufens.

Brancaleone.—The commune meanwhile being harassed by the factiousness of the nobility in 1252 decided on the election of an alien senator armed with ample powers, precisely as other communes gave the government into the hands of a podesta. Accordingly a Bolognese noble, Brancaleone degli Andalo, count of Casalecchio, and a Ghibelline, was invited to Rome. Before accepting office he insisted on making definite terms; he desired to hold the government for three years; and this although contrary to the statutes, was granted. Further, to insure his personal safety, he demanded that many scions of the noblest Roman houses should be sent as hostages to Bologna; and to this also the commune consented. Then, in Aug. 1252, he came with his judges and notaries, made oath to observe justice and the laws, and began to govern. He was head of the republic in peace and in war, supreme judge and captain in chief. He nominated the podestas of subject territories, despatched ambassadors, issued coin, concluded treaties, and received oaths of obedience. He convoked the council as seldom as was possible, although he frequently assembled the people in parliament. The chief complaint made against him was of undue severity in the administration of justice. He rendered the clergy amenable to secular tribunals, subdued the neighbouring cities of Tivoli, Palestrina, etc., and commanded in person the attacking force. But his greatest energy was directed to the repression of the more turbulent nobles, hanging some and banishing others. He recognized the expediency of winning the popular favour and was the first senator to add to his title that of "captain of the people." He befriended the people by promoting the organization of gilds, 13 in all. The admission of their heads into the councils of the commune in 1267 shows how far their interests had been promoted by Brancaleone.

When, on the expiration of his three years' term of office, Brancaleone's re-election was proposed, his enemies rose against him, accused him, threw him into prison, and vehemently protested against the continuance of "foreign tyranny." His life was spared only on account of the hostages sent to Bologna. The next senator chosen was a Brescian Guelph, Emanuele de Madio, a tool of the nobles, who were masters of the situation. But soon afterwards, in 1257, the people rose in revolt, drove the nobles from power, put the pope to flight, and recalled Brancaleone for another three years' term. He ruled more sternly than before, hung several nobles, and made alliance with Manfred, the representative of the Swabian party in Italy. This rendered him increasingly odious to the pope and procured his excommunication. But, disregarding the thunders of the Church, he marched against Anagni, the pope's birthplace, and Alexander was quickly obliged to humiliate himself before the senator of Rome. Brancaleone next set to work to destroy the fortified towers of the nobility, and in razing them to the ground ruined many of the adjacent dwellings. In 1258 Brancaleone died. Thus ended the career of a truly remarkable statesman. He was succeeded by his uncle, Castellano degli Andalo, who only retained office until the following spring (1259). Then the people, being bribed by the pope, joined with the nobles and overthrew him. His life too was saved by having followed his nephew's shrewd plan of sending hostages to Bologna. Two senators of Roman birth were next elected.

Charles of Anjou Senator.—At this period the fall of the empire had induced many Italian republics to seek strength by placing their governments in the hands of some prince willing to swear respect for their laws and to undertake their defence. In Rome the Guelphs and Ghibellines proposed various candidates for this office, and after many fierce quarrels ended by electing a committee of *boni homines,* charged with the revision of the statutes, reorganization of the city, and choice of a senator. This committee sat for more than a year without nominating anyone; then, the Guelph party being predominant, the majority agreed on the election as senator of Charles of Anjou, who after a long delay became senator, but held office for less than a year. Two Romans were elected in his stead, but soon

fell out with the pope, because the Guelph nobles again tried to exercise tyranny. The people, however, profited by these disturbances to rise on their own account, and formed a democratic government of 26 *boni homines* with Angelo Capocci, a Ghibelline, as its captain. By this government Don Henry, son of Ferdinand III., of Castile, was elected senator (1267). The rule of the new senator was very energetic, for he kept down the clergy, subdued the Campagna, persecuted the Guelph nobles, made alliance with the Tuscan Ghibellines, forcibly drove back the troops of King Charles, who was advancing towards Rome, and gave a splendid reception to Conradin. But the battle of Tagliacozzo (Aug. 23, 1268), followed by the murder of Conradin, proved fatal to the Ghibelline party. Charles was re-elected senator immediately after the battle, and the pope confirmed his powers for a term of ten years.

In 1278, the ten years' term having expired, the pope, after declaring that he left to the people the right of electing the senator, promulgated a new constitution (July 18, 1278), which, while confirming the rights of the Church over the city, prohibited the election of any foreign emperor, prince, marquis, count or baron as senator of Rome. Thus the Colonna, Savelli, Orsini, Annibaldi and other Roman nobles again rose to power, and the republic was again endangered and plunged into disorder. The Romans then gave the reconstitution of the city into the pope's hands by yielding to him the right of nominating senators. So Nicholas proceeded to name senators, alternating a Colonna with an Orsini, or simultaneously choosing one of each faction. The same power over the senate was granted with the same restriction to Martin IV. (1281–85), and he at once re-elected Charles of Anjou. Thus, greatly to the disgust of the Romans, the capitol was again invaded by French vicars, notaries, judges and soldiery. But the terrible blow dealt at Charles's power by the Sicilian Vespers (March 31, 1282) resounded even in Rome. The Orsini, backed by the people, rose in arms, massacred the French garrison, and quickly re-established a popular government. John Cencio, a kinsman of the Orsini, was elected captain and defender of the people, and ruled the city with the co-operation of the senator and a council of priors of the gilds. This government was of brief duration, for, although the pope had professed his willingness to tolerate experiment, he quickly arranged fresh terms, and, forsaking Charles of Anjou, again nominated two Roman senators. Pope and king both died in 1285, and Nicholas IV. (1288–92), also holding sway over the senate, favoured the Colonna in order to curb the growing mastery of the Orsini. But thus there were two powerful houses instead of one. In fact, John Colonna, when elected senator, ruled from the capitol as an independent sovereign, conducted in person the campaign against Viterbo, and subjected that city to the republic on May 3, 1291.

Boniface VIII. (1294–1303) tried to reduce the power of the Colonna family and succeeded for a time in exercising more power in Rome than any of the recent popes. This was due largely to the Jubilee which brought thousands of pilgrims to Rome. The citizens wished to profit by the gold which the pilgrims brought and for that reason were ready to postpone their rivalries.

Removal of the Popes to Avignon.—When the popes removed to Avignon the city was left almost entirely to govern itself. There was the same strife between the "ins" and the "outs," who persisted in using the names Guelphs and Ghibellines, although these names had lost their old meaning since the fall of the Hohenstaufens. The commune employed its freedom in trying to hold its own against the nobles, whose power was much lessened by the absence of the pope, and endeavoured to gain fresh strength by organizing the 13 regions. Accordingly, in 1305, a captain of the people was elected with 13 elders and a senator, Paganino della Torre, who governed for one year. The pope was opposed to these changes at first, but in 1310 he issued a brief granting Rome full permission to select its own form of government. Thus, the first pope in Avignon restored the rights of the Romans. The latter still considered Rome the Eternal City, the source of all law, and the only natural seat of the spiritual and temporal government of the world. To their republic, they thought, appertained a new and lofty destiny. In 1312, in spite of the opposition of the nobles, they insisted upon the coronation of the emperor Henry VII. In the same year, after a brief interval of rule by the nobles, the popular party again got the upper hand, only to be overthrown the following year.

Then the pope appointed King Robert of Naples as senator. Affairs took a fresh turn under Pope John XXII. (1316–34). Rome was still ruled by the vicars of King Robert; but, owing to the continued absence of the pope, matters grew daily worse. Trade and industry declined, revenue diminished, the impoverished nobles were exceedingly turbulent, deeds of murder and violence occurred on all sides; even by day the streets of the city were unsafe. Hence there was universal discontent. Accordingly the Italian Ghibellines hailed Louis the Bavarian as they had previously hailed Henry. The Roman people were roused to action, and, driving out the representatives and partisans of King Robert, in the spring of 1327 seized on the castle of St. Angelo and again established a democratic government. Regardless of the reproofs of the pope, they elected a haughty Ghibelline, Sciarra Colonna, captain of the people and general of the militia, with a council of 52 *popolani*, four to each region. Then ranged under the standards of the militia, the Romans gave chase to the foes of the republic, and Sciarra, returning victorious, ascended to the capitol, and invited Louis the Bavarian to Rome.

Encircled by a crowd of heretics, reformers and Minorite brethren, Louis convoked a parliament on the capitol, asking that the imperial crown might be conferred upon him by the people, from whom alone he wished to receive it. And the people proclaimed him their captain, senator and emperor. On Jan. 17, his coronation took place in St. Peter's. But, as he had neither money nor practical sense, his method of taxation and the excesses committed by himself and his over-excited philosophers speedily aroused the popular discontent. His ecclesiastical vicar, Marsilius of Padua, and John Janduno placarded the walls with insulting manifestos against the pope, whom the Minorites stigmatized as a heretic and wished to depose. The emperor decreed that henceforth the popes must reside in Rome—that if, when invited, they should fail to come they would be thereby held deposed from the throne. As a logical consequence, proceedings were immediately begun for the election of a new pope, Nicholas V., who on May 12 was proclaimed by the popular voice in St. Peter's square, and received the imperial sanction. But this ephemeral drama came to an end when the emperor departed with his anti-pope on Aug. 4. This caused the immediate downfall of the democratic government. A new parliament cancelled the emperor's edicts, and had them burnt by the public executioner. Meanwhile King Robert was again supreme in Rome, and being re-elected senator appointed vicars there as before. Anarchy reigned.

After the election of Benedict XII. (1334–42) confusion reached so great a pitch that, on the expiration of Robert's senatorial term, the Romans named 13 heads of regions to carry on the government with two senators, while the king still sent vicars as before. The people, for the sake of peace, once more granted the supremacy of the senate to the pope, and he nominated two senators. But in 1339 the Romans attacked the capitol, named two senators of their own choice, re-established a democratic government, and sent ambassadors to Florence to ask for the ordinances of justice by which that city had broken the power of the nobles, and also that a few skilled citizens should lend their help in the reconstitution of Rome. Accordingly some Florentines came with the *ordinamenti*, some portions of which may be recognized in the Roman statutes, and, after first rearranging the taxes, elected 13 priors of the gilds, a gonfalonier of justice, and a captain of the people after the Florentine manner. But there was a dissimilarity in the conditions of the two cities. The gilds having little influence in Rome, the projected reform failed, and the pope, who was opposed to it, re-elected the senators. Thereupon public discontent swelled. Another revolution in Rome re-established the government of the 13 elders and the two senators.

Cola di Rienzi.—The people, anxious to show their intention of respecting the papal authority, had despatched to Avignon as ambassador of the republic, in 1343, Cola di Rienzi (*q.v.*), who

begged the pope to return to Rome, to allow the city to celebrate a jubilee every 50 years, and then, as a personal request, asked to be nominated notary to the urban chamber. The pope consented to everything, and Rienzi communicated this good news to Rome in an emphatically worded epistle. After Easter, in 1344, he returned to Rome and found that the city was a prey to the nobles. He secretly built up a party of conspirators and in May 1347 convoked a parliament of the people and obtained its sanction for the following proposals: that all pending lawsuits should be at once decided; that justice should be equally administered to all; that every region should equip 100 foot soldiers and 25 horse; that the dues and taxes should be rearranged; that the forts, bridges, and gates of the city should be held by the rector of the people instead of by the nobility; and that granaries should be opened for public use. On the same day, amid general homage and applause, Rienzi was proclaimed head of the republic, with the title of tribune and liberator of the Holy Roman Republic, "by authority of the most merciful Lord Jesus Christ." The nobles withdrew scoffing but alarmed. Rienzi engaged a bodyguard of 100 men, and assumed the command of the 1,300 infantry and 390 light horse; he abolished the office of senator, retained the Thirteen and the general and special councils, and set the administration on a new footing. These measures and the prompt submission of the other cities of the State brought an instant increase of revenue to Rome.

The pope, willingly or unwillingly, accorded his approval to Rienzi's deeds. The provincial cities did homage to Rome and her tribune, and almost all the rest of Italy gave him its enthusiastic adherence. Great men like Petrarch were transported with joy. But on the convocation of a national parliament few representatives obeyed the summons and the scheme was a failure. Nevertheless, on Aug. 15, Rienzi caused himself to be crowned tribune with great pomp, and confirmed the rights of Roman citizenship to all natives of Italy. The nobles remained steadily hostile; conflict was unavoidable. At first Rienzi succeeded in vanquishing the Gaetani by means of John Colonna; he next endeavoured to suppress the Guelph and Ghibelline factions, and to restore Italy to "holy union."

The pope, however, was weary of toleration, and, coming to terms with the nobles, incited them to war. A battle took place in which 80 nobles, chiefly of the Colonna clan, were left dead; the aristocracy never again achieved the rule of the republic. Rienzi's head was turned by this sudden success, and in his great need of money he began to play the tyrant by levying taxes and exacting instant obedience. The papal legate saw his opportunity and seized it, by threatening to bring a charge of heresy against the tribune. Rienzi was dismayed. He declared himself friendly to the pope and willing to respect his authority; and he even sought to conciliate the nobles. At this moment certain Neapolitan and Hungarian captains, after levying soldiers with the tribune's consent, joined the nobles and broke out in revolt. On their proving victorious in a preliminary encounter with some of Rienzi's guards, the tribune suddenly lost heart, resigned the power he had held for seven months, and fled to Naples.

Meanwhile the Romans remained tranquil, intent on making money by the jubilee; but no sooner was this over than disorders broke out and the tyranny of the baronage recommenced. To remedy this state of things, application was made to the pope. He consulted with a committee of cardinals, who sought the advice of Petrarch, and the poet suggested a popular government, to the complete exclusion of the nobles, since these, he said, were strangers who ruined the city. The people had already elected the Thirteen, and now, encouraged by these counsels, on Dec. 26, 1351, chose John Perrone as head of the commune. But the new leader was unable to withstand the hostilities of the nobles; and in Sept. 1353 Francis Baroncelli was elected tribune. He was a follower of Rienzi, and did little beyond imitating his mode of government and smoothing the way for his return.

Rienzi, after various adventures, was at Avignon in confinement. Innocent VI. (1352–62) decided to send Cardinal Albornoz to Italy, in order to bring the State into subjection to the Church; and he further decided that Rienzi should accompany him to give him the support of his own popularity in Rome. In fact, directly the pair arrived Baroncelli was overthrown, the supremacy of the senate granted to the pope, and the government confided to Albornoz, who, without concerning himself with Rienzi, nominated a senator. Rienzi, profiting by his prestige and the apparent favour of the pope, was able to collect a band of 500 soldiers of mixed nationalities and on Aug. 1, 1354, took possession of the government. But his money ran short, and he resorted to violence to fill his purse. The result was a sudden revolt on Oct. 8, when the people stormed the capitol with cries of "Death to the traitor." Rienzi was killed.

Foreign Senators and the Banderesi.—Rome submitted to the pontiff, and the pope, instead of two senators, hastened to name a single one of foreign birth. This was a shrewd device of Albornoz and another blow to the nobles, with whom he was still at war. Thus was inaugurated, in 1358, a series of foreign senators, fulfilling the functions of a podesta, and changed every six months together with their staff of judges, notaries, and knights. The people approved of this reform as being inimical to the nobles and favourable to the preservation of liberty.

Hitherto the senators had been assisted, or rather kept in check, by the 13 representatives of the regions. In 1360 these were replaced by seven reformers, who soon became the veritable chiefs of the republic and were elected by ballot every three months, and the nobles, already shut out from power, were also excluded from the militia, which had been reorganized on the democratic system. Three thousand men, mostly archers, were enrolled under the command of two *banderesi*, with four *antepositi*, or lieutenants, constituting a supreme council of war. And the whole body was styled the *"Felix societas balestrariorum et pavesatorum."* It was instituted to support the reformers and re-establish order in the city and Campagna, to keep down the nobles and defend the republic. It fulfilled these duties with much severity. *Banderesi* and *antepositi* had seats in the special council beside those of the reformers, the gonfaloniers of the companies were seated beside the priors. Later these officials constituted the so-called *signoria dei banderesi*. When in 1362 the nobles made a riot in Rome, the *banderesi* drove them all from the city. The fight became so furious that all Rome was in arms, and even mercenaries were hired. Finally renewed submission was made to the pope.

On the death of Innocent VI. in 1362, an agreement was concluded with his successor, Urban V. (1362–70), who was obliged to give his sanction to the government of the reformers and *banderesi*. And then, Albornoz being recalled in disgrace to Avignon and afterwards sent as legate to Naples, these Roman magistrates were able, with or without the co-operation of the foreign senator, to rule in their own way. They did justice to the nobles by hanging a few more; and they defended the city from the threatening attacks of the mercenaries, who had become Italy's worst foes. It was at this period that the Roman statutes were revised and rearranged in the compilation which has come down to us supplemented by alterations of a later date.

Urban V. Begins to Destroy the Republic.—Urban V. (1362–70), no longer in safety at Avignon, decided to return to Italy. The Romans implored him to do so, and he was urged to it by the Italian *literati*, with Petrarch at their head. In April 1367 he left Avignon, and, entering Rome on Oct. 16, was given the lordship of the city. He showed much acumen in profiting by the first burst of popular enthusiasm to effect quick and dexterous changes in the constitution of the republic. After naming a senator, he abolished the posts of reformers and *banderesi*, substituting three conservators, or rather a species of municipal council, alone charged with judicial and administrative powers. The 13 leaders of the regions and the consuls of the gilds still sat in the councils, which were left unsuppressed. But all real power was in the hands of the pope, who, in Rome as in his other cities, nominated the principal magistrates. Thus, by transforming political into civil institutions, and concentrating the supreme authority in his own grasp, Urban V. dealt a mortal blow to the liberties of Rome. Yet he felt no sense of security among a people who, after the first rejoicings over the return of the Holy See, were

always on the brink of revolt. Besides, he felt himself a stranger in Italy, and was so regarded. Accordingly, in 1370 he decided to return to France, and died there on Dec. 19.

The Romans retained the conservators, conferring on them the political power of the reformers; they re-established the *banderesi* and the four *antepositi*. The new French pope, Gregory XI. (1370–78), had to be content with obtaining supremacy over the senate and the possession of the castle of St. Angelo. In Feb. 1376 the Romans nominated John Cenci captain of the people and gave him uncontrolled power over the towns of the patrimony and the Sabine land. The two councils were preserved, and a new magistracy was created, the "Three Governors of the Peace and Liberty of Rome."

Gregory XI. decided in 1376 to return to Rome and entered into a treaty with the republic, which, anxious for his return, promised him the same powers that Urban V. had had. He returned early in 1377, but was not able to get control of the government before his death in the following year. The next pope, Urban VI. (1378–89), whose election and acts provoked the Great Schism (1378–1417), had much trouble, but finally got himself recognized as supreme in Rome by promising a jubilee in 1389. He died before it could take place, and was succeeded by Boniface IX. (1389–1404). The latter was very shrewd. He crowned Ladislaus and by a skilful use of jubilees, of which he celebrated two, succeeded in bringing the city wholly under his power; he also reduced the Colonna to submission.

The next pope, Innocent VII. (1404–6), aided by Ladislaus of Naples, put down a revolt of the people, but had to make a concession that they might elect "seven governors of the liberty of the Roman republic." After Innocent's death King Ladislaus seized Rome, sacked it brutally and held sway over it until his death in 1414. Then the Romans revolted against the Neapolitans, and with the aid of the papal legate established a new government of 13 conservators.

Martin V. Supreme.—When after the Schism Martin V. was elected pope he made peace with Joanna, queen of Naples, who yielded Rome to him. Martin V. reduced the remains of the free Roman government to a mere civil municipality. Following the method of the other despots of Italy, he allowed the old republican institutions to retain their names and forms, their administrative and some of their judicial attributes, while all their political functions were transferred to the new government. Order was re-established and justice rigidly observed. Rome was in ruins; nobility and burghers were equally disorganized, the people unable to bear arms and careless of their rights, while the battered walls of the capitol recorded the fall of two republics.

Eugenius IV. (1431–47) was forced by a revolt to flee from Rome, and then the people re-established the "Seven Governors of Liberty." Later Eugenius recovered control over Rome. Under Nicholas V. (1447–55) there were conspiracies to restore the republic, headed by Stephen Porcari, who attempted to play the part of a Rienzi. He was pardoned the first time, but was executed after a second attempt. After that the Popes ruled Rome. Under Paul II. some scholars were seized on the charge of desiring to re-establish paganism in the republic. Under Sixtus IV. (1471–84) the Colonna were either put to death or made powerless, and the Orsini met the same fate under Alexander VI. (1492–1503). There was still a senator of Rome, whose nomination was entirely in the hands of the pope, still three conservators, and an elected council of 26 citizens. Now and then also a shadowy semblance of a popular assembly was held to cast dust in the eyes of the public, but even this was not for long. All these officials, together with the judges of the capitol, retained various attributes of different kinds. They administered justice and gave sentence. There were numerous tribunals, all with undefined modes of procedure, so that it was very difficult for the citizens to ascertain in which court justice should be sought. But in last resort there was always the supreme decision of the pope. Thus matters remained up to 1789. For Modern City *see* p. 472.

BIBLIOGRAPHY.—There is a good bibliography for mediaeval Rome in E. Calvi, *Bibliografia generale di Roma* (1906). The more important sources for the history of Rome in the middle ages, as far as they have been edited, are found in the *Liber Pontificalis*, edit. by Duchesne (1886–92) and by Mommsen, in the *Monumenta Germaniae Historica* (1896); in Baronius, *Annales Ecclesiastici* (best ed. Paris, 1864–82); and in the *Archivio della Reale Società Romana di Storia Patria*. *See* also Watterich, *Pontificum romanorum*, etc. (1862); Kehr, *Regesta pontificum*, etc. (1896). For the period 568–751 there is a good bibliography in C. Diehl, *Études sur l'administration byzantine* (1888); for 751–1252, in L. Halphen, *Études sur l'administration de Rome au moyen âge* (1907); for 1354–1471, in E. Rodocanachi, *Histoire de Rome* (1922). Each of these three books also has a bibliography of secondary works. Duchesne's *Les premiers temps de l'état pontifical, 754–1073* (1898) has corrected many errors formerly held. Older books which are still valuable are: Savigny, *Geschichte des römischen Rechts im Mittelalter;* J. Ficker, *Forschungen zur Reichs-und Rechtsgeschichte Italiens* (Innsbruck, 1868–74); F. Papencordt, *Geschichte der Stadt Rom.* (Paderborn, 1857); A. von Reumont, *Geschichte der Stadt Rom.* (1867–68). F. Gregorovius, *Geschichte der Stadt Rom* is a standard work and very interesting. It was finished in 1872 and consequently needs correction on many points. There is a fifth edition in German (Stuttgart, 1903 *seq.*) and an English translation, from the fourth edition, by Annie Hamilton (1894 *seq.*). P. Villari, *Il comune di Roma nel medio evo*, in his *Saggi storici e critici* (Bologna, 1890) is a "brilliant essay"; *cf.* also his *Mediaeval Italy from Charlemagne to Henry VII.* (1910). Camillo Re, *Statuti della città di Roma* (1880) prints the statutes, with a long introduction; *cf.* G. Gatti, *Statuti dei mercanti di Roma* (1885). For the time of Innocent III., A. Luchaire, *Innocent III.; Rome et Italie* (1904); *cf.* his article in *Revue Historique*, vol. 81 (1903). For Brancaleone, M. Rovere, *Brancaleone degli Andalò* (Udine, 1895). For the 14th and 15th centuries, the work of Rodocanachi, cited above, and also his *Les institutions communales de Rome* (1901), which is better for this later period than for the earlier ages. Hartmann Grisar S.J. announced a very elaborate work on the history of Rome and the popes in the middle ages, only the first volume, in German, was published (1899–1901, Eng. trans. 1911 *seq.*). O. Rössler, *Grundriss einer Geschichte Roms im Mittelalter* (1909) is useful. *See* also the two series *Storia politica de Italia*, one written by a *Società di professori* and the other by a *Società d'amici*, in which appeared the following useful volumes: G. Romano, *Dominazioni barbariche 395–1024* (1909); F. Bertolini, *Dominazioni germaniche* (1872); F. Lanzani, *Comuni* (1881); C. Cippola, *Signorie italiane* (1881) (all published at Milan). Some material is to be found in M. Creighton, *History of the Papacy* (2nd. ed., 1897) and in L. Pastor, *Geschichte der Päpste* (Leipzig, 1884 *seq.*), of which there is an English translation (St. Louis, 1898 seq.). A brief account is W. Miller's *Mediaeval Rome* (1902) in the Story of the Nations series.

(D. C. M.)

ROME, a city of Georgia, U.S.A., the county seat of Floyd county; 60 m. N.W. of Atlanta, at the confluence of the Etowah and the Oostanaula rivers to form the Coosa. It is served by the Central of Georgia, the Nashville, Chattanooga and St. Louis, and the Southern railways. Pop. 13,252 in 1920 (25% negroes); 21,843 in 1930 by the Federal census. The city has a beautiful location (625 ft. above sea-level) on hills and surrounded by pine-clad ridges and cultivated valleys. A rayon plant is under construction (1928). Rome is an important cotton market, handling 100,000 bales a year. The city has a commission-manager form of government. De Soto camped for a month on the site of Rome in 1540. It was in the territory of the Cherokee Nation, and here Gen. John Sevier, in Oct. 1793, defeated a band of marauding Indians. The city was founded in 1834 and chartered in 1847. Its name was chosen by lot from several proposed by the four founders. In 1863 there were brilliant cavalry manoeuvres in the vicinity, resulting in the capture (on May 3) of 1,600 Union soldiers by Gen. Nathan B. Forrest with only 410 Confederates. On May 19, 1864, the city was taken by a detachment of Sherman's army. Before the Civil War Rome was an important river port.

ROME, a city of Oneida county, New York, U.S.A., 15 m. N.W. of Utica, on the Mohawk river, Wood creek and the State Barge canal; served by the New York Central and the New York, Ontario and Western railways. Pop. (1920) 26,341 (20% foreign-born white); 1930 Federal census 32,338. The city lies at an altitude of 450 ft., on a level stretch between the river and the creek, which flow respectively into the Hudson river and through Oneida lake and the Oswego river into Lake Ontario. It is an important manufacturing city, with great brass and copper mills which employ three-fifths of the workmen of the city. About one-tenth of all the copper used in the United States is made here. The aggregate factory output in 1927 was valued at $45,007,881. The retail district of Rome stands on the old portage between the Mohawk river and Wood creek (about 1 m. apart).

which was used from time immemorial by the Indians and for nearly two centuries by the Dutch and English traders. To protect it Ft. Bull was built on Wood creek and Ft. Williams on the Mohawk, about 1725. The former was taken by French and Indians in March 1756, and the latter was destroyed by Col. Daniel Webb after the reduction of Oswego by the French in August of the same year. In 1758 Ft. Stanwix was erected by Gen. John Stanwix at a cost of £60,000, and permanent settlement began. Here in Oct.–Nov. 1768, Sir William Johnson and representatives of Virginia and Pennsylvania met with 3,200 Indians of the Six Nations and made a treaty with them, under which, for £10,460 in money and goods, they surrendered to the Crown their claims to what is now Kentucky, West Virginia and western Pennsylvania. The fort was dismantled immediately afterward. In 1776 it was rebuilt and renamed in honour of Gen. Philip Schuyler, but the old name clung to it in popular usage. On Aug. 2, 1777, Ft. Schuyler, containing about 750 men, under Col. Peter Gansevoort and Lieut.-Col. Marinus Willett, was besieged by an advance party of Col. Barry St. Leger's forces coming from the west. On Aug 6, Gen. Nicholas Herkimer, with some 800 men, on his way to the relief of the fort, was attacked by the main body of St. Leger's troops, ambuscaded in a ravine near Oriskany (*q.v.*), 6 m. east. During the action Willett, with 250 men and a small cannon, made a sortie from the fort, drew off a part of the enemy from Herkimer (so that he, though mortally wounded, was able to conduct the remnant of his force in orderly retreat down the valley), and brought back much booty. On Aug. 23, St. Leger, hearing exaggerated reports of enforcements approaching under Gen. Benedict Arnold, withdrew from the siege. The successful resistance to St. Leger contributed greatly to the American success at Saratoga. It was during the investment of Ft. Schuyler (or Stanwix) on this occasion that the Stars and Stripes was first raised (early Sunday morning on Aug. 3, 1777) in the face of an enemy. The making of it (from various pieces of stuff taken from clothing of different members of the garrison) "taxed the invention of the garrison," Col. Willett records, but "a decent one was soon contrived." In 1779 Ft. Schuyler was the headquarters of Col. Gozen Van Schaick when he destroyed the Onondaga villages; and on Oct. 22, 1784, a treaty was concluded here by three commissioners representing the United States and the chiefs of the Six Nations. In 1796 the township of Rome was organized, receiving its name "from the heroic defence of the republic made here." The village of Rome was incorporated in 1819 and in 1870 it was chartered as a city.

ROMFORD, a market town and outlying residential centre, 12½ m. E.N.E. from London by the L.N.E.R., in Essex, England, also served by the L.M.S.R. Pop. of urban district (1931) 35,918. Romford was included in the liberty of Havering-atte-Bower which until 1892 had a jurisdiction of its own distinct from that of the county. Romford has ironworks and electrical engineering works.

ROMILLY, SIR SAMUEL (1757–1818), English legal reformer, was the second son of Peter Romilly, and came of a Huguenot family that migrated to England. Samuel Romilly was born in Frith street, Soho, on March 1, 1757. He entered at Gray's Inn in 1778 and was called to the bar in 1783; his practice was mainly on the chancery side. In 1784 he became friendly with Mirabeau, and later supplied him with an account of House of Commons procedure for use in France. As a result of a visit to France he published in 1790 *Thoughts on the Probable Influence of the Late Revolution.* He married in 1798. In 1800 he became a K.C., and in 1806 he was solicitor-general in the Ministry of All the Talents, sitting as M.P. for Queenborough. It was now that Sir Samuel Romilly commenced the greatest labour of his life, his attempt to reform the criminal law of England, then at once cruel and illogical. He had already published *Observations* on the subject. By statute law innumerable offences were punishable by death, but, as wholesale executions would be impossible, the larger number of those convicted and sentenced to death at every assizes were respited, after having heard the sentence of death solemnly passed upon them. This led to many acts of injustice, as the lives of the convicts depended on the caprice of the judges, while at the same time it made the whole system of punishments and of the criminal law ridiculous. In 1808 Romilly managed to repeal the Elizabethan statute, which made it a capital offence to steal from the person. This success, however, raised opposition, and in the following year three bills repealing equally sanguinary statutes were thrown out by the House of Lords under the influence of Lord Ellenborough. Year after year the same influence prevailed, and Romilly saw his bills rejected; but his patient efforts and his eloquence ensured victory eventually for his cause by opening the eyes of Englishmen to the barbarity of their criminal law. The only success he had was in securing the repeal, in 1812, of a statute of Elizabeth making it a capital offence for a soldier or a mariner to beg without a pass from a magistrate or his commanding officer. Lady Romilly died on Oct. 29, 1818, and Sir Samuel committed suicide on Nov. 2,

See the *Memoirs of the Life of Sir Samuel Romilly written by himself, with a selection from his Correspondence, edited by his Sons* (3 vols., 1840); *The Speeches of Sir Samuel Romilly in the House of Commons* (2 vols., 1820); "Life and Work of Sir Samuel Romilly," by Sir W. J. Collins, in *Trans. of the Huguenot Society* (1908).

ROMNEY, GEORGE (1734–1802), English historical and portrait painter, was born at Dalton-in-Furness, Lancashire, on Dec. 26, 1734. His father was a builder and cabinet-maker, and the son, having manifested a turn for mechanics, was instructed in the latter craft, executing carvings of figures in wood, and constructing a violin, which he spent much time in playing. He was also busy with his pencil; and some of his sketches having attracted attention, his father apprenticed the boy, at the age of nineteen, to Steele, an itinerant painter of portraits and domestic subjects who had studied in Paris under Vanloo. In 1756 Romney married a young woman who had nursed him through a fever, and started as a portrait painter on his own account, travelling through the northern counties, executing likenesses at a couple of guineas, and producing a series of some twenty figure compositions, which were exhibited in Kendal, and afterwards disposed of by a lottery.

Having, at the age of twenty-seven, saved about £100, he left a portion of the sum with his wife and family, and started to seek his fortune in London, never returning, except for brief visits, till he came, a broken-down and aged man, to die. In London he rapidly rose into popular favour. His "Death of General Wolfe" was judged worthy of the second prize at the Society of Arts, but a word from Reynolds in praise of Mortimer's "Edward the Confessor" led to the premium being awarded to that painter, while Romney had to content himself with a donation of £50, an incident which led to the subsequent coldness between him and the president and prevented him from exhibiting at the Academy or presenting himself for its honours.

In 1764 he paid a brief visit to Paris, where he was befriended by Joseph Vernet; and his portrait of Sir Joseph Yates, painted on his return, bears distinct traces of his study of the works of Rubens then in the Luxembourg Palace. In 1766 he became a member of the Incorporated Society of Artists, and three years later he seems to have studied in their schools. He removed to Great Newport Street, near the residence of Sir Joshua, whose fame in portraiture he began to rival in such works as "Sir George and Lady Warren" and "Mrs. Yates as the Tragic Muse"; and his professional income rose to £1,200 a year. But this marked increase in his popularity had the effect of enlarging his ambitions. Realizing the need for more thorough knowledge, he was seized with a longing to study in Italy; and in the beginning of 1773 he started for Rome with Ozias Humphrey, the miniature painter. On his arrival he devoted himself to study, raising a scaffold to examine the paintings in the Vatican, and giving much time to work from the undraped model, of which his painting of a "Wood Nymph" was a result At Parma he studied Correggio.

In 1775 Romney returned to London, establishing himself in Cavendish Square, and resuming his work as a portrait painter. The admiration of the town was divided between him and Reynolds. Romney became acquainted with Hayley, his future biographer, then in the zenith of his popularity as a poet. His influence on the painter seems to have been far from salutary. He encouraged Romney's excessive and morbid sensibility, and

tempted him to expend his talents on ill-considered, seldom-completed paintings of ideal and poetical subjects. About 1783 Romney was introduced to Emma Hart, afterwards celebrated as Lady Hamilton, and she became the model from whom he worked incessantly. He painted her as a Magdalene and as a Joan of Arc, as a Circe, a Bacchante, a Cassandra; and he confessed that she was the inspirer of what was most beautiful in his art. But her fascinations had their share in aggravating that nervous restlessness and instability, inherent in his nature, which finally ruined both health and mind.

In 1786 Alderman Boydell started his great scheme of the Shakespeare Gallery, apparently at the suggestion of Romney. The painter entered heartily into the plan, and contributed his scene from the *Tempest*, and his "Infant Shakespeare attended by the Passions," the latter characterized by the Redgraves as one of the best of his subject pictures. Gradually he began to withdraw from portrait painting, to limit the hours devoted to sitters, and to turn his thoughts to mighty schemes of the ideal subjects which he would execute. Already, in 1792, he had painted "Milton and his Daughters," which was followed by "Newton making Experiments with the Prism." He was to paint the Seven Ages, Visions of Adam with the Angel, "six other subjects from Milton—three where Satan is the hero, and three from Adam and Eve,—perhaps six of each." Having planned and erected a large studio in Hampstead, he removed thither in 1797, with the fine collection of casts from the antique which his friend Flaxman had gathered for him in Italy. But his health was now irremediably shattered. In the summer of 1799, suffering from great weakness of body and depression of mind, he returned to Kendal, where his faithful and long-suffering wife received and tended him. He died on Nov. 15, 1802.

See the *Memoirs* by William Hayley (1809) and by the artist's son, the Rev. John Romney (1830). In the fully illustrated *George Romney*, by Lord Ronald Sutherland Gower (1904), pictures, mainly studies, are reproduced not elsewhere to be found. But the great work upon the artist is *Romney*, by Humphry Ward and W. Roberts (1904), containing 70 illustrations, a biographical and critical essay, and a *catalogue raisonné* of the painter's works. *See* also Arthur B. Chamberlain, *Romney* (1910).

ROMNEY, HENRY SIDNEY, Earl of (1641–1704), fourth son of Robert, 2nd earl of Leicester, was born in Paris in 1641. Sidney's handsome face helped his advancement at court, but the favour in which he was held by the duchess of York, to whom he was master of the robes, led to his temporary disgrace. In 1672 he was sent on a mission of congratulation to Louis XIV., and in 1677 became master of the robes to Charles II. He entered parliament in 1679, and became a close political ally of his nephew Sunderland, with whose wife he carried on an intrigue which caused scandal. Sunderland used this intimacy to further his political ends. Sidney was sent by Sunderland and others in 1679 on a special mission to urge William of Orange to visit England, a task which he discharged while acting as the official envoy of Charles II. at The Hague. He was recalled in 1682, but was again sent to Holland in 1685. He returned to England in the spring of 1688, and sought support for the prince of Orange in the event of his landing. He was allowed to leave England on giving his word not to visit The Hague, but he broke his promise on getting clear of England, and conveyed to William a duplicate of the invitation addressed to him by the English nobility, together with intelligence of affairs of state obtained through the countess of Sunderland.

He landed with William at Torbay, and received substantial rewards for his undoubted services, including the titles of Baron Milton and Viscount Sidney of Sheppey. William made him secretary of state in 1690, and in 1692, lord-lieutenant of Ireland. His inability to cope with the difficulties of this position led to his recall in the next year, when he became master-general of the ordnance. He was created earl of Romney in May 1694. On Anne's accession he was dismissed from his various offices. His titles became extinct on his death on April 8, 1704.

ROMNEY (New Romney), a municipal borough and one of the Cinque Ports in Kent, England, 75 m. S.E. by E. of London by the S.R.

Its harbour was the cause of the early importance of Romney and the annual assembly of the Cinque Ports, called the Brodhull. was held here owing to its central position. At the time of Domesday the archbishop of Canterbury and the bishop of Bayeux were joint lords. Romney also owed maritime service to the king, which consisted of supplying five ships to serve for 15 days in the year. A confirmation of liberties was granted by John in 1205. Important documents relating to the Cinque Ports are in the Guild Hall at New Romney. It lies on Romney Marsh, part of a level extending from Winchelsea in the south-west to Hythe in the north-east, which was within historic times in great part covered by an estuarine inlet of the sea. The river Rother, which now has its mouth at Rye Harbour, formerly entered the sea here, but had its course wholly changed during a great storm in 1287, and the gradual accretion of land led to the decay, not only of Romney, but of Winchelsea and Rye as seaports. Romney Marsh itself, is protected by a seawall, and its guardianship and drainage are in the hands of a special ancient corporation. The level affords pasturage for sheep. New Romney, which is now over a mile from the sea, has large sheep fairs in August, but little other trade. Of the five churches mentioned in the Domesday Survey only the Norman church of St. Nicholas remains.

ROMORANTIN, a town of central France, in the department of Loir-et-Cher, 31 m. S.E. of Blois by rail. Pop. (1926) 6,941. In 1560 Romorantin gave its name to an edict which prevented the introduction of the Inquisition into France. The town stands on the Sauldre at its confluence with the Morantin, whence its name (*Rivus Morantini*).

ROMSDAL, the valley of the river Rauma, in Norway. The Rauma is a torrent with several waterfalls (Mongefos, Vaermofos and Slettafos) which descends from Lake Lesjekogan to the Romsdal Fjord on the west coast (62° 30′ N.). The nearest port is Molde, from which steamers run to Veblungsnaes (30 m.) at the foot of the valley. A good road traverses the valley, which is one of the finest in southern Norway, flanked by steep mountains terminating in abrupt peaks—Vengetinder (5,960 ft.), Romsdalshorn (5,105), Troldtinder ("witch-peaks," 6,010) and others. Lake Lesjekogan also drains from the opposite end by the Laagen or Lougen river to the Glommen, and so to the Skagerrack, and the road follows its valley, the Gudbrandsdal.

ROMSEY (rŭm′zĭ), market town and municipal borough in Hampshire, England, 7 m. N.W. of Southampton by the S.R. Pop. (1931) 4,863. It is situated in the valley of the Test. The abbey church of SS. Mary and Elfleda is a fine Norman church little altered by later builders. A house founded here by Edward the elder (*c.* 910) became a Benedictine nunnery. The church, which is the only important relic of the foundation, is cruciform, with a low central tower. Building began in the first half of the 12th century, and continued through it, as the western part of the nave shows the transition to the Early English style, which appears in the west front. Decorated windows occur in the east end, beyond which a chapel formerly extended. Perpendicular insertions are insignificant. The nave and choir have aisles, triforium and clerestory. The transepts have eastern apsidal chapels, as have the choir aisles, though the walls of these last are square without. Foundations of the apse of a large pre-Norman church have been discovered below the present building. At the time of the Domesday Survey Romsey (*Romesyg, Romeseie*) was owned by the abbey, which continued to be the overlord until the dissolution. There is no evidence to show that Romsey was a borough before the charter of incorporation granted by James I. in 1608. In mediaeval times Romsey had a considerable share of the woollen trade of Hampshire, but by the end of the 17th century this manufacture began to decline.

ROMULUS, the son of Mars by the Vestal Rhea Silvia or Ilia, daughter of Numitor, who had been dispossessed of the throne of Alba by his younger brother Amulius. Romulus and Rĕmus, the twin sons of Silvia, were placed in a trough and cast into the Tiber by their grand-uncle. The trough grounded in the marshes where Rome afterwards stood, under the wild fig tree (*Ficus ruminalis*), which was still holy in later days. The babes were suckled by a she-wolf and fed by a woodpecker, and

then fostered by Acca Larentia, wife of the shepherd Faustulus. They became leaders of a warlike band of shepherds on the Palatine, and in course of time were recognized by their grandfather, whom they restored to his throne, slaying Amulius. They now founded a city on the site where they had been nurtured; later a quarrel broke out and Remus was slain. Romulus strengthened his band by offering an "asylum" to outcasts and fugitives, found wives for them by capture and waged war with their kinsmen. His most formidable foe was Titus Tatius (*q.v.*), king of the Sabines, but after an obstinate struggle he and Romulus united their forces and reigned side by side till Tatius was slain at Lavinium in the course of a blood-feud with Laurentum. Romulus then reigned alone till he suddenly disappeared in a storm. He was thereafter worshipped as a god under the name of Quirinus. Various rationalizing accounts also exist of the legend.

The whole story, probably first given by the annalists Fabius Pictor and Cincius Alimentus, is artificial and shows strong Greek influence. The birth, exposure, rescue, and subsequent adventures of the twins are a Greek tale of familiar type. Mars and his sacred beast, the wolf, are introduced on account of the great importance of this cult. The localities described are ancient sacred places; the Lupercal, near the *ficus ruminalis,* was naturally explained as the she-wolf's den. (*See* ROME, topography.) The *asylum* is pure Greek, both name and institution. The story was probably invented to give an explanation of the sacred spot named *inter duos lucos* between the arx and the Capitol. Another Greek touch is the deification of an eponymous hero. The rape of the Sabine women is clearly aetiological, invented to account for the custom of simulated capture in marriage; these women and also Titus Tatius represent the Sabine element in the Roman population. The name Romulus (=*Romanus,* cp. the forms *Siculus* and *Sicanus*) means simply "Roman," the derivation of Remus is obscure.

Romulus is regarded as the founder of the military and political institutions (*see* ROME), as Numa and his counterpart Ancus Marcius are of the religious institutions, of Rome.

BIBLIOGRAPHY.—Schwegler, *Römische Geschichte,* bks. viii.–x.; Sir George Cornewall Lewis, *Credibility of early Roman History,* chap. ii; W. Ihne, *History of Rome,* i.; Sir J. Seeley, Introduction to his edition of Livy, bk. i.; E. Pais, *Storia di Roma* (1898), i. pt. i, and *Ancient Legends of Roman History* (Eng. trans., 1906); J. B. Carter in Roscher's *Lexikon,* art. Romulus.

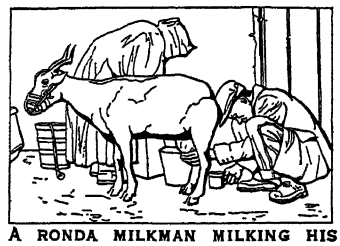
ROMULUS AUGUSTULUS, last Roman emperor of the West (Oct. 31, A.D. 475, to Sept. 4, 476), was elevated to the throne by his father, Orestes, "master of the soldiery" (Jordanes), who drove the emperor Julius (Nepos) to Dalmatia in the summer of 475. Romulus, who was then probably about 14 years old, owed his first name to an uncle, a *canes* of Patavio in Noricum; his nickname he probably owed to the barbarian soldiery; and by these two chances the last emperor successor of a Julius Caesar bore the names both of the first emperor and the first king. The reins of power were naturally held for him by his father, Orestes, nor is there any event of his reign worthy of record except the conclusion of peace with Gaiseric the Vandal. Shortly after his elevation to the throne, the barbarian mercenaries in the service of Rome presented to Romulus's father, Orestes, a demand that they should be allotted one-third of the lands of all Italy. With a last flicker of Roman courage and pride, Orestes refused: the mercenaries revolted under their leader and instigator, Odoacer (Aug. 23, 476), and in a very short while Orestes was defeated and beheaded and the Western empire came to an end. The victorious Odoacer was touched by the beauty and helplessness of Romulus, and spared his life, ordering him to retire to the villa built by Lucullus four centuries before, near Naples. Here he died at a date unknown to us.

RONALDSHAY, LAWRENCE JOHN LUMLEY DUNDAS, EARL OF (1876–), British administrator, was born June 11, 1876, the eldest surviving son of the 1st Marquess of Zetland and was educated at Harrow and Trinity College, Cambridge. From 1898–1907 he travelled extensively in Ceylon, India, Persia, Asiatic Turkey, Central Asia, Siberia, Japan, China and Burma. In 1900 he was appointed aide-de-camp to the staff of the viceroy, Earl Curzon, in India. He sat in the House of Commons as conservative member for the Hornsey division from 1907–16. A member of the royal commission on the public services in India from 1912–14 he was appointed governor of Bengal in 1916 in succession to Lord Carmichael of Stirling. He retained this appointment until 1922, when he was created G.C.S.I. and sworn of the privy council.

Lord Ronaldshay published *Sport and Politics under an Eastern Sky* (1902); *On the Outskirts of Empire in Asia* (1904); *A Wandering Student in the Far East* (1908); *An Eastern Miscellany* (1911); *Lands of the Thunderbolt: Sikhim, Chumbi and Bhutan* (1923); *The Heart of Aryavarta* (1925); *Life of Lord Curzon of Kedleston* (3 vols., 1927–28).

RONCESVALLES (Fr. *Roncevaux*), a village of northern Spain, in the province of Navarre; situated on the small river Urrobi, at an altitude of 3,220 ft. among the Pyrenees, and within 5 m. from the French frontier. Pop. (1920) 142. Roncesvalles is famous in history and legend for the defeat of Charlemagne and the death of Roland (*q.v.*) in 778. The small collegiate church contains several relics associated with Roland, and is a favourite place of pilgrimage. The battle is said to have been fought in the picturesque valley known as Valcarlos, which is now occupied by a hamlet (pop. in 1920, 996) bearing the same name, and in the adjoining defile of Ibaneta. Both of these are traversed by the main road leading north from Roncesvalles to St. Jean Pied de Port, in France.

RONDA, a town of southern Spain, in the province of Malaga; on the river Guadiaro and on the Algeciras-Bobadilla railway. Pop. (1920) 30,393. Ronda is built on a high rock nearly surrounded by the Guadiaro or Guadalevín, which flows through an abrupt chasm 530 ft. deep and 300 ft. wide, by which the old town is separated from the new. The stream was probably bridged by the Romans. Ronda has a considerable trade in leather, saddlery, horses, soap, flour, chocolate, wine and hats. The poet Vincente Espinel was born here in 1551.



A RONDA MILKMAN MILKING HIS GOAT FOR A CUSTOMER

Some remains of an aqueduct and theatre, about 7 m. N. of Ronda, are supposed to represent the *Acinipo* or *Arunda* of ancient geographers. Ronda gives its name to the Sierra or Serrania de Ronda, one of the main sections of the coast mountains which rise between the great plain of Andalusia and the Mediterranean.

RONDEAU, a structural form in poetry and (in the form of "rondo") in music. In poetry the rondeau is a short metrical structure which in its perfect form consists of 13 eight- or ten-syllabled verses divided into three strophes of unequal length, and knit together by two rhymes and a refrain. In Clement Marot's time the laws of the rondeau were laid down, and, according to Voiture, in the 17th century, the following was the type of the approved form of the rondeau:—

"Ma foy, c'est fait de moy, car Isabeau
M'a conjuré de luy faire un Rondeau:
Cela me met en une peine extrême.
Quoy treize vers, huit en *eau,* cinq en *ème.*
Je luy ferois aussi-tôt un bateau!

En voilà cinq pourtant en un monceau:
Faisons en huict, en invoquant Brodeau,
En puis mettons, par quelque stratagème,
Ma foy, c'est fait!

Si je pouvois encore de mon cerveau
Tirer cinq vers, l'ouvrage seroit beau;
Mais cependant, je suis dedans l'onzième,
Et si je croy que je fais le douzième,
En voilà treize ajustez au niveau.
Ma foy, c'est fait!"

All forms of the rondeau are alike in this, that the distinguishing metrical emphasis is achieved by a peculiar use of the refrain. Though we have a set of rondeaux in the *Rolliad* (written by Dr. Lawrence the friend of Burke, according to Gosse), it was not till modern times that the form had any real vogue in England.

Considerable attention, however, has lately been given in England to the form. Some English rondeaux are as bright and graceful as Voiture's own. Swinburne, who in his *Century of Roundels* was perhaps the first to make the refrain rhyme with the second verse of the first strophe, has brought the form into high poetry. In German, rondeaux have been composed with perfect correctness by Weckherlin, and with certain divergences from the French type by Götz and Fischart; the German name for the form is *rundum* or *ringel-gedicht*.

Although the origin of the refrain in all poetry was no doubt the improvisatore's need of a rest, a time in which to focus his forces and recover breath for future flights, the refrain has a distinct metrical value of its own; it knits the structure together, and so intensifies the emotional energy, as we see in the Border ballads, in the *Oriana* of Lord Tennyson, and in the *Sister Helen* of Rossetti. The suggestion of extreme artificiality —of "difficulty overcome"—which is one great fault of the rondeau as a vehicle for deep emotion, does not therefore spring from the use of the refrain, but from the too frequent recurrence of the rhymes in the strophes—for which there is no metrical necessity as in the case of the Petrarchan sonnet. The rondeau is, however, an inimitable instrument of gaiety, delicacy, colour and grace.

RONDEL, a form of verse closely allied to the rondeau (*q.v.*) but distinguished from it by containing 14 instead of 13 lines, and by demanding a slightly different arrangement of rhymes. The initial couplet is repeated in the middle and again at the close. The arrangement of rhymes is as follows: a, b b, a; a b, a b; a, b, b, a, a, b. This form, which was invented in the 14th century, was largely used in later mediaeval French poetry, but particularly by Charles d'Orléans (1391–1465), the very best of whose graceful creations are all rondels. The rondel, in French, may begin with either a masculine or a feminine rhyme, but its solitary other rhyme must be of the opposite kind.

One of the Prince d'Orleans' rondels may be given here as a type:—

Le temps a laissié son manteau
De vent, de froidure et de pluye,
Et s'est vestu de brouderie
De souleil luisant, cler et beau.
Il n'y a beste ne oyseau
Qu'en son jargon ne chante ou crie;
Le temps a laissié son manteau
De vent, de froidure et de pluye.
Rivière, fontaine et ruisseau
Portent, en livrée jolie,
Gouttes d'argent d'or faverie;
Chascun s'abille de nouveau;
Le temps a laissié son manteau
De vent, de froidure et de pluye.

Rondels existed in English from the 15th century, but the early specimens of it are very clumsy. It was revived in the 19th century. Correct examples are found in the poems of Robert Bridges, Dobson, Gosse and Henley. The following, by Austin Dobson, is a good example of what an English rondel should be in all technical respects.

Love comes back to his vacant dwelling,—
The old, old Love that we knew of yore!
We see him stand by the open door,
With his great eyes sad, and his bosom swelling.
He makes as though in our arms repelling
He fain would lie as he lay before;—
Love comes back to his vacant dwelling,—
The old, old Love that we knew of yore!
Ah! who shall help us from over-spelling
That sweet, forgotten, forbidden lore?
E'en as we doubt, in our hearts once more,
With a rush of tears to our eyelids welling,
Love comes back to his vacant dwelling,
The old, old Love that we knew of yore!

Théodore de Banville remarks that the art of the rondel consists in the gay and natural reintroduction of the refrain, which should always seem inevitable, while slightly changing the point of view of the reader. If this is not successfully achieved, "on ne fera que de la marqueterie et du placage, c'est-à-dire, en fait de poésie,—rien!" In Germany, the rondel was introduced, in the 18th century, under the name of *ringel-gedicht* by Johann Nikolaus Götz (1731–81).

RONDO, a musical form originally derived from the rondel in verse; as may be seen, long before the development of instrumental forms, in some of the *chansons* of Orlando di Lasso. The *rondeau en couplets* of Couperin and his contemporaries shows the same connection with verse. It consists of a single neatly rounded phrase alternating with several episodes (the *couplets*) without any important change of key. Ex. 1 shows Bach's handling of this early form. The later rondo is an important member of the sonata forms (*q.v.*), chiefly found in finales; but rondo-form sometimes occurs in slow movements. Ex. 2 is not more elaborate than the adagio of Beethoven's 4th symphony. Philipp Emanuel Bach invented an extraordinary kind of rondo, not part of a sonata, but on a voluminous scale with wildly incoherent episodes and modulations.

The later sonata-style rondo forms may be divided into two main classes:

(i.) *Sectional rondos; i.e.,* with little or no development or transition between the episodes and the main theme; very characteristic of Haydn, who, however, may run away with it in unexpected developments. The name rondo implies at least two episodes, and a sectional rondo may have more. Beethoven in his early works shows the influence of Haydn in this type of rondo; *e.g.,* the finales of sonatas, opp. 10, No. 3, and 14, Nos. 1 and 2; and the slow movements of the sonatas, opp. 2, No. 2, and 13 (*Pathétique*). The sectional rondo last appears on a gigantic scale in the finale of Brahms's G minor pianoforte quartet, op. 25; and it lends itself, like the cognate idea of a dance with several "trios" to Schumann's pianoforte pieces and to some of his finales.
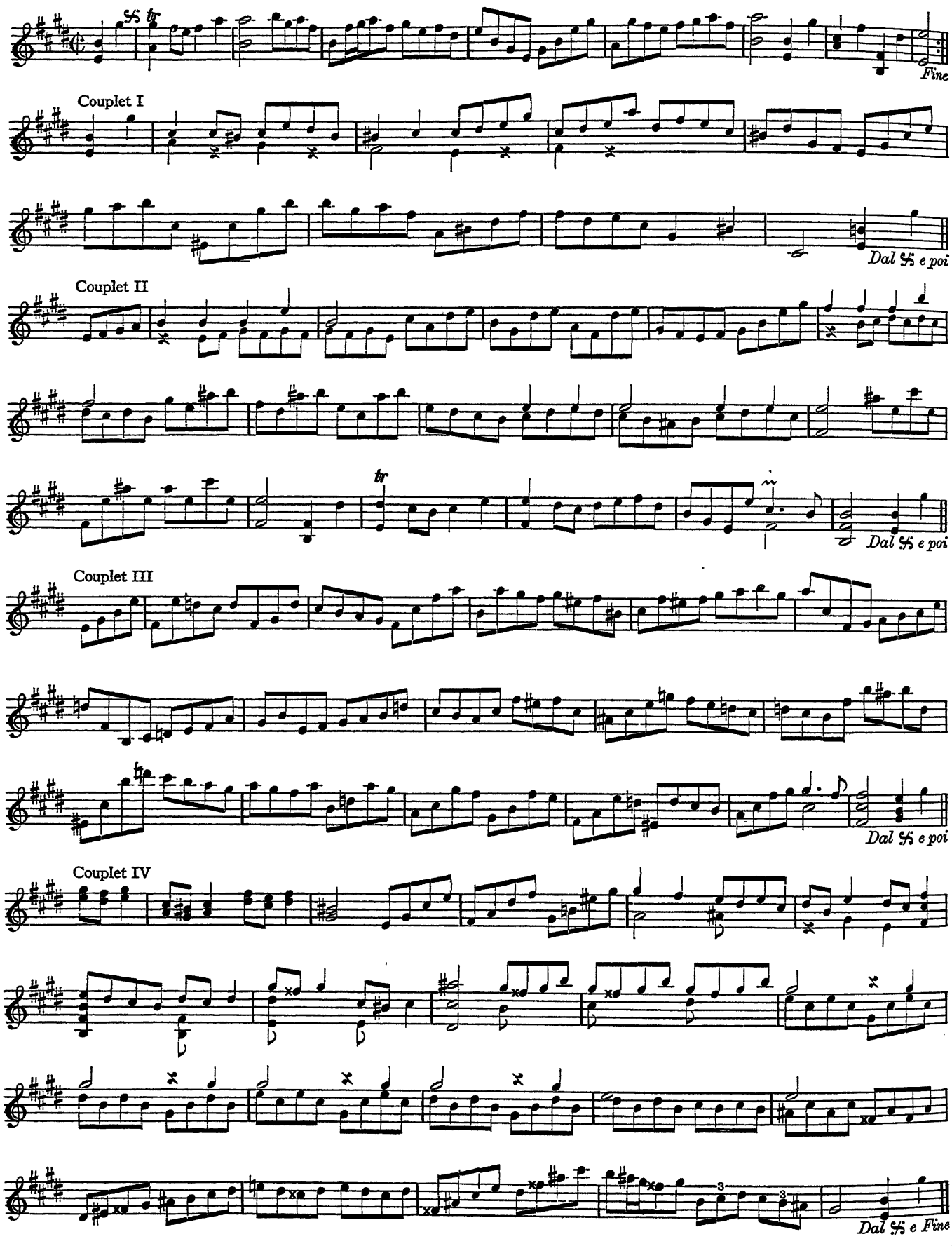
(ii.) *Rondos influenced by the form of a first movement* (for which *see* SONATA FORMS). In the normal scheme for this, which is Mozart's favourite rondo-form, the rondo-theme (which may contain several clauses) is followed by a well-organized transition to the key of the first episode, which key is chosen as if for the "complementary key" of a first movement. The return to the rondo-theme may be elaborate or abrupt, and the theme itself may be reduced to its first complete clause (but not to a mere fragment, without loss of the rondo effect). The second episode will be in a new key and may be followed by wide modulations, or itself be widely modulatory, or it may even be entirely a development of the previous material, as in the rondo of Beethoven's Sonata Op. 90, given on p. 525. When the rondo-theme returns again it is followed by a recapitulation of the first episode (perhaps preceded by the transitional passage suitably modified) in the tonic; after which the coda may contain a final return of the rondo-theme. When the second episode is concentrated on development the only difference between the rondo and a first movement is the slender fact that the whole first theme returns immediately after the first episode. Yet the rondo style can be recognised from the outset by the tunelike character of the main theme, and also by the fact that, unlike the most tuneful openings of first movements, it comes to a definite close instead of swinging continuously into the transition passage. A rondo with a development in its middle episode may return to the tonic with an immediate recapitulation of the first episode, omitting the expected second return of the main theme, thus: A, B (new key), A, C (development), B (tonic), A, Coda (where A is the rondo-theme and B and C the episodes). Mozart, Schubert and Brahms have a form, always worked on a very large scale, which consists only of A, B (new key), A, B (tonic), Coda; where a certain amount of development is edged in *à propos* of the transition-passage on its recapitulation. Only the style of the main theme can distinguish this from a first movement that omits its normal development-section.

In the rondos of classical concertos (*q.v.*) the orchestra (especially in Mozart) finds its opportunity in a series of accessory themes announced as soon as the solo instrument has given out the rondo-theme. These accessories are then held in reserve for the coda.

Two examples of rondo-forms are given on pp. 524–6:—

RONDO

Ex. 1. *Gavotte en Rondeau* (Rondeau en Couplets) from Bach's Sixth Violin Solo.
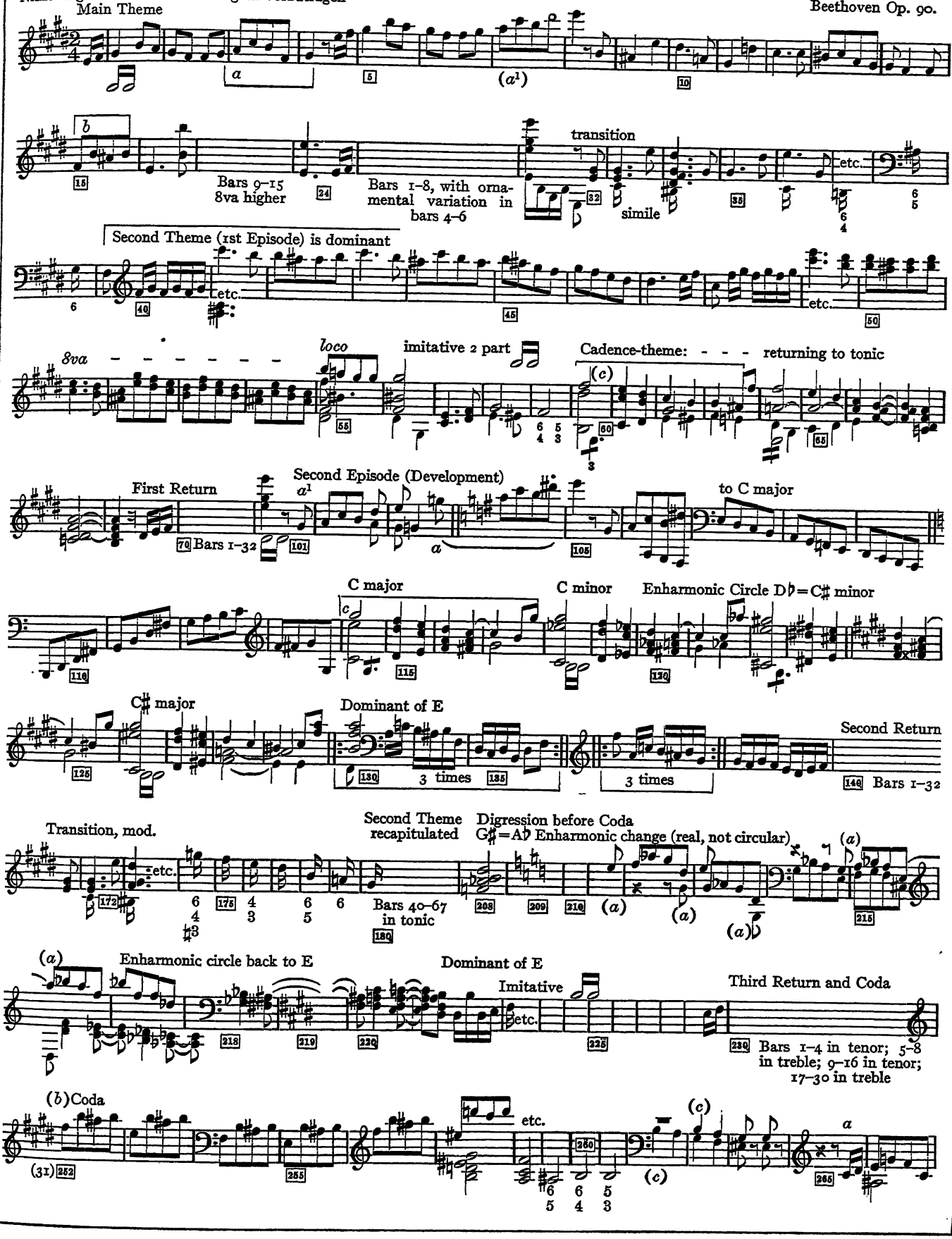


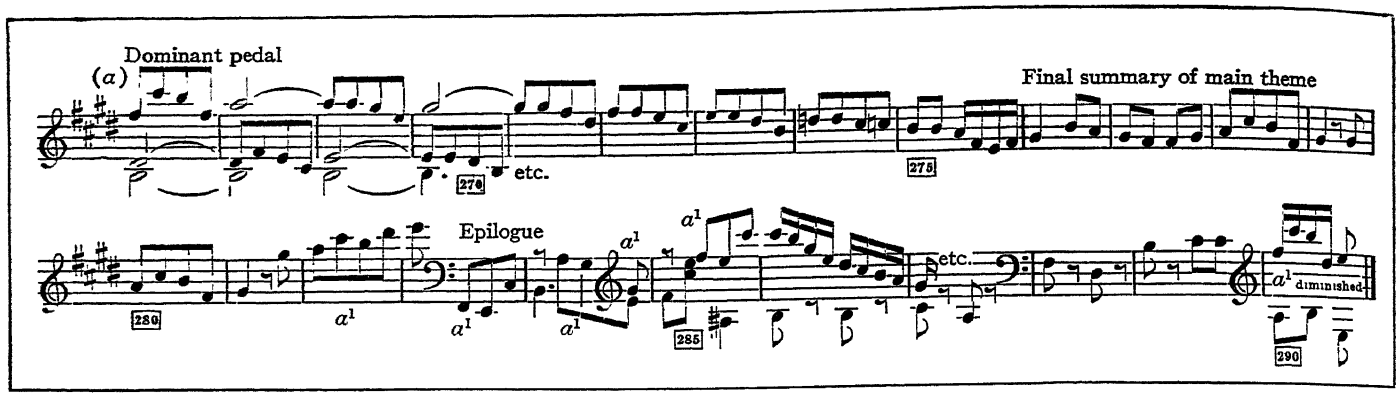
Ex. 2. Outline of Sonata form Rondo with developing middle episode.

and indicate prevalent movement of accompaniment. Blank bars indicate prevalence of the same chord.

Nicht zu geschwind und sehr singbar vorzutragen

Beethoven Op. 90.





RONSARD, PIERRE DE (1524–1585), French poet and "prince of poets" (as his own generation in France called him), was born at the Château de la Poissonnière, near the village of Couture in the province of Vendômois (department of Loir-et-Cher), on Sept. 11, 1524. His family is said to have come from the Slav provinces to the south of the Danube (provinces with which the crusades had given France much intercourse) in the first half of the 14th century. Pierre was the youngest son of Loys de Ronsard, *maître d'hôtel du roi* to Francis I. Pierre was sent to the Collège de Navarre at Paris when he was nine years old. It is said that the rough life of a mediaeval school did not suit him. He was quickly appointed page, first to the king's eldest son François, and then to his brother the duke of Orleans. When Madeleine of France was married to James V. of Scotland, Ronsard was attached to the king's service, and he spent three years in Great Britain. The latter part of this time seems to have been passed in England, though he had, strictly speaking, no business there. On returning to France in 1540 he was again taken into the service of the duke of Orleans, and travelled to Flanders and again to Scotland. After a time he was attached as secretary to the suite of Lazare de Baïf, the father of his future colleague in the Pléiade and his companion on this occasion, Antoine de Baïf, at the diet of Spires. Afterwards he was attached in the same way to the suite of the cardinal du Bellay-Langey. His diplomatic career was cut short by an attack of deafness which no physician could cure, and he devoted himself to study at the Collège Coqueret, the principal of which was Daurat—afterwards the "dark star" (as from his silence he has been called in France) of the Pléiade, and already an acquaintance of Ronsard's from his having held the office of tutor in the Baïf household. Antoine de Baïf, Daurat's pupil, accompanied Ronsard; Belleau shortly followed; Joachim du Bellay, the second of the seven, joined not much later. Muretus (Jean Antoine de Muret), a great scholar and by means of his Latin plays a great influence in the creation of French tragedy, was also a student here.

The Pleiade.—Ronsard's period of study occupied seven years, and the first manifesto of the new literary movement, which was to apply to the vernacular the principles of criticism and scholarship learnt from the classics, came not from him but from Du Bellay (*q.v.*). The *Défense et illustration de la langue française* of the latter appeared in 1549, and the Pléiade (or *Brigade,* as it was first called) may be said to have been then launched. The orthodox canon is beyond doubt composed of Ronsard, Du Bellay, Baïf, Belleau, Pontus de Tyard, Jodelle the dramatist, and Daurat. Some single and minor pieces, an epithalamium on Antoine de Bourbon and Jeanne de Navarre (1550), a "Hymne de la France" (1549), an "Ode à la Paix," preceded the publication in 1550 of the first four books of the *Odes* of Ronsard. This was followed in 1552 by his *Amours de Cassandre* with the fifth book of *Odes*. These books excited a violent literary quarrel. Marot was dead, but he left a numerous school, some of whom saw in the stricter literary critique of the Pléiade, in its outspoken contempt of merely vernacular and mediaeval forms, in its strenuous advice to French poetry to "follow the ancients," and so forth, an insult to Marot and his followers. An acute rivalry ensued between the followers of Clément Marot, the "École Marotique," and the new school. The Pléiade found a powerful supporter at court in Marguerite de Valois. Ronsard published his *Hymns,* dedicated to Marguerite de Savoie, in 1555; the conclusion of the *Amours,* addressed to another heroine, in 1556; and then a collection of *Oeuvres complètes,* said to be due to the invitation of Mary Stuart, queen of Francis II., in 1560; with *Elégies, mascarades et bergeries* in 1565. To this same year belongs his most important and interesting *Abrégé de l'art poétique français.*

Charles IX. gave him rooms in the palace; he bestowed upon him divers abbacies and priories; and he called him and regarded him constantly as his master in poetry. Neither was Charles IX. a bad poet. This royal patronage excited violent dislike to Ronsard on the part of the Huguenots, who wrote constant pasquinades against him, strove (by a ridiculous exaggeration of the Dionysiac festival at Arcueil, in which the friends had indulged to celebrate the success of the first French tragedy, Jodelle's *Cléopatre*) to represent him as a libertine and an atheist, and (which seems to have annoyed him more than anything else) set up his follower Du Bartas as his rival. According to some words of his own, which are quite credible considering the ways of the time, they were not contented with this variety of argument, but attempted to have him assassinated.

During this period Ronsard's work was considerable but mostly occasional, and the one work of magnitude upon which Charles put him, the *Françiade* (1572), has never been ranked, even by his most devoted admirers, as a chief title to fame. The metre (the decasyllable) which the king chose could not but contrast unfavourably with the magnificent alexandrines which Du Bartas and Agrippa d'Aubigné were shortly to produce; the general plan is feebly classical, and the very language has little or nothing of that racy mixture of scholarliness and love of natural beauty which distinguishes the best work of the Pléiade. Moreover it had the singular bad luck almost to coincide with the massacre of St. Bartholomew, which had occurred about a fortnight before its publication. The death of Charles made little difference in the court favour which Ronsard enjoyed, but, combined with his increasing infirmities, it seems to have determined him to quit court life. During his last days he lived chiefly at his house in Vendôme, the capital of his native province, at his abbey at Croix-Val in the same neighbourhood, or else at Paris, where he was usually the guest of Jean Galland, well known as a scholar, at the Collège de Boncourt. It seems also that he had a town house of his own in the Faubourg Saint-Marcel. He received gifts and endowments from foreign patrons, including Elizabeth of England. Mary, queen of Scots, who had known him earlier, addressed him from her prison; and Tasso consulted him on the *Gerusalemme.* He died at his priory of Saint-Cosme at Tours, and he was buried in the church of that name on Dec. 27, 1585.

After Ronsard's death the classical reaction set in under the auspices of Malherbe. After Malherbe the rising glory of Corneille and his contemporaries obscured the tentative and unequal work of the Pléiade, which was, moreover, directly attacked by Boileau himself, the dictator of French criticism in the last half of the 17th century. Then Ronsard was, except by a few men of taste, like La Bruyère and Fénelon, forgotten when he was

not sneered at. In this condition he remained during the whole 18th century and the first quarter of the 19th. The Romantic revival, seeing in him a victim of its special *bête noire* Boileau, and attracted by his splendid diction, rich metrical faculty, and combination of classical and mediaeval peculiarities, adopted his name as a kind of battle-cry, and for the moment exaggerated his merits somewhat. The critical work, however, of Sainte-Beuve in his *Tableau de la littérature française au 16ème siècle,* established his place in French literature.

Generally speaking, Ronsard is best in his amatory verse (the long series of sonnets and odes to Cassandre, Marie, Genèvre, Hélène—Hélène de Surgères, a later and mainly "literary" love —etc.), and in his descriptions of the country (the famous "Mignonne allons voir si la rose," the "Fontaine Bellerie," the "Forêt de Gastine," and so forth), which have an extraordinary grace and freshness. No one used with more art than he the graceful diminutives which his school set in fashion. He knew well too how to manage the gorgeous adjectives ("marbrine," "cinabrine," "ivoirine" and the like) which were another fancy of the Pléiade, and in his hands they rarely become stiff or cumbrous. In short, Ronsard shows eminently the two great attractions of French 16th-century poetry as compared with that of the two following ages—magnificence of language and imagery and graceful variety of metre.

BIBLIOGRAPHY.—Of editions of his *Oeuvres complètes* he himself published seven—the first in 1560, the last in 1584. Between his death and the year 1630 ten more complete editions were published, the most famous of which is the folio of 1609. From 1630 Ronsard was not again reprinted for more than two centuries. Just before the close of the second, however, Sainte-Beuve printed a selection of his poems to accompany the above-mentioned *Tableau* (1828). There are also selections by M. Noel (in the *Collection Didot*) and Becq de Fouquières. M. Prosper Blanchemain, who had previously published a volume of *Oeuvres inédites de Ronsard,* undertook a complete edition (8 vols., 1857–67) for the *Bibliothèque Elzévirienne.* Later editions are by Marty-Laveaux (1887–1893), and B. Pifteau (1891); and by P. Laumonier (2 vols., 1914). C. H. Page published a translation of his *Songs and Sonnets* with introductory essay and notes (Boston, 1924). As for criticism, Sainte-Beuve followed up his early work by articles in the *Causeries du lundi,* and the chief later critics have dealt with him in their collected works. In English A. Tilley's *Literature of the French Renaissance* (1904) and Saintsbury's *History of Criticism,* vol. ii. may be consulted. *See* also P. Champion, *Ronsard et son temps* (1905); P. de Nolhac, *Ronsard et l'humanisme* (1921); H. Franchet, *Le Poète et son oeuvre d'après Ronsard* (1923); P. Laumonier, *Ronsard* (1923); and S. de Ricci, *Catalogue d'une collection unique des éditions originales de Ronsard* (1925).

RÖNTGEN, DAVID, sometimes called DAVID DE LUNÉVILLE (1743–1807), German cabinet-maker, eldest son of Abraham Röntgen, was born at Herrenhag on Aug. 1, 1743 and died at Wiesbaden on Feb. 12, 1807. In 1753 his father migrated to Neuwied, near Coblenz, where he established a furniture factory. He learned his trade in his father's workshop, and succeeded to the paternal business in 1772. At that time the name of the firm was already well known, but although he is always reckoned as one of the foreign cabinet-makers and workers in marquetry who, like Oeben and Riesener, achieved distinction in France during the superb *floraison* of the Louis Seize style, he never ceased to live at Neuwied, where apparently the whole of his furniture was made, and merely had a shop, or show-room, in Paris. His first appearance there was in Aug. 1774. He soon acquired favour with Marie Antoinette who appointed him her *ébéniste-méchanicien.* The powerful trade corporation of the *maîtres-ébénistes* disputed his right to sell in Paris furniture of foreign manufacture, and in 1780 he found it advisable to seek admission to the corporation. He introduced a new style of marquetry, in which light and shade, instead of being represented as hitherto by burning, smoking, or engraving the materials, were indicated by small pieces of wood so arranged as to create the impression of *pietra dura.* He was also proficient in constructing furniture in which mechanical devices played a great part, and unquestionably much of the reputation he enjoyed among contemporaries is explained by his mechanical genius. Röntgen also had shops in Berlin and St. Petersburg, and twice went to Russia when he sold to the Empress Catherine furniture to the value of 20,000 roubles, to which she added a personal present of 5,000 roubles and a gold snuff-box—in recognition of his ingenuity in surmounting a secretaire with a clock indicating the date of the Russian naval victory over the Turks at Cheshme, news of which had arrived on the previous evening. In 1793 the Revolutionary government seized the contents of his show-rooms and his personal belongings. Five years later the invasion of Neuwied led to the closing of his workshops to which prosperity never returned.

See F. de Salverte, *Les Ébénistes du XVIII. Siècle* (1927).

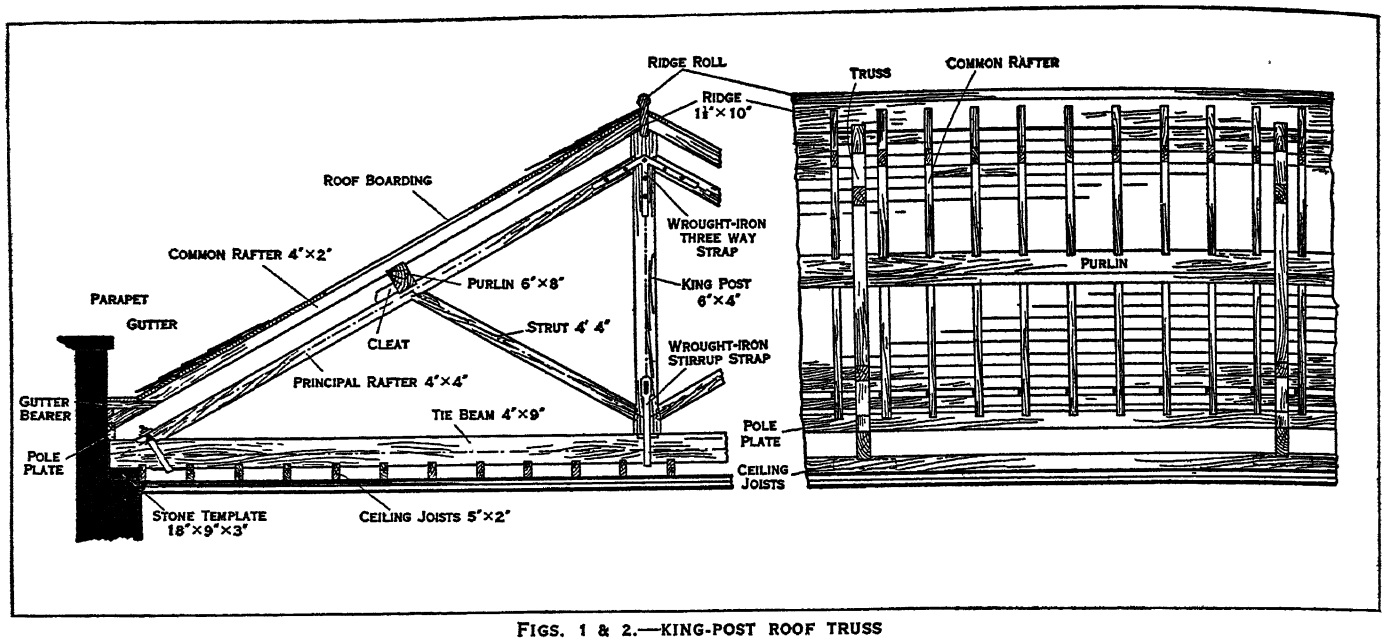
RÖNTGEN, WILHELM KONRAD VON (1845–1923), German physicist, was born at Lennep on March 27, 1845. He received his early education in Holland, and then went to study at Zürich. He then became assistant to Kundt at Würzburg and afterwards at Strasbourg, becoming *Privatdozent* at the latter university in 1874. Next year he was appointed professor of mathematics and physics at the Agricultural Academy of Hohenheim, and in 1876 he returned to Strasbourg as extraordinary professor. In 1879 he was chosen ordinary professor of physics and director of the Physical Institute at Giessen, whence in 1885 he removed in the same capacity to Würzburg. It was at the latter place that he made the discovery for which his name is chiefly known, the Röntgen rays. In 1895, while experimenting with a highly exhausted vacuum tube on the conduction of electricity through gases, he observed the fluorescence of a barium platinocyanide screen which happened to be lying near. Further investigation showed that this radiation had the power of passing through various substances which are opaque to ordinary light, and also of affecting a photographic plate. Its behaviour being curious in several respects, particularly in regard to reflection and refraction, doubt arose in his mind whether it was to be looked upon as light or not, and he was led to put forward the hypothesis that it was due to longitudinal vibrations in the ether, not to transverse ones like ordinary light; but in view of the uncertainty existing as to its nature, he called it X-rays. For this discovery he received the Rumford medal of the Royal Society in 1896, jointly with Philip Lenard, who had already shown, as also had Hertz, that a portion of the cathode rays could pass through a thin film of a metal such as aluminium. Röntgen also conducted researches in various other branches of physics, including elasticity, capillarity, the ratio of the specific heats of gases, the conduction of heat in crystals, the absorption of heat-rays by different gases, piezo-electricity, the electromagnetic rotation of polarized light, etc. Röntgen received the Nobel Prize for physics in 1901. He died at Munich on Feb. 10, 1923. *See* also X-RAYS.

ROOFS. A roof is the covering of a structure. Its chief purpose is to enclose the upper parts of a building as a protection against wind, rain and snow; in communities of dwellings, domestic buildings, industrial and commercial structures, fire-resistance is a necessary property of roofing.

Roofs may be flat, or may be inclined at an angle to suit the roof covering. Covering materials are selected for pitched roofs according to their resistance to rain and snow, durability in changes of temperature and in acid atmospheres, and for their artistic qualities in relation to architectural design. Modern buildings erected in concrete usually have flat roofs, consisting of concrete slabs surfaced with asphalt or with waterproofed cement coatings. Sufficient fall must be given to drain water off quickly and adequate gutters formed in the concrete to discharge the water in heavy storms.

For buildings erected in steel framework flat concrete roofs may be adopted, but in order to keep the eaves of a building at a lower level, while providing additional storeys in the accomodation, it is more usual in cities to adopt a Mansard type of roof, having the general form shown in fig. 5, but constructed in steel. Cross members are avoided as much as possible—except where required as floor girders—and the frame is made rigid by strong steel gussets at the changes of direction of the slopes. Two storeys in the roof—or more—can be obtained in this way.

While timber framework continues to be used for supporting roof coverings of lead, copper, zinc, special felts, asbestos sheets, slates and tiles—both for flat and pitched roofs—steel has largely replaced timber for the main supports and for many transverse members in the larger buildings, and even for semi-permanent



FIGS. 1 & 2.—KING-POST ROOF TRUSS

industrial buildings and stores, because of the rapidity with which materials can be prepared, assembled and erected. Steel is also economically justified for use in roof framing except for dwellings and small buildings, or for dye-works and bleach-works where rapid oxidation renders steel unsuitable. Roofs are often made with considerable projection at the eaves. This serves to protect the upper portion of the external walls and also possesses aesthetic value in design.

Forms of Roofs.—The simplest form is the "flat roof" consisting of horizontal wood joists laid from wall to wall as in floors. The roof must have sufficient fall to allow water to drain away into gutters placed at convenient points. The joists are covered with boards followed by a waterproof material such as asphalt, lead, zinc or copper. These flat roofs cannot be economically constructed for cold climates with heavy snowfalls; they are difficult to maintain weathertight under such conditions.

"Lean-to," "shed," or "pent" roofs are developments of the same form of construction as the flat roof, one end of the joists (now called "rafters") being lifted to form a decided slope, which enables slates, tiles, asbestos sheets and other materials to be employed in small units.

Simple roofs in general use with a double slope are called "coupled rafter roofs," the rafters meeting at the highest point upon a horizontal ridge-piece which stiffens the framework and gives a level ridge-line. In some old roofs the rafters are connected without any intervening ridge-plate, with the result that after a time the ridge instead of remaining level takes on a wavy outline, due to the fact that some of the timbers have settled slightly owing to decay or other causes, whilst others have remained firm. The lower ends of the rafters should rest upon a wood plate bedded on the top of the wall; this assists in spreading the weight over the wall, and provides fixing for the timbers. The simple "couple roof" consists merely of two sets of rafters pitched from plates on the walls on either side of the building and sloping upwards to rest against a common ridge-piece. There are no ties between the feet of the rafters, which therefore exert a considerable thrust against the supporting walls; this form of roof is only suitable for spans of 10 to 12 feet. Where the ends of the rafters are connected by ceiling joists which form a level ceiling the joists act as ties and prevent any outward thrust on the supports. Such roofs are termed "couple close roofs." When used for spans between 12 ft. and 18 ft. a binder supported by an iron or wood "king" tie every 5 or 6 ft. should be run along across the centres of the ceiling joists and the latter spiked to it. When ties are fixed about half-way up the rafters the roof is called a "collar roof," and may be used for spans up to 16 ft. This type of roof is commonly used in dwelling-houses where the fir framing is generally hidden from view by the ceilings. Where required extra support is obtained from partitions and cross walls. If the span is above 20 ft. without intermediate support, it is necessary to employ "principals" and "purlins." American usage sanctions much greater spans than English for simple raftered roofs. Frequently spans as great as 30 ft. or more are roofed without trusses or interior supports, provided that the feet of the rafters are adequately tied by means of ceiling or floor joists at or near the plate level. Principals are strong trusses of timber rigidly framed together and placed at intervals of about 10 ft. to support the weight of the roof covering. Purlins—stout timbers running longitudinally—are supported on the principal rafters at intervals of 6 to 8 ft., and on these the common rafters are fastened. Principals, or "roof trusses" as they are more often called, are framed together in various ways; they may be of timber members with iron fastenings, or entirely of steel, or again a combination of steel and timber. In the latter case they are called "composite trusses" and the use of steel is confined to tension members.

The "king-post truss" may be used for spans up to 30 ft. and is constructed as shown in figs. 1 and 2. It has a central post sustaining the "tie-beam" in the centre with struts projecting from its base to support the principal rafters at a point where the weight from the purlins renders strutting necessary. The members are connected by wrought-iron straps and bolts; a strap connects the king-post and tie-beam and is often fitted with a gib-and-cotter arrangement (iron folding wedges) which allows the whole truss to be tightened up should any settlement or shrinkage occur. "Queen-post trusses" have two queen-posts supporting the tie beam (fig. 3). Trusses of this type are suitable for spans up to 45 ft. The joints between the members are made in a similar manner to those of the king-post principal with wrought-iron straps. There are two purlins on each slope, one supported at the top of each "queen," the other about half-way down the principal rafter. A stout straining beam connects the heads of the queens. In fig. 4, *a* and *b* are details at the foot of the queen-post, and *c* at the head. In roofs of larger span, up to 60-ft., the tie-beam requires to be upheld at more than two points, and additional posts called "princesses" are introduced for this purpose. This also entails extra struts and purlins. In such large spans the straining beam often becomes of such a length as to require support and this is effected by continuing the principal rafters up to the ridge and introducing a short king-post to sustain the beam in the middle of its length.

Open Timber Roofs.—Open timber roofs of various types but principally of "hammer-beam" construction were used in the middle ages where stone vaulting was not employed. Many of

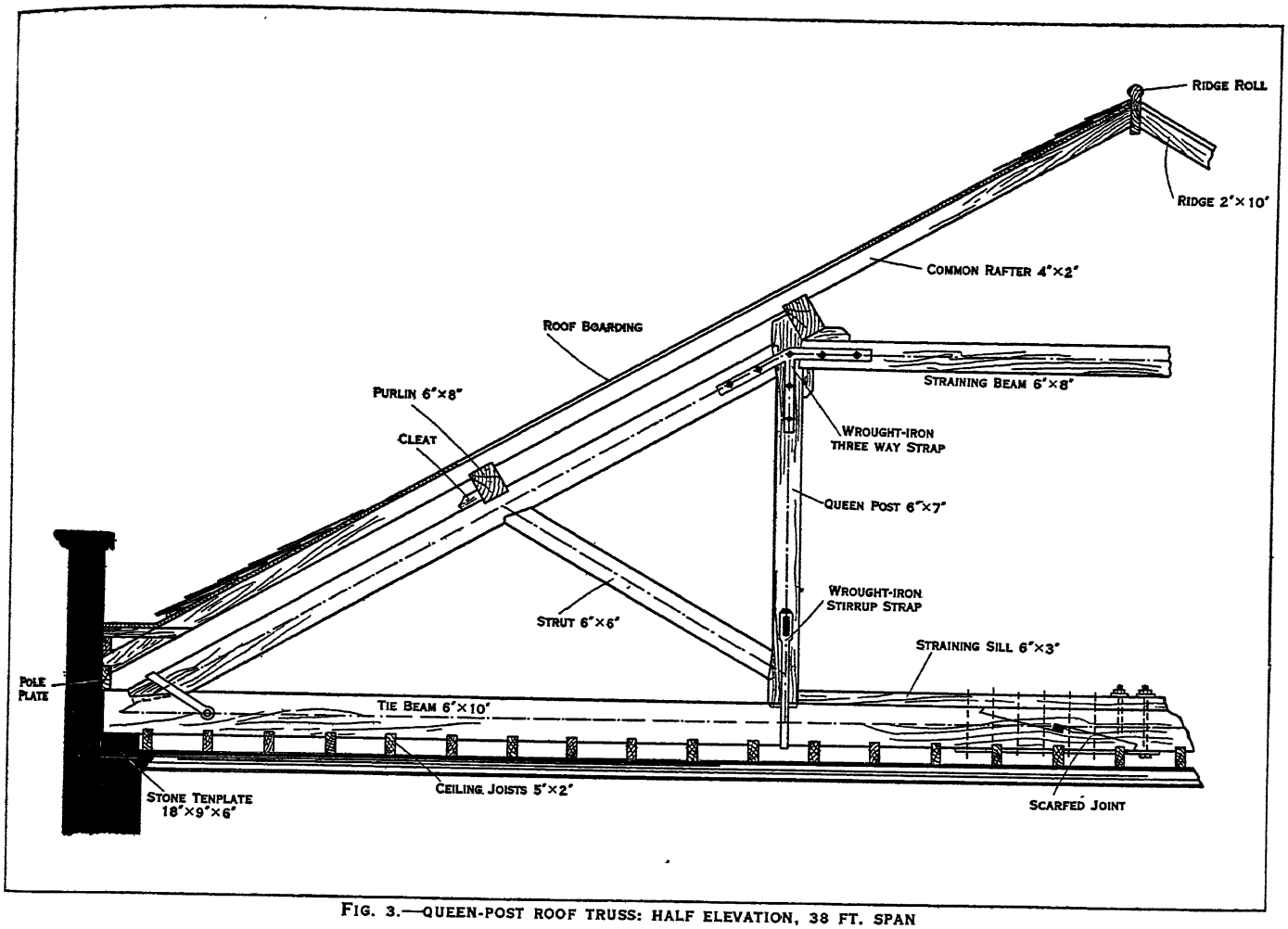


FIG. 3.—QUEEN-POST ROOF TRUSS: HALF ELEVATION, 38 FT. SPAN

these old roofs still exist in good preservation and exhibit the great skill of the mediaeval carpenters who designed and erected them. Such forms are still used, chiefly for ecclesiastical buildings and the roofs over large halls. In the best periods of Gothic architecture the pitch of these roofs was made very steep, sometimes as much as 60° with the horizon. In the hammer-beam

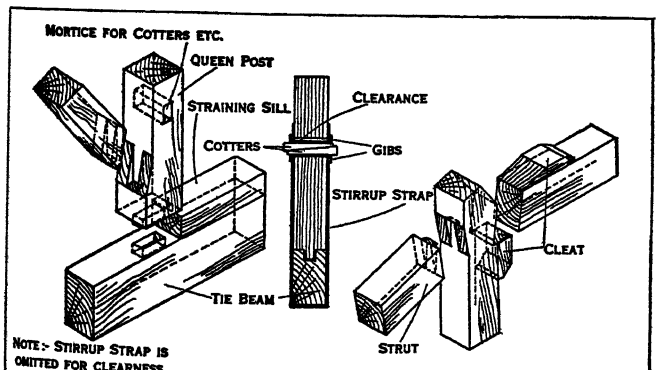


FIG. 4.—(A) DETAIL OF QUEEN-POST TRUSS AT B. (B) VERTICAL SECTION THROUGH QUEEN-POST. (C) DETAIL OF QUEEN-POST TRUSS AT HEAD; PURLIN AND WROUGHT-IRON STRAPS ARE OMITTED FOR THE SAKE OF CLEARNESS

ype of roof the tie-beam at the foot of the rafters is omitted, collar connecting the principal rafters at a point about half-ay in their length, and the lower portion of the rafters consting of struts and braces rigidly connected to relieve thrust pon the walls serving as abutments. There are two kinds of ammer-beam, the arched and the bracketed. The "hammer-eam" projects from the top of the wall and is bracketed from a rbel projecting from the wall some distance below. This form of roof has a style and dignity appropriate to the period in which it was developed.

The Mansard Roof (fig. 5) is a useful form of construction which obtains its name from François Mansart (*q.v.*). This kind of roof has been largely used in France and other European countries, and in America in the old colonial days. It is well adapted to some styles of architecture, but requires careful proportioning of the slopes for a satisfactory effect. In America the term "Mansard Roof" (*q.v.*) is reserved for roofs of double pitch sloping up from all 4 sides of building; the term "gambrel roof" (*q.v.*) being applied to double pitched roofs ending in gables. By the use of a Mansard roof extra rooms can be obtained without adding an additional storey to the building. Fig. 5, A, B, C, D and E show various sectional forms. A similar type of curb roof is often used having a flat lead or zinc-covered top in place of the pitched slate or tile-covered top of the ordinary Mansard roof.

Composite Roof Trusses of wood and iron are frequently used for all classes of buildings, and have proved very satisfactory. They are built upon the same principles as wooden roof trusses. The struts—that is, those members subjected to compressional stress—are of wood, and iron bars or rods are used for the ties, which have to withstand tensile forces. When shrinkage occurs, as usually happens in large trusses, the joints of the framing are tightened up by the bolts attached to the tie-rods. Figs. 6, 7 and 8 are the sections and plan of a simple method of constructing the roof for a small domestic building with plaster ceilings to the top rooms. It is a couple close roof with the addition of a collar and struts, and king-rod to every fourth rafter. Trimming is necessary for openings and where portions of the structure, such as chimney stacks, cut into the roof. A dragon tie is framed to the wall-plates at the hipped angles to receive the thrust from the hip rafters.

Steel Roof Trusses.—Because of their adaptability in form

and detail, speed of fabrication and general economy, roof principals of steel are now the most usual kind of roof support where trussed framing is required. They are particularly suitable for commercial buildings, and, while not artistic if judged by comparison with the traditional treatment of timber, are capable of

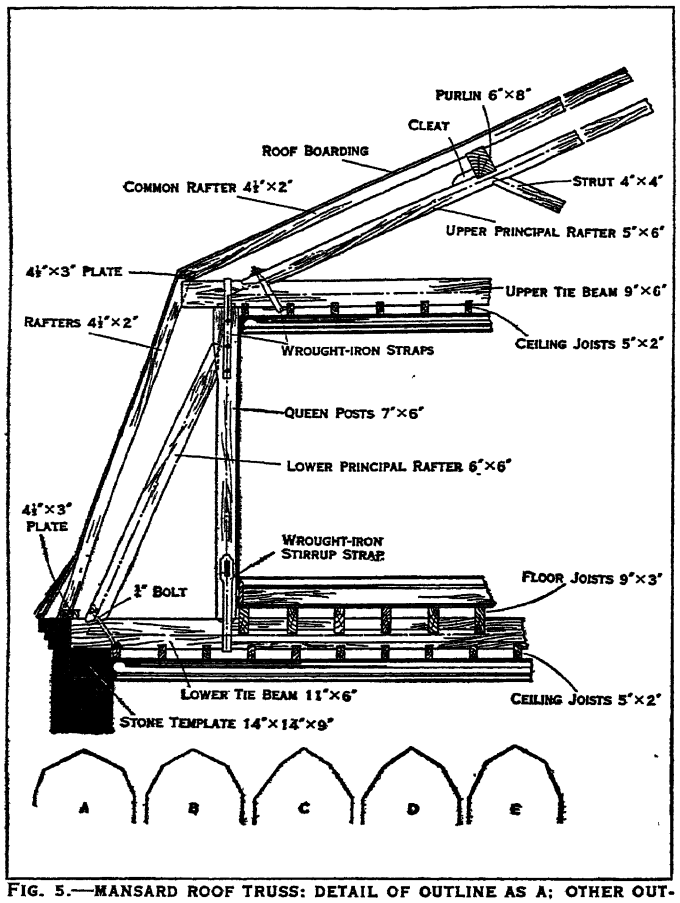


FIG. 5.—MANSARD ROOF TRUSS: DETAIL OF OUTLINE AS A; OTHER OUTLINES AT B, C, D AND E

acceptable aesthetic form based on the economic suitability for their particular purpose.

In the early days of steel trusses, T sections for rafters and struts were usually employed, with rounds and flats for the tie bars. Modern methods of fabrication have gradually developed the use of the L (angle) section for nearly all structural members in roof trusses of moderate span, double angles being used for rafters and ties, single gusset plates riveted between the angles, and ties and struts of either single or double angle section riveted to the faces of the gussets.

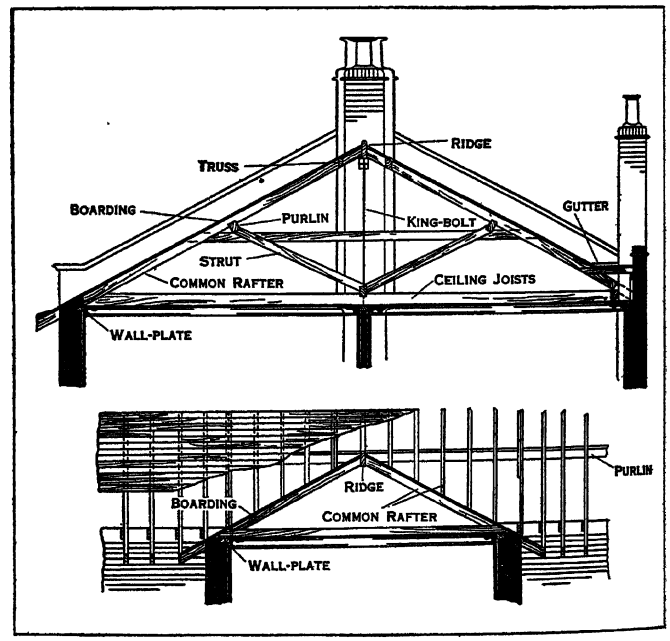
The guiding principle is simplicity of form and of detail, and efficiency for service. Often more material is employed in a member than is strictly necessary—and a more economical use of material might be arranged—but usually economy of material means a loss in fabrication costs or the necessity of carrying stocks of many and variable sections of steel.

Double channels are very convenient and largely used for compression members in large span roofs and in unusual structures.

The types of trusses in modern use are given in fig. 9. These include the "queen rod," having vertical ties and inclined struts, the "trussed rafter," in which the struts are at 90° to the rafter, and variations of these forms. Perfect triangulation of steel frames is easy to arrange and the dimensions of the members can be suitably arranged by selection from a large number of standard sections of rolled steel.

Where large areas of uninterrupted floor space are required in textile sheds, garages, etc., a form of roof is often adopted in which main girders of the parallel type, up to 150 ft. span, support cantilever trusses, the main girders being placed to form the ridges of the slopes and the cantilevers attached at each side as shown in fig. 10. The gutters are central between the trusses and the girder spacing up to 30 ft. span. Clear bays are thus provided 150 ft. × 30 ft.

Domical Roofs.—Domes may be framed up with wood rafters cut to shape. For small spans this construction is satisfactory, but domes of considerable size are now framed in steel or in reinforced concrete. The outer dome of St. Paul's cathedral in London is of lead-covered wood, framed upon and supported by a conical structure of brickwork which is raised above the inner dome of brick. Concrete is a very suitable material for use in the construction of domes, with iron or steel reinforcement in the shape of bars, mesh, or perforated plates. One of the best modern examples of concrete vaulting and domical roofing without metal reinforcement occurs in the Roman Catholic cathedral at Westminster, a remarkable building designed by Mr. J. F. Bentley. The circle developed by the pendentives of a nave dome is 60 ft. in diameter. The thickness of the dome at the springing is 3 ft. gradually reduced to 13 in. at the crown; the curve of equilibrium is therefore well within the material. The domes were turned on closely boarded centering in a series of superimposed rings of concrete, averaging 4 ft. in width, and the concrete was not reinforced. The independent external covering of the domes is formed of 3 in. artificial stone slabs cast to the curve. They rest on radiating ribs 5 in. deep of similar material fixed on the concrete and rebated to receive the slabs; thus an air space of 2 in. is left between the inner shell and the outer covering, the object being to render the temperature of the interior more uniform. At the springing and at the crown the spaces between the ribs are left open for ventilation. The sanctuary dome differs in several respects from those of the nave. Unlike the latter, which seem to rest on the flat roofing of the church, the dome of the sanctuary emerges gradually out of the substructure, the supporting walls on the north and south being



FIGS. 6 & 7.—ROOF FOR DOMESTIC BUILDING

kept down so as to give greater elegance to the eastern turrets. The apsidal termination of the choir in the east is covered in with a concrete vault surmounted by a timber roof, in striking contrast to the domes covering the other portions of the structure. Fig. 11 is a section through the nave showing how the domes are buttressed, fig. 12 is a section through the sanctuary dome, and figs. 13 and 14 a section and part plan of the vaulting of the choir with its wood span roof above the concrete vault.

Covering Materials for Roofs.—There are many different roof-covering materials in common use, of which the principal

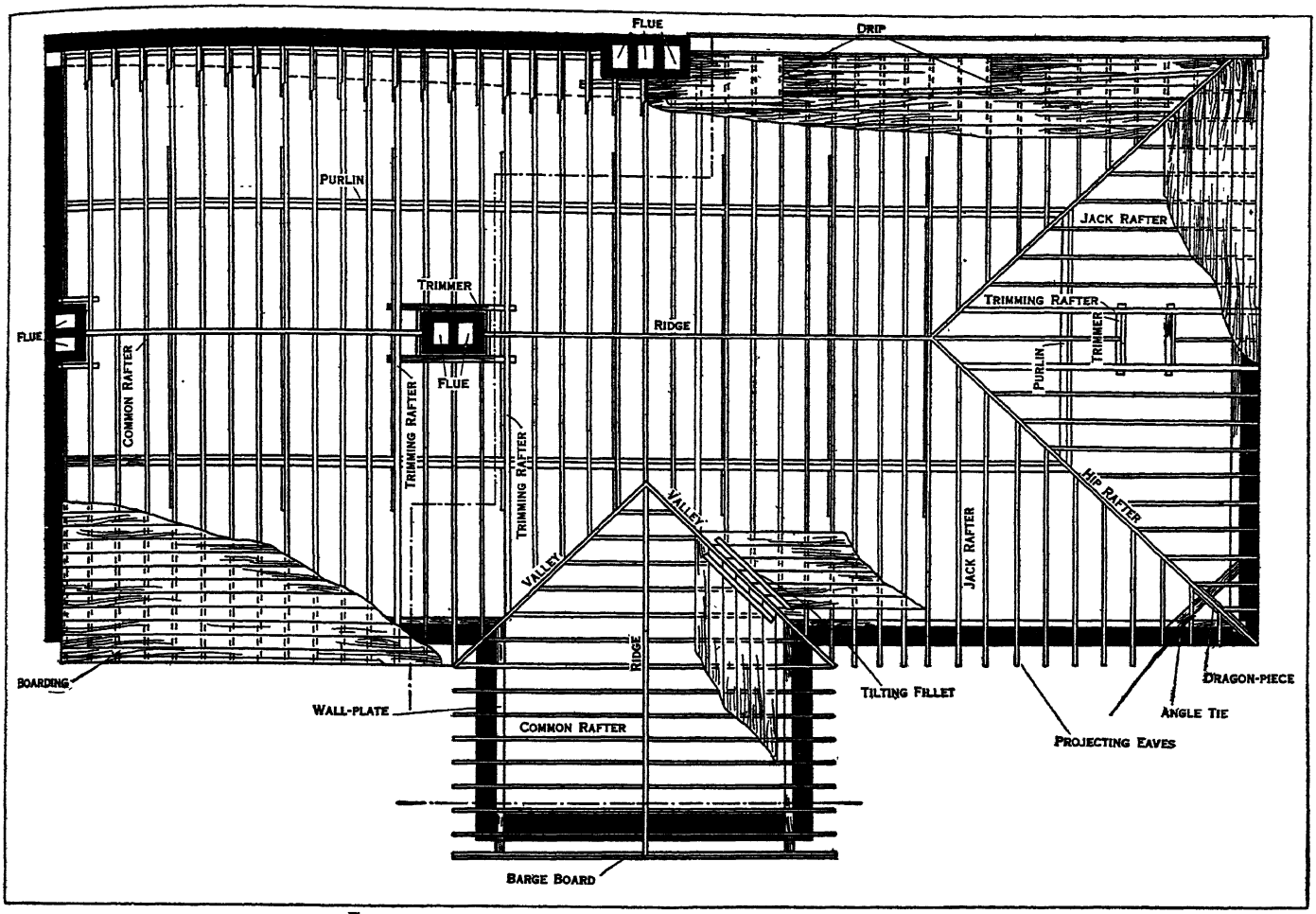


FIG. 8.—PLAN OF A ROOF SHOWING THE DETAILS OF CONSTRUCTION

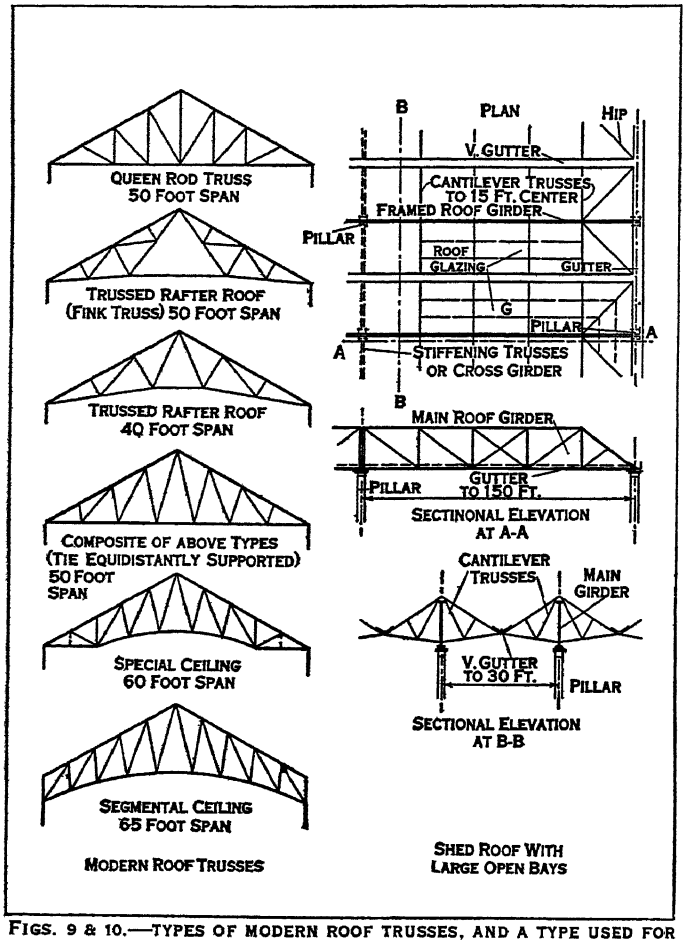
characteristics are given. The nature of the outer covering affects the details of roof construction in many respects. A light covering such as felt or corrugated iron can be safely laid upon a much lighter timber framing than is necessary for a heavy covering of tiles or slates.

Roofing felt is an inexpensive fabric of animal or vegetable fibre treated with bituminous preparations to make it capable of resisting the weather. It is used as a roofing material for temporary buildings. When exposed to the weather it should be treated with a compound of tar and slaked lime well boiled and applied hot, the surface being sprinkled with sand before it becomes hard. Bituminous felt is employed as a non-conducting and safeguarding under-cover to slates and tiles, used only for the roofs of important buildings. The felt is supplied in rolls containing from 25 to 35 yd. by 30 in. wide. The sheets should be laid with a lap of at least 2 in. at the joints and secured to the boarding beneath by large-headed clout-nails driven in about 2 in. apart.

Corrugated iron is supplied either black or galvanized. It is especially suited for the roofs of out-buildings and buildings of a temporary or semi-permanent character. Being to a large extent self-supporting, it requires a specially designed roof framework of light construction. If, as is usually the case, the sheets are laid with the corrugations running with the slope of the roof, they can be fixed directly on purlins spaced 5 ft. to 10 ft. apart according to the stiffness and length of the sheets. In pure air zinc coating of the galvanized sheets is durable for many years, but in large cities and manufacturing towns its life is short unless protected by painting. In such districts it has often been found that plain ungalvanized sheets well coated with paint will last longer than those galvanized, for the latter are attacked by corrosive influences through minute flaws in the zinc coating developed in the process of corrugation or transit or resulting from some defect in the coating. The stock sizes of corrugated sheets vary from 5 ft. to 10 ft. long, and from 2 ft. to 2 ft. 9 in. wide with corrugations measuring 3 in. to 5 in. from centre to centre. For roofing purposes the sheets are supplied in several thicknesses ranging from No. 16 to No. 22 Standard Wire Gauge. No. 16 is for exceptionally strong work, No. 18 and No. 20 are used for good-class work, and No. 22 for the roofs of temporary buildings. The sheets when laid should lap one full corrugation at their sides and from 3 in. to 6 in. at the ends. Riveting is the best method of connecting the sheets, although galvanized bolts, which are not so satisfactory, are frequently employed. The joints should be made along the crowns of the corrugations to avoid leakage. Holes can be punched during the erection of the roof. For attachment to timber framework, galvanized screws or nails with domed washers are used. Fixing to a steel framework is effected by galvanized hook bolts which clip the purlins and pass through the sheet. Sheets corrugated in the Italian pattern have raised half-rounds every 15 in. or so, the portions between being flat. Such sheets have a very neat appearance and give a better effect in some positions than the ordinary corrugations.

Zinc in sheets is a material largely used as a roof covering, and if care be taken to ensure metal of good quality, it is strong and durable, as well as light and inexpensive. Zinc is stronger weight for weight than lead, slate, tile or glass, but weaker than copper, wrought-iron or steel, although with the exception of the latter two it is not so durable under normal roofing conditions. It is not liable to easy breakage as are slates, tiles and glass. It is usually supplied in flat sheets, although it can also be had in the corrugated form similar to corrugated sheet-iron. When exposed to air, a thin coating of oxide is formed on the surface which protects the metal beneath from any further change, and obviates the necessity of painting. In laying the sheets, the use of solder and nails should be avoided entirely except for fixing clips and

tacks which do not interfere with the free expansion and contraction of the sheets. Zinc expands freely, and sheets laid with soldered seams or fixed with nails are liable to buckle and break away owing to movements caused by changes of temperature. The usual sizes of zinc sheets are 7 ft. or 8 ft. long by 3 ft. wide and weighing from 11½ to 25 oz. per sq.ft. The thickness varies from 25 to 19 Standard Wire Gauge. A dependable method of



FIGS. 9 & 10.—TYPES OF MODERN ROOF TRUSSES, AND A TYPE USED FOR LARGE UNINTERRUPTED FLOOR AREAS

laying zinc on flat roofs is with the aid of wood "rolls," about 2 in. × 2 in. in section, splayed at the sides, spaced 2 ft. 8 in. apart and fixed to the roof boarding with zinc nails. Iron nails should not be used as this metal affects the zinc. The sheets of zinc are laid between the rolls with their sides bent up 1½ in. or 2 in. against them, and held firmly in position by clips of zinc attached to the rolls. A cap of the same metal is then slipped over each roll and fastened down by tacks about 3 in. long soldered inside it so as to hook under the same clips that anchor the sheet. Drips of about 2½ in. are made in the slope at intervals of 6 ft. or 7 ft.—that is, the length of a sheet—and care must be taken at these points to keep the work waterproof. The lower sheet is bent up the face of the drip and under the projecting portion of the upper sheet, which is finished with a roll edge to turn off the water. The end of the roll has a specially folded cap which also finishes with a curved or beaded water check, and this in conjunction with the saddle piece of the roll beneath forms a weather-proof joint (figs. 15 and 16). The fall between the drips is usually about 1½ in. deep, but where necessary it may be less, the least permissible fall being about 1 in 80. Felt laid beneath zinc has the effect of lengthening the life of the roof and should always be used, as the edges of the boarding upon which it is laid are, when the latter warps, apt to cut the sheets. It also forms a cushion protecting the zinc if there is traffic across the roof.

Sheet-lead forms a much heavier roof covering than zinc, but it lasts a great deal longer and more easily withstands the attacks of impure air. Lead must be laid on a close boarding, for its great ductility prevents it from spanning even the smallest spaces without bending and giving way. This characteristic of the metal, however, conduces largely to its usefulness, and enables it to be dressed and bossed into awkward corners without the necessity of jointing. The coefficient of expansion for lead is nearly as great as that for zinc and much higher than for iron; precautions to allow free expansion and contraction must be taken when laying the lead covering. The manner of laying is with rolls and drips as in the case of zinc, the details of the work differing somewhat to suit the character of the material (*see* figs. 17, 18 and 19); the use of nails and solder should be avoided as far as possible. Contact with iron sets up corrosion in lead, and when nails are necessary they should be of copper; screws should be of brass. Lead is supplied in rolls of 25 to 35 ft. long and 6 ft. to 7 ft. 6 in. wide. That in general use varies from one-fourteenth to one-seventh of an inch in thickness. The weights most suitable for employment in roofing work are 7 or 8 lb. per square foot for flats and gutters, 6 lb. for ridges and hips, and 5 lb. for flashings.

As a roof covering copper is lighter, stronger and more durable than either zinc or lead. It expands and contracts much less than these metals, and although not so strong as wrought-iron and steel it is much more durable. From a structural point of view these qualities enable it to be classed as the best available metal for roof covering, although its heat-conducting properties require it to be well insulated by layers of felt and other non-conducting material placed beneath the metal. On exposure to the air copper develops a feature of great beauty in the coating of green carbonate which forms upon its surface and protects it from further decomposition. Perhaps the chief disadvantage in the use of copper has been in its first cost, but it is now comparatively cheap and account must also be taken of the almost imperishable nature of the metal and that its light weight requires less substantial framework for its support. Copper roofing should be laid in a similar manner to zinc, with wood rolls at intervals of about 2 ft. 4 in. It is, however, often laid with welted seams. The general stock sizes of sheets are from 4 ft. to 5 ft. 3 in. long and 2 ft. to 3 ft. 6 in. wide. The thickness almost invariably used is known as 24 S.W.G. and weighs 16 oz. per square foot. Thinner metal would suffice, but owing to the increased cost of rolling very little would be gained by adopting the thinner gauges.

In the United States of America "tin" roofs are quite commonly used. Sheets of wrought-iron coated either with tin or zinc are used of a size usually 14 in. by 20 in., though they may be had double this size. Preparation for laying is made by fixing an insulating foundation of somewhat stout paper or felt; this must be dry, else it is apt to spoil the impermeable covering laid upon it by causing it to rust. Junctions between the sheets are made by welted seams in which the four edges of the sheets are turned over so as to lock together, thus forming one large sheet of tin covering the roof. In high-class work of a permanent nature the seams in addition are soldered, rosin only being used as a flux. Each sheet also is secured to the roof with two or three tin cleats. The life of such a roof may be practically doubled by the application of a coat of good paint, which, however, adds considerably to the cost.

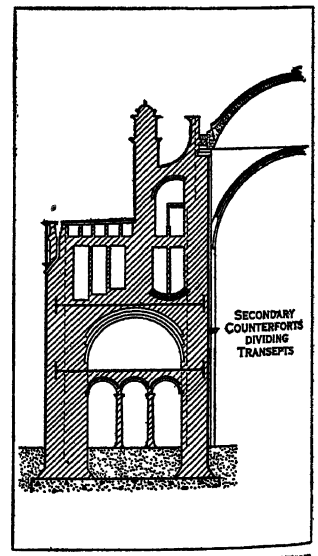


FIG. 11.—WESTMINSTER CATHEDRAL: SECTION THROUGH NAVE

The greatest use of bituminous materials in modern roof coverings is in the form of tar and gravel or tar and slag roofs. These consist of three or more layers or plies glued to each other and covered by heavy coats of coal tar pitch. Onto the upper layer

of pitch, before it has hardened, there is sprinkled a bed of gravel or slag, which is held in place by the pitch, and at the same time protects it. Flat tile roofs, terraces or promenades are frequently built in a somewhat similar manner, with an under layer of several plies of pitch and felt, covered with an inch thick bed of cement, on which the tile is laid. Adequate expansion joints, filled with some elastic cement, are usually installed in the tiled surface. Such roofs, either tile covered or gravel and slag covered, are perfectly watertight, do not crack under extremes of heat and cold, and have become the most common type for the better class of flat roof, such as those of large modern office and apartment buildings, etc. If adequately flashed at the intersections with walls and parapets, they can be built perfectly level without fall or slope.

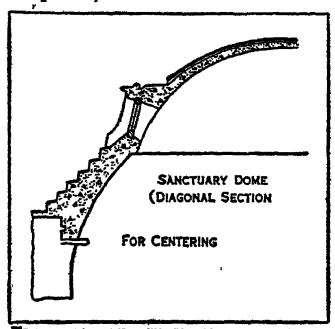
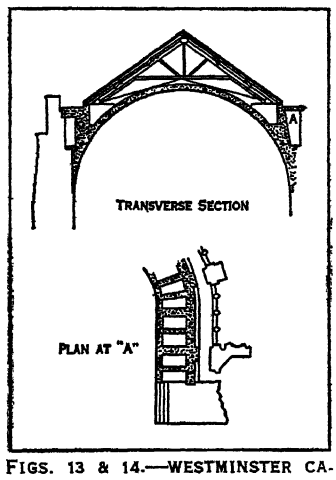


FIG. 12—WESTMINSTER CATHEDRAL: DIAGONAL SECTION THROUGH SANCTUARY DOME

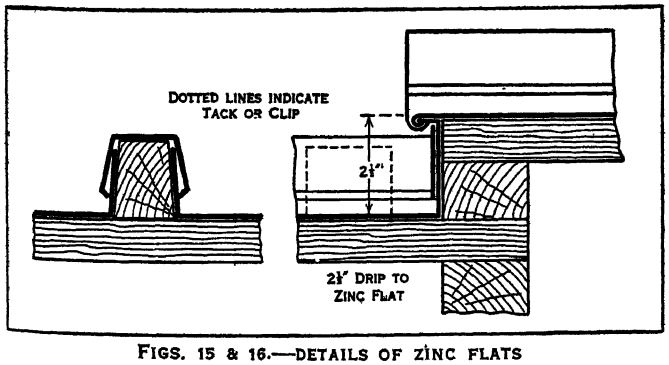
Slate (*q.v.*) is a strong and very impermeable material, and these qualities and the fact that it is easily split into thin plates suitable for laying, as well as its low cost, for many years caused it to be by far the most generally used of all materials for roof covering.



FIGS. 13 & 14.—WESTMINSTER CATHEDRAL: CHOIR-VAULTING

Slates are cut to many different sizes varying in length from 10 in. to 36 in. and in width from 5 in. to 24 in. There are perhaps thirty or more recognized sizes, each distinguished by a different name. In common practice those generally used are "large ladies," 16 in. by 8 in.; "countesses," 20 in. by 10 in.; and "duchesses," 24 in. by 12 in. Generally speaking, the rule governing the use of the different sizes is that the steeper the pitch the smaller the slate, and vice versa. Buildings in very exposed positions naturally require steeply pitched roofs, if they are to be covered and rendered weather-tight by small lapped units of covering.

Slates may be fixed by nailing at the head or at about the middle. The latter method is the stronger, as the levering effect of the wind cannot attain so great a strength. There is a small economy effected by centre nailing, as the margin is slightly larger and fewer slates are required to cover a given space; longer nails, however, are required, for as slates are laid at an angle with the pitch of the roof their centres cannot be made to approach so near to the slating battens or boarding as the head, which lies close on the surface to which it is fixed. Another important point is that the nail-holes in the centre-nailed slating are only covered by 3 in. of the tail (the amount of the "lap") of the course of slates above, and rain is very liable to be forced under by the wind and cause the wood battens or other woodwork to rot. Head-nailed slates, on the other hand, have their holes covered by two layers of slate, and are removed from exposure by the length of the gauge plus the lap, which in the case of "countess" slating equals 11 in.

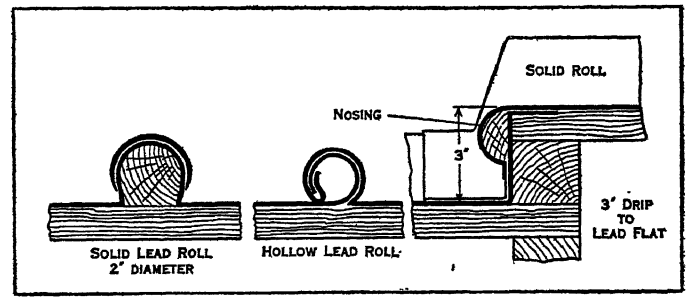


FIGS. 15 & 16.—DETAILS OF ZINC FLATS

A point in favour of centre-nailing is that the slates are more securely held to the battens or boards and offer much more resistance to being lifted by the wind.

"Open slating" is an economical method of laying slates that is often adopted for the roofs of sheds, foundries and temporary buildings. The slates in the same course are not laid edge to edge as in close slating, but at a distance of two or more inches apart. This forms a roof covering light in weight and inexpensive, which, although not strictly weather-proof, is sufficiently so for the buildings upon which it is used.

Slates are laid upon open battens fixed upon the rafters or upon close boarding or upon battens fixed upon boarding. The battens are ¾ in. or 1 in. thick and 1½ in. to 3 in. wide, and are spaced to suit the gauge of the slates. When close boarding is used it is often covered with inodorous asphalted felt, and to allow of ventilation of the materials, under-battens are sometimes fixed vertically, ridge ventilators introduced and air inlets arranged at the eaves. The beds of slates laid without provision for the admission of air have been found occasionally to have rotted so as to scale and crumble easily.



FIGS. 17, 18 & 19.—DETAILS OF LEAD FLATS

The nails used in slating are important and the durability of the work depends on a good selection. They should have large flat heads. The most satisfactory are those made of a composition of copper and zinc, but others of copper, zinc, galvanized iron and plain iron are used. Those of copper are most durable, but are soft and expensive while zinc nails are soft and not very durable; they will last for about twenty years. Iron nails even if galvanized are only employed in cheap and temporary work; they may be preserved by being heated and plunged in boiled linseed oil. The pitch of a roof intended for slating should not incline less than 25° with the horizontal, while for the smaller sizes 30° is a safer angle to adopt.

Modern slate roofs are frequently laid with varying courses and of varying thicknesses, usually with the heavier slate from three-quarters to an inch and a half thick at the eaves, with thinner and smaller slate in the upper part of the roof. Marked variation of colour is often sought by combining green and purple slate, or fading and unfading slate.

Tiles for roofing purposes are made from clay and baked in a kiln, like bricks. The clay from which they are made is, however, of a specially tenacious nature and prepared with great care so as to obtain a strong and non-porous covering. Tiles are obtainable in many colours, some having a beautiful effect when fixed and many improving with age. They comprise tints from yellowish red, red and brown to dark blue. As with bricks the quality depends to a large extent upon the burning; underburnt tiles are weak and porous, liable to early decay, while overburning, though improving the tiles as regards durability, will cause warping and variation of colour. Variation of colour is now deliberately obtained, and artistic effects are secured by sand facing, artificial rustication and by burning to metallic surfaces. The usual shape is the "plain tile," but they are made in various other shapes with a view both to easier fixing and lighter weight, and

to ornamental effect. There are also several patented forms on the market for which the makers claim special advantages. The ordinary tiles are slightly curved in the direction of length to enable them to lie closely at their lower edges. Some of them have small "nibs" at the head by which they may be hung upon the battens without nails. Nail-holes are provided, and it is advisable to nail every 4th or 5th course, at least. Others are made without the nibs, and are fixed either by nailing to the battens or boarding or hung by means of oaken pegs wedged in the holes to the battens, the pegs in the latter case acting in the same way as the above-mentioned nibs. Plain tiles are of rectangular form, the standard dimensions are 10½ in. long by 6½ in. wide. They are usually ½ in. thick and weigh about 2½ lb. each.

There are many forms of ornamental tiles, which are plain tiles having their tails cut to various shapes instead of moulded square. A number of patented forms of tiles also are on the market, some of which possess considerable merit. *Pantiles* are suitable for temporary and inferior buildings, if laid dry and on flat slopes, but if laid upon boards and felt and bedded and pointed in mortar, pantiles may prove an excellent covering. They are laid on a different principle from plain tiles, merely overlapping each other at the edges, and this necessitates bedding in mortar and pointing inside and sometimes outside with mortar or cement. This pointing plays an important part in keeping the interior of the building free from the penetration of wind and water. Pantiles are generally made to measure 13½ in. long by 9½ in. wide, and weigh from 5 lb. to 5½ lb. each. Moulded on at the head of each tile is a small projecting nib which serves for the purpose of hanging the tile to the lath or batten. They are laid with a lap of 3½ in., 2½ in. or 1½ in., giving a gauge (and margin) of 10 in., 11 in. and 12 in., respectively. The side lap is generally 1½ in., leaving a width of 8 in. exposed face. There are many other forms based upon the shape of the pantile, some of which are patented and claim to have advantages which the original form does not possess. Among such are "corrugated tiles," of the ordinary shape or with angular flutes, and also the Italian pattern "double roll tiles," "Foster's lock-wing tiles." Poole's bonding roll tiles are a development of the Italian pattern tile. French and Belgian tiles of the "Marseille" pattern are economical and therefore popular for housing schemes and cheap building.

Wood shingles are common roofing materials throughout the United States and Canada, and were at one time in general use in Europe. The present customary usage is to make them either of cedar or cypress, varying from 18 to 24 inches long, and from 6 inches to a foot or more wide. The butts at the thick end are from a half to three-quarters of an inch thick; the upper end tapers to not over one-eighth of an inch. They are usually laid from four and one-half to five and one-half inches to the weather. Owing to the fire risk, wood shingle roofs are gradually passing out of use, and in many localities are prohibited.

The 20th century has seen the development of many specialized roof materials, either with an asbestos or a bituminous felt base, designed for sloping roofs and intended to give an aesthetic effect similar to that of either shingles or slate. In the better and heavier types the units come separately as individual shingles; in the lighter and cheaper classes, the shingle shapes are cut upon strips.

Glass as a roof covering and the different methods of fixing it are dealt with in the article GLAZING.

There are many other materials used for roof covering besides those already described, many of them of considerable value. Some have in the past enjoyed considerable vogue, but have practically died out of use owing to the development and cheapening of other forms of roofing. Among these may be included thatch and wood shingles, the use of which in these days is practically reduced to special cases. Other roofing materials are those of recent invention, some of which may have a great future, depending upon the development, reliability and aesthetic value of the products. Sheets of asbestos-cement used as slates or tiles make a light, strong and fireproof covering. Large terra-cotta tiles or slabs are much used in the United States of America. A good form of flat roof is that in which concrete is used as a foundation for a waterproof layer of asphalt, laid to falls to allow the water to run off easily. This is the usual method adopted when a roof garden is required. Shingles or thatch look extremely well on a roof, but their use is debarred in a great many districts owing to the danger of fire. Galvanized iron tiles, zinc tiles and copper tiles may be employed on small areas with good effect. The London County Council (General Powers) Act, 1909, requires provision for a normal wind pressure of 28 lb. per sq.ft. if the inclination is 20° or more. Flat roofs must be designed to carry 56 lb. per sq.ft. in addition to their own weight. From the above particulars it is easy to calculate the weight of the roofing material and the wind pressure on the roof.

Regulations.—The London Building Act of 1894 and its amendments set forth with regard to roofs erected in the London district that every structure on a roof is to be covered with slate, tile, metal or other incombustible material, except wooden cornices and barge boards to dormers not exceeding 12 in. in depth, and doors and windows and their frames. Every dwelling-house or factory above 30 ft. in height and having a parapet must have means of access to the roof. The pitch of the roofs of warehouse buildings must not exceed 47°, and those of other buildings 75°, but towers, turrets and spires are excepted. In domestic buildings not more than two storeys are to be formed in the roof, and if the floor is more than 60 ft. above the street level fireproof materials must be used throughout and a sufficient means of escape provided.

The Building and Health Laws and Regulations and Amendments affecting the city of New York are similar to those of London. They give very full working details as to the strengths of materials required to be used and the wind pressure to be provided against. They provide that where a building exceeds three storeys or 40 ft. in height and the roof has a pitch of over 60°, it shall be constructed of iron rafters and be lathed with iron or steel inside and plastered or filled in with fireproof material not less than 3 in. thick and covered with metal, slate or tile.

LITERATURE—The principal reference books on this subject are the following:—G. L. Sutcliffe, *The Modern Carpenter, Joiner and Cabinet Maker;* J. Gwilt, *Encyclopaedia of Architecture;* F. E. Kidder, *Trussed Roofs and Roof Trusses;* J. Brandon, *Analysis of Gothic Architecture;* A. Pugin, *Ornamental Gables;* M. Emy, *L'Art de la charpenterie;* Viollet le Duc, *Dictionnaire;* J. K. Colling, *Details of Gothic Architecture;* G. Ellis, *Modern Practical Carpentry;* Jaggard & Drury, *Architectural Building Construction;* Blake, *Roofs & Roof Coverings;* J. W. Riley, *Carpentry & Joinery;* C. F. Mitchell, *Building Construction;* Rivington, *Building Construction.*

ROOK (*Corvus frugilegus*), throughout a great part of Europe, the commonest of the crow tribe. Besides its gregarious habits, which are distinctive, the rook is distinguished from the rest of the *Corvidae* by losing at an early age the feathers from its face, leaving a bare, scabrous and greyish-white skin visible at some distance. In the rare cases in which these feathers persist, the rook may be known from the crow (*q.v.*) by the rich purple gloss of its black plumage, especially on the head and neck, as well as by its voice. The sexes are very similar. It nests in colonies on large trees (occasionally on buildings), making a strong nest of twigs and earth and using it year after year. The three to five green eggs, marked with grey and brown, are laid in early April. In Britain the rook is resident and stationary, but in most of Europe it is either a summer or winter visitor. Its food is very varied, but includes a high percentage of noxious insects. The bird is thus of great value to the farmer.

ROON, ALBRECHT THEODOR EMIL, COUNT VON (1803–1879), Prussian general field-marshal, was born at Pleushagen, near Colberg, in Pomerania, on April 30, 1803. He entered the corps of cadets at Kulm in 1816, proceeded to the military school at Berlin, and in Jan. 1821 joined the 14th (3rd Pomeranian) regiment. In 1826 he was appointed an instructor in the Berlin cadet school, and in 1832 published his *Grundzüge der Erd-, Völker- und Staaten-Kunde* (3 vols.), gaining a great reputation. This was followed by *Anfangsgründe der Erdkunde* (1834), *Militärische Länderbeschreibung von Europa* (1837) and *Die iberische Halbinsel* (1839).

In 1832, he rejoined his regiment, and became alive to the inefficient state of the army; in 1842 he was promoted to be major and attached to the staff of the VII. Corps. In 1848 he was appointed chief of the staff of the VIII. Army Corps, and during the disturbances of that year served under the Crown Prince William (afterwards emperor), distinguishing himself in the suppression of the insurrection at Baden. At that time he broached the subject of his schemes of army reform. In 1850 came the revelation of defective organization; next year Roon was made a full colonel and began active work as reorganizer.

Prince William became regent in 1857, and in 1859 he appointed Roon (now lieutenant-general) a member of a commission to report on military reorganization. Supported by Manteuffel and Moltke, Roon was able to get his plans to create an armed nation, to extend Scharnhorst's system and to adapt it to Prussia's altered circumstances generally adopted. To attain this he proposed a universal three years' service, and a reserve (*Landwehr*) for the defence of the country when the army was actively engaged. During the Italian War he was charged with the mobilization of a division. At the end of 1859, though the junior lieutenant-general in the army, he succeeded von Bonin as war minister, and two years later the ministry of marine was also entrusted to him. His proposals of army reorganization met with the bitterest opposition, and it was not until after long fighting against a hostile majority in the chambers that, with Bismarck's aid, he carried the day. Even the Danish campaign of 1864 did not wholly convince the country of the necessity of his measures, and it required the war with Austria of 1866 (when he was promoted general of infantry) to convert obstinate opposition into enthusiastic support. After that von Roon became the most popular man in Prussia, and his reforms were ultimately copied throughout continental Europe. His system, adopted after 1866 by the whole North German Confederation, produced its inevitable result in the war with France 1870–71. He was created a count, and in Dec. 1871, succeeded Bismarck as president of the Prussian ministry. Ill-health compelled him to resign in the following year. He was promoted field-marshal on Jan. 1, 1873, and died at Berlin on Feb. 23, 1879.

After his death his son published the valuable *Denkwürdigkeiten aus dem Leben des Generalfeldmarschalls Kriegsministers Grafen Roon* (2 vols., Breslau, 1892), and *Kriegsminister von Roon als Redner politisch und militärisch erläutert* (Breslau, 1895). His correspondence with his friend Professor Cl. Perthes, 1864–67, was also published at Breslau in 1895.

ROORKEE: *see* RURKI.

ROOSEVELT, FRANKLIN DELANO (1882–), thirty-second President of the United States, was born at Hyde Park, N. Y., Jan. 30, 1882. His father, James Roosevelt a wealthy landowner, vice-president of the Delaware & Hudson Railroad, and Democratic politician, held several minor diplomatic offices under President Cleveland; his mother, Sara Delano, had sprung from a family of New York merchants and shippers. The upper Hudson Valley community in which Franklin D. Roosevelt was reared was devoted to sports, and he early learned to hunt to hounds, shoot, play polo and tennis, and manage an ice-boat. In summers at Campobello on the New Brunswick coast he made long cruises by catboat and yacht. European travel began when the boy was three and he learned to speak German and French fluently. Passing through Groton School, he entered Harvard in 1900 and on graduation went to the Columbia University Law School in 1904. In March, 1905, he married Anna Eleanor Roosevelt of New York, a sixth cousin, the wedding being attended by President Theodore Roosevelt, who was uncle of the bride and fifth cousin of the groom. Thereafter the couple frequently saw President Roosevelt in Washington or at Oyster Bay. In 1907 Franklin D. Roosevelt completed his course at Columbia, was admitted to the bar, and began practise in New York City. His father had meanwhile died, and he combined his legal work with frequent visits to Hyde Park where he took an important position in business, philanthropic and social activities.

Contact with Theodore Roosevelt inspired the young man with an interest in politics; the Democratic leaders in Dutchess County saw in him a promising recruit. In 1910 they gave him the nomination for State Senator. Though only one Democrat had been elected to that post since 1856, by virtue of a pleasing personality, a strenuous automobile campaign, and a schism in the Republican party, he obtained a narrow majority. In his first year in Albany he attained prominence by leading a small band of Democratic legislators who refused to accept the Tammany Hall candidate for election to the U. S. Senate, William F. Sheehan. Declaring Sheehan unfit for the place by his character and close association with predatory traction corporations, Roosevelt held his fellow-insurgents firm against the party caucus till a better candidate was substituted. The reputation for progressivism and independence which he thus obtained was extended by his championship of reform legislation. In 1911 he was prominent in the New York movement for nominating Woodrow Wilson to the Presidency, and in June, 1912, led an unofficial delegation of 150 men to the Democratic Convention in Baltimore, where he did effective work. Reëlected that fall to the State Senate, he introduced some notable bills for protecting the farmers against unfair commission merchants and stimulating rural co-operation. The incoming Wilson Administration offered him a choice of several minor posts; he accepted the Assistant Secretaryship of the Navy.

Spending the years 1913–1921 in the Navy Department, Mr. Roosevelt was the principal lieutenant of Secretary Josephus Daniels in administering naval affairs. During 1913–1916 he was an unwearying advocate of greater naval preparedness, producing many speeches and articles; he set about converting useless navy yards into industrial plants for making naval supplies; and he and Mr. Daniels broke up an alleged combination of armour plate manufacturers. Before war broke out he had built up a small Naval Reserve on the basis of systematic civilian training. During the conflict he gave much attention to the submarine problem. He was one of the earliest and most enthusiastic advocates of the mine barrage between Norway and the Orkneys, refusing to heed American and British experts who pronounced it impossible; and he was also largely responsible for the 110-foot submarine chasers, of which about 400 were built. In the summer of 1918 he had charge of the inspection of American naval forces in European waters and did much to promote co-operation with the British Admiralty. After the armistice he took charge of demobilization in Europe and helped dispose of naval supplies stored there. He returned to the United States on the same ship with Wilson (February, 1919) and began speaking for the League of Nations. The following year he received the Democratic nomination for Vice President, made approximately a thousand speeches, and after the Democratic defeat returned to New York to practise law.

In August, 1921, Mr. Roosevelt was stricken with infantile paralysis and emerged with the muscles of his legs and lower abdomen paralyzed. By careful exercises and winter treatments at Warm Springs, Ga., he gradually recovered. Meanwhile he continued legal work, establishing the firm of Roosevelt & O'Connor in 1924, and kept up much of his business and civic activity. As head of the Boy Scouts Foundation in New York City he raised large sums, and at Warm Springs he established an important hydrotherapeutic centre on a non-profitmaking basis. In 1924 he placed Alfred E. Smith in nomination at the Democratic National Convention. After the Democratic defeat of that year he made efforts to bring the Bryan-McAdoo and Smith-Raskob factions together on a progressive basis. These failed, but he succeeded in softening much of the Southern opposition to Smith. In 1927 he urged acceptance of Smith and in 1928 nominated him again at the Houston Convention. At Smith's insistence, though protesting that two more years of private life were necessary to his health, he allowed himself to be drafted as Democratic candidate for governor of New York. Carrying the State by about 25,000 votes while Smith lost it by more than 100,000, he was inaugurated in January, 1929. He furnished a conciliatory administration, and in 1930 was reëlected by the unprecedented plurality of 725,000, economic depression and the quarrel over prohibition cutting down the Republican vote. His

principal achievements in his two terms as governor were partial settlement of the hydroelectric question on the basis of public development of the St. Lawrence waterpower; a strengthening of the Public Service Commission; and passage of various pieces of social welfare legislation, including an old-age pension law.

With the approach of the election of 1932, it became evident that Mr. Roosevelt was in a happy position to unite the discordant Democratic elements. His name had magic in the West, his Georgia residence had pleased the South, and his New York majorities gave him prestige everywhere. The principal obstacles he faced were the hostility of Tammany Hall, differences which had developed with Alfred E. Smith, and an impression in liberal circles of a lack of courage in grappling with fundamental issues. But Tammany was placed upon the defensive by a relentless legislative investigation of misgovernment in New York City conducted by Samuel Seabury, while Mr. Smith's opposition strengthened Mr. Roosevelt in many quarters. At the Chicago Convention in July the rival candidates proved unable to unite, and on the third ballot a change by the California and Texas delegations gave Mr. Roosevelt the nomination. When immediately thereafter the Tammany investigation reached a climax in public hearings on the removal of Mayor James J. Walker, Governor Roosevelt's vigorous handling of the evidence forced the mayor's resignation to avoid removal and won general approbation. He at once began a campaign which took him into every section, travelling 12,500 miles and delivering some 200 speeches. Making effective use of demands for tariff reduction, farm relief, and greater attention to the "forgotten man," he enlisted the support of such Progressive Republicans as Senators George W. Norris, Hiram E. Johnson, Bronson Cutting, and Robert M. La Follette. The economic depression caused an enormous defection of Republican voters, and in November Mr. Roosevelt received 472 electoral votes against 59 given to President Hoover, carrying all but six states with a popular plurality of over seven million votes. Declining to resign as governor, in December he opened a special session of the legislature called to consider the financial problems of New York City. He was inaugurated President on March 4, 1933. (A. N.)

ROOSEVELT, THEODORE (1858–1919), 26th president of the United States, was born in New York city on Oct. 27, 1858. His father, Theodore Roosevelt, was of a Dutch family conspicuous for centuries in the affairs of the city of his birth; his mother, Martha Bulloch, came of Scotch-Irish and Huguenot stock, which had given men of distinguished quality to the service of Georgia and the South. It is not without significance that he came to consciousness of the world in which he lived at a period when his country was in the throes of a disastrous civil war and his own home was sharply divided in its sympathies. His father's devotion to the North and his mother's fervent adherence to the Southern cause may well have played a part in developing in him the passion for national solidarity which was one of the conspicuous elements of his personality. Young Roosevelt's ill-health necessitated tutors and withheld him from the rough-and-tumble companionship of boys his own age; but deliberately and with great persistence, he built up his frail body. He entered Harvard in 1876. His record for scholarship there was creditable but not extraordinary. He did his part in student activities, but was not conspicuous except as a somewhat odd young man whose speech at critical moments came tumbling over itself under the onrush of his thoughts. An important element of his education during this period were his hunting trips in the Maine woods. From the stalwart backwoodsmen the city boy learned something of the cares, the needs, the aspirations of common men; their courage, their simple wisdom, their feats of strength and endurance deeply impressed him. To be like them, and to be accepted by them as an equal, became a major ambition.

He was graduated from Harvard in 1880 and the same year married Alice Hathaway Lee, of Boston. At the Columbia Law school, and in the office of his uncle, Robert B. Roosevelt, he prepared himself for the bar. But the law did not attract him. His interest lay rather in literature, in natural history and in the prospect of useful and strenuous activity, which the world of politics presented. Against the counsel of his friends who urged that politics was a "dirty business" Roosevelt joined a local political club. His associates there had, indeed, been brought up in a rough school; but they were warm-hearted, sharp-witted, without pretence, and, in the main, honest. They saw the political game in terms of human values, being realists, practical in their methods, scornful of theories. As Roosevelt's first political mentors, they guided him (1881) through his initial campaign for the State legislature.

Within six weeks of the opening of the session, Roosevelt made his mark at Albany when he offered a motion to impeach a certain highly respectable judge who had proved over-lenient to a group of notorious financiers. Even at that time he understood the principles and perils of democratic government and was convinced that corruption struck directly at its foundations. He was sharply and at last successfully opposed, but his characterization of the sinister forces behind a corrupt legislature as "the wealthy criminal class" stuck in the public mind. Roosevelt was in the New York assembly three years; and in 1884 his party's candidate for speaker. They were years of sharp adjustment and discipline. A real diffidence in childhood had found refuge in an attitude of assertiveness which quickly put him at odds with his fellow legislators, but the isolation which came to him brought its own corrective. He acknowledged in after years that his first lesson in real politics was the lesson that power lies in the subordination of the individual to the team. He became the acknowledged leader of a small but potent group of young men who felt keenly the need of a new spirit in political life and were willing to fight both in the legislature and within the Republican party to keep the corrupting influences in check. As chairman of the New York delegation to the Republican convention in Chicago in 1884, Roosevelt supported the candidacy of Sen. George F. Edmunds on whom the progressive elements of the party had united, and with vigour and courage opposed the nomination of James G. Blaine. But when Blaine was chosen Roosevelt refused to desert the party, contending that Blaine, having been fairly nominated, had a right to the support of all loyal Republicans; pointing out that "a man cannot act both without and within the party." He was denounced by the "independents" and in the councils of the party was regarded with suspicion for his pre-convention fight upon the nominee. It became clear to him that, for the moment at least, his political career was ended. He had other, deeper reasons, moreover, for seeking new surroundings. The death of his wife early in 1884, following the birth of a daughter, had been followed 12 hours later by the death of his mother. When the campaign was over, therefore, he betook himself to the ranch which he had established the previous autumn on the banks of the Little Missouri River in Western Dakota. For three years he lived a ranchman's life. He hunted, rode on the roundup, did the daily chores of the ranch; with unflagging zeal he observed the wild life about him; he read widely, studied avidly the strange and various human nature which found untrammelled expression in the Dakota "Bad Lands," and at odd moments wrote biographies of Thomas H. Benton and Gouverneur Morris. Within six months of his coming, he virtually took the leadership of the forces of law and order in the region, organized a protective association to check the cattle-thieves and did active duty as deputy-sheriff. He found the men of the open range delightful companions. They bore with his inexperience and came greatly to admire his fearlessness, his patience in hardship, his wide knowledge. They helped him to become an American of the new time. A call from the Republicans in New York city to be their candidate for mayor brought Roosevelt back into politics in 1886. The widespread fear on the part of the propertied classes that Henry George, the candidate of the United Labor party, might be elected caused many Republicans, however, to vote for Abram F. Hewitt, the Democratic nominee, who was chosen, Roosevelt running third.

Official Appointments.—Immediately after the election, Roosevelt married Edith Kermit Carow, a friend of his childhood, and thereafter made his home at Sagamore Hill, near Oyster Bay, L.I. It was his intention to devote himself to literature; but his interest in public affairs drew him again into political

life. In 1889, President Harrison appointed him a member of the U.S. Civil Service commission in Washington, and for six years he directed the battle against the entrenched defenders of the "spoils system." While he was in office, more than 20,000 government positions were added to the classified service in which appointment and promotion was for merit only; but his efforts were useful beyond their immediate results. His critics—and they were numerous and vociferous—called him a publicity-hunter who was happy only in the full glare of the limelight. He did, indeed, all his life dramatize any movement in which he was engaged. The process was not deliberate; it was the inevitable effect of the qualities of mind and character which constituted his personality, plus a peculiar magnetism as difficult to trace and analyse as genius. It was Roosevelt's most valuable service in this cause that he made the public comprehend that the "spoils system" ran counter to the American ideal of life and government. He left the Civil Service commission in 1895 to become president of the police board of New York city. On the force money ruled, politics ruled; merit was only incidentally a consideration in appointments; police officers, high and low, used their power to extort bribes for "protection" from saloon-keepers, liquor-dealers, gamblers and prostitutes. Roosevelt built up the *morale* of the force by substituting a system of appointment and promotion by merit for the established system of bribery; by rewarding bravery and devotion, by swiftly punishing negligence and venality and by enforcing the laws regardless of "pressure." The politicians of both parties opposed him; all the sensational, and most of the "respectable" newspapers derided or scolded him; two of the four members of the police board of which he was chairman intrigued against him. He became the most discussed figure in the public life of the city.

During these tumultuous years, he was making an impression also on a growing number of his fellow-citizens outside New York. In addresses and essays, he reminded Americans of the principles on which their country was based. The political campaign of 1896 startled Roosevelt and for the first time he became conscious of the menace which lay in the popular unrest. During his earlier manhood other problems had engaged his interest—civic corruption, the spoils system, indifference to the obligations of citizenship, divided allegiance, foreign affairs, the national defence. Though he worked effectively in the New York legislature in behalf of legislation regulating labour in sweat-shops, there is no indication that he kept in close touch with the social, economic and industrial movements which were rapidly developing to a crisis. The events of the free-silver campaign, however, awakened him to conditions of supreme significance. He noted a new cleavage of sections in the economic rebellion of the West against the financial oligarchy of the East, and, in the demagogy which was stirring the poor against the rich, a class cleavage from which the country had hitherto happily been free.

The election of William McKinley to the presidency brought Roosevelt back to Washington as assistant secretary of the navy. He had since his first entrance on the political scene been an ardent advocate of preparedness. He frankly favoured a strong foreign policy and looked forward, in fact, to the ultimate withdrawal of the European powers from the Western Hemisphere. The conditions in Cuba had long convinced him that war with Spain was inevitable and that it was both right and necessary to drive the Spanish power from the Caribbean sea. With vigour, he set to work to make the navy ready. He reorganized the system of rank and promotion among naval officers; he adjusted the differences between the "line" and the "engineers." Finding the marksmanship inadequate, he asked Congress for $800,000 for target-practice, spent it and asked for half a million more. "The shots that hit," he pointed out, "are the shots that count!" When the United States battleship *Maine* was blown up in Havana harbour on Feb. 15, 1898, Roosevelt sharpened his efforts. During a temporary absence of his chief, John D. Long, he took it upon himself to instigate the preparations which he had in vain asked the secretary of the navy to make. He ordered great quantities of coal and ammunition, directed the assembling of the American fleet, stirred the arsenals and navy yards to activity and, finally, cabled Commodore George Dewey what would be expected of him in case war came.

The Spanish War.—On the outbreak of hostilities, in April, Roosevelt resigned from the Navy Department and joined with his friend, Leonard Wood, a young army surgeon, to organize the 1st U.S. Volunteer Cavalry. The regiment was an odd aggregation of diverse elements. It gave Roosevelt deep satisfaction to see North and South, East and West, side by side in the ranks, and to note the attachment of cowboy and millionaire, of clubman and miner. It was, indeed, largely his leadership which fused these normally incohesive elements, and dramatized the fallacy of socialistic agitators who claimed that there was a fundamental cleavage in the United States between the "haves" and the "have-nots." The history of the Santiago campaign on the Spanish side is a history of incredibly inept generalship, and, on the American side, of inefficiency and blundering. Roosevelt, who succeeded to the command of the regiment on the promotion of Wood after the first fight, established himself in the affection of his men by his solicitous care for their welfare, and his insistence on sharing their occasional privations on equal terms. In the battle of San Juan hill Roosevelt personally led the cavalry division in the assault of the Spanish outpost known as Kettle Hill and from that position, at the head of his brigade, charged across an intervening valley and up the slopes of the ridge which was the enemy's main line of defence. The advance of the Rough Riders, as they were popularly known, lacked military form and was called "the school-boy charge" by officers of the regular army who led the orderly advance of the regiments of regular infantry which captured the San Juan blockhouse. But the impetuous rush of Roosevelt and his men—joined by the 1st and 10th (coloured) cavalry, all dismounted—had a reckless and exultant sweep which contributed notably to breaking the Spanish spirit.

Governor of New York.—The Rough Riders were mustered out of service on Sept. 15, 1898. Two weeks later, the Republican party of New York State nominated Roosevelt as its candidate for governor. The party owing to scandals connected with the administration of the Erie canal had come into bad odour; and Thomas C. Platt, the Republican "boss," who distrusted Roosevelt as a radical of "altruistic" views, reluctantly agreed to his nomination. Roosevelt was elected by a scant majority, and instantly a struggle began between himself and Platt which lasted as long as he was governor. For years, this mild-mannered old gentleman with his penchant for arid theology and his genius for the manipulation of men, had carried Republican governors and legislatures in his pocket as a small boy carries marbles. To be pocketed by the "easy boss" seemed to Roosevelt altogether less desirable than never to have been elected governor at all; but to fight him meant to accomplish absolutely nothing; for the State legislature was in the main in the hands of the astute Platt. Roosevelt solved the dilemma by yielding on points not involving fundamental principles and insisting on going his own way on all issues of real importance. Roosevelt remained governor for two years. He reformed the administration of the canals, making the canal commission non-partisan; he introduced the merit system into many of the subordinate offices of the State; he secured extensive legislation to provide better protection for the workers of the State, and laws in behalf of forest preservation, the protection of wild life, and the purity of food products. When, in matters of economic legislation, Platt proved obdurate, Roosevelt went to the public for support.

By this means he was able to secure (1899) from Platt's own legislature, against his plaintive protests and the angry opposition of the conservative press, the important Ford Franchise Act, taxing corporation franchises. His administration as governor remains significant in American political history because it marks the beginning of an effort on his part to secure the subservience to government and law of great business combinations; an effort which culminated during his second term as president and definitely established a new trend in the United States both in business and politics. It became clear to Platt that his first apprehensions regarding Roosevelt had been only too accurate. He decided, therefore, to resist Roosevelt's desire to succeed himself

as governor by lifting him into the honourable seclusion of the vice-presidency. Neither President McKinley nor Senator Hanna, his astute political guide, approved the idea; Roosevelt and his Eastern friends laboured hard to prevent his nomination, but his friends in the West, out of a real enthusiasm, played into the hands of the man who was plotting their hero's political demise. The combination proved irresistible, McKinley refused to intervene and Roosevelt was nominated. He spoke a little ruefully of having "taken the veil," and made plans to beguile the dreary boredom of the vice-presidency with the study of law.

ROOSEVELT AS PRESIDENT

President McKinley was shot in Buffalo on Sept. 6, 1901, and died Sept. 14. On the same day Theodore Roosevelt took the oath as president of the United States. His sudden accession to power caused a flutter of apprehension in the ranks of what was known as "Big Business." The new president was, as a matter of fact, by nature a conservative, but he wore his conservatism with a difference, standing as far removed from the reactionary position of men like Platt and Hanna, as he was from the radicalism of Bryan. He recognized what many of the spokesmen of capital refused to recognize, that true conservatism demanded a just re-appraisal of industrial and economic conditions and prompt, far-reaching remedial action. On Feb. 18, 1902, he threw what was in effect a bomb into the financial world, when he announced through his attorney general, Philander C. Knox, that he had brought suit in behalf of the United States for the dissolution of a holding corporation known as the Northern Securities Company. The announcement caused consternation among such financiers as J. P. Morgan, Edward H. Harriman and James J. Hill. The holding company was a device designed by shrewd legal minds to evade the restrictions of the Sherman anti-Trust act of 1890, and was generally regarded as impregnable. In the Knight case (1895) involving the American Sugar Refining Company, the Supreme Court had, in fact, held that Congress was without constitutional power to forbid it.

Campaign Against Financial Interests.—When Roosevelt came to the presidency, the average American was moving rapidly toward the cynical conclusion that there was one law for the corporations and another for the individual; one law for the rich, another for the poor. The corporations carried on their existence in a kind of "twilight zone" between State and Federal authority, where neither seemed able to reach them; and when finally a body so revered and so obviously incorruptible as the Supreme Court admitted that Congress was powerless to check the growth and extension of the power of organized wealth, the common man began to wonder whether he would have to seek a corrective which other peoples had found effective. "The United States," said the New York *World* years later, "was never closer to a social revolution than at the time Roosevelt became president." Roosevelt, made aware of the danger first by the campaign of 1896, recognized that the fundamental principles of democratic government—equal justice and national solidarity—were being undermined and that on the outcome of the struggle between the financial powers and the government depended the future vitality of American Government. His vision and courage were vindicated by the courts which he had invoked. On April 9, 1903, the U.S. circuit court, sitting at St. Louis, ordered the dissolution of the Northern Securities Company; and on March 14, 1904, the Supreme Court affirmed the decree.

The anthracite coal strike in 1902 brought the menace of popular unrest to the surface. The miners, under the leadership of John Mitchell, were insistent in their demands; the operators led by J. P. Morgan and George F. Baer, president of the Philadelphia and Reading Railway, were obdurate. Roosevelt for the first time asserted the right of the President to act as representative of the public in an industrial dispute. The miners agreed to arbitrate, but the operators were indignant at the President's "interference" in what they regarded as their private concern. Roosevelt saw clearly what the operators failed to see, that the labour problem had entered upon a new phase; that the growth of industry necessitated a new approach to the questions affecting it; that the public was in no mood to suffer for the inability of the operators to recognize the parity of human rights with the rights of property, and that in a winter of coal famine lay the possible beginnings of irreparable discontent. After a long-drawn struggle he succeeded in impressing these views upon the operators.

The initiation of the Government's suit against the Northern Securities Company marked the beginning of a conflict between Roosevelt and the large financial interests which continued unabated throughout his administration and for years thereafter, until the outbreak of the World War (1914) brought a shift of issues and a truce. The business leaders were convinced that the President was a destroyer, and was shaking the foundations of the social structure and undermining the institution of private property. His objection, in regard to corporations, as he frequently pointed out, was not to size but to wrongdoing. In swift succession, the President ordered suits brought against the United States Steel Corporation, the Standard Oil Company, the American Sugar Refining Company and other powerful combinations. Meanwhile, he inspired important legislation involving the regulation of railroads. The Elkins law (Feb. 19, 1903) forbade rebates; the Hepburn rate bill (June 29, 1906) granted the interstate commerce commission the right to fix railroad rates. A Pure Food bill, forbidding the manufacture, sale or transportation of adulterated foods, drugs, medicines and liquors, became law on June 30, 1906; the following day another act, providing for the inspection of stockyards and packing-houses, was signed by the President. An Employers' Liability act was adopted. A department of commerce and labour, including a bureau of corporations, was established by congressional action on Feb. 14, 1903. President Roosevelt strengthened his position in reference to the excesses and transgressions of corporations by setting himself with equal firmness against the violence of labour agitation. He noted that the hunger for special privilege was not limited to the ranks of capital. He was by nature sympathetic to the labouring man and scrupulously fair to his interests, but struck at him fearlessly when he thought he was wrong, linking two advocates of violence in the ranks of labour on one occasion with a law-dodging railroad magnate, as "undesirable citizens."

Conservation.—Early in his administration, with the purpose of breaking the strangle-hold of a small minority on the sources of wealth which should be open to the honest endeavours of all the people, the President—under the guidance of Gifford Pinchot—embraced the policy of conservation. The established theory in regard to the national resources was that the general prosperity of the country could best be advanced by the development of these resources by private capital, and upon this theory land was either given away or sold for a trifle. Under this policy, over wide areas, the timber-lands had been stripped bare with reckless waste; the control of the nation's water power had to a dangerous extent passed into private hands; and the public grazing lands and the wealth in minerals and oil in the public domain were bringing enormous dividends to a few, but no returns whatsoever to the people as a whole to whom these natural resources belonged.

Under Roosevelt's administration the area of the national forests was increased from 43 to 194 million acres, the water power resources of those areas were put under government control to prevent speculation and monopoly, and cattle-raisers grazing their herds on the reserves were forced to pay for what they got. In March 1907 Roosevelt created the Inland Waterways commission, and in May 1908 held a conference of State governors at the White House in behalf of conservation. As a result of this conference he appointed a national conservation commission to prepare an inventory, the first ever made for any nation, of all the natural resources within the territory of the United States. A joint Conservation Congress held in Dec. 1908 was followed by a North American Conservation conference in Feb. 1909. The movement for the reclamation of land either excessively or insufficiently watered was essentially a part of the effort in behalf of conservation. It received congressional sanction in the Reclamation Act (June 17, 1902) and achieved its most noteworthy result in the building of the Roosevelt dam in

Arizona, which, by impounding the waters of the Salt river, turned a desert into one of the most fertile farming districts in the world. No policy of Roosevelt's administration excited deeper public interest or sharper opposition than his efforts in behalf of conservation. His official acts and the influence of his speeches and messages led to the adoption by both citizens and government of a new theory regarding natural resources. It is that the Government, acting for the people who are the real owners of public property, shall permanently retain the fee in public lands, leaving their products to be developed by private capital under leases which are limited in their duration and which give the Government complete power to regulate the industrial operations of the lessees.

Re-election.—The popularity which Roosevelt enjoyed at the end of his first term found emphatic expression in the election of 1904. By the largest majority which, up to that time, had been accorded any candidate, Roosevelt was chosen to succeed himself in the White House, receiving 7,623,486 popular votes and 336 electoral votes, against 5,177,971 popular votes and 140 electoral votes cast for Alton B. Parker, the Democratic nominee.

Foreign Policy.—Roosevelt's warfare with the forces popularly symbolized as "Wall Street" was punctuated at intervals during his administration by actions in the realm of international relations which greatly stimulated national pride. The President was brilliantly assisted in his conduct of foreign affairs, first by John Hay and then by Elihu Root, but he was in reality his own Secretary of State. His policy in regard to the army and navy was a highly important part of his foreign policy. He believed in the virtue of being ready as a preventive of war, pointing out the results of unpreparedness in the preface to his first book, *The History of the Naval War of 1812* (1882), and urging an effective army and navy in many of his later writings. He increased greatly the general efficiency of the army. His promotion of officers for merit in defiance of the rules of seniority and his order directing officers to demonstrate their ability to ride 90 m. in three successive days caused some criticism, especially in the more conservative element in the army. Roosevelt's services as Assistant Secretary of the Navy contributed vitally to the distinguished success of the American fleets during the Spanish War. As President he sought with great persistence to build up the navy's power and to make it as effective as possible, giving younger and more progressive officers the prestige of his support in their struggles within the service. When in 1907 he sent the battleship fleet around the world—against the advice of experts in naval construction—he did so partly to call the attention of the great powers, notably Japan, to the fighting strength of the United States, and partly to dramatize the navy and its needs to the American people. The voyage was brilliantly successful.

The attitude of Roosevelt in foreign affairs as in domestic was frank, clear-cut and firm. He knew the involutions of international politics in the Old World as no American president before him had known them, and he countered and checked his subtle opponents in diplomacy with skill and relish. He was bold—startlingly bold at times—but never reckless, calculating costs in advance, saying unambiguously what he had to say and taking account of the human equation. His handling of the German emperor in the matter of Venezuela in 1902 was so firm and so courteous that the emperor became his devoted admirer even though he recalled the ambassador who had failed to warn him that the President meant what he said. His action in regard to an old dispute with Great Britain over the boundary of Alaska was equally friendly and effective.

Swift and vigorous was his action (1903) in sending a cruiser to Panama immediately following its secession from Colombia. He was one of the first Americans to apprehend the part which the Pacific was destined to play, both commercially and politically, in world history. The long delay, moreover, during the Spanish War, in bringing one of the navy's greatest battleships, the *Oregon*, from the Pacific coast of the United States to the Atlantic, had convinced Roosevelt of the urgent need, if only for strategic reasons in the event of war, of a canal across the Isthmus of Panama. When, therefore, after years of fruitless negotiations, the opportunity came to him to acquire for the United States the right to build the canal, he acted promptly convinced that to do otherwise was to invite a new and dangerous succession of postponements.

The charge was made that President Roosevelt had encouraged or even fomented the revolution in Panama; but no evidence has been produced to give the accusation the slightest support. Roosevelt's boast (1911) "I took Panama," must, moreover, be considered in conjunction with a phrase he added at the semi-jocose request of a French engineer who himself claimed the credit and the responsibility for the insurrection—"when Bunau-Varilla handed it to me on a silver platter." Roosevelt's leadership in the actual construction of the canal was of vital significance. When private engineers failed in the task, he appointed an army engineer, Col. George W. Goethals, as head of the Canal commission with autocratic powers. He broke the precedent which was supposed to prevent an American president from leaving the territory of the United States during his term of office in order to inspect the work and encourage the workers.

Roosevelt approved and eloquently defended the policy of national expansion adopted by the Government under President McKinley. Aside from the acquisition of the Canal Zone, however, he made no move to acquire further territory for the United States. To the surprise of Europe, he carried out the provisions of the American pledge not to annex Cuba, and launched that long-oppressed people as an independent republic under the protection of the United States but not under its Government. By assuming supervision of the finances of San Domingo, he put an end to controversies in that unstable republic which threatened to disturb the peace of Europe.

Roosevelt's action in bringing about peace between Japan and Russia in 1905 added greatly to his prestige at home and abroad. Portions of Roosevelt's papers, published since his death, reveal the extent to which international politics on the Continent were involved in a struggle which appeared to be localized in the Orient and indicate that it was Roosevelt's intervention which prevented in 1904 and again in 1906, during the Algeciras Conference, the outbreak of the World War which actually came in 1914. The Nobel Prize committee recognized his services in ending the Russo-Japanese War by conferring upon him its award for the promotion of international peace. In accepting the honour in an address at Christiania in 1910, he suggested the possibility of a League of Nations for the prevention of war. He was the first to send an international controversy for settlement to the International Court of Arbitration at The Hague and was instrumental in having the Second Hague Conference called. He was opposed, however, to peace treaties which promised more than human nature could be counted upon to fulfil, and had no patience with any policy remotely resembling "peace at any price."

His administration had a profound effect on the national prestige of his country. He found the Government of the United States, when he took up the reins, in the position among world powers of a new boy in school; he left it firmly established in the first rank, admired and feared, its favour sought after, its citizenship respected in the remotest corners of the globe.

Home Affairs.—In domestic affairs his influence was even more far-reaching. His success in drawing the leaders on both sides of the social and economic struggle back from the danger zone where extremes meet in violent disturbance was possible only because he had to an unprecedented degree the support of the public, regardless of party. His vigour, his courage, his abounding vitality, his lack of presidential pomposity, his familiarity with all manner of men, even his loudness of action or utterance, and his undisguised delight in driving the "band wagon," all endeared him to "plain folks." He entered into men's lives, kindled fires in them, impelled them to scorn ease and safety and rejoice to do the fine, the difficult thing. His power to inspire his followers to take a pride in their country and her welfare brought to his side hundreds of young men of ability, who asked no greater privilege than to serve under him in an enterprise which in its details was prosaic enough but which he had somehow invested

with the spirit of high adventure. The President gave them work to do in the Federal departments and in the island possessions. Their high quality impelled the British ambassador, James Bryce, an acute observer of governments, to remark to Roosevelt that he had "never in any country seen a more eager, high-minded and efficient set of public servants, men more useful and creditable to their country, than the men then doing the work of the American Government in Washington and in the field." Roosevelt had, indeed, the gift of stimulating men to raise themselves for the moment above the ordinary level of their abilities and their desires.

SCIENTIFIC EXPEDITIONS AND TRAVELS

In March, 1909, Roosevelt retired from the Presidency. He adhered to a pledge which he had made after his election in 1904 not to accept the nomination for the Presidency in 1908, and gave his support to the candidacy of William H. Taft, his Secretary of War. Taft was nominated and elected. On April 23, 1909, Roosevelt, accompanied by his son Kermit, sailed for Africa on a scientific expedition under the auspices of the Smithsonian Institution in Washington.

Africa.—Roosevelt entered Africa at Mombasa, and for ten months, moving slowly northward, he hunted big game and collected specimens. He was a keen naturalist, accepted by scientists in his field as a trustworthy observer who had added substantially to the study of American fauna. He had a memory which all who came in contact with him agreed was astonishing in its tenacity and accuracy; and for one who had given only the off-hours of a busy life to scientific study, his knowledge was wide and thorough; but he recognized its limitations and humbly yielded to instruction.

Roosevelt emerged from the wilderness at Gondokoro at the end of Feb. 1910. Nothing showed better the fascination which he exercised over the imaginations of men the world over than the interest which his reappearance created. An address at Khartum on orderly government created a mild stir, but another address, delivered before the students of the University of Cairo, denouncing the assassination by nationalists of the pro-British premier, Boutros Pasha, brought him threats of assassination.

Europe.—Roosevelt's journey northward was in the nature of a triumphal procession. An official at the Vatican precipitated an unpleasant situation by stipulating certain conditions for an interview with the Pope, but Roosevelt's refusal to permit any limitation on his freedom of action was direct and emphatic. In Paris he made a public address at the Sorbonne on "Citizenship in a Republic," in Berlin he spoke at the University on "The World Movement," and, at the emperor's side, reviewed the Imperial Guard, the first civilian who had ever reviewed German troops.

Before he reached England, the king, Edward VII., died, and when Roosevelt arrived in London it was as President Taft's special ambassador to the funeral. His Romanes lecture at Oxford on "Biological Analogies in History" was widely praised, but a speech at the Guildhall in London in which he criticized what appeared to him as the timid ineptitude of the British Government in Egypt brought sharp rebukes from both sides of the Atlantic, but had the endorsement of the new king and of his Foreign Secretary. The address had certain momentous consequences in the appointment of Lord Kitchener as consul general to Egypt (in effect, governor) and the strengthening of a British position which, through its control of the Suez canal and the road to India, became of vital importance to the British Empire on the outbreak of the World War four years later. What remained to Englishmen, however, as the most striking memory of Roosevelt's stay in England, was the walk he took through the New Forest with Sir Edward Grey, when he proved that, though he had spent less than a month altogether in England since his boyhood, he could identify every bird which he saw or heard.

THE RETURN TO POLITICS

Roosevelt returned to the United States on June 18, 1910, disembarking at New York, and received a tumultuous welcome. He had already been put in touch with the political situation. The struggle between the conservative and the progressive elements in the Republican party, which under Roosevelt had remained under the surface, had, under President Taft, developed into what threatened to become a definite schism. A new tariff law, the dismissal of certain commissions which Roosevelt had appointed, the President's position in a bitter controversy regarding western lands, and the general mood of the Administration led Roosevelt to believe that Taft, instead of carrying forward the policies of the former administration, was definitely aligned with their opponents.

Security for Roosevelt and his fame lay in his retirement to his home acres as a kind of national sage; but at the request of the governor of New York, Charles Evans Hughes, he plunged into a factional fight within the Republican Party in the State (1910) and was sharply defeated. In numerous addresses in many parts of the country, however, and in the columns of the *Outlook*, a weekly periodical of which he was "contributing editor," Roosevelt carried forward his fight for what he called the new nationalism; a struggle for "social justice and popular rule," the control by the people of their political instruments and their government for the purpose of providing a condition approximating equality of opportunity. "The new nationalism" was denounced as revolutionary; it was, in fact, essentially conservative, seeking, as it did, merely a reinvigoration of established American institutions. Certain mildly radical expedients which it proposed were: the recall of elective officers by popular vote, the referendum, intended to make the legislatures more directly responsive to the popular will, and the direct primary. The recall of judicial decisions, advocated by Roosevelt as a check on the reactionary tendency of the judiciary in its function as the interpreter of the constitution, frightened the conservatives. As the struggle between the two factions in the Republican Party became increasingly bitter, pressure was brought to bear upon Roosevelt to declare himself a candidate for the presidency; and on Feb. 25, 1912, to use his own phrase, he "threw his hat in the ring."

It was not in Roosevelt's nature, once he had entered a struggle of any sort, to strike with cushioned gloves. The quarrel between Roosevelt and Taft, brought into the open by the contest for delegates, proved distressing alike to the friends of the protagonists and to the general public. In the 13 States where presidential primaries were held, the result, however, gave evidence that the majority of the Republican voters wanted him as their candidate; for of 362 delegates thus selected, 278 favoured Roosevelt and 48 Taft. The President's strength, in fact, came largely from States which cast a very small Republican vote and in which the control of the political machinery was in the hands of the office-holders. In many cases, the progressive voters named protesting delegations who appeared before the Republican National Committee in Chicago before the convention met (June 22, 1912) to claim the seats which they declared had been fraudulently assigned to their rivals. By a margin of 15 votes—which were offered to Roosevelt, but on terms which he felt he could not accept—the convention was organized by his opponents.

In the stirring events of the convention—though not in the hall itself—Roosevelt played the dominant part. He was ready to agree on a compromise candidate, but only on condition that the rolls of the convention be purged of those delegates who, he insisted, had been fraudulently seated. The convention nominated Taft, and the defeated elements, under the leadership of Roosevelt, formed the Progressive Party. Its first convention, held in Chicago early in August, proved unique in American political history, in the fact that women were admitted as delegates. Roosevelt announced the principles of his party, demanding what he had fought for throughout his presidency—the control of the government and the resources of the United States by the people rather than by the professional politicians and financiers; asking, in effect, for a return to fundamental principles. On Aug. 7, the convention nominated Roosevelt for president and Hiram Johnson of California, for vice-president. The Democrats, meanwhile, meeting in Baltimore, had nominated Woodrow Wilson for president. During the campaign, both Wilson and Taft concentrated their artillery on Roosevelt. At the height of the campaign,

on Oct. 14, Roosevelt was shot by a maniac in Milwaukee as he was getting into the automobile which was to take him to the hall where he was to speak; he insisted, however, on making his address and it was an hour and a half before he consented to be taken to a hospital. In the election, Wilson received 435 electoral votes, Roosevelt 88 and Taft 8. The popular vote was 6,293,097 for Wilson; 4,119,507 for Roosevelt; 3,484,956 for Taft, and 901,873 for the Socialist candidate, Eugene V. Debs.

RETIREMENT

Roosevelt had expected defeat and it brought no bitterness. He returned to his editorial work on the *Outlook*, wrote his *Autobiography* and only interrupted the life of a country gentleman to move upon a little town in Michigan with a score of "character witnesses" in May, 1913, to confound the editor of a magazine called *Iron Ore* who had rashly put in print a charge widely current, that the ex-president was occasionally or, in fact, frequently, drunk. The defendant admitted that he had combed the country in vain for witnesses to substantiate his charge, acknowledged his error and paid the six cents in damages which was all Roosevelt would accept.

In the autumn of 1913, Roosevelt went to South America to address numerous learned bodies and to secure specimens in the jungles of Brazil for the American Museum of Natural History. His journey from capital to capital—a repetition of his triumphal progress through Europe—belied the theory that his action as President regarding Panama had angered the South American peoples. At the suggestion of the Brazilian government and accompanied by a gallant Brazilian explorer, Col. Candido Rondon, he set out to determine the course of a hitherto unknown river, vaguely indicated on existing maps as the River of Doubt. The journey of 900 m. through primeval wilderness was arduous and full of peril, with death by starvation awaiting the expedition if it went too slow; and death in the rapids waiting if it went too fast. Canoes were crushed in the treacherous waters; supplies were lost; fever made sharp inroads. Finally Roosevelt himself was taken desperately ill, but he struggled forward, until at last, when disaster seemed inevitable, the party reached civilization at the confluence of the river they had charted with the Madeira, a tributary of the Amazon. In honour of the exploit the Brazilian government christened the stream the Rio Roosevelt.

The World War.—He returned to the United States in May 1914. Early August brought the catastrophe in Europe which, as President, he had foreseen and postponed. His sympathies were with France and England, for he distrusted the German emperor whose imperious and unstable mind had during his presidency caused him frequent irritation and anxiety; but he maintained for a few weeks a neutrality in utterance if not "in thought," which he later regretted. But before September was over, he was once more in the centre of public discussion and debate. He saw earlier than the leaders of the administration in power that America could not remain untouched by the gigantic struggle, since any disturbance of the existing balance of power would have a profound effect not only on the foreign relations of the United States but on the personal lives of the American people. America could afford to see England, France and their allies win, but she could not afford to see Germany win, for a German victory implied an aggressive neighbour in Canada and in the Caribbean and the adoption by the United States of the European condition of an "armed peace." He wanted America to enter the war on the side of the Allies because he was convinced that if she did not accept the gage of battle at that time, she would have to accept it later under less favourable conditions. He pleaded for preparedness, but he went beyond the immediate need to what he was convinced was the ultimate necessity—an international tribunal backed by force to execute its decrees. He attacked the divided allegiance—"fifty-fifty Americanism" was his phrase—which permitted certain Americans of German origin to praise all things German at the expense of the American institutions under which they lived; but at the same time he pleaded for justice for the German-American who kept his head and was loyal.

The destruction of the *Lusitania* by a German submarine brought from Roosevelt a scathing denunciation of German methods of warfare, and successive attacks on what seemed to him the timid and inept statesmanship of the Wilson administration. There was a kind of berserker fury in these attacks. Between himself and his opponents in power he knew no middle ground of compromise and party truce; the issues that divided him from them were to his mind not political but moral. It seemed to him that Wilson was deliberately lulling the public into a sense of false security, permitting it to dissipate its spiritual energies in an orgy of acquisition while their president set about with gestures and phrases to exorcise an opponent both aggressive and armed. Once more Roosevelt appealed to the public conscience, and stirred it as never before.

In this last struggle of a stormy life, he rose to what seemed to many of his countrymen new heights of devotion, as he pleaded for the defence of those institutions which he had as president himself revitalized. "Let us pay with our bodies for our souls' desire!" The shift of issues had brought to Roosevelt's support many of the men who had been his bitterest enemies, and early in 1916 he was put forward as a candidate for the Republican nomination for president. He warned the public that he must not be nominated unless the nation were in an "heroic mood." An effort was made by the Progressives to persuade the Republicans to join them in nominating Roosevelt, but the majority of the Republican delegates were not ready to forgive the schism of 1912, and his suggestion that Gen. Wood be named as a compromise candidate never reached the convention. Roosevelt refused the nomination of the Progressive Party, and gave the Republican nominee, Charles Evans Hughes, his support.

When the United States entered the war in April 1917, "the Colonel," as he was affectionately known, offered to raise a division of volunteers from among the ranks of the "outdoor men" of the country who would be almost immediately ready for service; 250,000 men recorded their desire to go under his leadership to France and Congress passed a bill authorizing the creation of two divisions of volunteers, but the President refused his consent. "This is a very exclusive war," Roosevelt remarked, "and I have been blackballed by the committee on admissions." His four sons all went to the front; two were wounded, one Quentin, the youngest, a lieutenant in the Air Service, was killed in combat over the German lines. Roosevelt, forbidden to fight in the field, grimly and in bitter disappointment flung himself into the work that lay at hand. Here and there over the country he spoke for the Liberty Loan campaign, for the Red Cross and other relief agencies; and in the pages of the Kansas City *Star* and the *Metropolitan Magazine* fought week after week for speed in military preparation, for an honest facing of facts and for whole-hearted and unreserved participation in the war by the side of the allies, greeting the Administration's satisfaction over the "happy confusion" of the war preparations with words of stinging realism.

The fever he had contracted in Brazil returned now and again. For weeks he travelled and made public addresses in spite of it. In Feb. 1918, however, he became dangerously ill; was operated upon, recovered, returned to his full activity and was again laid low. His illness scarcely abated his ceaseless activity and in nowise seemed to weaken the force of his fighting spirit. At no previous period in his career was his following so large or so devoted. It seemed as though, in the intensity and grief of the war-years, his countrymen turned to him with new understanding and affection. While scholars talked of this or that notable act of an administration which was already acquiring a kind of glamour in the perspective of a decade, the common man called him "the great American" and let others analyse why. He died in his sleep on Jan. 6, 1919.

Character and Influence.—It can be said of Washington that he founded the American nation, and of Lincoln that he preserved it; it can be said of Roosevelt that he revitalized it. Twice, at critical times, through his vision, his ardour, his effective anger, his faith in American institutions and his peculiar understanding of all sections of the American people, he cleansed the body of the nation of treacherous poisons, and set its soul to work on labours

higher than the acquisition of physical comforts. He dreamed nobly for his country and impelled millions of his countrymen to dream nobly. He was the most versatile man who has ever been president of the United States. Apart from his gifts as politician, statesman and popular leader, he was eminent as naturalist, soldier, orator, historian; and was one of the most widely-read men of his time. *The Winning of the West* has faults of hasty composition inevitable in a book written in the off-hours of a crowded life, but it maintains its authority; his *Naval History of the War of 1812* has not been supplanted as the leading work on the subject. He was an assiduous and occasionally a brilliant writer. His narratives are lucid and swift, his descriptions full of colour and significant detail, his literary criticism straightforward and free from the jargon of the craft. His letters have taken a high place in epistolary literature; his volume of *Letters to his Children* is already a classic. His political writings, moreover, are direct and clear, open to the most untutored intelligence, and flashing at intervals with arresting epithets. Under the stress of emotion, in some of the prefaces of his hunting books, in a descriptive passage here and there—in his appeal, for instance for imagination in the writing of history—his prose became transmuted into the gold of poetry.

"A man who could do so much could not do everything perfectly, though few have ever done so many things so well," wrote his friend Albert Bushnell Hart (*Encyclopædia Britannica*, 12th edition). "It was more true of him than of most men that his defects were inherent in his virtues. There were few half-tones in Roosevelt's moral perceptions and fewer in his vocabulary; he saw things as either black or white, and he forgot sometimes that he had not previously seen them as he saw them at the moment. . . . The very intensity of his convictions sometimes blinded him to the sincerity and even to the justice of other points of view. Nevertheless, this intensity, this moral fervour, gave his ideas a momentum and a success which they could never have acquired had they proceeded from a more judicial mind. He scorned 'weasel words,' and on occasion he did not hesitate to describe his enemies as thieves and liars. His remarkable energy reminded observers of some great elemental force which, like any natural phenomenon, is controlled by its own necessary laws."

Writings.—Theodore Roosevelt's published works, including books, pamphlets, addresses, campaign speeches, contributions to the books of others, translations and periodical articles, number between two and three thousand titles and date from 1877 to his death. He wrote during his life not less than 150,000 letters, most of which are included with the Roosevelt papers in the Library of Congress in Washington. More has been written about him than about any other American. There have been many collections of Roosevelt's works, the latest and best being the Memorial edition, 24 vol. (1923–26); and the National edition, 20 vol. (1926).

Roosevelt's principal works are: *Naval War of 1812* (1882); *Hunting Trips of a Ranchman* (1885); *Thomas Hart Benton* (1887); *Gouverneur Morris* (1888); *Ranch Life and the Hunting Trail* (1888); *Winning of the West*, 4 vol. (1889–96); *New York* (1891); *Wilderness Hunter* (1893); *Hero Tales from American History* (with Henry Cabot Lodge) (1895); *American Ideals* (1897); *Rough Riders* (1899); *Oliver Cromwell* (1900); *Outdoor Pastimes of an American Hunter* (1905); *African and European Addresses* (1910); *African Game Trails* (1910); *New Nationalism* (1910); *Realizable Ideals* (1912); *History as Literature* (1913); *Progressive Principles* (1913); *Autobiography* (1913); *Through the Brazilian Wilderness* (1914); *Life Histories of African Game Animals* (with Edmund Heller) 2 vol. (1914); *America and the World War* (1915); *Book-lover's Holidays in the Open* (1916); *Fear God and Take Your Own Part* (1916); *Foes of our Own Household* (1917); *Great Adventure* (1918); *Theodore Roosevelt's Letters to his Children* (1919); *Theodore Roosevelt and his Time Shown in his Own Letters*, Ed. by J. B. Bishop, 2 vol. (1920); *Roosevelt in the Kansas City Star* (1921); *Letters to Anna Roosevelt Cowles* (1924); *Selections from Correspondence of Theodore Roosevelt and Henry Cabot Lodge* (1925).

Bibliography.—The more important biographical studies are: **L. F.** Abbott, *Impressions of Theodore Roosevelt* (1920); Corinne Roosevelt Robinson, *My Brother Theodore Roosevelt* (1921); H. A. Beers, *Four Americans* (1920); Joseph Bucklin Bishop, *Theodore Roosevelt and His Times* (1920); Archie, Butt, *Letters* (1924); Lord Charnwood, *Theodore Roosevelt* (1924); Tyler Dennett, *Roosevelt and the Russo-Japanese War* (1925); Bradley Gilman, *Roosevelt the Happy Warrior* (1921); H. F. Gosnell, *Boss Platt and His New York Machine* (1924); William Hard, *Theodore Roosevelt: a Tribute* (1919); Henry L. Stoddard, *As I Knew Them—from Grant to Coolidge* (1927); W. D. Lewis, *Life of Roosevelt* (1919); J. F. Rhodes, *McKinley and Roosevelt Administrations* (1922); Kermit Roosevelt, *Happy Hunting Grounds* (1920); Theodore Roosevelt, Jr., *Average Americans* (1919); Albert Shaw, *Cartoon History of Roosevelt's Career* (1910); Julian Street, *The Most Interesting American* (1920); Mark Sullivan, *Our Times* (1926–28); F. S. Wood, *Roosevelt as We Knew Him* (1927); C. B. Whittlesey, *Roosevelt Genealogy* (1902); J. E. Amos, *Theodore Roosevelt, a Hero to His Valet* (1927); Hermann Hagedorn, *Boy's Life of Roosevelt* (1918), and *Roosevelt in the Bad Lands* (1921); O. K. Davis, *Released for Publication* (1924); H. F. Pringle, *Theodore Roosevelt. A Biography* (1931). For fuller record of Roosevelt's writings *see* R. W. G. Vail, *Roosevelt Bibliography* (1929). (H. Hag.)

ROOT, ELIHU (1845–), American lawyer and political leader, was born at Clinton (N.Y.), on Feb. 15, 1845. He graduated at Hamilton college where his father was a professor in 1864, taught at the Rome (N.Y.) academy in 1865, and graduated at the University Law school, New York city, in 1867. As a corporation lawyer he soon attained high rank and was counsel in many famous cases. Politically, he became identified with the reform element of the Republican Party. He was U.S. attorney for the Southern District of New York (1883–85), and a delegate to the State Constitutional Convention of 1894, acting as chairman of its judiciary committee. From Aug. 1899 until Feb. 1904 he was secretary of war in the cabinets of Presidents McKinley and Roosevelt, and in this position reorganized the army and created a general staff, and in general administered his department with great ability during a period marked by the Boxer uprising in China, whither troops were sent under Gen. A. R. Chaffee, the insurrection of the Filipinos, the withdrawal of U.S. troops from Cuba and the establishment of a government for the Philippines under a Philippine Commission, for which he drew up the "instructions," in reality comprising a constitution, a judicial code and a system of laws. In 1903 he was a member of the Alaskan Boundary Tribunal. In July 1905 he re-entered President Roosevelt's cabinet as secretary of State, where he considerably improved the consular service. In the summer of 1906, while attending the Pan-American Conference at Rio de Janeiro, he was elected its honorary president, and during a tour through the Latin-American republics, brought about a better understanding between the United States and these republics. In general he did much to further the cause of international peace, and he concluded treaties of arbitration with Japan, Great Britain, France, Italy, Spain, Portugal, Austria-Hungary, Switzerland, Norway, Sweden, Denmark, Holland and other countries. Upon his resignation from the cabinet he was elected, in Jan. 1909, as U.S. senator from New York. In 1910 he was chief counsel for the United States before The Hague Tribunal for the arbitration of the long-standing dispute concerning fisheries between his country and Great Britain (*see* Newfoundland). Upon his return, he was appointed by President Taft a member of the Permanent Court of Arbitration. In the same year he was elected president of the Carnegie Endowment for International Peace. Root thus took up again the work which he had initiated when secretary of State, and became the recognized leader of the peace movement in the United States. In 1912 he was awarded the Nobel Peace Prize. He strongly supported in the Senate the treaty of obligatory arbitration concluded between the United States and Great Britain in 1912, but failed to prevent amendments to the treaty being inserted by the Senate which prevented an exchange of ratifications.

He took a leading part in the passage of the Federal Reserve bill of 1913, providing for a Federal Bank under Federal control, in order to stabilize the finance of the country. In matters of foreign policy also his opinion had great weight. In 1915 a treaty negotiated by Secretary of State Bryan with Colombia provided for payment by the United States of $25,000,000 to Colombia in settlement of all outstanding claims between the two countries

arising out of the independence of Panama; Mr. Root opposed ratification, principally because a statement of regret on the part of the United States had been inserted in the preamble, though he also considered the sum too much. His opinion prevailed, and later on, in 1922, when the Senate finally ratified the treaty, the clause in question was omitted.

On March 4, 1915, his term as senator expired and he declined to be a candidate for re-election. That summer he was president of the New York State Constitutional Convention, and advocated, among other measures, the short ballot, means for remedying the law's delays, the reduction of costs involved in the administration of justice and measures which would facilitate the impeachment of unworthy public officials. After the declaration of war by the United States, on April 6, 1917, he gave his whole support to the Government. He was asked by President Wilson to head the mission which was sent to Russia shortly thereafter with a view to encouraging the Revolutionary Government under Kerensky to carry on the war with vigour. He accepted, but while in Russia the overthrow of the Moderates there by the Bolsheviks under Lenin frustrated the purposes of his mission.

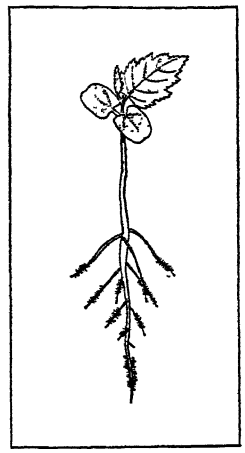
At the conclusion of the war, though not a member of the U.S. Mission to Paris to conclude peace, his advice was requested in the matter of the Covenant of the League of Nations and his views prevailed to a certain extent. To the Covenant as actually drafted, however, he was opposed. He was, nevertheless, of the opinion that the Covenant and the Treaty of Versailles should be accepted with reservations, to secure the interests of the United States, inasmuch as the President's re-election in 1916 and his presence as negotiator at Paris had led the other plenipotentiaries, however erroneously, to believe that he represented the opinion of his fellow countrymen. In Mr. Root's opinion it would be better to accept the Covenant with reservations, and by subsequent amendments to remove the obstacles which had originally stood in the way of its acceptance.

He accepted an invitation from the League of Nations to become a member of the Advisory Committee of Jurists which met at The Hague in 1920 for the purpose of devising a plan for a permanent court of international justice, in accordance with Art. 14 of the Covenant. His presence enabled the committee to frame a plan acceptable to all by which the judges were to be elected by the separate and concurrent action of the Council (in which the Great Powers had a preponderance) and the Assembly (in which the Small Powers were in a majority), each interest, real or alleged, having thus a veto upon the abuse of power by the other. The plan was accepted with modifications by the Council and Assembly on Dec. 14, 1920, and became the statute of the court. It functioned perfectly when the judges were elected in 1921.

Root was appointed by President Harding one of the U.S. delegates to the International Conference on Armament Limitation, which met at Washington in Nov. 1921. There he secured the adoption of the convention subjecting submarines to the requirements of surface vessels and prohibiting the use of noxious gases in warfare. He devised the Pacific agreements which resulted in the cancellation of the Anglo-Japanese alliance, and drafted the Four Power Pacific Treaty, which took its place. In Jan., 1929, he accepted an invitation to be a member of a committee of jurists meeting at Geneva to test and revise the original statutes of the Permanent Court of International Justice in the light of eight years' experience. He participated in every session held for this purpose and offered valuable suggestions. His main work, however, was the working out of a formula upon which the United States might see its way clear to become a member of the court. This Root protocol, as redrafted by Sir Cecil Hurst, was unanimously accepted by the committee of jurists, and is intended to replace the protocol of Sept. 23, 1926 drawn up in answer to the American Senate reservations. The changes made were only in the article on advisory opinions and were held to be favorable to the United States. The hope was general that the United States Senate would act favorably sometime after the report of the committee had been formally accepted by the League Council which meets in June, 1929.

A collection of Root's public addresses has been edited by Robert Bacon and James Brown Scott in eight volumes. He also published *Experiments in Government and the Essentials of the Constitution* (Princeton Lectures, 1913) and *American Ideals During the Past Half Century* (International Conciliation, no. 210, 1925).

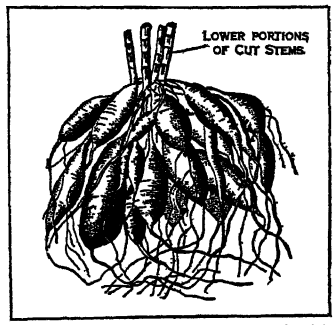
ROOT, in popular use, the part of a plant which is normally below the surface of the earth. Botanically its application is more restricted. The embryo of a typical plant, for instance a pea plant, has an ascending axis which grows into the shoot, and a descending axis or radicle which grows into the root. When the seed germinates, the radicle is the first to appear; it grows downwards, and its primary function is to act as a holdfast for the plant; its most important function, however, is the absorption of water and dissolved nutrient substances from the soil, and it also frequently serves for storage of foodstuffs. The root is distinguished from underground shoots by not bearing leaves and by having its apex (growing point) protected by a cap (root-cap), which can be clearly seen by making a median vertical section through the root-tip; the cap protects it in its passage through the soil. The root also generally bears root-hairs, slender unicellular outgrowths of the outer layer, borne in the region a little behind the root-tip. The root-hairs serve to increase the surface of the root for absorption of water and mineral substances; they also are of service in bringing the root into intimate relationship with the soil particles; the older root-hairs are continually dying off, so that they are borne only on a small part of the area behind the apex. Branches of the root, which repeat the form and structure of the main root, are developed in regular succession from above downwards (acropetal), and owing to the fact that they originate in a definite position in the interior of the root (generally opposite the xylem masses) they develop in longitudinal rows and have to break through the overlying tissue of the parent root. True forking of the root (dichotomy) occurs in the Lycopodiaceae (the shoots of which also branch dichotomously), but is unknown in the higher plants.



FROM STRASBURGER'S "LEHRBUCH DER BOTANIK" (GUSTAV FISCHER)

FIG. 1.—SEEDLING (ULTIMATE ROOT-BRANCHES)

Roots which originate elsewhere than as acropetal outgrowths of a main root are known as *adventitious*, and may arise on any part of a plant. They are especially numerous on underground stems, such as the under side of rhizomes, and also develop from stem nodes under favourable conditions, such as moisture and absence of light; a young shoot or a cutting placed in moist soil quickly forms adventitious roots. They may also arise from leaves under similar conditions, as, for instance, from begonia leaves when planted in soil.



FROM STRASBURGER'S "LEHRBUCH DER BOTANIK" (GUSTAV FISCHER)

FIG. 2.—ROOT-TUBERS OF DAHLIA VARIABILIS

The forms of roots depend on their shape and mode of branching. When the central axis goes deep into the ground in a tapering manner without dividing, a *taproot* is produced. This kind of root is sometimes shortened, and becomes swollen by storage of food-stuffs, forming the *conical* root of carrot, or the *fusiform* or spindle-shaped root of radish, or the *napiform* root of turnip. In ordinary forest trees the first root protruded continues to elongate and forms a long primary root-axis, whence secondary axes come off. In primary plants, especially monocotyledons, the primary axis soon dies and the secondary axes take its place. When the descending axis is very short, and at once divides into thin, nearly equal fibrils, the root is called *fibrous*, as in many grasses; when the fibrils are thick and succulent, the root is *fasciculated*, as in *Ranunculus Ficaria*, and *Oenanthe crocata*; when some of the

fibrils are developed in the form of tubercules, the root is *tuberculate*, as in dahlia. Some of these so-called roots are formed of a stem and root combined, as in *Orchis*, where the tuber consists of a fleshy swollen root bearing at the apex a stem bud. As in the case of the stem, growth in length occurs only for a short distance behind the apex, but in long-lived roots increase in diameter occurs continually in a similar manner to growth in thickness in the stem.

Roots are usually underground and colourless, but in some cases where they arise from the stem they pass for some distance through the air before reaching the soil. Such roots are called *aerial*. They are well seen in the screw-pine (*Pandanus*), the Banyan (*Ficus indica*), and many other species of *Ficus*, where they assist in supporting the stem and branches. In the mangrove they often form the entire support of the stem, which has decayed at its lower part. In tree-ferns they form a dense coating around, and completely concealing, the stem; such is also the case in some Dracaenas and palms. In *epiphytes*, or plants growing in the air, attached to the trunks of trees, such as orchids of warm climates, the aerial roots produced do not reach the soil; they continue always aerial and greenish, and they possess stomata. Delicate hairs are often seen on these epiphytal roots, as well as a peculiar spongy investment formed by the cells of the epidermis which have lost their succulent contents and are now filled with air. This layer is called the *velamen*, and serves to condense the moisture contained in the air, on which the plant is dependent for its water-supply. Some leafless epiphytic orchids, such as species of *Angraecum*, depend entirely upon their aerial roots for nourishment; these perform the functions both of leaves and roots. A respiratory or aerating function is performed by roots of certain mangroves (*q.v.*), growing in swampy soil or water and sending vertical roots up into the air which are provided with aerating passages by which the root system below can communicate with true outside air.

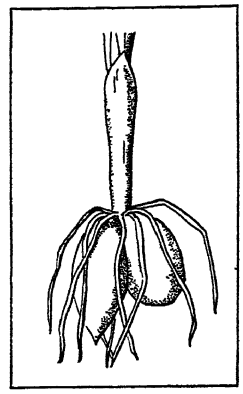


FIG. 3.—FLESHY ROOT OF ORCHIS

Parasitic plants, as the mistletoe (*Viscum*), broom-rape (*Orobanche*), dodder (*Cuscuta*) and *Rafflesia*, send root-like processes into the substance of the plants whence they derive nourishment. Leaf-buds are sometimes formed on roots, as in plum, cherry and other fruit trees; the common elm affords an excellent example, the young shoots which grow up in the neighbourhood of a tree arising from the roots beneath the soil. In some plants no roots are formed at all; thus in the orchid *Corallorhiza*, known as coral-root, a stem-structure, the shortly branched underground rhizome, performs all the functions of a true root, which is absent. In aquatic plants the root acts merely as a holdfast or is altogether absent as in *Salvinia*, *Utricularia* and others. The well known epiphyte *Tillandsia usneoides* (Spanish moss) is rootless.

For the interval structure of the root *see* PLANTS: *Anatomy*.

ROOT. In the ancient *arithmetike* (ἀριθμητική),—the theory of numbers of the Greeks—the numbers considered were primarily integers. A *square number* was therefore an integer that had two equal integral factors; for example, 9 was a square number, the product of the two equal factors 3 and 3. These factors represented the length of the side of a square of which the area is 9 square units. Each was therefore called a "side," and so the Latins spoke of "finding" a *latus* as modern writers speak of "extracting" a *square root*. The Arab writers of the 9th century spoke of such a factor as *root*, and their mediaeval translators adapted the word *radix* (compare "radish") with the adjective *radical* and the verb *extrahere* (pull out). In modern usage a root is one of the equal factors of any kind of a number or of an algebraic expression, the square root being one of the two equal factors: the cube root, one of three; the fourth root, one of four, etc. Thus the cube root of 216, $\frac{1}{27}$, 0·343 and $-\frac{8}{125}$ are respectively 6, $\frac{1}{3}$, 0·7 and $-\frac{2}{5}$. It is also customary to use such expressions as "the square root of 2," although 2 has no two equal factors, meaning that this root is approximately 1·414 ... and designating the number of decimal places (or of significant figures) to which it is to be carried. Symbolically, $\sqrt{2}$ or $2_{\frac{1}{2}}$ means the square root of 2, and $\sqrt[3]{2}$ or $2_{\frac{1}{3}}$ means the cube root of 2, but *see* the "principal root" referred to later. The *index of the root* (indicating what root is to be found) is not written in the square-root symbol $\sqrt{}$, but it is inserted in the case of other roots. The expression "root 2" means in Great Britain the square root of 2, but in the United States the word "square" is used before "root" in this connection.

In the modern extension of the number system, every number has two square roots, one positive and the other negative; thus the square root of 4 is $+2$ or -2. It also has three cube roots; thus the cube root of 1 is 1, $-\frac{1}{2}+\frac{1}{2}\sqrt{-3}$, and $-\frac{1}{2}-\frac{1}{2}\sqrt{-3}$, as can be seen by cubing these numbers. Similarly, the number of *n*th roots of a number is *n*, of which (if *n* is even) two are real and the rest are imaginary (or complex; see *Complex Numbers*); or of which (if *n* is odd) one is real and the rest are imaginary. For example, the four fourth roots of 16 are $+2$, -2, $+2\sqrt{-1}$, and $-2\sqrt{-1}$; or as ordinarily written, ∓ 2, $\mp 2i$; and the three cube roots of 8 are 2, $-1\mp\sqrt{-3}$.

The symbol $\sqrt{}$ means the *principal root* of the number. Thus, $\sqrt{4}$ means 2, not -2; and $\sqrt[3]{8}$ means 2, not $-1\mp\sqrt{-3}$. The principal root of a positive number means the positive real root.

The common method of finding any root of a number is based upon the Binomial Theorem (*q.v.*) and is given in most textbooks on arithmetic and elementary algebra. Practically, however, in working physical problems, square and cube roots are found from tables (*q.v.*), by logarithms (*q.v.*) or by the use of such instruments as the slide rule or other computing machines. (*See* MATHEMATICAL INSTRUMENTS.)

A *root of an equation* is a value of the unknown quantity that will reduce the equation to an identity. For example, 3 is a root of the equation $x^2+4x-21=0$; for if 3 be substituted for x, we have $9+12-21=0$. There are two roots to this equation, the other being -7. Every rational integral algebraic equation has as many roots as the degree of the equation; for example, an equation of the fifth degree has five roots, not necessarily different and not all necessarily real. If unreal, the imaginaries (complex) roots enter in pairs. (*See* EQUATIONS.)

BIBLIOGRAPHY.—On the Greek theory, *see* Sir T. L. Heath, *A History of Greek Mathematics* (Cambridge, 1921); on the general history, L. E. Dickson, *History of the Theory of Numbers* (1919–23); on the algebraic theory, G. Chrystal, *Algebra* (2nd ed., Edinburgh, 1889); on the history of terms and methods, D. E. Smith, *History of Mathematics* (Boston, 1923–25, especially vol. 2). (D. E. S.)

ROOT-CROPS. Many kinds of roots are cultivated for human use, some such as carrots, parsnips, etc., being grown extensively on a commercial scale. But what are commonly termed root-crops are those which are grown on farms in rotation with other field crops (*see* ROTATION OF CROPS; also TURNIPS, MANGOLD-WURZELS and BEET).

In a broad sense, however, all roots grown for human food are called root-crops, as are many grown for other useful purposes. The root-crops most commonly produced for human food include the beet, carrot, onion, parsnip, potato, radish, sugar beet, sweet potato and turnip. Representative minor root-crops are the chufa (*Cyperus esculentus*), cultivated by the negroes of the southern United States, and the so-called tule-potato (tubers of *Sagittaria latifolia*), cultivated by the Chinese in central California. Many roots grown for other economic purposes assume local importance as crops, as the liquorice, grown in southern Europe.

ROOT-CUTTER: *see* FARM (STATIONARY) MACHINERY.

ROOTHAM, CYRIL BRADLEY (1875–), English musician, was educated at Clifton College, St. John's College, Cambridge and the Royal College of Music. He became a university lecturer at Cambridge in 1913. He further promoted the cause of music in the university by his admirable productions at the Cambridge theatre as conductor of the musical society of the university; these included notable revivals of Purcell's *Fairy Queen*, in 1920, and of his *King Arthur* in 1928. His works include chamber and choral music; his choral setting of Milton's *Ode on the Nativity* received the Carnegie Trust award in 1928.

ROOZEBOOM, HENDRIK WILLEM BAKHUIS (1854–1907), Dutch physical chemist, was born on Oct. 24, 1854; he was at first (1878) assistant in the Chemistry institute at Leyden, then lecturer (1890), and finally (1896) professor of inorganic and physical chemistry at Amsterdam. He died on Feb. 8, 1907. Roozeboom is best known for the introduction into chemistry of the "phase rule" (*see* CHEMISTRY: *Physical*), which had been deduced previously by J. Willard Gibbs on thermodynamical grounds. With his students he made a large number of investigations of melting points and solubilities in studying the equilibria between solid and liquid phases in various systems. He started in 1904 to publish a compilation under the title of *Die heterogene Gleichgewichte vom Standpunkt der Phasenlehre,* which was completed in 1918, after his death, by his pupils.

See *Recueil Trav. Chim. Pays-Bas* (1908); *Ber. d. Deutsch Chem. Ges.* (1907).

ROPE AND ROPE-MAKING. Rope is made of animal or vegetable fibres and of metallic wires. Fibre rope alone will be considered here. (*See* WIRE ROPE.) "Cordage" is a term applied generally to yarns, twines, ropes and cables but refers specifically to "rope" in the industry.

Fibre rope is cordage of "stranded" construction, *i.e.,* fibres or hairs laid parallel and twisted together making a yarn; two or more of these yarns twisted together "forming" the strand and three or more of these strands twisted together "laying" the rope. Three or more ropes laid together make a "cable-laid" rope, sometimes referred to colloquially as "hawser-laid." The smallest fibre ropes made are approximately $\frac{1}{2}$ in. in circumference or $\frac{3}{16}$ in. in diameter so that any similar products of less than these dimensions are not rope in the usual acceptation of the term.

Two or more yarns twisted together, either plain twisted or laid, are twine regardless of the form of put-up; laid twine is sometimes referred to as "corded." Single yarns are known as yarns except binder twine, which is a single yarn product. This group of products is known as "ply and yarn goods" in the hard fibre cordage industry and as yarns, twines or cords in the soft fibre industry. Braided construction of yarns, such as sash cords, is sometimes referred to as "rope."

Early History of Rope-Making.—The beginning of rope-making is lost in antiquity. In his very earliest days man must have had something to serve as cords and twines: strips of hide or of bark, pliant reeds and rushes, withes of tough woods, fibrous roots, hairs of animals. As the need for stronger and longer lines developed it was met by twisting a number of these together and forming a rope or cord. There is no record of who first performed this operation.

Not only were ancient civilized nations accomplished rope-makers, but savage tribes in all parts of the world made ropes and cords. The North American Indian, for instance, made cordage of such fibre plants as yucca and agave, the inner bark of trees, hair and skins. The native Peruvians were good rope-makers, using a substance known as "totora." The Egyptians made rope of hides, papyrus and palm fibre. Specimens of Egyptian ropes of papyrus have been taken from ancient tombs and some are estimated to be not less than 3,500 years old. It is known that rope was made in China at a very remote period.

There are numerous records of the use of rope among the Greeks and Romans. The triumphal arch at Orange (A.D. 41), illustrates a coil of rope, pulley and anchor in bas-relief. A painting on a drinking cup in the British Museum shows an Attic sailing ship, 6th century B.C., with ropes and sails. Historians also occasionally mention the use of rope in connection with some great undertaking. Herodotus tells us that Xerxes, during his invasion of Greece (480 B.C.), crossed his army over the Hellespont upon bridges of boats held together by enormous cables stretched from shore to shore.

Rope-making had been going on for centuries with little change up to the time of the introduction of machinery about the middle of the 19th century. In the early days all the yarn was spun by hand. The hemp was first hackled by combing it straight over a board studded with sharp steel teeth. A bunch or "head" of this hackled hemp was placed around the spinner's waist, who attached a few fibres to a hook on the spinning wheel and, as the hook was revolved by means of a large wheel turned by hand, walked backwards away from the wheel feeding the fibre from the supply around his waist, preserving the uniformity and proper size of the yarn. Several yarns were twisted together by use of a hand wheel and several hooks, forming the "strand" and three or more strands twisted together "laying" the rope. Horse-power was used in old times for forming and laying rope which was too large to be made by hand. The term "rope-walk" came from the long low buildings used and the walking back and forth of the spinners and rope-makers. In the early days every community of any size had its rope-walk, there being 173 in the United States in the year 1810. These walks were often 900 ft. or more in length. Many were in the open air.

The crude methods of rope-making of centuries ago are still used in many parts of the world to-day. Improved rope-walk methods are used extensively to-day for making extra large ropes and all but the smaller sizes of tarred hemp ropes; it is also an economical and quick method of making ropes to special order for immediate delivery.

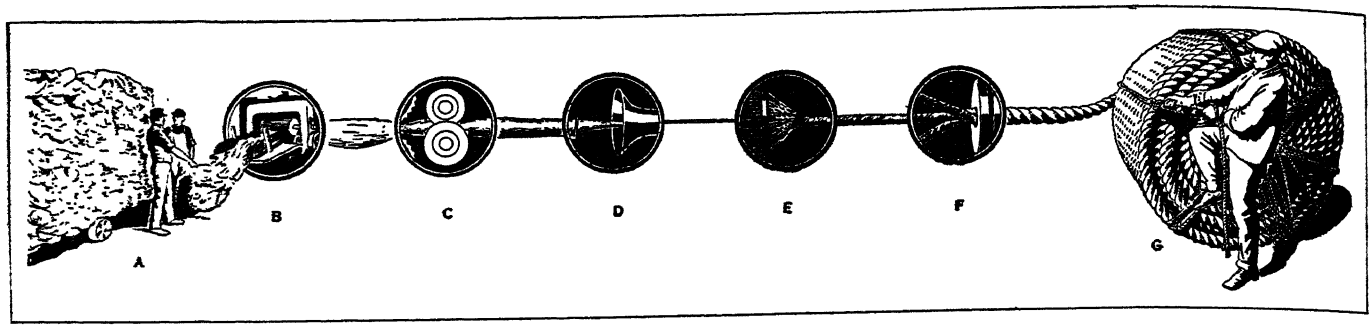
Raw Materials.—In the United States and European countries soft fibres, principally hemp (coming mostly from Russia, Italy and the United States) and flax were used for rope until the second quarter of the 19th century. Hemp is still used for tarred hemp rope and fittings for marine purposes. Abaca commonly referred to as Manila fibre, because it is grown almost exclusively in the Philippine Islands and exported principally from the port of Manila, has established itself as the best material for rope-making where strength and durability are the prime requirements. Henequen, sometimes misnamed sisal, is next in importance as a rope fibre, and comes from Yucatan, Mexico and Cuba. Sisals are important rope fibres and come principally from Java, Africa, Bahamas. Other fibres used are New Zealand, Mauritius, Maguey and Istle fibres. Jute and cotton are used to a limited extent in the manufacture of ropes of stranded construction. Cotton is used to a greater extent in the manufacture of braided cords.

Present Manufacturing Processes.—The primary object of twisting fibres together in a rope is that, by mutual friction, they may be held together when a strain is applied to the whole. Hard twisting has the further advantage of compacting the fibres and preventing, to some extent, the penetration of moisture when the ropes are exposed to water; but the yield of rope from a given length of yarn diminishes in proportion to the increase of twist.

The rope-making process is essentially the same, no matter what kind of fibre is used. The process divides itself into five operations. First, selection of fibre; second, preparing the sliver; third, spinning the yarn; fourth, forming the strands; fifth, laying the strands into rope. With cable-laid ropes there is another operation, laying the strands of the cable, which are in fact completed ropes, into the finished cable.

At the start of the manufacturing process the bales of fibre are opened and heads of fibre shaken out. The fibre is put through several processes of combing and straightening. These operations are, in general, all of the same kind. The fibre is slowly carried along on a series of bars connected by endless chains, the bars being studded with sharp steel pins, like combs, that stand upright as the fibre passes along with them. A similar set of combs, moving very much faster, pulls the fibre rapidly away from the first set, combing it out at the same time. Fine jets of lubricant are sprayed on the fibre as it enters the first machine.

The fibre is delivered from the machine in a heavy, continuous stream or sliver which is coiled by hand or machine into a receptacle, or on the floor. Several of these slivers are then fed into a similar machine, and the kinks and unevenness further removed by a repetition of the same process. This preparation or combing is repeated from 8 to 12 times on five different machines, each operation combing the fibre and producing a smaller and more even sliver, until finally it comes out of the finisher in a continuous stream as water flows from a hose.



BY COURTESY OF THE COLUMBIAN ROPE CO

PROCESSES THROUGH WHICH FIBRE PASSES IN THE MANUFACTURE OF ROPE: (A) FIBRE FROM BALES WITH TANGLES SHAKEN OUT; (B) THE BREAKER WHERE THE FIBRE IS COMBED; (C) SLIVER (FIBRE AFTER IT IS COMBED) COMPRESSED INTO COMPACT FORM; (D) FIBRE TWISTED INTO YARN; (E) YARN DRAWN THROUGH A GUIDE AND TWISTED INTO A READY OR STRAND; (F) STRANDS LAID UP INTO ROPE; (G) FINISHED ROPE COILED AND READY FOR SHIPPING

The thoroughness with which these operations are carried out—the care taken in preparing the fibre—is largely responsible for the uniformity and excellence of the finished product.

In the preparation of the sliver, the object has been merely to eliminate all sorts of dirt and foreign matter and to lay these fine, thread-like strands parallel with one another so that they can be more easily spun together. As the sliver enters the spinning machine it is taken from the rollers by another series of fine combs. From the combs it passes through a funnel-shaped tube and is then wound about a little capstan. It is between the tube and the capstan that the yarn comes into being. The friction on the revolving capstans draws the yarn through the machine. From the capstans it is automatically wound on a large spool about 12 in. long, named a bobbin. The capstans and the bobbin whirl very fast, and the combination of this whirling motion and the drawing forward of the revolving capstans, spins the heretofore parallel fibres into what is known as a yarn. For different sizes of yarn and for yarns designed for various purposes, a varying number of twists per foot are imparted to the yarn. This yarn is the first merchantable product of the cordage mill and may be sold in this original form or used as the basis of other cordage products.

A rope is usually formed of three or four strands, each strand composed of a number of yarns laid parallel and slightly twisted together. Making these strands is "forming." As the strand is twisted it is wound on a large reel and appears as a smooth, round strand composed of a number of individual yarns. This is known as the "ready." The yarn has a tendency to untwist; to overcome this the twist of the ready or strand is made in the opposite direction. The result is that the tendency of the yarn to untwist in one direction, and the tendency of the ready to untwist in the other direction balance each other.

The rope-making operation is "laying." In laying the rope, three or four of the reels containing the readies or strands are put on the laying machine, and the strands are led through a "block," wound around the capstan, and reeled on the finishing end of the laying machine. In laying there is a different twisting problem, for the ready is neutral—that is, it has no tendency to untwist—and if the readies were twisted together without altering this neutral condition the rope would continually untwist. So an extra twist is added to the ready as it is passed into the machine, this twist being computed so that it will be just sufficient to counteract the tendency of the three strands to untwist when they are formed into a rope. All good rope is absolutely neutral; if cut off in 5 to 10 ft. lengths and laid on the ground, it will not untwist of its own accord.

Cable-laid rope consists of three completed ropes, nine of the simple strands which form an ordinary rope. The same method of balancing the twisting strands is used, an additional twist or foreturn being given to the three-strand ropes just before they are laid up, so that their tendency to untwist in one direction shall exactly counterbalance the tendency of the cable to untwist in the opposite direction.

Uses and Care of Rope.—The uses of rope are many and varied. The marine and fishing industries consume more than half of the rope produced. Cable-laid rope is also used extensively for the drilling of oil, water and gas wells. Ropes are used in the transmission of motive power. (*See* POWER TRANSMISSION, MECHANICAL.) Small cotton ropes are used extensively in textile mills for small machine drives. Rope is used on the farms for hoisting, hauling, harness and many other uses. Rope is used in building and engineering projects construction. In the home also it has many applications.

The useful life of rope depends on the quality of the rope, and on the care and treatment it receives. To give the best service, it must be made of high grade raw material, selected with a thorough knowledge of what the rope is to do. It must be so made that every strand will be of even tension. It must be properly treated with a lubricant which will at once preserve and lubricate. There are three general sources of damage which will shorten the life of rope; first, mechanical injury, such as bending over too sharp a pulley, second, damage from chemicals, such as acids, and third, damage from climatic or other conditions of storage, such as moisture or dry rot. It should be stored in a cool dry place with air circulation. (J. S. McD.)

In addition to the heavy rope there are many varieties of cord and twine made by means of the preparing, spinning and doubling machines. The fishing industry takes many different types for lines and nets, while the variety of cord and twine for other industrial and for household purposes is almost unlimited. All yarn from long vegetable fibre is more or less rough as it leaves the spinning frame, even after two or more threads have been twisted together. It is therefore necessary, for many uses, to impart a polish to the cord or twine. Special machines are used for this purpose. Bobbins of yarn, equal to the number required, and depending upon the capacity of the machine, are placed in a bank or creel, and the ends are collected and passed under a roller which is immersed in hot starch. The yarns become saturated with this starch, but, as they emerge from the starch-box, the superfluous starch is removed by passing the yarns between two rollers. The yarns now pass over a series of drying cylinders and polishing rollers, and are finally rewound by the same machine on to other bobbins. This machine is termed a bobbin-to-bobbin polishing machine. In some cases the hot drying cylinders are replaced by a system of hot-air drying. The finished yarns are now made up by machinery into hanks, balls or cheeses, according to which happens to be the best state for future use and for transport.

Driving Ropes.—It has already been stated that cotton driving ropes are extensively applied in the transmission of motive power. Although the mechanical efficiency of transmission by ropes is less than that obtained by wheel gearing, rope driving has several compensating advantages:—

1. It is practically noiseless.
2. It occupies less space than belt driving, and the slip is not so great.
3. The turning movement is better; machines therefore run more steadily and production is increased.
4. Shafts may be run at higher speeds.
5. Greater range of drives; anything from 10 ft. to over 80 ft.,

and much greater distances when carrier pulleys are used.

6. The drive is usually obtained by a number of ropes; if one should break, the rope may be removed and the machinery run, in most cases, until stopping-time.

The number of ropes to be used depends upon the power to be transmitted; upon the sectional area of the ropes, and upon the surface speed of the driving pulley. The speed of the rope may vary from 2,000 ft. to 6,000 ft. or over per minute. In some few exceptional cases 60 ropes have been used on one pulley; the number usually varies between 15 and 40. (*See* POWER TRANSMISSION: *Mechanical.*)

The foregoing refers exclusively to ropes made from fibrous yarns; metallic ropes appear under the heading WIRE ROPE.

See T. Woodhouse and P. Kilgour, *Cordage and Cordage Hemp and Fibres* (1919); Robert Chapman, *A Treatise on Rope-making* (1868); H. R. Carter, *Modern Flax, Hemp and Jute Spinning and Twisting* (1925); P. J. Stopford, *Cordage and Cables* (1925); "U.S. Government Master Specifications for Rope Cotton," *Bureau of Standards Cir.* 326, (1927).

ROPE MOULDING, in architecture and the decorative arts, a convex half or quarter round moulding, spirally channelled, so that it resembles a rope; also called cable moulding (*q.v.*).

ROPES, JOHN CODMAN (1836–1899), American military historian and lawyer, was born at St. Petersburg on April 28, 1836. He graduated at Harvard in 1857, was admitted to the bar in 1861 and became a successful lawyer. He founded in 1876 the Military Historical Society of Massachusetts for the collection and discussion of evidence relating to the Civil War. To it he presented his military library and his collection of prints and medals. He died at Boston on Oct. 28, 1899. His principal work is an unfinished *Story of the Civil War,* to which he devoted most of his later years; this covers the years 1861–62 (1894–98). It was completed in five volumes in 1913 by W. R. Livermore. *The Army under Pope* (in "Campaigns of the Civil War," vol. iv., 1881) is a detailed narration of the Virginia campaign of Aug.–Sept., 1862, which played a great part in reversing contemporary judgment on the events of those operations, notably the condemnation of Gen. Fitz John Porter's conduct. His *Campaign of Waterloo* (1892) is a standard work.

ROPE-WALKING, the art of walking, dancing and performing tricks on a rope or wire stretched between two supports.

ROPEWAYS AND CABLEWAYS. The aerial ropeway is essentially an intermittent handling device and may be defined as that method of handling materials which consist of drawing receptacles—such as buckets or skips—suspended from ropes and by means of ropes, from place to place, such receptacles being manually or automatically filled and discharged. There is no limit to the length of a ropeway installation, since it may consist of any number of units, while the length of a single unit may be as much as 4½ miles.

Historical.—At what period of history ropeways were first used it is impossible to say, but the fact that ropes and pulley blocks—which are the essential parts of a ropeway—were known to the ancients, seems to render a pedigree of at least 2,000 years possible. An old engraving shows a ropeway in use in the City of Danzig in 1644. This was the work of Adam Wybe, a Dutch engineer, and is a single ropeway in its simplest form, consisting of an endless rope passing over pulleys suspended on posts; to the rope were attached a number of small buckets which carried earth from a hill outside the city to the rampart inside the moat. The rope was probably of hemp.

In modern ropeways wire ropes are exclusively used, which date back from about 1860, when a ropeway was erected in the Harz mountains. Since then several systems have been evolved, but space does not permit of entering into details of all the possible applications of a ropeway; it must suffice, therefore, to mention the two principal types, which are known as single and double ropeways. In the former, one endless travelling rope both supports and conveys the load, while in the latter the load carriers are supported by a stationary rail rope on which they are hauled along by an independent endless hauling rope. The systems are also termed, respectively, mono-cableway and bi-cableway, but since a cableway is generally understood to be a different type of aerial transport altogether the names single and double ropeway are preferable.

Such aerial transport resembles in substance vehicular rail transport; in this case, however, the rolling stock is suspended from a rope which serves as a rail, instead of running on the permanent way of a light railway. It is obvious that a single overhead rope as a track, has enormous advantages over a pair of rails laid on the ground, as in the orthodox rail-track with its sleepers, the cost of preparation of the ground has to be considered, which may involve the construction of embankments, bridges, etc. When building a ropeway the overhead rope should run in a bee-line from place to place—say from an undeveloped area to the nearest available point where main transport is available, whereas in the case of a light railway, owing to limitations of grade, usually about 3%, the permanent way has to traverse a tortuous route, three or four times as long possibly, as the bee-line of the rope-track, which, moreover, may be negotiated with safety on a grade of 40%. For example, a ropeway may be cited, which has a total length of 5,400 ft. with a total difference in altitude of 2,000 ft., the ground which it covers could not have been negotiated by a rail track of less than 15 m. in length, graded at 1 in 42. It is essential to take as straight a line as possible when laying out a ropeway because curves generally necessitate angle-stations, which entail expenditure of more capital and increase in working cost. On the other hand, ground that would be difficult for the railway engineer, such as steep hills, deep valleys and turbulent streams, has no terrors for the ropeway erector.

The Single Ropeway.—The single ropeway consists essentially of an endless running rope from which the carriers are suspended and with which they move in the following way:—The receptacles are fitted with simple curved hangers pivoted from a Λ-shaped saddle, which holds sufficiently tight by frictional contact to the rope and therefore travels with the same. The suspended frame of the load carrier is also fitted by the side of the Λ-shaped saddle with the small grooved pulley which engages at the terminals with shunt rails and thus disengages itself from the running rope; the frame of the load carrier becomes stationary on these shunt rails for filling or emptying, after which it is pushed on to the returning rope again. Or the carriers may be permanently fixed to this rope and move with it. The ropeway itself consists of an endless rope running between two terminal drums, one of 6 to 10 ft. diameter, known as the driving drum, being provided with power receiving and transmitting gear, while the drum at the opposite terminal is fitted with tightening gear. The endless rope is supported on suitable pulleys which are, in turn, supported on standards or trestles spaced at intervals, varying with the nature of the ground. The rope runs at an average speed of 4 m. per hour, at which speed the bucket or skip can be arranged to load and unload itself automatically. Generally speaking, the single ropeway is not so suitable for heavy loads and long distances as the double. The work of Ropeways Ltd. favours the single-rope system. The founder of that firm, J. Pearce Roe, introduced multiple sheaves for supporting the rope at each standard. The maximum load carried on such a ropeway is 150 tons per hour. Another installation on the same system serves an iron mine in Spain and spans 6,500 yd. of very rough country so steep that in many places even the sure-footed mule cannot keep on the track. This ropeway can deal with 85 tons per hour. The greatest distance covered on any one section of the single ropeway is 7,100 yd., or about 4 miles. The Dorada ropeway which is the longest in the world—47 m. in length—is built on the single-rope system. It has 15 units and a capacity of 20 tons per hour. In addition to the conveyance of merchandise, principally coffee, it is also occasionally used for passenger traffic.

The Double Ropeway.—This consists, as already stated, of an independent rail rope and a separate continuous hauling rope disposed parallel to one another. The carrier runs on the stationary rope which is fitted with running heads having grooved steel wheels. The load is borne by a hanger pivoted from the carrier and conveyed along the rail rope by the endless hauling rope at an average speed of 4 to 6 m. per hour. A great variety of clips have been introduced for the purpose of coupling the

carriers to the hauling rope, but these are automatically connected and disconnected at the shunt rails of the terminals. The hauling is operated by driving gear at one end and controlled at the other by tightening gear, just as in the single rope system. The rail ropes of a double ropeway are sectionalized every 2 or 3 m., whilst the longest section for a hauling rope is about 9 miles. Such ropeways will support single loads of 6 cwt. to a ton or more.

Motive Power.—The power required for a ropeway will vary according to conditions but is relatively moderate. If the aggregate down gradients exceed the up gradients the power consumption may be nil or the ropeway may even produce power which may be harnessed to drive other machines; or it may have to be absorbed by some form of brake device. In a Japanese ropeway 1,800 yd. in length, which runs mostly at an incline of 1 in 1½, the force generated is absorbed by a hydraulic brake, the revolving fan of which drives the water against fixed vanes which repel and heat it. In this way 50 h.p. is absorbed and the speed brought under the control of a hand brake.

The initial outlay for a ropeway is usually moderate, though of course it varies according to topographical conditions.

Ropeways are largely independent of weather conditions and their working need not be interrupted even by heavy snowfalls. Their construction is very simple and there is little to get out of order. Sound workmanship and good material will ensure a relatively long life. The ground space occupied by ropeway installations, beyond that occupied by the terminals is exceedingly small and is confined to the emplacements of the standards which, in modern ropeways are few and far between.

Aerial Cableways.—The aerial cableway is a development of the ropeway and is a conveyor capable of hoisting and dumping at any desired point. The load is carried along a track consisting of a single span of suspended cable which covers a comparatively short distance as rope haulage goes. The trackway may either run in a more or less horizontal direction, *i.e.*, the terminals may be on the same level, or it may be inclined at such an angle that the load will descend by gravity. The trackway or rail rope rests upon saddles of hard wood or iron on the tops of terminal supports usually known as towers, which may likewise be constructed of wood or iron, and if the exigencies of the work render it desirable they can be mounted on trolleys and rails, in which case the cableway is rendered portable and can be moved about, which is sometimes a great advantage in connection with dock and harbour work. The motive power may be either steam, gas, or electricity. The motor is situated in what is termed the head tower, which is occasionally a little higher than the tail tower. The span between the two towers sometimes extends to 2,000 ft., but this is exceptional. Objects weighing as much as 8 tons are handled by such devices. The load, which may be carried in a skip or tray, is borne by an apparatus called the carrier, which is a modification of a running head, consisting of pulleys and blocks and running along the main cable or trackway. This carrier is also fitted with pulleys or guides for the dump line, and is drawn along the main cable by an endless hauling rope which passes from the carrier over the head tower and is wound several times around the drum of the winding engine to secure frictional hold, then back over the head tower to the tail tower, returning to the rear end of the carrier. The hoisting rope passes from the engine to the fall-block for raising the load. The dump line comes from the other side of the winding engine drum and passes to a smaller block attached to the rear end of the skip or tray. The whole weight of the skip is borne by the hoisting rope, while the dump line comes in slack but at the same rate of speed. Whenever it is desired to dump the load the dump line is shifted to a section of the drum having a slightly larger diameter, and being thus drawn in at a higher rate of speed the load is discharged. The engine is then reversed and the carriage brought back for the next load.

This is, in outline, the mode of operating all cableways. These appliances have rendered great service as labour-savers in navvying, mining and quarrying work; for instance in placer-mining cableways have been found very useful when fitted with a self-filling drag-bucket which will take the place of a great number of hands. Cableways can be worked at a great speed; a good mean speed, however, would be 500 to 750 ft. per min. for conveying, and 200 to 300 ft. per min. for hoisting. *See* also TELPHERAGE.

BIBLIOGRAPHY.—G. F. Zimmer, *Mechanical Handling and Storing of Material* (1916); H. Blyth, *Modern Telpherage and Ropeways* (1926).

(G. F. Z.)

ROPS, FÉLICIEN (1833–1898), Belgian painter, designer and engraver, was born at Namur, in Belgium, on July 7, 1833; he spent his childhood in that town, and afterwards in Brussels, where he composed in 1856, for his friends at the university, the *Almanach Crocodilien,* his first piece of work. He also brought out two *Salons Illustrés,* and collaborated on the *Crocodile,* a magazine produced by the students. The humour shown in his contributions attracted the attention of publishers. He designed, among other things, frontispieces for Poulet-Malassis, and afterwards for Gay and Doucé. In 1859–60 he contributed some of his finest lithographs to a satirical journal in Brussels called *Uylenspiegel.* About 1862 he went to Paris and worked at Jacquemart's. He subsequently returned to Brussels, where he founded the short-lived International Society of Etchers. In 1865 he brought out his famous "Buveuse d'Absinthe," which placed him in the foremost rank of Belgian engravers; and in 1871 the "Dame au Pantin." After 1874 Rops resided in Paris. His talent was stimulated by travels in Hungary, Holland and Norway. He executed 600 original engravings enumerated in Ramiro's *Catalogue of Rops' Engraved Work* (Paris, Conquet, 1887), and 180 from lithographs (Ramiro's *Catalogue of Rops' Lithographs,* Paris, Conquet, 1891), besides a large number of oil-paintings in the manner of Courbet, and of pencil or pen-and-ink drawings, several very remarkable water-colour pictures, among which are "Le Scandale," 1876; "Une Attrapade," 1877 (now in the Brussels Museum); a "Tentation de St. Antoine," 1878; and "Pornocrates," 1878. From 1880 to 1890 Rops devoted himself principally to illustrating books: *Les Rimes de joie,* by Théo Hannon; *Le Vice suprême* and *Curieuse,* by J. Péladan; and *Les Diaboliques,* by Barbey d'Aurévilly; *L'Amante du Christ,* by R. Darzens; and *Zadig,* by Voltaire; and the poems of Stéphane Mallarmé have frontispieces due to his fertile and powerful imagination. Before this he had illustrated the *Légendes Flamandes,* by Ch. de Coster; *Jeune France,* by Th. Gautier; and brought out a volume of *Cent Croquis pour réjouir les Honnêtes Gens.* His last piece of work, an advertisement of an exhibition, was done in November 1896. Rops died on Aug. 23, 1898, at Essonnes, Seine-et-Oise, on his estate, where he lived in complete retirement with his family. Rops joined the Art Society of the "XX.," formed at Brussels in 1884, as their revolutionary views were in harmony with the independence of his spirit. After his death, in 1899, the Libre Esthétique, which in 1894 had succeeded the "XX.," arranged a retrospective exhibition, which included about fifty paintings and drawings by Rops. His engraved work is the most important, both as to mastery of technique and originality of ideas. Hardly any artist of the 19th century equalled him in the use of the dry-point and soft varnish.

In 1896 *La Plume* (Paris) devoted a special number to this artist, fully illustrated. E. Deman, Brussels, brought out a volume in 1897 entitled *Félicien Rops et son oeuvre*—papers by various writers. We may also mention a study of *Félicien Rops,* by Eugène Demolder (Paris, 1894), and another by the same writer in *Trois Contemporains* (1901); *Les Ropsiaques,* by Pierre Gaume (London, 1898), and the notice by T. K. Huysmans in this volume called *Certains. See* also E. Romiro, *Félicien Rops* (1905).

RORQUAL, a name for a species of *Balaenoptera,* large whales of elongated shape, with a small back fin and longitudinal folds on the throat (*see* CETACEA). The flippers are small, the head small and flat, the whalebone coarse and short, the tail much compressed. There are probably four species. Sibbald's rorqual or blue whale (*B. musculus*) is the largest of all animals, reaching lengths of over 100ft. The common rorqual (*B. physalus*) is some 20ft. shorter, slate colour above and white beneath. (For illustration *see* CETACEA.)

RORSCHACH, a busy commercial town in the Swiss canton of St. Gall, situated on the south-west shore of the Lake of Constance, and by rail 62 m. N.E. of Zürich. In 1925 its population

was 11,250, mostly German-speaking. From 1408 to 1798 it belonged to the abbot of St. Gall, and then to the canton Säntis (named canton of St. Gall in 1803) of the Helvetic Republic.

ROS, SIR RICHARD (b. 1429), English poet, son of Sir Thomas Ros, lord of Hamlake (Helmsley) in Yorkshire and of Belvoir in Leicestershire, was born on March 8, 1429. In Harl. ms. 372 the poem of "La Belle Dame sanz Mercy," first printed in W. Thynne's *Chaucer* (1532), has the ascription "Translatid out of Frenche by Sir Richard Ros." "La Belle Dame sanz Mercy" is a long and rather dull poem from the French of Alain Chartier, and dates from about the middle of the 15th century. It is written in the Midland dialect, and is surprisingly modern in diction. The opening lines—

> Half in a dreme, not fully wel awaked,
> The golden sleep me wrapped under his wing,

have often been quoted, but the dialogue between the long-suffering lover and his lady does not maintain this level.

See W. W. Skeat, *Chaucerian and Other Pieces* (1897); and Dr. H. Gröhler, *Ueber Richard Ros' mittelenglische Uebersetzung* . . . (Breslau, 1886).

ROSA, CARL AUGUST NICHOLAS (1842–1889), English musical impresario, was born at Hamburg on March 22, 1842, his family name (which he subsequently changed) being Rose. He started as a solo violinist, studying at Leipzig and Paris. In 1867 he met and married the famous operatic soprano Madame Parepa (1836–74). In 1875 he started the Carl Rosa Opera company, for producing the best operas in English versions, and both during his own life and after his death this company popularized good music in England, encouraging native composers and training many singers. Carl Rosa married a second time in 1881. He died in Paris on April 30, 1889.

ROSA, SALVATOR (1615–1673), Italian painter of the Neapolitan school, was born in Arenella, in the outskirts of Naples, on July 21, 1615, according to Passeri. His father, Vito Antonio de Rosa, an architect, sent him to study in the convent of the Somaschi fathers. Salvator went to his uncle Paolo Greco to learn painting, then to his brother-in-law Francesco Fracanzaro, a pupil of Ribera, and afterwards to Ribera himself. He obtained some instruction under the battle-painter Aniello Falcone, but chiefly painted alone. Encouraged by Lanfranco he went to Rome in 1635 to study; but, catching fever, he returned to Naples and Falcone, and for a while painted nothing but battle-pieces. He went on to the landscape art peculiarly characteristic of him—wild scenes peopled with shepherds, seamen or especially soldiers. He then revisited Rome, and was housed by Cardinal Brancaccio. In 1646 he took part in the insurrection of Masaniello against the Spaniards but on the approach of Don John of Austria he escaped to Rome. He was a man of facile and versatile genius, an actor, poet and musician as well as a painter. It was about this time that Rosa wrote his satire named *Babylon*, under which name Rome was indicated.

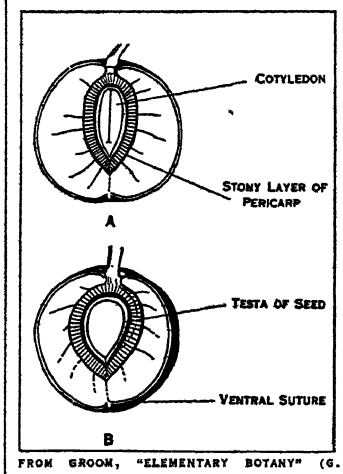
Cardinal Giancarlo de' Medici now invited the painter to Florence. Salvator remained in the Tuscan capital for the better part of nine years, introducing there the new style of landscape; he had no pupils, but various imitators. Lorenzo Lippi the painter poet, and other *beaux esprits* shared with Rosa the hospitalities of the cardinal, and they formed an academy named *I Percossi* (the Stricken). He was well acquainted also with Ugo and Giulio Maffei, and housed with them more than once in Volterra, where he wrote four other satires—*Music, Poetry, Painting* and *War*. Finally he reverted once more to Rome, and hardly left that city again. To confute his detractors he wrote the last of the series, entitled *Envy*. Among the pictures of his closing years were the "Battlepiece" now in the Louvre; "Pythagoras and the Fishermen"; the "Oath of Catiline" (Pitti Gallery); and "Saul and the Witch of Endor" (Louvre), which is almost his latest work. He died on March 15, 1673.

Rosa was a leader in that tendency towards the romantic and picturesque which has differentiated modern from old art. He himself courted reputation for his historical works, laying comparatively little stress on his landscapes; in portraits he was forcible. In chiaroscuro he is simple and effective; his design has energy and a certain grandeur. Among his pictures not already mentioned we may name, in the National Gallery, London, "Mercury and the Dishonest Woodman"; in the Pitti Gallery are many representative pictures including his own portrait and a grand portrait of a man in armour. Other works are at Chantilly, Chatsworth, Leningrad, Vienna and in Rome (Gall. Nazionale and Colonna). His etchings reflect his sympathy with the rough and ready life of the soldier and peasant. He also produced a number of large mythological and historical plates.

See G. B. Passeri, *Vite dei Pittori, Scultori ed Architetti* (Rome, 1772); F. Baldinucci, *La Vita di S. Rosa* (Venice, 1830); Lady Morgan, *Life and Times of S. R.* (1824); G. A. Cesareo, *Poesie e lettere di S. R.* (Naples, 1892); Leandro Ozzola, *Vita e Opere di Salvator Rosa* (Strasbourg, 1908); E. W. Manwaring, *Italian Landscape in 18th Century England* (New York, 1925).

ROSA, MONTE, the name of a great glacier-clad mountain mass (Aostan patois word *roëse*, a glacier) which rises south-east of Zermatt, and on the frontier between Switzerland and Italy. Ten summits in this huge mass are distinguished by name, of which four (Nordend, 15,132 ft., Zumsteinspitze, 15,004 ft., Signalkuppe or Punta Gnifetti, 14,965 ft., and Parrotspitze, 14,643 ft.) rise on the frontier. The five lower summits are on the Italian slope, but the highest of all, the Dufourspitze, 15,217 ft. (named by the Swiss government in honour of General Dufour, the head of the survey which first accurately fixed the position of these points), rises west of the frontier ridge, on a buttress, and being entirely in Switzerland, is its highest peak (and not, as often stated, the Dom, 14,942 ft., in the Mischabel group). The summit of the Dufourspitze was first attained in 1855 by a large English party, including G. and C. Smyth, and C. Hudson. The Zumsteinspitze was first climbed in 1820, the Signalkuppe (on top of which there is now a club hut) in 1842, the Nordend in 1861 and the Parrotspitze in 1863.

ROSACEAE, in botany, a large cosmopolitan family of seed-bearing plants which belong to the series Rosales of dicotyledons and containing about 100 genera with 2,000 species. The plants vary widely in manner of growth. Many are herbaceous, growing erect, as *Geum*, or with slender creeping stem, as in species of *Potentilla*, sometimes sending out long runners, as in strawberry; others are shrubby, as raspberry, often associated with a scrambling habit, as in the brambles and roses, while apple, cherry, pear, plum and other British fruit trees represent the arborescent habit. Vegetative propagation takes place by means of runners, which root at the apex and form a new plant, as in strawberry; by suckers springing from the base of the shoot and rising to form new leafy shoots after running for some distance beneath the soil, as in raspberry; or by shoots produced from the roots, as in cherry or plum. The scrambling of the brambles and roses is effected by means of prickles on the branches and leaf-stalks.



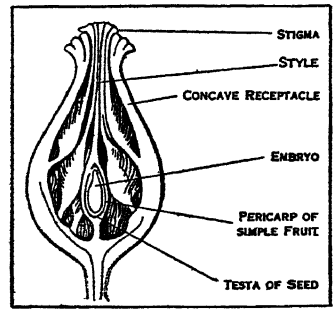
FROM GROOM, "ELEMENTARY BOTANY" (G. BELL & SONS)

CHERRY (PRUNUS CERASUS)

A. Vertical section of the drupe of Cherry, cut vertically through the ventral and dorsal suture; B. fruit cut vertically in a plane at right angles to preceding one

The leaves, which are arranged alternately, are simple, as in apple, cherry, etc., but more often compound, with leaflets palmately arranged, as in strawberry and species of *Potentilla*, or pinnately arranged, as in the brambles, roses, mountain ash, etc. A difference in this respect often occurs in one and the same genus, as in *Pyrus*, where apple (*P. Malus*), and pear (*P. communis*) have simple leaves, whereas mountain ash or rowan (*P. aucuparia*) has pinnately compound leaves. In warm climates the leaves are often leathery and evergreen. The leaves are stipulate, the stipules being sometimes small and short-lived, as in *Pyrus* and *Prunus* (cherry, plum, etc.), or more important structures adnate to the base of the leaf-stalk, as in roses, brambles, etc. The flowers,

which are regular, generally bisexual, and often showy, are sometimes borne singly, as in some species of rose, or of the cloudberry (*Rubus chamaemorus*), or few or more together in a corymbose manner, as in some roses, hawthorne and others. The inflorescence in agrimony is a raceme, in *Poterium* a dense-flowered spike, in *Spiraea,* a number of cymes arranged in a corymb. The parts of the flowers are arranged on a pentamerous plan, with generally considerable increase in the number of stamens and carpels. The shape of the thalamus or floral receptacle, and the relative position and number of the stamens and carpels and the character of the fruit, vary widely and form distinguishing features of the different suborders, six of which may be recognized.



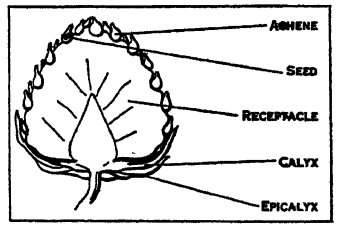
FROM GROOM, "ELEMENTARY BOTANY" (G. BELL & SONS)

DOG ROSE (ROSA CANINA), SHOWING VERTICAL SECTION OF COMPOUND FRUIT

Suborder I. Spiraeoideae is characterized by a flat or slightly concave receptacle on which the carpels, frequently two to five in number, form a central whorl; each ovary contains several ovules, and the fruit is a follicle except in *Holodiscus.* The plants are generally shrubs with simple or compound leaves and racemes or panicles of numerous small white, rose or purple flowers. This suborder is nearly allied to the family Saxifragaceae, chiefly north temperate in distribution. The largest is *Spiraea,* numerous species of which are cultivated in gardens; *S. salicifolia* occurs in Britain apparently wild in plantations, but is not indigenous. The native British meadow-sweet is *S. Ulmaria;* dropwort is *S. Filipendula.*

Suborder II. Pomoideae is characterized by a deep cup-shaped receptacle with the inner wall of which the two to five carpels are united; the carpels are also united with each other, and each contains generally two ovules. The fruit is made up of the large fleshy receptacle surrounding the ripe ovaries, the endocarp of which is leathery or stony and contains one seed. The plants are shrubs or trees with simple or pinnately compound leaves and white or rose-coloured often showy flowers. The genera are distributed through the north temperate zone, extending southwards in the New World to the Andes of Peru and Chile. The largest genus, *Pyrus,* with about 65 species, includes apple (*P. Malus*), pear (*P. communis*), wild service (*P. torminalis*), rowan or mountain-ash (*P. aucuparia*) and white beam (*P. Aria*). *Mespilus* (medlar) and *Cotoneaster* are also included. (*See* separate articles for most of the above.)

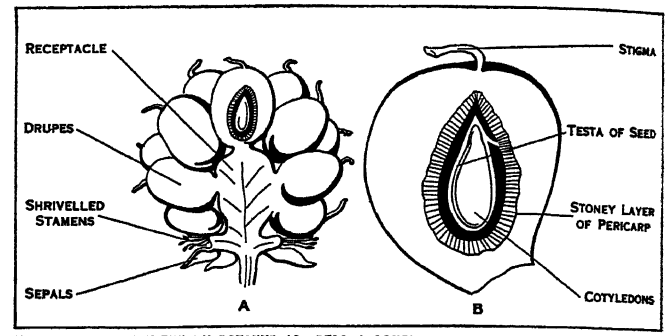
Suborder III. Rosoideae is characterized by the receptacle being convex and swollen, as in strawberry, or cup-shaped, as in rose, and bearing numerous carpels, each of which contains one or two ovules, while the fruit is one-seeded and indehiscent. The genera are grouped in tribes according to the form of the receptacle and of the fruit. The Potentilleae bear the carpels on a large, rounded or convex outgrowth of the receptacle. In the large genus *Rubus* the ripe ovaries form drupels upon the dry receptacles; the genus is almost cosmopolitan, but the majority of species occur in the forest region of the north temperate zone and in the mountains of tropical America. *R. fruticosus* is blackberry, *R. Idaeus,* raspberry, and *R. Chamaemorus,* cloudberry. In the flower of *Potentilla, Fragaria* (strawberry) and a few allied genera an *epicalyx* is formed by stipular structures arising at the base of the sepals. The fruits consist of numerous dry achenes borne in *Fragaria* on the much-enlarged succulent torus, which in the other genera is dry. In *Geum* (avens) and *Dryas* (an arctic and alpine genus) the style is persistent in the fruit, forming a feathery appendage (*Dryas*) or a barbed awn (avens), either of which is of service in distributing the fruit. The Potentilleae are chiefly north temperate, arctic and alpine plants.



FROM GROOM, "ELEMENTARY BOTANY" (G. BELL & SONS)

STRAWBERRY (FRAGARIA VESCA), SHOWING VERTICAL SECTION OF COMPOUND FRUIT

The Roseae comprise the large genus *Rosa* (150 species), characterized by a more or less urn-shaped torus enclosing the numerous carpels which form dry one-seeded fruits enveloped in the bright-coloured fleshy torus. The plants are shrubs bearing prickles on the stems and leaves; many species have a scrambling habit resembling the brambles. The species of *Rosa,* like those of *Rubus,* are extremely variable, and a great number of subspecies, varieties and forms have been described. Petals are often wanting, as in *Alchemilla* (lady's mantle) and *Poterium,* and the flowers are often unisexual and frequently wind-pollinated, as in salad burnet (*Poterium Sanguisorba*), where the small flowers are crowded in heads, the upper pistillate, with protruding feathery stigmas, and the lower staminate (or bisexual), with exserted stamens. *Agrimonia* (agrimony) has a long spike of small honeyless flowers with yellow petals; in the fruit the torus becomes hard and crowned by hooked bristles which ensure the distribution of the enclosed achenes.

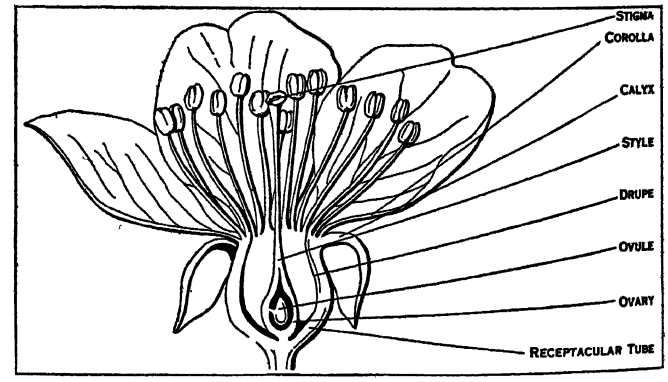


FROM GROOM, "ELEMENTARY BOTANY" (G. BELL & SONS)

BLACKBERRY (RUBUS FRUTICOSUS); SHOWING (A) VERTICAL SECTION OF COMPOUND FRUIT, (B) VERTICAL SECTION OF SINGLE DRUPE (ENLARGED)

Suborder IV. Neuradoideae contains only two genera of desert-inhabiting herbs with yellow flowers; and the five to ten carpels are united together and with the base of the cup-shaped torus, which enlarges to form a dry covering round the one-seeded fruits.

Suborder V. Prunoideae is characterized by a free solitary carpel with a terminal style and two pendulous ovules, and the fruit a one-seeded drupe. The torus forms a cup from the edge of which spring the others parts of the flower. The plants are deciduous or evergreen trees or shrubs with simple leaves often with small caducous stipules, and racemes or umbels of generally showy, white or pink flowers. There are five genera, the chief of which is *Prunus,* to which belong the plum (*Prunus communis*), with several well-marked subspecies—*P. spinosa* (sloe or blackthorn), *P. insititia* (bullace), *P. domestica* (wild plum), the almond (*P. Amygdalus*) with the nearly allied peach (*P. persica*), cherry (*P. Cerasus*), birdcherry (*P. Padus*) and cherry laurel (*P. Laurocer-*



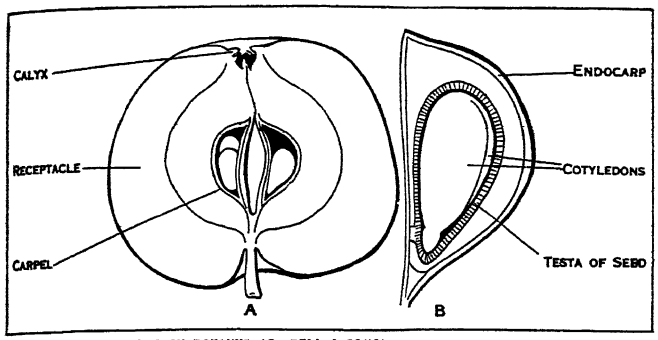
FROM GROOM, "ELEMENTARY BOTANY" (G. BELL & SONS)

VERTICAL SECTION OF FLOWER OF CHERRY

asus). The tribe is distributed through the north temperate zone, passing into the tropics.

Suborder VI. Chrysobalanoideae resembles the last in having a single free carpel and the fruit a drupe, but differs in having the style basal, not terminal, and the ovules ascending, not pendulous; the flowers are also frequently zygomorphic. The genera are tropical evergreen trees or shrubs, the great majority being South American.

In North America the family is represented by about 40 genera, the largest being *Crataegus* (hawthorn) with about 70



FROM GROOM, "ELEMENTARY BOTANY" (G. BELL & SONS)

APPLE (PYRUS MALUS); SHOWING (A) VERTICAL SECTION THROUGH FRUIT, (B) ONE OF THE PARCHMENT-LIKE CHAMBERS, REMOVED FROM THE FRUIT CONTAINING A SEED

species, *Rubus* (bramble) with 40 species, *Potentilla* (cinquefoil, five-finger) with about 40 species, *Prunus* (plum, *cherry*, etc.) with 20 species, and *Rosa* with 15 species. *Potentilla* is the most generally distributed genus in the United States.

ROSAMOND, known as "The Fair" (d. *c.* 1176), mistress of Henry II., king of England, is believed to have been the daughter of Walter de Clifford of the family of Fitz-Ponce. Rosamond is said to have been Henry's mistress secretly for several years, but was openly acknowledged by him only when he imprisoned his wife Eleanor of Acquitaine as a punishment for her encouragement of her sons in the rebellion of 1173–74. Rosamond died in 1176, and was buried in the nunnery church of Godstow before the high altar. The body was removed by order of St. Hugh, bishop of Lincoln, in 1191, and was, seemingly, reinterred in the chapter house. The story that she was poisoned by Queen Eleanor first appears in the French Chronicle of London in the 14th century. The romantic details of the labyrinth at Woodstock, and the clue which guided King Henry II. to her bower, were the inventions of story-writers of later times. There is no evidence for the belief that she was the mother of Henry's natural son William Longsword, earl of Salisbury.

ROSARIO, a city and river port of Argentina, in the province of Santa Fé, on the west bank of the Paraná, 186 m. by rail N.W. of Buenos Aires. Pop. (1922, estimate) 265,000. It ranks next to Buenos Aires in size and in trade. It is accessible to ocean-going steamers of 26 ft. draught. The city stands on the eastern margin of the great pampean plain, 65 to 75 ft. above the wide river-bed washed out by the Paraná. It extends back a considerable distance from the river, and there are country residences and gardens of the better class along the line of the Central Argentine railway and northward toward San Lorenzo. The city is laid out with chessboard regularity, and the streets are well paved, lighted with gas and electricity, traversed by tramway lines, and provided with sewers and water mains. The Boulevard El Santafecino is an attractive residence street with double driveways separated by a strip of garden and bordered by fine shade trees. The chief edifices of an official character are the custom-house, post-office, municipal hall and law courts. There is a large charity hospital, and the English and German colonies maintain a well-equipped infirmary. The largest sugar refinery in Argentina is here, and there are flour-mills, breweries and some smaller manufactures. The city is chiefly commercial, being the shipping port for a large part of northern Argentina, among its exports being wheat, flour, baled hay, linseed, Indian corn, sugar, rum, cattle, hides, meats, wool, quebracho extract, etc. The railway connections are good, including the Buenos Aires and Rosario and the Central Argentine lines to the national capital, the Buenos Aires and Rosario line northward to Tucumán, where it connects with the Government line to Salta, Jujuy and the Bolivian frontier, the Central Argentine line westward to Córdoba, with connections at Villa María for Mendoza and the Chilean frontier, and two narrow-gauge lines, one running to Santa Fé and the other to Córdoba. The port of Rosario is well equipped with modern appliances for handling freight.

Rosario was founded in 1730 by Francisco Godoy, but it grew so slowly that it was still a small village up to the middle of the 19th century. In 1854 Gen. Justo José de Urquiza, then at the head of the Argentine Confederation, made it the port of the ten inland provinces then at war with Buenos Aires, and in 1857 imposed differential duties on the cargoes of vessels first breaking bulk at the southern port.

ROSARY, a popular devotion of the Roman Catholic Church, consisting of 15 Paternosters and Glorias and 150 Aves. The word also denotes the chaplet of beads for counting the prayers. It is divided into three parts, each containing five decades, a decade comprising 1 Pater, 10 Aves and a Gloria, in addition to a subject for meditation selected from the "mysteries" of the life of Christ and of the Blessed Virgin. The Christian practice of repeating prayers is traceable to early times: Sozomen mentions (*H.E.* v. 29) the hermit Paul of the 4th century who threw away a pebble as he recited each of his 300 daily prayers. It is not known precisely when the mechanical device of the rosary was first used. William of Malmesbury (*De gest. pont. Angl.* iv. 4) says that Godiva, who founded a religious house at Coventry in 1043, left a string of jewels, on which she had told her prayers, that it might be hung on the statue of the Blessed Virgin. Thomas of Cantimpré, who wrote about the middle of the 13th century, first mentions the word "rosary" (*De apibus*, ii. 13), using it in a mystical sense as Mary's rose-garden. Jacob Sprenger, a Dominican, founded the first confraternity of the rosary at Cologne in 1474. The feast of the Rosary of the Blessed Virgin Mary was ordered to be observed on the first Sunday in Oct. in such churches as maintained an altar in honour of the rosary. Clement XI., by bull of Oct. 3, 1716, directed the observance of the feast by all Christendom.

BIBLIOGRAPHY.—*See* the critical dissertation in the *Acta sanctorum, Aug.* 1, 422 *sqq.*; Quétif and Échard, *Script. Ord. Praed.* i. 411 *sqq.*; Benedict XIV. olim Prospero de Lambertini, *De festis B.V.M.* i. 170 *sqq.*; H. Holzapfel, O.F.M., *St. Dominikus u. der Rosenkranz* (Munich, 1903); Pradel, *Rosenkranz-Büchel* (Trier, 1885); D. Dahm, *Die Brüderschaft vom hl. Rosenkranz* (Trier, 1902); H. Thurstan, S. J., in *Catholic Encycl.*, art. "Rosary." For the indulgences attached to the devotion consult Beringer, S.J., *Die Ablässe*, 11th éd. 292 ff., 354 ff. (Paderborn, 1895). For the corresponding devotion among Buddhists, consult Waddell, *The Buddhism of Tibet, or Lamaism* (London, 1895), and an article by Monier Williams in the *Athenaeum*, Feb. 9, 1878; for that of the Mohammedans, *see* L. Petit, *Les Confrères musulmanes* (Paris, 1899), and E. Arnold, *Pearls of the Faith, or Islam's Rosary* (London, 1882). There is an excellent article, "Rosenkranz," by Zöckler in Herzog-Hauck, *Realencyklopädie*, 3rd ed. vol. 17, pp. 144–150.

ROSAS, JUAN MANUEL DE (1793–1877), tyrant of Buenos Aires and outstanding figure in the history of Argentina, was born on March 30, 1793, in the city of Buenos Aires, where his father took an active part in defeating the English in 1807. Juan Rosas received a meagre education and at an early age left his parents. For a time he subsisted as a *vaquero*, or cowboy, but later purchased a cattle-run of his own, Los Cerrillos. The anarchical state of the country since winning its independence enabled him to obtain leave to arm his cowboys, whom he made the most efficient fighting force in the country. By adroit use of this weapon, and by strict attention to his own interest, he rapidly became the dominant figure in the province of Buenos Aires. As governor of the province from 1829 to 1832, he gave it the first peace it had known in 20 years, so that in 1835, after a brilliant Indian campaign, he was unanimously elected dictator of Buenos Aires, and held that position until 1852. Throughout his régime, he waged a war of extermination against the leaders of the interior provinces who sought to combine against him or to set up for

themselves as independent rulers. In spite of the continual combinations, domestic and foreign, in which this policy embroiled him, and of wars with Paraguay, Chile, Peru, Brazil, Uruguay, France and England, from which he had scarcely a moment's freedom, he broke the powers of the *caudillos* and upheld the supremacy of Buenos Aires in the country. In 1852 he was finally overthrown by a coalition of his neighbours and disaffected generals. He took refuge in England, at Swaythling, near Southampton, where he lived in poverty until his death on March 17, 1877.

(W. B. P.)

ROSCELLINUS (RUCELINUS or ROUSSELIN) (*c.* 1050–*c.* 1122), often called the founder of Nominalism (*see* SCHOLASTICISM), was born at Compiègne (Compendium). He studied at Soissons and Reims, was afterwards attached to the cathedral of Chartres, and became canon of Compiègne. It seems most probable that Roscellinus was not strictly the first to promulgate nominalistic doctrines; but in his exposition they received more definite expression, and, being applied to the dogma of the Trinity, attracted universal attention. Roscellinus maintained that it is merely a habit of speech which prevents our speaking of the three persons as three substances or three Gods. If it were otherwise, and the three persons were really one substance or thing (*una res*), we should be forced to admit that the Father and the Holy Spirit became incarnate along with the Son. Roscellinus seems to have put forward this doctrine in perfect good faith, and to have claimed for it at first the authority of Lanfranc and Anselm. In 1092, however, a council convoked by the archbishop of Reims condemned his interpretation, and Roscellinus, who was in danger of being stoned to death by the orthodox populace, recanted his error. He fled to England, but having made himself unpopular by an attack on the doctrines of Anselm, he left the country and repaired to Rome, where he was well received and became reconciled to the Church. He then returned to France, taught at Tours and Loc-menach (Loches) in Brittany (where he had Abelard as a pupil), and finally became canon of Besançon. He is heard of as late as 1121, when he came forward to oppose Abelard's views on the Trinity.

Of the writings of Roscellinus, nothing is preserved except a letter to Abelard, mainly concerned with the doctrine of the Trinity (ed. J. A. Schmeller, Munich, 1850). *See* F. Picaret, *Rosselin, philosophe et théologien* (1896), and authorities quoted under SCHOLASTICISM.

ROSCIUS GALLUS, QUINTUS (*c.* 126–62 B.C.), Roman actor, was born, a slave, at Solonium, near Lanuvium. He studied the delivery and gestures of the most distinguished advocates in the Forum, especially Q. Hortensius, and won universal praise for his grace and elegance on the stage. He especially excelled in comedy. Cicero took lessons from him. The two often engaged in friendly rivalry to try whether the orator or the actor could express a thought or emotion with the greater effect, and Roscius wrote a treatise in which he compared acting and oratory. Q. Lutatius Catulus composed a quatrain in his honour, and the dictator Sulla presented him with a gold ring, the badge of the equestrian order, a remarkable distinction for an actor in Rome, where the profession was held in contempt. Like his contemporary Aesopus, Roscius amassed a large fortune, and he appears to have retired from the stage some time before his death. In 76 B.C. he was sued by C. Fannius Chaerea for 50,000 sesterces (about £400), and was defended by Cicero in a famous speech.

See H. H. Pflüger, *Cicero's Rede pro Q. Roscio Comoedo* (1904).

ROSCOE, SIR HENRY ENFIELD (1833–1915), English chemist, was born in London on Jan. 7, 1833. After studying at University college, London, where he came under the influence of Graham and Williamson, he went to Heidelberg to work under R. W. Bunsen. In 1857 he succeeded Sir E. Frankland in the chair of chemistry at Owens college, Manchester, where he remained for 30 years, and from 1885 to 1895 he was M.P. for the south division of Manchester. He served on several royal commissions on educational questions, in which he was keenly interested, and from 1896 to 1902 was vice-chancellor of London university. He was elected a fellow of the Royal Society in 1863 and awarded a Royal Medal in 1873. He was knighted in 1884, and died at Leatherhead, Surrey, on Dec. 18, 1915.

Roscoe's first published paper (1854) deals with the analysis of certain varieties of gneiss, but this problem was set him in order to acquire analytical skill. His scientific work includes a memorable series of researches carried out with Bunsen between 1855 and 1862, in which they laid the foundations of comparative photochemistry; this work was subsequently continued by Roscoe alone. In 1867 he began an elaborate investigation of vanadium and its compounds, which probably constitutes his chief contribution to inorganic chemistry; he devised a process for preparing the metal in a pure state. He was the author of researches on niobium, tungsten, uranium, perchloric acid, the solubility of ammonia, etc. Roscoe also investigated the "constant boiling mixtures" of the common volatile acids with water; he proved that the compositions of the mixtures depended on the external pressure and so they could not be definite compounds. He was very interested in spectrum analysis, but although he lectured and wrote on the subject he did little research in this direction. His publications include: *Lectures on Spectrum Analysis* (1869); a *Treatise on Chemistry* (the first edition of which appeared in 1877–92); *A New View of Dalton's Atomic Theory*, with Dr. A. Harden (1896); and an *Autobiography* (1906). The *Treatise on Chemistry*, written in collaboration with Carl Schorlemmer (1834–92), is a standard work.

See Obituary notice, *Proc. Roy. Soc.*, vol. 93 (1916–17).

ROSCOE, WILLIAM (1753–1831), English historian and miscellaneous writer, was born on March 8, 1753 at Liverpool, the son of a market-gardener and publican. In 1769 he was articled to a solicitor, and in 1774 he commenced business as an attorney. Roscoe was also a political pamphleteer, and like many other Liberals of the day hailed the promise of liberty in the French Revolution. The commercial crisis of 1816 brought to Roscoe great difficulties, and forced him to sell his great collection of books and pictures. Some of these were secured by friends and placed in the library of the Liverpool Athenaeum. Roscoe now found a pleasant task in arranging the library of his friend Coke of Holkham. He died on June 30, 1831.

The first edition of his *Poetical Works* was published in 1857, and is sadly incomplete, omitting, with other verses known to be from his pen, the *Butterfly's Ball*, a fantasy, which has charmed thousands of children since it appeared in 1807. Other verses are in *Poems for Youth, by a Family Circle* (1820).

The *Life* by his son Henry Roscoe (2 vols., 1833) contains full details of Roscoe's career, and there are references to him in the *Autobiographical Sketches* of De Quincey, and in Washington Irving's *Sketch Book*.

ROSCOMMON, WENTWORTH DILLON, 4TH EARL OF (*c.* 1630–1685), English poet, was born in Ireland about 1630. He was a nephew of Thomas Wentworth, earl of Strafford, and was educated partly under a tutor at his uncle's seat in Yorkshire, partly at Caen in Normandy and partly at Rome. After the Restoration he returned to England, and was well received at court. In 1649 he had succeeded to the earldom of Roscommon, and he was now put in possession by act of parliament of all the lands possessed by his family before the Civil War.

His reputation as a didactic writer and critic rests on his blank verse translation of the *Ars Poetica* (1680) and his *Essay on Translated Verse* (1684). The essay contained the first definite enunciation of the principles of "poetic diction," which were to be fully developed in the reign of Queen Anne. Roscommon, who was fastidious in his notions of "dignified writing," was himself a very correct writer, and quite free from the indecencies of his contemporaries. He saw clearly that a low code of morals was necessarily followed by a corresponding degradation in literature, and he insists that sincerity and sympathy with the subject in hand are essential qualities in the poet. He has the distinction of having been the first critic to avow his admiration for *Paradise Lost*. He was buried in Westminster Abbey on Jan. 21, 1685.

Roscommon's poems were collected in 1701, and are included in Anderson's and other collections of the British poets. He also translated into French from the English of Dr. W. Sherlock, *Traitté touchant l'obéissance passive* (1686).

ROSCOMMON, a county of Ireland in the province of Connaught, bounded north-east by Leitrim, north-west by Sligo, west

by Mayo, west and south by Galway, east by Longford and east and south by Westmeath and Offaly County. The area is 629,633 ac., or about 985 sq.m. Pop. (1926) 83,504. The greater part of the county belongs to the great limestone plain of central Ireland. In the north-east, on the Leitrim border, the Braulieve mountains, consisting of flat-topped ridges, attain an elevation in Cashel mountain of 1,377 ft.; and in the north-west the Curlew mountains, of similar formation, between Roscommon and Sligo, rise abruptly to a height over 800 feet. In the east the Slievebawn range, formed of sandstone, have a similar elevation. The Shannon forms nearly the whole eastern boundary of the county, and on the west the Suck from Mayo forms for over 50 m. the boundary with Galway till it unites with the Shannon at Shannon Bridge. The other tributaries of the Shannon within the county are the Arigna, the Feorish and the Boyle. The lakes formed by expansions of the Shannon on the borders of Co. Roscommon are Loughs Allen, Boderg, Boffin, Forbes and Ree. Other lakes within the county are Lough Key in the north and Lough Gara (mostly in Co. Sligo) in the north-west. The county town, Roscommon, has a population of 1,830.

The district was granted by Henry III. to Richard de Burgo, but remained almost wholly in the possession of the native septs. Until the time of Elizabeth, Connaught was included in the two districts of Roscommon and Clare, but in 1579 it was further subdivided by Sir Sydney, and was assigned its present limits. All the old proprietors were dispossessed at the Cromwellian settlement, except the O'Conor family headed by the O'Conor Don. Within the county are the ruins of Crogan, the palace of the kings of Connaught. The principal ancient castles are the stronghold of the M'Dermotts on Castle island, Lough Key, the dismantled castle of the M'Donoughs at Ballinafad, and the extensive fortress at Roscommon rebuilt by John d'Ufford, justiciary of Ireland in 1268. There are fragments of a round tower at Oran. The abbey of Boyle is in good preservation, and has good Norman arches. The Irish bard Carolan, who died in 1738, is buried by the ruined church of Kilronan, in the extreme north of the county. The bishopric of Elphin was united with Kilmore and Ardagh in 1833, and the former cathedral and episcopal buildings are largely modernized.

The administrative county of Roscommon returns four members to Dáil Eireann.

ROSE, the name of a distinguished family of German chemists. VALENTINE ROSE the elder was born on Aug. 16, 1736 at Neu-Ruppin, and died on April 28, 1771 at Berlin, where he was an apothecary and, for a short time, assessor of the Ober Collegium Medicum. He was the discoverer of "Rose's fusible metal." His son, VALENTINE ROSE the younger, born on Oct. 31, 1762, at Berlin, was also an apothecary in that city and assessor of the Ober Collegium Medicum from 1797. It was he who in 1800 proved that sulphuric ether contains no sulphur. He died in Berlin on Aug. 10, 1807, leaving four sons, one of whom, Heinrich, was a distinguished chemist, and another, Gustav, a crystallographer and mineralogist. HEINRICH ROSE, born at Berlin on Aug. 6, 1795, began to learn pharmacy in Danzig. During the summer of 1816 he studied at Berlin under M. H. Klaproth, and in the autumn entered a pharmacy at Mitau. In 1819 he went to Stockholm, where he spent a year and a half with J. J. Berzelius, and in 1821 he graduated at Kiel. Returning to Berlin he became a *Privatdozent* in the university in 1822, extraordinary professor of chemistry in 1823 and ordinary professor in 1835, and there he died on Jan. 27, 1864. He devoted himself especially to inorganic chemistry and the development of analytical methods, and the results of his work are summed up in the successive issues of his classical work, *Ausführliches Handbuch der analytischen Chemie* (Berlin, 1829; 6th revised ed. in French, Paris, 1861). He was the discoverer of antimony pentachloride and Columbium compounds.

His brother, GUSTAV ROSE (1798–1873), born at Berlin where he became successively *Privatdozent* (1823), extraordinary professor of mineralogy (1826) and ordinary professor (1839). He explored Southern Asia under the direction of Humboldt, and also made detailed studies of Vesuvius and Etna and of the extinct volcanoes of Auvergne. The science of petrography, according to G. vom Rath, originated with him. He was the first in his own country to use the reflecting goniometer for the measurement of the angles of crystals, and to teach the method of studying rocks by means of microscopic sections.

In addition to many scientific memoirs he published *Elemente der Krystallographie* (1830); *Mineralogischgeognostische Reise nach dem Ural, dem Altai und dem Kaspische Meere* (1837–42); *Das Krystallochemische Mineral-system* (1852); and *Beschreibung und Eintheilung der Meteoriten* (1863).

ROSE, JOHN HOLLAND (1855–), English historian, was born at Bedford, and educated at Owens college, Manchester. In 1911 he was appointed reader in modern history, and in 1919 Vere-Harmsworth professor of naval history, at Cambridge university. His researches were directed to the French revolutionary and Napoleonic era on which he became a recognized authority.

His numerous historical works include *The Life of Napoleon I.* (1902); *The Development of the European Nations, 1870–1900* (1905); *William Pitt and the Great War* (1911); *The Personality of Napoleon* (1912); *The Origin of the War* (1914); *Nationality as a Factor in Modern History* (1916) and many articles and papers.

ROSE (*Rosa*). The rose has for all ages been the favourite flower, and has a place in general literature that no other plant can rival. In most cases the rose of the poets and the rose of the botanist are one and the same in kind, but popular usage has attached the name rose to a variety of plants whose kinship to the true plant no botanist would for a moment admit. The rose gives its name to the family Rosaceae, of which it may be considered the type. The genus consists of species varying in number, according to the diverse opinions of botanists, from 30 to 180, or even 250, exclusive of the many hundreds of mere garden varieties. The wide discrepancy above alluded to illustrates very forcibly the extreme variability of the plants, their adaptability to various conditions, and consequently their wide dispersion over the globe, the facility with which they are cultivated, and the readiness with which new varieties are continually being produced in gardens by the art of the hybridizer or by careful selection. The species are natives of all parts of the Northern Hemisphere but, except at considerable elevations, are scantily represented in the Tropics.

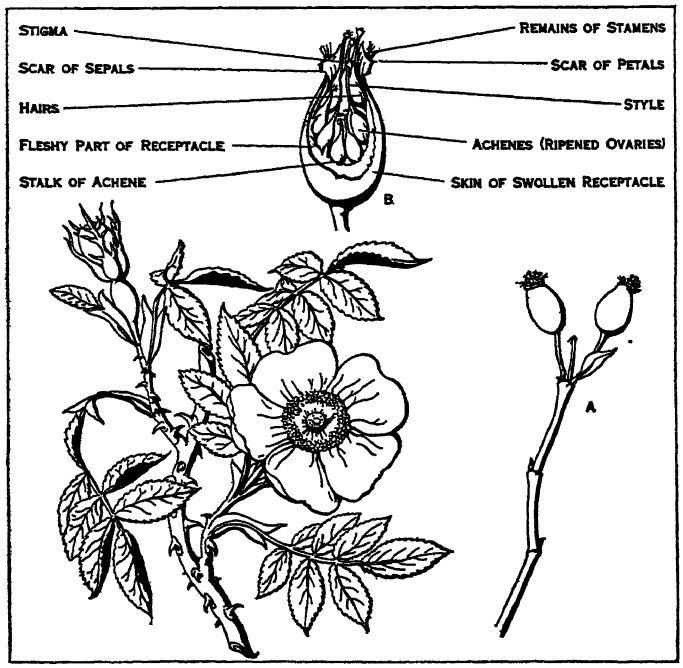
They are erect or climbing shrubs, never herbs or trees, generally more or less copiously provided with straight or hooked prickles of various shapes and with glandular hairs, as in the sweet-brier or in the moss-rose of gardens. The leaves are invariably alternate, provided with stipules, and unequally pinnate, the leaflets varying in number from 1 to 11 and even 15, the odd leaflet always being at the apex, the others in pairs. The flowers are solitary or in loose cymes (cluster-roses) produced on the ends of the shoots. The flower-stalk expands into a vase- or urn-shaped dilatation, called the receptacle or receptacular tube, which ultimately becomes fleshy and encloses in its cavity the numerous carpels or fruits. From the edge of the urn or "hip" proceed five sepals, often more or less compound like the leaves and overlapping in the bud. Within the sepals are five petals, generally broad or roundish in outline, with a very short stalk or none at all, and of very various shades of white, yellow or red. The very numerous stamens originate slightly above the sepals and petals; each has a slender filament and a small two-celled anther. The carpels are very numerous, ultimately hard in texture, covered with hairs, and each provided with a long style and button-like stigma. The carpels are concealed within the receptacular tube and only the stigmas as a rule protrude from its mouth. Each carpel contains one ovule.

The so-called fruit is merely the receptacular tube, which, as previously mentioned, becomes fleshy and brightly coloured as an attraction to birds, which devour the hips and thus secure the dispersion of the seed. The stamens are in whorls, and, according to Payer, they originate in pairs one on each side of the base of each petal so that there are ten in each row; a second row of ten alternates with the first, a third with the second, and so on. By repeated radial and tangential branching a vast number of stamens are ultimately produced, and when these stamens assume a petaloid aspect we have as a consequence the double

flowers which are so much admired. Under natural circumstances rose flowers do not secrete honey, the attraction for insects being provided by the colour and perfume and the abundance of pollen for food. The stigmas and anthers come to maturity at the same time, and thus, while cross-fertilization by insect agency is doubtless most common, self-fertilization is not prevented.

The large number of species, subspecies, varieties and forms described as British may be included under about 12 species. Among them may be mentioned *R. spinosissima,* the Scotch rose, much less variable than the others; *R. rubiginosa* (or *R. eglanteria*), the sweet-brier, represented by several varieties; *R. canina,* the dog rose, including numerous subspecies and varieties; the large-fruited apple rose, *R. pomifera;* and *R. arvensis,* the parent of the Ayrshire roses. Cultivated roses are frequently "budded" or worked upon the stems of the brier or *R. canina,* or upon young seedling plants of the same species; and upon stems of an Italian rose called the Manetti. Other species, notably *R. polyantha* and *R. rugosa,* also are used for stocks and do well.

The numerous forms native to North America may be referred to about 20 species. These are widely distributed and include several well-known wild roses. The smooth rose (*R. blanda*), usually lacking prickles, with flowers about 3 in. broad, occurs abundantly from Newfoundland to Saskatchewan and southward to New Jersey and Missouri. The prickly rose (*R. acicularis*), with spiny stems, leaves composed of from 5 to 9 leaflets, and solitary flowers, 2½ in. broad, ranges from Quebec to Alaska and south to Colorado. The pasture rose (*R. virginiana*), from ½ to 6 ft. high, with few or solitary flowers, 2 to 3 in. across, sometimes double, occurs from Newfoundland to Wisconsin and south to Georgia. This is the most common wild rose of the Eastern States and Canada. The prairie rose (*R. setigera*), with climbing



DOG ROSE (ROSA CANINA), SHOWING SPRAY WITH FLOWERS, LEAVES AND THORNS
(A) Fruit (hips), (B) One hip cut vertically to show achenes or true fruits inside the ripened receptacle (pome)

stems, leaves usually with three leaflets, bears rose-pink flowers which turn white with age. This handsome rose, which grows wild from Ontario to Wisconsin and south to Florida and Texas, has become naturalized eastward to New England. The California rose (*R. californica*), a sparsely prickly shrub, 3 to 9 ft. high, flowering nearly the year round, sometimes forms thickets along streams. The Cherokee rose (*R. laevigata*), a vigorous evergreen climber native to China and Japan, widely planted in the Southern States and running wild as if indigenous, was first described botanically from American plants.

Roses have been grown for so many centuries and have been crossed and recrossed so often that it is difficult to refer the cultivated forms to their wild prototypes. The older roses doubtless originated from *R. gallica,* a native of central and southern Europe. *R. centifolia* (the cabbage rose), a native of the Caucasus, contributed its share. A cross between *R. gallica* and *R. indica* was the source of the important Bourbon roses. The yellow-flowered Austrian and Persian brier originated from *R. lutea,* a native of Austria and the East. The monthly or China roses sprang from the Chinese *R. indica,* and these, crossed with others of the *R. centifolia* or *gallica* type, are the source of the "hybrid perpetuals." Tea roses and noisettes also acknowledge *R. indica* as one of their progenitors. A magnificent race called "hybrid teas" have been evolved by crossing the tea roses and hybrid perpetuals. They are much more vigorous in constitution than the true tea roses, while quite as beautiful in blossom and more perpetual in bloom than the hybrid perpetuals. By crossing the Japanese *R. Wichuriana* with hybrid perpetuals a beautiful and vigorous race of climbers has been produced.

The Banksian rose is a Chinese climbing species, with small white or fawn-coloured flowers of great beauty, but rarely seen; the Macartney rose (*R. bracteata*) is also of Chinese origin. Its nearly evergreen deep green leaves and large white flowers are very striking. The Japanese *R. rugosa* is also a remarkable species, notable for its bold rugose foliage, its large white or pink flowers, and its conspicuous globular fruit. *R. damascena* is cultivated in some parts of the Balkans for the purpose of making attar of roses. In Germany the same variety of rose is used, while at Grasse a strain of the Provence rose is cultivated for the same purpose. In India *R. damascena* is grown largely near Ghazipur for the purpose of procuring attar of roses and rose water. Rose water is chiefly produced in Europe from the Provence or cabbage rose, *R. centifolia,* grown for the purpose at Mitcham, England, and abundantly in the south of France. Conserve of roses and infusion of roses, two medicinal preparations, are prepared from the petals of *R. gallica.* A conserve of roses is made in the Caucasus.

Cultivation.—The rose is so universal a favourite that some portion of the garden must necessarily be devoted to it, if the situation be at all favourable. Many choice roses will not, however, thrive in the vicinity of large towns, since they require a pure air, and do not endure a smoky atmosphere. The best soil for them is a deep rich strong loam free from stagnant moisture. Very light sandy or gravelly soils, or soils which are clayey and badly drained, are not suitable. Light soils would be improved by a dressing of strong loam in conjunction with cow-dung or nightsoil; the latter, provided it is properly prepared and not too fresh, is indeed the very best manure for roses in all but soils which are naturally very rich. Heavy soils are improved by adding burned earth or gritty refuse, with stable manure and leaf-mould, peat moss litter, etc.; and damp soils must necessarily be drained by trenching. Tea roses may, however, be grown to perfection in a gravel soil, provided it be well manured. Roses generally require a constant annual supply of manure, and, if this is given as a mulching in autumn, it serves to protect their roots through the winter. They also require liberal supplies of water during the growing season, unless the surface is mulched or top-dressed from time to time with well-rotted manure. Mulching with manure however, during the growing season has the disadvantage that it enriches the top layer of soil and encourages the formation of surface roots which often perish from lack of moisture during hot weather; and many growers prefer to rely on keeping a top mulch of fine soil by frequent and vigorous hoeing.

An open situation, not shaded but sheltered from strong winds, is what the rose prefers. October and November are the best months for planting roses, but if the weather be wet or frosty and the soil sticky, the plants should be placed in a sheltered place and protected by green boughs or matting until suitable conditions prevail. The planting should never be deep, the uppermost layer of roots being about 2 or 3 in. below the general level

of the surface, and the soil should always be kept stirred with the hoe during the summer months. In regard to pruning, roses vary considerably, some requiring close cutting and others only thinning out; some again, such as strong growing climbers, may be safely pruned in autumn, and others are better left till spring. Instructions on this point as to the several groups of varieties will be found in most rose catalogues. It may be laid down as a general rule that the more strongly growing varieties should be less severely cut back than the weakly varieties; and, again, the more tender the variety, the later in the spring should the pruning be done, April being the best month for pruning teas and noisettes.

Where dwarf beds of roses are required, a good plan is to peg down to within about 6 in. from the ground the strong one-year-old shoots from the root. In due time blooming shoots break out from nearly every eye, and masses of flowers are secured, while strong young shoots are thrown up from the centre, the plant being on its own roots. Before winter sets in, the old shoots which have thus flowered and exhausted themselves are cut away, and three or four or more of the strongest and best ripened young shoots are reserved for pegging down the following season, which should be done about February. In the meantime, after the pruning has been effected, plenty of good manure should have been dug in lightly about the roots. Thus treated, the plants never fail to produce plenty of strong wood for pegging down each succeeding season.

One of the most troublesome fungoid pests of the rose is the mildew (*Sphaerotheca pannosa*). The young shoots, leaves and flower-buds frequently become covered with a delicate white mycelium, which by means of the suckers it sends into the underlying cells robs its host of considerable amounts of food, and causes the leaves to curl and fall early. The spores are produced in great abundance and carried by animals and the wind to other plants, and so the disease is rapidly spread. Later the mycelium increases and forms a thick velvety coating on the young shoots, and in this the winter stage of the fungus is produced. Spraying with potassium sulphide (1 oz. to 2 to 3 gal. of water) is a good means of checking the spread of the disease.

The rose rust (*Phragmidium subcorticatum*) appears on both cultivated and wild roses in the spring, bursting through the bark in the form of copious masses of orange powder consisting of the spores of the fungus. These spores infect the leaves, and produce on them in the summer small dots of an orange colour and, later, groups of spores that are able to live through the winter. The last, the teleutospores, are of a dark colour, and it is by these that the disease is started in the spring. It is therefore important that all the affected leaves should be destroyed in the autumn, and the bushes should be sprayed with a copper mixture in the spring to prevent the infection of the leaves by spores brought from a distance. Many other fungi attack the rose, but perhaps the only other one that merits mention here is *Actinonema Rosae*. This attacks the leaves, forming large dark blotches upon them and frequently causing them to fall prematurely.

A very large number of insect pests are found upon the rose, but the best known and most formidable on account of their great powers of reproduction are the aphides. More than one species is found upon the rose, though *Aphis rosae* is the commonest. Their attack should be checked by the use of a quassia or nicotine spray. The larvae of some of the *Tortrix* moths fold the leaves almost as soon as they are developed from the bud, and do considerable damage in this way and by devouring the leaves, while several "looper" caterpillars are also found feeding on the foliage. Many species of saw-fly larvae are also known to attack the rose, feeding either upon the leaves or devouring the young shoot. These larvae should be carefully searched for and destroyed whenever found.

See Dean Hole, *Book about Roses* (1894); Rev. A. Foster Mellias, *Book of the Rose* (1905); J. Weathers, *Beautiful Roses for Garden and Greenhouse* (1903); J. H. Pemberton, *Roses, their History, Development and Cultivation* (1908); L. H. Bailey, *The Standard Cyclopedia of Horticulture* (1914–27); J. H. Nicolas, *Rose Manual* (1930), and the publications of the National Rose Society.

ROSEBERY, ARCHIBALD PHILIP PRIMROSE, 5TH EARL OF (1847–1929), British statesman, born in London on May 7, 1847, was the son of Archibald, Lord Dalmeny (1809–1851) and Catherine, daughter of the 4th earl Stanhope. Lady Dalmeny married, after her husband's death, the duke of Cleveland. Young Dalmeny was educated at Brighton and at Eton, where he had as slightly junior contemporaries A. J. Balfour and Randolph Churchill. In 1866 he matriculated at Christ Church, Oxford, but went down in 1868, by the request of the dean, rather than abandon the possession of a small racing stud. In the same year he succeeded his grandfather, the 4th earl, in the earldom and the family estates. After some time spent in travel he acquired an English country house called The Durdans, Epsom, which he largely rebuilt and adorned with some of the finest turf portraits of George Stubbs. He had a famous stable, and, later, won the Derby three times, in 1894, 1895 and 1905. In 1878 he married Hannah, only child of Baron Meyer Amschel de Rothschild.

Though impeded in his political career by his exclusion from the House of Commons, Lord Rosebery's reputation as a social reformer and orator was steadily growing. In 1878 he was elected Lord Rector of Aberdeen and in 1880 of Edinburgh University, where he gave an eloquent address upon Patriotism. In 1880 he entertained Gladstone at Dalmeny, and during the "Mid Lothian campaign" he arranged the demonstrations. In August 1881 he became under-secretary at the home office, his immediate chief being William Harcourt. His work was practically confined to the direction of the Scottish department of the office, and he resigned in 1883. He resumed office (1884) as first commissioner of works with a seat in the cabinet.

In the brief Gladstonian government of 1886 Lord Rosebery threw in his lot with the old leader, and was foreign secretary. His views on foreign policy differed materially from those of Granville and Gladstone. His mind was dwelling constantly upon the political legacy of the two Pitts; he was a reader of John Seeley; he had himself visited the colonies; had predicted that a war would not, as was commonly said, disintegrate the empire, but rather the reverse; had magnified the importance of taking colonial opinion, and had always been a convinced advocate of some form of Imperial Federation. He was already taunted with being an Imperialist, but his independent attitude won public approval. In January 1889 he was elected a member of the first county council of London, and on Feb. 12, chairman of that body by 104 votes to 17. With a view to the impending political campaign he found it necessary to resign the chairmanship of the county council in June. In November of this year, however, Lady Rosebery died, and he withdrew for a period from public business. In January 1892 he again for a few months became chairman of the county council. In October he received the Garter.

In August 1892, upon the return of Gladstone to power, he was induced with some difficulty (for he was suffering at the time from insomnia) to resume his position as foreign minister. He strongly opposed the evacuation of Egypt; he insisted upon the exclusive control by Great Britain of the Upper Nile Valley, and also upon the retention of Uganda. In 1893 the question of Siam came near to causing serious trouble with France, but the crisis was averted, and the lines were laid down for preserving Siam, if possible, as a buffer state between the English and French frontiers in Indo-China. In the spring of 1895 he was clear-sighted enough to refuse to join the anti-Japanese league of Russia, France and Germany at the end of the China-Japan War.

Lord Rosebery's personal popularity had been increased at home by his successful intervention in the coal strike of December 1893, and when in March 1894 the resignation of Gladstone was announced, his selection by Queen Victoria for the premiership was generally welcomed, but the malcontents in his own party, who considered that William Harcourt should have been the prime minister, or who were perpetually intriguing against a leader who did not satisfy their idea of radicalism, made Lord Rosebery's personal position no easy one. The support of the Irish Nationalists was endangered by his insistence that the goodwill of England, the "predominant partner," was essential to the success of Home Rule. On June 24, 1895, the government fell.

For the state of disorganization and discontent in the Liberal Party during the next ten years of opposition *see* LIBERAL PARTY. The breach between William Harcourt and Rosebery had never been healed, and Rosebery found himself also, to his great grief, at variance with Gladstone. He declined to support Gladstone's demand for intervention on behalf of the Armenians at the risk of a European war, and on Oct. 8, 1896, he announced to the Liberal whip, Thomas Ellis, his resignation of the Liberal leadership. For some time he held aloof from party politics, "ploughing his furrow alone," as he afterwards phrased it.

In 1898, on the death of Gladstone, he paid a noble and eloquent tribute in the House of Lords to the life and public services of his old leader. He gave a general support to the policy of the Salisbury government on the South African War. But the war had brought to the front a section antagonistic to the war and known in the jargon of the day as pro-Boers. These had won the qualified support of Campbell-Bannerman, the leader in the House of Commons. Lord Rosebery maintained for the most part a sphinx-like seclusion, but in July 1901 he at last came forward strongly as the champion of the Liberal Imperialist section of the party, which included Asquith, Grey and Haldane. At a meeting at Chesterfield (Dec. 1901), he spoke of "cleaning the slate" of the old party cries, and eventually spoke of his separation from the "tabernacle" of Campbell-Bannerman. But the main body of the party stood by Campbell-Bannerman, and a partial reconciliation was effected. Chamberlain's tariff reform campaign helped to bring the Liberal Imperialists nearer to the rest of the party. Rosebery's own pronouncements on the tariff issue were hesitating, and to some extent contradictory. But though he eventually came into line with his colleagues on tariff reform, he finally broke with Campbell-Bannerman on the question of Home Rule for Ireland. On the fall of the Conservative government in Dec. 1905, Campbell-Bannerman was invited to form a cabinet, and Rosebery retired from party politics, though he encouraged his immediate associates to join the new government.

Rosebery continued eloquent and witty addresses on miscellaneous subjects. No public man of his time was more fitted to act as unofficial national orator; none more happy in the touches with which he could adorn a social or literary topic and charm a non-political audience; and on occasion he wrote as well as he spoke. His *Pitt* (1891) was already a classic; his *Appreciations and Addresses* and his *Peel* (containing a remarkable comment on the position of an English prime minister) were published in 1899; his *Napoleon: the Last Phase*—an ingenious, if paradoxical attempt to justify Napoleon's conduct in exile at St. Helena—in 1900; his *Cromwell* in the same year. In 1906 he published an appreciation of his old friend Randolph Churchill, inspired by the publication of Winston Churchill's *Life* of his father.

Lord Rosebery took an active part in the constitutional crisis in 1910 and 1911. He treated the Parliament Bill as a revolutionary measure, which in effect constituted single-chamber government, and did his utmost to arouse the nation to a sense of its danger. While, however, he bitterly condemned the conduct of ministers in going to "a young and inexperienced King" for contingent guarantees, he declined to follow the extreme course, recommended by the "die-hards," of rejecting the bill. He shrank from the scandal of a great creation of peers. If the bill were allowed to pass, the House of Lords would be left with some vitality; if the creation of peers were forced, they would have none at all. He showed his own estimate of the impotence of the House after the passage of the bill by ceasing to attend its debates; and indeed he took no further part in public life till the outbreak of war in 1914 fired his patriotism. As lord-lieutenant of Midlothian and Linlithgowshire he promoted recruiting and other war-like activities among his own people and helped to hearten the nation and to avert a premature peace by occasional speeches. In 1921 he published a number of collected papers under the title of *Miscellanies: Literary and Historical.* He was chancellor of Glasgow university in 1908, as he had long been chancellor of London university, and he was chosen lord rector of St. Andrew's university for the year of its quincentenary celebration in 1911.

Lord Rosebery had two sons and two daughters. His eldest son, Lord Dalmeny (b. Jan. 1882), entered parliament in 1906 as Liberal member for Mid Lothian, but retired in 1910; he was well known as a cricketer, captaining the Surrey eleven in 1905 and 1906. The younger son, Neil Primrose (1882–1917) was under-secretary for the Foreign Office in 1915 and parliamentary secretary for munitions in 1916. He died of wounds received in action in Palestine on Nov. 18, 1917. The elder daughter, Lady Sybil, in 1903 married Captain Charles Grant; the younger, Lady Margaret, in 1899 married the 1st earl of Crewe.

Lord Rosebery died at his home at Epsom, Surrey, May 21, 1929.

ROSEBURG, a city of western Oregon, U.S.A., on the South Umpqua river, 200 m. S. of Portland, between the Cascade and the Coast ranges; the county seat of Douglas county. It is on the Pacific highway and the Southern Pacific railroad. Pop. (1920) 4,381 (95% native white); 1930 by Federal census 4,362. Roseburg is the metropolis of the fertile Umpqua valleys. The city was founded in 1858 and incorporated in 1872.

ROSECRANS, WILLIAM STARKE (1819–1898), American soldier, was born in Kingston (O.), on Sept. 6, 1819, and graduated in 1842 from the U.S. Military Academy. After serving (1843–47) as assistant professor at West Point, he resigned (April 1854) and went into business in Cincinnati. On the outbreak of the Civil War he volunteered for service under McClellan and helped raise the Ohio "Home Guards," with which he served in the West Virginian operations of 1861 as brigadier general. He was second in command to McClellan during this campaign, and succeeded to the command when that officer was called to Washington. In the latter part of 1861 he conducted further successful operations in the same region, and early in 1862 was transferred to the West as a major general of volunteers. He took part in the operations against Corinth, and when Gen. John Pope was ordered to Virginia, Rosecrans took over command of the army of the Mississippi, with which he fought the successful battles of Iuka and Corinth. Soon afterwards he replaced D. C. Buell in command of the forces. In December he advanced against Gen. Braxton Bragg, and on Dec. 31 to Jan. 3 fought the bloody, indecisive battle of Stone river (Murfreesboro), after which Bragg withdrew his army to the southward. In 1863 Rosecrans, refusing to advance until the isolation of Vicksburg was assured, did not take the offensive until late in June. The operations thus begun were most skilfully conducted and Bragg was forced back to Chattanooga, whence he had to retire. But Rosecrans sustained a great defeat at the battle of Chickamauga (*q.v.*), and was soon besieged in Chattanooga. He was then relieved from his command. Later he did good service in Missouri, and in March 1865 was made brevet-major general U.S.A. He resigned in 1867, and in 1868 became minister to Mexico. He was a representative in Congress from California, 1881–85, and register of the treasury, 1885–93. Under an act of Congress he was, on March 2, 1889, restored to the rank of brigadier general and retired. He died near Redondo (Calif.), March 11, 1898. On May 17, 1902 his body was reinterred with military honours in the National Cemetery at Arlington.

See Edward Channing, *History,* vol. vi.; J. B. McMaster, *History of the People During Abraham Lincoln's Administration* (1927).

ROSEGGER, PETER (1843–1918), Austrian poet and novelist, known down to 1894 under the pseudonym *Petri Kettenfeier,* was born at Alpl near Krieglach in Upper Styria, on July 31, 1843, the son of a peasant. His work includes novels, poems, miscellaneous and religious writings and some books which are autobiographical in character, notably *Waldheimat* (1873) and *Mein Weltleben* (1898). He died on June 26, 1918.

Rosegger's *Ausgewählte Schriften* appeared in 30 volumes (1881–94); a popular edition (1895–1900); his *Schriften in steirischer Mundart* (3 vols., 1894–96). *See* also H. Möbius, *P. Rosegger* (1903).

ROSELLE AND ROSELLE PARK, two contiguous boroughs of Union county, New Jersey, U.S.A., adjoining Elizabeth on the west; served by the Central of New Jersey, the Lehigh Valley and (for freight) the Rahway Valley railways. The population of the borough of Roselle in the year 1930 was 13,021 by the Federal census, and of Roselle Park by the same census

and in the same year 8,969.

ROSELLINI, IPPOLITO (1800–1843), Italian Egyptologist, was born at Pisa. He studied under Mezzofanti at Bologna, and in 1824 became professor of oriental languages at Pisa. He is best known as the associate of J. F. Champollion (*q.v.*), whom he accompanied in his Egyptian explorations (1828), the account of which he published as *Monumenti dell' Egitto e della Nubia* (Florence, 1832–40, 10 vols. fol.).

ROSEMARY, botanically *Rosmarinus officinalis,* a plant of the mint family (Labiatae), the only representative of the genus and a native of the Mediterranean region. It is a low shrub with linear leaves, dark green above, white beneath, and with margins rolled back on to the under face. The flowers are in small axillary clusters. Each has a two-lipped calyx, from which projects a bluish two-lipped corolla enclosing two stamens. The fruit consists of four smooth nutlets. Rosemary was highly esteemed by the ancients for its aromatic quality and medicinal uses. In modern times it is valued mainly for its perfume; the oil is obtained by distillation. Rosemary plays an important part in literature and folk-lore, being an emblem of remembrance.

ROSENHEIM, a town and watering-place in the republic of Bavaria, at the confluence of the Mangfall and the Inn, 40 m. by rail S.E. of Munich. Pop. (1925) 17,998. Rosenheim is frequented for its saline and sulphur baths, and there are saltworks.

ROSENKRANZ, KARL (1805–1879), German philosopher of the Hegelian school, was born at Magdeburg on April 23, 1805. He was professor of philosophy at Königsberg from 1833 until his death on July 14, 1879. Rosenkranz was a loyal Hegelian. In the great division of the school, he, in company with Michelet and others, formed the "centre," midway between Erdmann and Gabler on the one hand, and the "extreme left" represented by Strauss, Feuerbach and Bruno Bauer. With F. W. Schubert he edited Kant's *Sämtliche Werke* (Leipzig, 12 vols., 1838–42), the last vol. of which contains his *Geschichte der kantischen Philosophie.*

See his autobiography entitled *Von Magdeburg nach Königsberg* (1873), which deals with his life up to the time of his settlement at Königsberg; Quäbicker, *Karl Rosenkranz* (1899), and J. Hutchison Stirling, *The Secret of Hegel* (1865) part 6.

ROSENWALD, JULIUS (1862–), American merchant and philanthropist, was born in Springfield, Ill., on Aug. 12, 1862, and was educated in the public schools. From 1885 to 1906 he was president of Rosenwald and Weil, clothing manufacturers, Chicago. In 1895 he became vice president and treasurer of the mail order house of Sears, Roebuck and Company, Chicago; from 1910–25 president, and from then on chairman of the board. The gross sales of the company, which approximated $2,000,000 in 1896, increased to $290,000,000 in 1927. He was, during the World War, a member of the advisory commission of the council of national defence by appointment by President Wilson, and in Aug. 1918 went on a special mission to France for the secretary of war. In 1910–20 he served in Washington as a member of the President's industrial conference.

In 1916 Rosenwald founded the Sears, Roebuck and Company employees' savings and profit sharing pension fund, to enable those who remain in the employ of the company ten years or more to secure an income after the close of their active business careers, or, in case of death, to provide an estate for their families. The fund has paid to employees who have left the service of the company, in cash and in shares of the company's capital stock, an amount equivalent to nearly $13,000,000. All of the fund's assets are invested in the company's capital stock, and on Dec. 31, 1927, it amounted to approximately 400,000 shares, having a market value of about $35,500,000 of which $5,500,000 was contributed by the employees. In Dec. 1921 Rosenwald pledged $21,000,000 to safeguard the interest of Sears, Roebuck and Company during the critical period of business readjustment after the war. In 1920 and 1921 the company had paid no dividends on its common stock and it was apparent that its capital at the end of 1921 must show impairment. By Rosenwald's action the company was enabled to readjust its finances without injury to its capital.

The Julius Rosenwald fund with assets of $20,000,000 is dedicated to "the well-being of mankind." It is the expressed intention of the founder that the entire fund, both capital and interest, shall be expended within a reasonable time; the income and part of the capital has been used to aid in the building of rural schools for negroes in 14 Southern States. By 1927 more than 4,000 Rosenwald schools, with a capacity for 467,000 pupils and 10,000 teachers had been built (409 in 1927). These buildings cost over $18,000,000, of which 59% has come from public funds, 20% from negroes, 4% from whites and 17% from the Rosenwald fund. Rosenwald has devoted much time to work for philanthropic, educational and civic organizations. He gave $100,000 to the Hoover German children's relief fund in 1920–21, $250,000 to the fund for Hampton-Tuskegee (negro educational institutions), $250,000 for a building to house Jewish philanthropic organizations of Chicago; and (with Mrs. Rosenwald) $3,000,000 for the University of Chicago. He founded dental infirmaries in the Chicago public schools. He also pledged $3,000,000 for an industrial museum in Chicago, and a total of $6,000,000 for Jewish colonization work in Russia. He has contributed $25,000 to each of 20 Y.M.C.A. and Y.W.C.A. buildings (costing $3,850,000) for negroes in 18 cities serving a negro urban population of more than 1,250,000. It is estimated that, in addition to the creation of the Julius Rosenwald fund, Rosenwald has given $15,000,000 for educational, civic and philanthropic causes. In recognition of his work on behalf of education of the coloured he has been given the William E. Harmon award for distinguished achievement in race relations. He is a trustee of the University of Chicago, the Chicago Orchestra association and other bodies; is chairman of the bureau of public efficiency and honorary chairman of the Jewish charities, all of Chicago; and is trustee of the Baron de Hirsch fund, Rockefeller foundation, Tuskegee normal and industrial institute, and many other organizations.

ROSES, WARS OF THE, a name given to a series of civil wars in England during the reigns of Henry VI., Edward IV. and Richard III. Their importance in the general history of England is dealt with elsewhere, and their significance in the history of the art and practice of war is small. They were marked by a ferocity and brutality practically unknown in the history of English wars before and since. The honest yeoman of Edward III.'s time had evolved into a professional soldier of fortune, and had been demoralized by the prolonged and dismal Hundred Years' War, at the close of which many thousands of ruffians, whose occupation had gone, had been let loose in England. At the same time the power of feudalism had become concentrated in the hands of a few great lords, who were wealthy enough and powerful enough to become king-makers. The disbanded mercenaries enlisted indifferently on either side, corrupting the ordinary feudal tenantry with the evil habits of the French wars, and pillaged the countryside, with accompaniments of murder and violence, wherever they went. It is true that the sympathies of the people at large were to some extent enlisted: London and, generally, the trading towns being Yorkist, the country people Lancastrian—a division of factions which roughly corresponded to that of the early part of the Great Rebellion, two centuries later, and similarly in a measure indicative of the opposition of hereditary loyalty and desire for sound and effective government. But there was this difference, that in the 15th century the feeling of loyalty was to a great extent focussed upon the great lords.

It is from the Wars of the Roses that there originated the deep-rooted dislike of the professional soldier which was for nearly four centuries a conspicuous feature of the English social and governmental system, and it is therefore in their results rather than their incidents that they have affected the evolution of war. They withdrew the English army system from European battlefields precisely at the moment of transition when the regimental and technical organization of armies was becoming a science and seeking models, and the all-powerful English longbow at the moment when the early, scarcely effective firearms were, so to speak, struggling for recognition as army weapons. On the other hand, they destroyed the British military organization. The national army, aloof from the main streams of military progress, remained for 150 years an aggregation of county levies armed

with bills and bows.

The first campaign, or rather episode, of these wars[1] began with an armed demand of the Yorkist lords for the dismissal of the Lancastrian element in the king's council, Henry VI. himself being incapable of governing. The Lancastrians, and the king with them, marched out of London to meet them, and the two small armies (3,000 Yorkists, 2,000 Lancastrians) met at St. Albans (May 22, 1455). The encounter ended with the dispersion of the weaker force, and the king fell into the hands of the Yorkists. Four years passed before the next important battle, Blore Heath, was fought (Sept. 23, 1459). In this the earl of Salisbury trapped a Lancastrian army in unfavourable ground near Market Drayton, and destroyed it; but new political combinations rendered the Yorkist victory useless and sent the leaders of the party into exile. They made a fresh attempt in 1460, and, thanks partly to treason in the Lancastrian camp, partly to the generalship of Warwick, won an important success and for the second time seized the king at Northampton (July 10, 1460). Shortly afterwards, after a period of negotiation and threats, there was a fresh conflict. Richard duke of York went north to fight the hostile army which gathered at York and consisted of Lancashire and Midland Royalists, while his son Edward, earl of March, went into the west. The father was ambushed and killed at Wakefield (Dec. 30, 1460), and the Lancastrians, inspired as always by Queen Margaret of Anjou, moved south on London, defeated Warwick at St. Albans (Feb. 17, 1461), and regained possession of the king's person. But the young earl of March, now duke of York, having raised an army in the west, defeated the earl of Pembroke (Feb. 2, 1461) at Mortimer's Cross (5m. west of Leominster). This was the first battle of the war which was characterized by the massacre of the common folk and beheading of the captive gentlemen—invariable accompaniments of Edward's victories, and notably absent in Warwick's. Edward then pressed on, joined Warwick, and entered London, the army of Margaret retreating before them. The excesses of the northern Lancastrians in their advance produced bitter fruit on the retreat, for men flocked to Edward's standard. Marching north in pursuit, the Yorkists brought their enemy to bay at Towton (*q.v.*), 3m. south of Tadcaster, and utterly destroyed them (March 29, 1461). For three years after Towton the war consisted merely of desultory local struggles of small bodies of Lancastrians against the inevitable. The duke of York had become King Edward IV., and had established himself firmly. But in 1464, in the far north of England, the Red Rose was again in the field. Edward acted with his usual decision. His lieutenant Montagu (Warwick's brother) defeated and slew Sir Ralph Percy at Hedgley Moor, near Wooler (April 25, 1464), and immediately afterwards destroyed another Lancastrian army, with which were both Henry VI. and Queen Margaret, at Hexham (May 8, 1464). The massacres and executions which followed effectively crushed the revolt. For some years thereafter Edward reigned peacefully, but Warwick the king-maker and all the Neville following having turned against him (1470), he was driven into exile. But at a favourable moment he sailed from Flushing with 1,500 retainers and Burgundian mercenaries, and eluding the Lancastrian fleet and the coast defence troops, landed at Ravenspur (Spurn Head) in Yorkshire in March 1471. His force was hardly more than a bodyguard; the gates of the towns were shut against him, and the country people fled. But by his personal charm, diplomacy, fair promises and an oath of allegiance to King Henry VI., sworn solemnly at York, he disarmed hostility and, eluding Montagu's army, reached his own estates in the Wakefield district, where many of his old retainers joined him. As he advanced south, a few Yorkist nobles with their following rallied to him, but it was far more the disunion of the Warwick and the real Lancastrian parties than his own strength which enabled him to meet Warwick's forces in a pitched battle. At Barnet, on Easter Eve, April 14, 1471, the decisive engagement was fought. But in the midst of the battle reinforcements coming up under the earl of Oxford to join Warwick came into conflict with their own party, the badge of the Vere star being mistaken for Edward's *Rose-en-soleil*. From that point all the mutually distrustful elements of Warwick's army fell apart, and Warwick himself, with his brother Montagu, was slain. For the last time the unhappy Henry VI. fell into the hands of his enemies. He was relegated to the Tower, and Edward, disbanding his army, reoccupied the throne. But Margaret of Anjou, his untiring opponent, who had been in France while her cause and Warwick's was being lost, had landed in the west shortly after Barnet, and Edward had to take the field at once. Assembling a fresh army at Windsor, whence he could march to interpose between Margaret and her north Welsh allies, or directly bar her road to London, he marched into the west on April 24. On the 29th he was at Cirencester, and Margaret, engaged in recruiting an army, was near Bath. Edward hurried on, but Margaret eluded him and marched for Gloucester. At that place the governor refused the Lancastrians admittance, and seeking to cross the Severn out of reach of the Yorkists, they pushed on by forced marches to Tewkesbury. But Edward too knew how to march, and caught them up. The battle of Tewkesbury (May 4, 1471) ended with the destruction of Margaret's force, the captivity of Margaret, the death of her son Edward (who, it is sometimes said, was stabbed by Edward IV. himself after the battle) and the execution of 16 of the principal Lancastrians.

This was Edward's last battle. The rest of his eventful reign was similar in many ways to that of his contemporary Louis XI., being devoted to the consolidation of his power, by fair means and foul, at the expense of the great feudatories. But the Wars of the Roses were not yet at an end. For 14 years, except for local outbreaks, the land had peace, and then Richard III.'s crown, struck from his head on Bosworth Field (Aug. 22, 1485), was presented to Henry earl of Richmond, who, as Henry VII., established the kingship on a secure foundation. A last feeble attempt to renew the war, made by an army gathered to uphold the pretender Lambert Simnel, was crushed by Henry VII. at Stoke Field (4m. south-west of Newark) on June 16, 1487.

ROSETTA (Coptic *Rashit*, Arabic *Rashīd*), a town situated at the western or "Rosetta" mouth of the Nile on the west bank, and called Bolbitine by the Greeks. When the other branches and the Alexandria canal silted up, Rosetta prospered like its sister port of Damietta on the eastern branch; the main trade of the overland route to India passed through it until Mehemet Ali cut a new canal joining Alexandria to the Nile. Rosetta is now much decayed. A railway joins it to Alexandria. The celebrated Rosetta Stone which supplied Champollion with the key for the decipherment of the ancient monuments of Egypt was found near Fort St. Julien, 4 m. N. of the town, in 1799, by Boussard, a French officer. It is a basalt stele inscribed in hieroglyphic, demotic and Greek with a decree of the priests assembled at Memphis in favour of Ptolemy V. Epiphanes. It was ceded to the English at the capitulation of Alexandria (1801) and is now in the British Museum.

ROSETTE, an ornament, usually circular, oval or polygonal, formed by a series of petals or leaves radiating from the centre and symmetrically disposed. The form undoubtedly originated as an attempt to represent, systematically, the corolla of an open flower. Egyptian rosettes were thus, probably, representations of the open lotus. In Assyrian ornament, and in the Persian work based upon it, rosettes are one of the most common ornaments and are used, by continuous repetition, to form decorative bands. Although common in archaic pottery of the Greek islands, they were little used in the developed art of Greece itself. The Romans, on the other hand, used the form lavishly and gave it great richness by employing the complex acanthus leaf as the basic radiating form. It was used not only at the centre of each face of the Corinthian capital, but also to decorate the little panels between the modillions (*q.v.*) or scrolled brackets of the Corinthian order and as a decoration for the centre of the coffers or sunk panels of

[1]The name, as is well known, comes from the "white rose of York" and the "red rose of Lancaster"; but these badges, though more or less recognized as party distinctions, by no means superseded the private devices of the various great lords, such as the "falcon and fetterlock" of Richard duke of York, the "rose in sun" of Edward IV., the "crowned swan" of Margaret, the Vere star, and even the revived "white hart" of Richard II.

a coffered vault or ceiling. The rosette almost went out of use in the mediaeval period save as it sometimes occurred as an individual flower in Gothic naturalistic ornament. In the Perpendicular period in England, the popularity of the heraldic Tudor rose gave a new importance to the rosette idea, and rosettes were frequently employed, repeated at regular intervals, to decorate hollow mouldings. Renaissance rosettes in design are based upon those of Rome, but were used even more lavishly, owing to the immense development of wooden coffered and panelled ceilings.

In metal-work the idea of the rosette was probably developed independently, owing to the ease with which little drops of metal could be soldered or fastened in a circle, to a basic utensil. Such rosettes, formed either of a simple circle of nearly hemispherical shape, or of one large hemisphere surrounded by several smaller ones, are favourite late Bronze and early Iron age decorations in the metal-work of the Celts, Scandinavians and northern Europe generally. (T. F. H.)

ROSEVILLE, a city of Placer county, California, U.S.A., on Secret Ravine (a tributary of the Sacramento river) 18 m. N.E. of Sacramento. It is on Federal highway 40, and is served by the Southern Pacific railway lines. Pop. 4,477 in 1920 (82% native white); estimated locally at 7,800 in 1928. There are immense railroad construction and repair shops and freight-classification yards here, and the largest ice-manufacturing and storage plant in the country, for the refrigeration of fruit and vegetable cars.

ROSE WINDOW or **WHEEL WINDOW,** in architecture, a term applied to any decorated, circular window. Undecorated circular windows are found in certain imperial Roman structures, used especially in the upper portions of rooms or pierced through vaults, as in the tomb of the time of Hadrian known as the Casale dei Pazzi, near Rome, but structural decoration of such forms was apparently not attempted until the Byzantine and Romanesque periods. One of the earliest decorated circular windows extant is that of the Italian Romanesque church of S. Maria in Pomposa, possibly as early as the 10th century, in which the decoration consists of a pierced marble slab of great richness, with a design of interlaces and birds purely Byzantine. In French Romanesque work circular windows also appear, but in the earlier examples, such as the 11th century apse of S. Sernin at Toulouse, they are undecorated, like those of the Roman empire. Meanwhile, in Mohammedan work, the cusped circle had been a common form, usually, however, not as a window, but as the outer boundary of a sunk hemisphere, as in the mosque of Ibn Touloun at Cairo (876–78).

The crusaders probably saw many examples of such forms; in any case it is only after the earlier crusades and especially towards the middle of the 12th century that the idea of making a rich decorative motive out of a round window appeared. From then on the simple rose window became more and more common, and was, in fact, a distinguishing characteristic of many transitional and early Gothic cathedrals. It was particularly used at the west end of the nave and the ends of the transepts. An exceptional early use is the round window which lighted the triforium roof space from the nave in the original form of Notre Dame at Paris (before 1177). In the west front of Laon cathedral (completed prior to 1200) there is an enormous rose window with 12 semi-circles around the edge and the central foiled and cusped circle separated from the apexes of these semi-circles by a considerable distance, the connection between being made by little radiating colonnettes like spokes. This window is remarkably advanced for its date, as the filling, like that of the Paris triforium, is essentially bar tracery. The rose window of the west front of Chartres cathedral (1194–1212) consists, on the other hand, of plate tracery, the circle being filled with a thin plate of stone, through which are pierced many small foiled or cusped holes. A similar form of plate tracery within a circle is used to cap the twin windows of the clerestorey bays.

The introduction of developed bar tracery gave a compelling impetus to rose window design. The general scheme consisted of a series of radiating forms, each of which was tipped by a pointed arch at the outside of the circle. The bars between these forms were joined at the centre by a pierced circle of stone and the forms themselves frequently treated like little traceried windows with subsidiary, subdividing bars, arches and foiled circles. The most beautiful examples of this type are those of the west front of Rheims cathedral (end of the 13th century) and the transepts of Rheims, Amiens and Notre Dame at Paris (all of the last half of the 13th century). The introduction of the wavy lines of flamboyant tracery completely changed the character of French rose windows, but they continued basically radiating in design. The radiating elements consisted of an intricate network of wavy, double curved bars, creating all sorts of interesting circles and flame shapes, and incidentally, furnishing a diagonal bracing to the whole composition which added materially to its structural strength. The rose at the end of the transept at Beauvais (early 16th century) is characteristic.

The influence of the French rose windows was widespread from an early period. Variations of the form appear in a multitude of late Italian Romanesque churches, as in the widely varying type in the late 12th century west front of S. Pietro in Toscanella, and the more normal example in S. Zeno at Verona (late 12th century). In England the rose window has never been so popular as in France. Those in the transepts of Westminster Abbey are more characteristically French than English. The most typically English examples are in the transepts of Lincoln cathedral; that on the north from the Early English period is a remarkably delicate example of plate tracery; that on the south from the Curvilinear period of the early 14th century is striking because it is not radiating in design, and therefore completely at odds with the French prototypes. (*See* TRACERY.) (T. F. H.)

ROSEWOOD, the name given to several distinct kinds of ornamental timber. That, however, so called in the United Kingdom is Brazilian rosewood, the *palissandre* of the French, the finest qualities of which, coming from the provinces of Rio de Janeiro and Bahia, are believed to be the produce principally of *Dalbergia nigra,* a leguminous tree of large dimensions, called *cabiuna* and *jacaranda* by the Brazilians. The same name, jacaranda, is applied to several species of *Machaerium,* also trees belonging to the family Leguminosae; and there can be no doubt that a certain proportion of the rosewood of commerce is drawn from these sources.

Rosewood is exported in large quantities from Rio de Janeiro, Bahia, Jamaica and Honduras. The heartwood attains large dimensions, but as it begins to decay before the tree arrives at maturity it is always faulty and hollow in the centre. On this account squared logs or planks of rosewood are never seen, the wood being imported in half-round flitches 10 to 20 ft. in length and from 5 to 12 in. in their thickest part. Rosewood has a deep ruddy brown colour, richly streaked and grained with black resinous layers. It takes a fine polish, but, on account of its resinous nature, it is somewhat difficult to work. The wood is very much in demand by cabinet-makers and pianoforte-makers.

ROSICRUCIANISM. A system of mystical and metaphysical philosophy intended to guide the development of the inner consciousness. Popular opinion credits the foundation of the Fraternity of Rosicrucians as having occurred in Cassel, Germany, early in the seventeenth century when some pamphlets were issued entitled the "Allgemine und General-Reformation der ganzen weiten Welt," and the "Fama Fraternitates," believed to have been written by the theologian, Johann Valentin Andrea (1586–1654). Later investigations, however, revealed that although the family arms of Andrea contained a cross and perhaps a rose (*see* below), he had no actual part in the revival of the Fraternity in Germany and that the pamphlets were published in various languages under the symbolical name of Christian Rosenkreuz (Christian Rose Cross). The pamphlet referred to the previous existence of the Fraternity in the Orient, but for nearly a hundred years the historical background was considered mythical.

Research during the past few years revealed that the Rosicrucian Fraternity had an actual organized existence long prior to what was only a revival in Germany. In 1607 Figulus, a well-known writer of mystical literature, issued a pamphlet referring to the existence of the Fraternity in Europe in 1410. This date

was also referred to by P. Gautier, another well-known writer of Hermetic and mystical literature. Michael Maier, one-time officer of the Fraternity, states that the year 1413 was the year in which the greatest revivals of activity occurred, while Kaisvetter, another officer, mentions the work of one Friesan or Friesau, who was national Imperator of the Fraternity in 1468. Cornelius Agrippa mentions the foundation of a branch in 1507 and states that Brother Philalathes was "invested with the power of Imperator." In a letter from the well-known Dr. Landalf, of Lyon, France, addressed to Agrippa, he states that he was acquainted with the Fraternity in 1509. Paracelsus recorded his admission into a Rosicrucian Lodge in Basle, in 1530.

Heinrich Khunrath, Rosicrucian officer and author in Germany and Austria, published a book dealing with the secret principles in 1598, and an international congress of Rosicrucians was held in England in the year 1604. Many ancient Rosicrucian manuscripts preserved in a rare collection in the city of Cologne contain proof that the organization was old even in the sixteenth century. One book in the collection by Brother "Omnis Moriar," refers to a Rosicrucian Lodge in Germany in 1115, while Arnold de Villanova, an officer of the Fraternity speaks in his "Rosary" of the Fraternity existing in 1230; and we find reference to the organization in Denmark in 1484 and France in 1597.

The name of the organization is derived from its original symbol, the cross with a single red rose in its centre. While the early Rosicrucians gave time to the study of alchemy and devoted much time to experiments in transmutation, the principles were not confined to the changing of gross metals into gold but of the grosser elements of human nature into higher, spiritual qualities.

The Fraternity is generally known throughout the world as the Ancient Mystic Order of Rosae Crucis, often abbreviated to the initials "AMORC." It came to America first in 1694. It is non-sectarian and in a broad sense non-religious, inasmuch as its teachings include the practical sciences to a greater extent than principles of religious thought. It has consistently tabooed the superstitious arts of the Orient and does not include fortune telling, necromancy, or spiritualism. Each jurisdiction is under the direction of an Imperator who has a supreme council as an advisory board and establishes chartered lodges and chapters. All jurisdictions are united in a general international body through the appointment of one high officer as a member of the International Rosicrucian Council. This body constitutes the supreme advisory power of the world-wide organization.

The organization is not related to any other Fraternity despite the fact that there is a symbolical degree in the Scottish Rites of Freemasonry known as the "Rosicrucian Degree." Many Masonic historians have shown that modern Freemasonry was outlined by men trained in Rosicrucian rituals, but the Rosicrucian Fraternity makes no claims in this regard. There are some Masonic-Rosicrucian societies, such as the Societas Rosicruciana en Anglia, with headquarters in London, composed exclusively of Freemasons, but these are not part of the International Rosicrucian Organization. Some students of Oriental philosophy have also used the word "Rosicrucian" as part of their title but these are not affiliated with the International organization.

BIBLIOGRAPHY.—Hargrave Jennings, *The Rosicrucians, Their Rites and Mysteries* (three editions, 1870–87); A. E. Waite, *The Real History of the Rosicrucians*, 1887; John Yarker, *The Arcane Schools* (1909); Fr. Wittemans, *Historie des Rose-Croix* (three editions 1924–1925), the most complete and modern of those published in Europe; H. Spencer Lewis, F.R.C., *Rosicrucian Questions and Answers with Complete History of the Order*, (1929). U. S. A. (H. S. L.)

ROSIN or **COLOPHONY,** the resinous constituent of the oleo-resin exuded by various species of pine, known in commerce as crude turpentine. The separation of the oleo-resin into the essential oil-spirit of turpentine and common rosin is effected by distillation in large stills. Rosin (a later variant of "resin," *q.v.*), varies in colour, according to the age of the tree whence the turpentine is drawn and the amount of heat applied in distillation, from an opaque almost pitchy black substance through grades of brown and yellow to an almost perfectly transparent colourless glassy mass. The commercial grades are numerous, ranging by letters from A, the darkest, to N, extra pale,—superior to which are W, "window glass," and WW, "water white" varieties, the latter having about three times the value of the common qualities.

Rosin is a brittle and friable resin, with a faint pine-like odour; the melting-point varies with different specimens, some being semi-fluid at the temperature of boiling water, while others do not melt till 220° or 250° F. It is soluble in alcohol, ether, benzene and chloroform. In addition to its extensive use in soap-making, rosin is largely employed in making inferior varnishes, sealing-wax, various cements and as a sizing agent in the manufacture of paper. It is also used for preparing shoemakers' wax, as a flux for soldering metals, for pitching lager beer casks, for rosining the bows of musical instruments, etc. In pharmacy it forms an ingredient in several plasters and ointments.

The chief region of rosin production is the South Atlantic and Eastern Gulf states of the United States. American rosin is obtained from the turpentine of the swamp pine, *Pinus australis*, and of the loblolly pine, *P. Taeda*. The main source of supply in Europe is the "landes" of the departments of Gironde and Landes in France, where the cluster pine, *P. Pinaster*, is extensively cultivated. In the north of Europe rosin is obtained from the Scotch fir, *P. sylvestris*, and throughout European countries local supplies are obtained from other species of pine.

ROSKILDE or ROESKILDE, a town of Denmark in the *amt* (county) of Kjøbenhavn (Copenhagen), 20 m. by rail W. of Copenhagen, on the great lagoon-like inlet named Roskilde Fjord. Pop. (1928) 13,540. Its chief interest is historical. It was the capital of the kingdom until 1443, and the residence of the bishops of Zealand until the Reformation. The cathedral was consecrated in 1084, but of this early building only foundation walls remain; the present structure of brick was begun in 1215, and enlarged and restored at various later dates. It contains the tombs of most of the Danish kings from Harold I. (987).

ROSMEAD, HERCULES GEORGE ROBERT ROBINSON, 1ST BARON (1824–1897), British colonial administrator, was born on Dec. 19, 1824. He was of Irish descent on both sides; his father was Admiral Hercules Robinson, his mother a Miss Wood of Rosmead, County Westmeath, from which he afterwards took his title. Passing from Sandhurst into the 87th Foot, he attained the rank of captain; but in 1846, through the influence of Lord Naas, he obtained a post in the Board of Public Works in Ireland, and subsequently became chief commissioner of fairs and markets. His energy in these positions, notably during the famine of 1848, and the clearness and vigour of his reports, secured for him at the age of 30 the office of president of the island of Montserrat. He was governor of St. Christopher from 1855 to 1859, when he was knighted in recognition of his services in introducing coolie labour into the island. Subsequently he was governor of Hong-Kong, of Ceylon (K.C.M.G. in 1869), and, in 1872, of New South Wales. It fell to his lot to annex the Fiji islands to the British empire, and his services were rewarded in 1875 by promotion to G.C.M.G.

In 1879 he was transferred to New Zealand, and in 1880 he succeeded Sir Bartle Frere as high commissioner of South Africa. He arrived in South Africa shortly before the disaster of Majuba, and was one of the commissioners for negotiating a peace which was personally distasteful to him. It left him with the task of conciliating on the one hand a Dutch party elated with victory, and on the other hand a British party almost ready to despair of the British connection. He was called home in 1883 to advise the Government on the terms of the new convention concluded with the Transvaal Boers in Feb. 1884. On his return to South Africa he found that a critical situation had arisen in Bechuanaland, where Boer commandoes had seized large tracts of territory and proclaimed the "republics" of Stella and Goshen (*see* KRUGER, S.J.P.). They refused to retire within the limits of the Transvaal as defined by the new convention, and Robinson, alive to the necessity of preserving this country—the main road to the north—for Great Britain, took action which led to the expedition of Sir Charles Warren and the annexation of Bechuanaland early in 1885. Robinson won Kruger's confidence by his fair-mindedness, while he seconded Rhodes's efforts to unite the British and Dutch parties in Cape Colony. His mind, however, was that of the admin-

istrator as distinguished from the statesman, and he was content to settle difficulties as they arose. In 1887 Robinson was induced by Rhodes to give his consent to the conclusion of a treaty with Lobengula which secured British rights in Matabele and Mashona lands. In May 1889 Robinson retired. In his farewell speech he declared that there was no permanent place in South Africa for direct imperial rule. This was interpreted to mean that South Africa must ultimately become independent—an idea repugnant to him. He explained in a letter to *The Times* in 1895 that he had referred to the "direct rule of Downing Street over the Crown colonies, as contrasted with responsible colonial Government." He was made a baronet in 1891.

Early in 1895, when he had entered his 71st year and was not in robust health, he yielded to Lord Rosebery's entreaties, and went out again to South Africa, in succession to Sir H. Loch. The Jameson raid produced a permanent estrangement between him and Cecil Rhodes, and he was out of sympathy with the new colonial secretary, Joseph Chamberlain, who had criticized his appointment, and now desired Robinson to take this opportunity of settling the whole question of the position of the Uitlanders in the Transvaal. Robinson answered that the moment was inopportune, and that he must be left to choose his own time. Alarmed at the imminent danger of war, he confined his efforts to inducing the Johannesburgers to lay down their arms on condition that the raiders' lives were spared, not knowing that these terms had already been granted to Jameson. He came home to confer with the Government, and was raised to the peerage as Baron Rosmead. He returned to South Africa later in the year, but was compelled by ill-health, in April 1897, to quit his post, and died in London on Oct. 28, 1897.

ROSMINI-SERBATI, ANTONIO (1797–1855), Italian philosopher, was born at Rovereto, Italian Tirol, on March 25, 1797. In 1828 he founded a new religious order, the Institute of the Brethren of Charity, known in Italy generally as the Rosminians. The members might be priests or laymen, who devoted themselves to preaching, the education of youth, and works of charity—material, moral and intellectual. They have branches in Italy, England, Ireland, France and America. In London they are attached to the church of St. Etheldreda, Ely Place, Holborn. Rosmini's *The Five Wounds of the Holy Church* and *The Constitution of Social Justice* were placed (1849) upon the Index. Rosmini at once declared his submission and retired to Stresa on Lago Maggiore, where he died on July 1, 1855. Before his death he had the satisfaction of learning that the works in question were dismissed, that is, proclaimed free from censure by the Congregation of the Index. Twenty years later, the word "dismissed" (*dimittantur*) became the subject of controversy, some maintaining that it amounted to a direct approval, others that it was purely negative and did not imply that the books were free from error. The controversy continued till 1887, when Leo XIII. finally condemned 40 of his propositions and forbade their being taught.

The most comprehensive view of Rosmini's philosophical standpoint is to be found in his *Sistema filosofico,* in which he set forth the conception of a complete encyclopaedia of the human knowable, synthetically conjoined, according to the order of ideas, in a perfectly harmonious whole. Rosmini laid down ideal being as the fundamental principle of all philosophy and the supreme criterion of truth and certainty.

Of his numerous works—collected ed. (17 vols., Milan, 1842–44) supplemented by *Opere postume* (5 vols., Turin, 1859–74)—the most important are the *New Essay on the Origin of Ideas* (Eng. trans., 1883); *The Principles of Moral Science* (1831); *The Restoration of Philosophy in Italy* (1836); *The Philosophy of Right* (1841–45). The following have also been translated into English: *A Catholic Catechism,* by W. S. Agar (1849); *The Five Wounds of the Holy Church* (abridged trans. with introd. by H. P. Liddon. 1883); *Maxims of Christian Perfection,* by W. A. Johnson (1889); *Psychology* (Anonymous) (1884–88); *Sketch of Modern Philosophy,* by Lockhart (1882); *The Ruling Principle of Method Applied to Education,* by Mrs. W. Grey (Boston, Mass., 1887); *Select Letters,* by D. Gazzola. Rosmini's *Sistema filosofico* was translated by Thos. Davidson *Rosmini's Philosophical System,* 1882, with a biographical sketch and complete bibliography); *see* also *Lives* by G. S. Macwalter (1883) and G. B. Pagani (1907); C. Werner, *Die italienische Philosophie des 19. Jahrhunderts* (1884); F. X. Kraus, "Antonio Rosmini: ein Leben, seine Schriften," in *Deutsche Rundschau,* liv. lv. (1888); "Church Reformation in Italy" in the *Edinburgh Review,* cxiv. (July 1861); and numerous recent Italian works, for which Baldwin's *Dictionary of Philosophy* or Pagliani's *Catalogo Generale* (Milan, 1905) should be consulted.

ROSNY, JOSEPH HENRY, a pseudonym covering the collaboration of the French novelists, Joseph Henri Honoré Boëx (1856–), and his brother Séraphin Justin François Boëx (1859–). The novels of J. H. Rosny are full of scientific knowledge, of astronomy, anthropology, zoology and, above all, sociology. The stories are approached from the point of view of society rather than of the individual, but the characters, strongly individualized and intensely real, are only incidentally typical. The elder Rosny was the sole author of the earlier novels, and began novel-writing as an avowed disciple of Zola. Among these earlier works may be mentioned *Le Bilatéral* (1886), and the "prehistoric" novel, *Vamireh* (1891), a masterpiece of its kind. MM. Rosny were among the writers who in 1887 entered a formal protest in the *Figaro* against Zola's *La Terre,* and they were designated by Edmond de Goncourt as original members of his academy. Among their other novels the more famous are: *Daniel Valgraive* (1891); *L'Indomptée* (1895), the history of a girl medical student in Paris; *Le Serment* (1896, dramatized 1897); *Les Ames perdues* (1899), an anarchist novel; *La Charpente* (1900); *Thérèse Degaudy* (1902); *Le Crime du docteur* (1903); *Le Docteur Harambur* (1904); *Le Millionaire* (1905); *Sous le fardeau* (1906); *La Guerre de feu* (1911) and *La Carapace* (1914).

ROSS, BETSY (1752–1836), heroine of one of the most picturesque legends which has grown up around the origin of the American flag, was born in Philadelphia, Pa., on Jan. 1, 1752. She married John Ross, whose brother, George Ross, was one of the signers of the Declaration of Independence.

The versions of the flag story as told by her descendants, agree in the following main points: Washington, accompanied by Robert Morris and Gen. George Ross, called at the little upholstery shop in Arch street, where she was carrying on the business in which she and her husband had been engaged, and asked if she could make a flag. She said she never had made one, but that she could try. They thereupon produced a design, rather roughly drawn. She examined it and, noticing that the stars were six-pointed, suggested that they should be made with five points. The gentlemen agreed with her that five points would look better, but that the six-pointed stars would be easier to make. She then showed them how a five-pointed star could be made with a single clip of the scissors. Washington then and there changed the sketch and the three gentlemen left. Soon after a new design was sent to her, coloured by William Barrett, a painter of some note. She thereupon set to work to make the famous flag, which was soon completed and approved.

This story was first presented by William J. Canby, grandson of Betsy Ross, in a paper read in 1870 before the Historical Society of Pennsylvania, and it was verified by other descendants of the family who remembered the story as frequently told to them. No contemporary documentary evidence has ever been found to support the story, nor has any, on the other hand, been found which gives the honour to anyone else. All that has been verified is that there was a Mrs. Ross living in Philadelphia at the time of the flag's adoption, and that she was an upholsterer and flagmaker by trade. She died at Philadelphia on Jan. 30, 1836.

Canby's claims are ably presented by L. Balderston in *The Evolution of the American Flag* (1909). *See* also P. D. Harrison, *The Stars and Stripes* (1914); G. H. Preble, *Origin and History of the American Flag* (new ed., 1917); S. Abbott, *Dramatic Story of Old Glory* (1919).

ROSS, SIR JAMES CLARK (1800–1862), British rear-admiral and Polar explorer, was born in London on April 15, 1800. He entered the navy in 1812 accompanying his uncle, Captain (afterwards Sir) John Ross, on his first Arctic voyage in search of a North-West passage (1818). Between 1819 and 1827 he made four Arctic expeditions under Parry, and in 1829–33 again under his uncle, and determined (1831) the position of the North Magnetic Pole. In 1834 he was promoted captain, and in 1835–38 worked on the magnetic survey of Great Britain. In 1839–43 he

commanded the Antarctic expedition of the "Erebus" and "Terror." (*See* POLAR REGIONS.) He wrote *A Voyage of Discovery and Research to Southern and Antarctic Regions* (1847). He was elected to the Royal Society in 1848, and was captain of the "Enterprise," in the first Franklin search expedition. He died at Aylesbury on April 3, 1862.

ROSS, JANET ANNE (1842–1927), English writer, daughter of Sir Alexander Cornewall Duff Gordon, was born in London on Feb. 24, 1842. She is the original of Rose Jocelyn in Meredith's *Evan Harrington.* She married in 1860 Henry Ross, a banker in Egypt and a great traveller, and her life in Egypt, where she spent six years, is described very vividly in her *Fourth Generation: Reminiscences* (1912). From 1863 to 1867 she was a correspondent of *The Times.* In 1867 she and her husband settled in Italy, where her house was a centre for the lovers of Italian culture. She died in Florence on Aug. 23, 1927. Her publications include: *Three* Generations of English *Women* (2 vols., 1888); *The Land of Manfred* (1889); *Old Florence and Modern Tuscany* (1904); *Lives of the Early Medici* (1910); *Letters of Principal J. M. Lindsay to Janet Ross* (1922).

ROSS, SIR JOHN (1777–1856), British rear-admiral and Arctic explorer, son of the Rev. Andrew Ross, entered the Royal Navy in 1786. In 1808 he captained the Swedish Fleet, and in 1812 was promoted commander. In 1818 he commanded an Arctic expedition fitted out by the Admiralty, but failed to discover much that was new; but in 1829–33 he made a second Arctic expedition, which achieved important geographical and scientific results. In 1850 he undertook a third voyage in search of Sir John Franklin, and in the following year he attained flag-rank.

His publications include—*Voyage of Discovery for the Purpose of Exploring Baffin's Bay* (1819); *Narrative of a Second Voyage in Search of a North-West Passage, including the Discovery of the North Magnetic Pole* (1835); *Memoirs and Correspondence of Lord De Saumerez* (1838).

ROSS, JOHN, or KOOESKOOWE (1790–1866), chief of the Cherokee Indian nation, was of Scottish-Indian descent, born among the Cherokees in Georgia in 1790. He was principal chief from 1828 until his death. In 1830–31 he applied to the Supreme Court of the U.S. for an injunction restraining the State of Georgia from executing its laws within the Cherokee territory, but the court dismissed his suit on the ground that it had no jurisdiction. A small party among the Cherokees under the leadership of John Ridge, a subchief, were disposed to treat with the U.S. for the removal of their nation west of the Mississippi, and in Feb. 1835, while Ridge was negotiating at Washington, Ross proposed to cede the Cherokee lands to the U.S. for $20,000,000. The U.S. Senate resolved that $5,000,000 was sufficient. Both the Ridge treaty and the $5,000,000 proposal were rejected in a full council of the Cherokees Oct. 1835. The council authorized Ross to renew negotiations, but before leaving for Washington he was arrested by the Georgia authorities on the ground that he was a white man residing in the Indian country contrary to law. He was soon released, but in December of this year a few hundred Cherokees concluded a treaty of removal with the U.S. Indian commissioner at New Echota. When Ross learned this he called a council in Feb. 1836, and at this meeting the treaty was declared null and void and a protest against the proceedings at New Echota was signed by more than 12,000 Cherokees. Notwithstanding Ross's opposition, the Senate in the following May ratified the treaty and in Dec. 1838, Ross, with the last party of Cherokees, left for the West (*see* GEORGIA). During the Civil War, Ross signed a treaty with the Confederate States in Oct. 1861, but in the summer of 1862 was forced (by Union sympathizers in the nation) to proclaim neutrality and soon afterwards went over to the Union lines. He was in Washington treating with the Federal Government in Feb. 1863 when the treaty with the Confederate States was abrogated by the Cherokees. He died at Washington on Aug. 1, 1866.

See C. C. Royce, "The Cherokee Nation of Indians" in the *Fifth Annual Report of the Bureau of Ethnology* (1887), and T. V. Parker, *The Cherokee Indians* (New York, 1907).

ROSS, SIR RONALD (1857–), British physician and bacteriologist, was born at Almora, India, on May 13, 1857. He studied medicine at St. Bartholomew's hospital, London, and in 1881 entered the Indian medical service. In 1892 he commenced a series of special investigations on the subject of malaria, in 1895 undertook the experimental verification of the theory that the micro-organisms of this disease are spread by mosquitoes, and in 1897–98 investigated the life history of the parasites. In 1899 he retired from the Indian medical service, and, after a journey to west Africa in 1899 for the study of malaria-bearing mosquitoes, devoted himself to research and teaching, joining the Liverpool school of tropical medicine as lecturer and subsequently becoming professor of tropical medicine at Liverpool university. In 1913 he became physician for tropical disease at King's college, London, and later, director-in-chief of the Ross Institute and Hospital for Tropical Diseases. During the World War, Ross was appointed to the R.A.M.C. and became War Office consultant in malaria. After the War he was consultant in malaria for the Ministry of Pensions. In 1902 he received the Nobel Prize for medicine, in 1911 a K.C.B. and in 1918 a K.C.M.G. He received the Royal Medal of the Royal Society, of which he was a fellow, in 1901. He was editor of *Science Progress,* and his other publications include *The Prevention of Malaria* (1910), *Philosophies* (1910), *Psychologies* (1919), *The Revels of Orsera,* a romance (1920), and *Memoirs* (1923), as well as mathematical and medical works. (*See* MALARIA.)

ROSS, a town in Herefordshire, England; 133 m. W. from London and 12 S.E. from Hereford by the G.W.R. Pop. (1931) 4,738. It is situated on the river Wye. There are manufactures of machinery and agricultural implements, and cider and malt are produced. The church of St. Mary the Virgin, surmounted by a lofty spire, shows good Decorated and Perpendicular work. The market house (1670) is a picturesque building supported on columns, the upper portion serving as a town hall. The town owes much to John Kyrle (d. 1724), eulogised by Pope (*Moral Epistle,* 1732). Wilton Castle, near the town, was burned by the Royalists during the Civil War. The inhabited portion is modern.

Ross was granted to the see of Hereford by Edmund Ironside, but became crown property in 1559.

ROSS AND CROMARTY, northern county, Scotland. The mainland portion is bounded north by Sutherland and Dornoch Firth, east by the North Sea and Moray Firth, south by Beauly Firth and Inverness-shire and west by the strait of the Minch. The island portion (for details *see* HEBRIDES) consists of the northern part of Lewis-with-Harris, and many smaller islands, all but eleven uninhabited, are scattered principally off the west coasts of Lewis and the mainland. The area of the mainland is 1,572,294 acres and of the islands 404,413 acres, giving a total for the county of 1,977,248 acres (excluding water). The inhabited islands belonging to the mainland are all situated off the west coast. They are Bernera, Gillean (lighthouse), Croulin, Horisdale, Dry, Ewe, Martin and Tanera More. On the North Sea front the chief indentations are Beauly Firth and Inner Moray Firth, marking off the Black Isle from Inverness-shire; Cromarty Firth, bounding the districts of Easter Ross and the Black Isle; Moray Firth, separating Easter Ross from Nairnshire; and Dornoch Firth, dividing north-east Ross from Sutherlandshire. On the Atlantic face—which is a coastline of more than 300 m.—the principal sea lochs and bays, from S. to N., are Loch Duich, Loch Alsh, Loch Carron, Loch Kishorn, Loch Torridon, Loch Shieldaig, Upper Loch Torridon, Gairloch, Loch Ewe, Gruinard Bay, Little Loch Broom and Enard Bay.

Almost all the southern boundary with Inverness-shire is guarded by a rampart of peaks, ranging from 3,400 to nearly 3,900 ft. To the north of Glen Torridon rise the masses of the Liatach, with summits of 3,456 and 3,358 ft. On the north-eastern shore of Loch Maree rises Ben Slioch (3,217), while the Fannich group contains at least six peaks of more than 3,000 ft. The isolated mass of Ben Wyvis (3,429) is the most noteworthy feature in the north-east, and the Challich Hills in the north-west with peaks of 3,483 and 3,474 ft. are equally conspicuous, though less solitary. Only a small fraction of western and southern Ross is under 1,000 ft. in height. Easter Ross and the peninsula of the Black Isle are comparatively level. The longest stream is the

Orrin, which rises in An Sithean and flows mainly east by north to its confluence with the Conon after a run of about 26 m., during a small part of which it forms the boundary with Inverness-shire. At Aultgowrie the stream forms the falls of Orrin in a narrow gorge. From its source in the mountains in Strathvaich the Blackwater flows south-east for 19 m. till it joins the Conon, forming soon after it leaves Loch Garve the picturesque falls of Rogie. Within a short distance of its exit from Loch Luichart the Conon pours over a series of graceful cascades and rapids and then pursues a winding course of 12 m., mainly E. to the head of Cromarty Firth. The falls of Glomach, in the south-west, are the deepest in Britain (370 ft. sheer). Twelve miles south by east of Ullapool are the three falls of Measach, close to the gorge of Corriehalloch.

The Oykell, throughout its course, forms the boundary with Sutherlandshire, to which it properly belongs. The largest and most beautiful of the many freshwater lakes is Loch Maree (*q.v.*). Of the straths or valleys the more important run from the centre eastwards, such as Strathconon (12 m.), Strathbran (10 m.), Strathgarve (8 m.), Strathpeffer (6 m.) and Strathcarron (14 m.). Excepting Glen Orrin (13 m.), in the east central district, the longer glens lie in the south and towards the west. In the extreme south Glen Shiel (9 m.) runs between fine mountains to its mouth on Loch Duich. General Wade's road passes down the glen. Farther north are Glen Elchaig (9 m.), Glen Carron (12 m.), in the latter of which the track of the Dingwall and Skye railway is laid, and Glen Torridon (6 m.).

Geology.—The central portion of the county is occupied by the younger highland schists or Dalradian series. On the eastern side of the county the Dalradian schists are covered unconformably by the Old Red Sandstone. The western boundary of the younger schist is formed by the great pre-Cambrian dislocation line which traverses the county from Elphin on the north by Ullapool to Glen Carron. Most of the area west of the line of disturbance is covered by Torridonian Sandstone, mainly dark reddish sandstones, grits and shales, resting unconformably on the ancient Lewisian gneiss. Within the Torridonian tract the gneiss occupies large areas north of Coigach, on the east of Enard Bay, between Gruinard Bay and Loch Maree. The Lewisian gneiss is everywhere penetrated by basic dikes, generally with a N.W.-S.E. direction; some of these are of great breadth. The Torridonian rocks are succeeded unconformably by a series of Cambrian strata which is confined to a narrow belt west of the line of main thrusting. Glacial striae are found upon the mountains up to heights of 3,000 ft., and much boulder clay is found in the valleys and spread over large areas in the eastern districts. Raised beaches occur at 100, 50 and 25 ft. above the present sea-level; they are well seen in Loch Carron. (*See*, further, HEBRIDES.)

Agriculture and Industries.—The most fertile tracts lie on the eastern coast, especially in Easter Ross and the Black Isle, where the soil varies from a light sandy gravel to a rich deep loam. Among grain crops oats is that most generally cultivated, but barley and wheat are also raised. Turnips, mangolds and potatoes are the chief green crops. On the higher grounds there is a large extent of good pasturage which carries heavy flocks of sheep, blackfaced being the principal breed. Most of the horses are maintained for the purposes of agriculture. The herds of cattle, mainly native Highland or crosses, are large. Owing partly to the unkindly nature of the bulk of the surface—which offers no opportunity for other than patchwork tillage—the number of small holdings is enormous, half the total number being under 5 acres, and the average size under 20 acres. Over 800,000 acres are devoted to deer forests, a greater area than in any other county in Scotland. The natural woodland has largely disappeared, but afforestation has been undertaken recently. Apart from agriculture, the salmon fisheries in the bays and river mouths, and the herring, cod and ling fisheries are the only considerable industry. There are distilleries near Dingwall, Tain and Invergordon.

The L.M.S. railway entering the county to the north of Beauly runs northwards to Dingwall, and then strikes off to the north-east by Invergordon and Tain, where it bends to the west by north, leaving the shire at Culrain, having largely followed the coast throughout. At Muir of Ord it sends off the Black Isle branch and at Dingwall a branch to Strathpeffer, as well as a line to Strome Ferry and Kyle of Loch Alsh on the south-western shore.

Population and Administration.—The population of the county in 1931 was 62,802; 37,597 on the mainland and 25,205 on the islands. Thus Ross and Cromarty, though the third largest in size, is the fourteenth county in population. In 1931 there were 3,435 persons who spoke Gaelic only and 31,098 speaking Gaelic and English. The chief towns and villages are Stornoway (pop. 3,771), Dingwall (2,554), Tain (1,383), Cromarty (837), Invergordon (1,417). Ullapool is a fishing port near the mouth of Loch Broom. The county returns one of the Inverness members to parliament. Dingwall, Tain and Fortrose are royal burghs, and Dingwall is the county town. Ross and Cromarty forms a sheriffdom, and there are resident sheriffs-substitute at Dingwall and Stornoway, the former also sitting at Tain and Cromarty. The shire is under school-board control and there are academies at Dingwall and Fortrose.

History and Antiquities.—It may be doubted whether the Romans ever effected even a temporary settlement in the area of the modern county. At that period, and for long afterwards, the land was occupied by Gaelic Picts, who, in the 6th and 7th centuries, were converted to Christianity by followers of St. Columba. Throughout the next three centuries the natives were continually harassed by Norse pirates, of whose presence tokens have survived in several place-names (Dingwall, Tain, etc.). At this time the county formed part of the great province of Moray. When the rule of the Celtic *maormors* or earls ceased in the 12th century, consequent on the plantation of the district with settlers from other parts (including a body of Flemings), by order of David I., who was anxious to break the power of the Celts, the bounds of Moravia were contracted and the earldom of Ross arose. At first Ross proper only included the territory adjoining Moray and Dornoch Firths. The first earl was Malcolm MacHeth, who received the title from Malcolm IV. After his rebellion in 1179 chronic insurrection ensued, which was quelled by Alexander II., who bestowed the earldom on Farquhar Macintaggart, then abbot of Applecross, and in that capacity lord of the western district. William, 4th earl, was present with his clan at the battle of Bannockburn (1314), and almost a century later (1412) the castle of Dingwall, the chief seat on the mainland of Donald, lord of the Isles, was captured after the disastrous fight at Harlaw in Aberdeenshire, which Donald had provoked when his claim to the earldom was rejected. The earldom reverted to the crown in 1424, but James I. soon afterwards restored it to the heiress of the line, the mother of Alexander MacDonald, 3rd lord of the Isles, who thus became 11th earl. In consequence, however, of the treason of John MacDonald, 4th and last lord of the Isles and 12th earl of Ross, the earldom was again vested in the crown (1476). Five years later James III. bestowed it on his second son, James Stewart, whom he also created duke of Ross in 1488. By the 16th century the whole area of the county was occupied by different clans, the Rosses, Munroes, Macleods, Macdonalds and Mackenzies. The county of Ross was constituted in 1661, and Cromarty in 1685 and 1698, both being consolidated into the present county in 1889. (*See* CROMARTY, county.) Apart from occasional conflicts between rival clans, the only battles in the shire were those of Invercarron (1650), when Montrose was crushed by Colonel Strachan, and Glenshiel (1719) when the Jacobites, under the earl of Seaforth, aided by Spaniards, were defeated, near Bridge of Shiel, by General Wightman.

Stone circles, cairns and forts are found in the eastern district. A vitrified fort crowns the hill of Knockfarrel in the parish of Fodderty, and there is a circular dun near the village of Lochcarron. Some fine examples of sculptured stones occur, the finest being at Shandwick. Among old castles are those of Lochslin, in the parish of Fearn, said to date from the 13th century, which, though ruinous, possesses two square towers in good preservation: Balone, in the parish of Tarbat, once a stronghold of the earls of Ross; the remains of Dingwall Castle, their original seat; and Eilean Donain in Loch Alsh, which was blown up by English war-

ships during the abortive Jacobite rising in 1719.

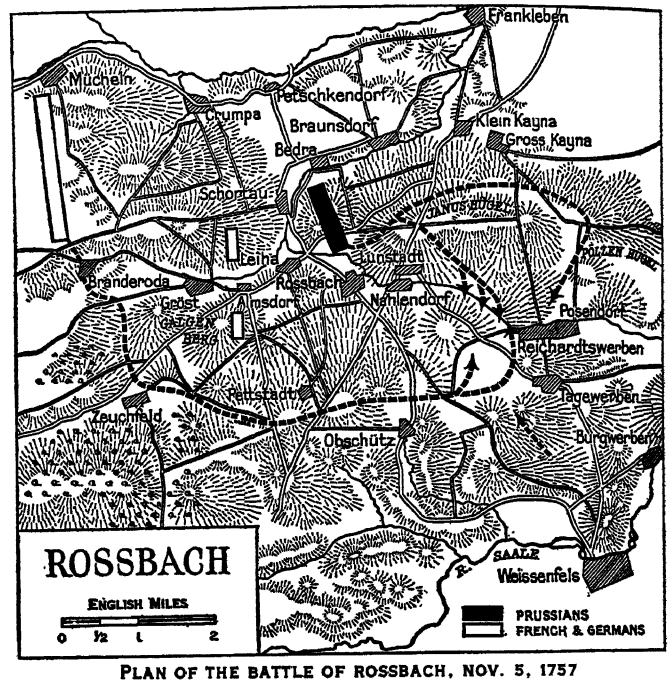
ROSSANO, a city of Calabria, Italy, in the province of Cosenza, 24 m. N.N.E. from that town direct, with a station 4 m. distant on the line from Metaponto to Reggio. It is picturesquely situated on a precipitous spur of the mountain mass of the Sila overlooking the Gulf of Taranto, the highest part of the town being 975 ft. above sea-level. Rossano is the seat of an archbishop, and in the cathedral is preserved the *Codex Rossanensis,* an uncial ms. of the Gospels of Matthew and Mark in silver characters on purple vellum, with twelve miniatures, of great interest in the history of Byzantine art, belonging to the 6th century A.D. Marble and alabaster quarries are worked in the neighbourhood.

Rossano (*Roscianum*) was one of the important fortresses of Calabria. Totila took it in 548. In the 14th century Rossano was made a principality for the great family of De Baux. Passing to the Sforza, and thus to Sigismund of Poland, it was united in 1558 to the crown of Naples by Philip II. of Spain.

ROSSBACH, a village of Prussian Saxony in the district of Merseburg, 8 m. S.W. of that place and N.W. of Weissenfels, famous as the scene of Frederick the Great's victory over the allied French and the army of the Empire on Nov. 5, 1757. For the events preceding the battle *see* SEVEN YEARS' WAR. The Prussian camp on the morning of the 5th lay between Rossbach (left) and Bedra (right), facing the Allies, who, commanded by the French general, Charles de Rohan, prince de Soubise, and Joseph Frederick William, duke of Saxe-Hildburghausen, General Feldzeugmeister of the Empire, had manoeuvred in the preceding days without giving Frederick an opportunity to bring them to action, and now lay to the westward, with their right near Branderoda and their left at Mücheln (*see* sketch). The advanced posts of the Prussians were in the villages immediately west of their camp, those of the Allies on the Schortau hill and the Galgenberg.

The Allies possessed a numerical superiority of two to one in the battle itself, irrespective of detachments,[1] and their advanced post overlooked all parts of Frederick's camp. They had had the best of it in the manoeuvres of the previous days, and Hildburghausen determined to take the offensive. He had some difficulty, however, in inducing Soubise to risk a battle, and the Allies did not begin to move off their camping-ground until after eleven on the 5th, Soubise's intention being probably to engage as late in the day as possible, with the idea of gaining what advantages he could in a partial action. The plan was to march the Allied army by Zeuchfeld, round Frederick's left (which was covered by no serious natural obstacle), and to deploy in battle array, facing north, between Reichardtswerben (right) and Pettstädt (left). The duke's proposed battle and the more limited aim of Soubise were equally likely to be attained by taking this position, which threatened to cut off Frederick from the towns on the Saale. This position, equally, could only be gained by marching round the Prussian flank, *i.e.,* by a flank march before the enemy. The obvious risk of interference on the exposed flank was provided against by a considerable flank guard, and in fact it was not in the execution of their original design but in hastily modifying it to suit unfounded assumptions that the Allies met with disaster.

Frederick spent the morning watching them from a house-top in Rossbach. The initial stages of their movement convinced him that the Allies were retreating southward towards their magazines, and about noon he went to dinner, leaving Captain von Gaudi on the watch. This officer formed a different impression of the Allies' intentions, for the columns which from time to time became visible in the undulations of the ground were seen to turn eastwards from Zeuchfeld. Gaudi's excited report at first served only to confirm Frederick in his error. But when the king saw for himself that hostile cavalry and infantry were already near Pettstädt, he realized the enemy's intentions. The battle for which he had manoeuvred in vain was offered to him, and he took it without hesitation. Leaving a handful of light troops to oppose the French advanced post (or flank guard) on the Schortau hill, the Prussian army broke camp and moved—half an hour after the king gave the order—to attack the enemy. The latter were marching in the normal order in two main columns, the first line on the left, the second line on the right; farther to the right was a column consisting of the reserve of foot, and between the first and second lines



PLAN OF THE BATTLE OF ROSSBACH, NOV. 5, 1757

was the reserve artillery on the road. The right-wing cavalry was of course at the head, the left-wing cavalry at the tail of the two main columns. At first the regulation distances were preserved, but when wheeling eastward at Zeuchfeld there was much confusion, part of the reserve infantry getting in between the two main columns and hampering the movements of the reserve artillery, and the rest, on the outer flank of the wheel, being unable to keep up with the over-rapid movement of the wheeling pivot. A weak flank guard was thrown out towards Rossbach. When it was seen that the Prussians were moving, as far as could be judged, eastward, it was presumed that they were about to retreat in order to avoid being taken in flank and rear; and the Allied generals thereupon hurried the march, sending the cavalry on ahead.

Frederick had no intention either of forming up parallel to the enemy or of retreating. As his army could move as a unit twice as fast as the enemy's, he intended to make a détour, screened by the Janus Hügel and the Pölzen Hügel, and to fall upon them suddenly from the east. If at the moment of contact the Allies had already formed their line of battle facing north, the attack would strike their right flank; if they were still on the move in column eastwards or north-eastwards, the heads of their columns would be crushed before the rest could deploy in the new direction—deployment in those days being a lengthy affair. To this end General von Seydlitz, with every available squadron, hurried eastward from Rossbach, behind the Janus Hügel, to the Pölzen Hügel; Colonel von Moller, with eighteen heavy guns, came into action on the Janus Hügel at 3.15 against the advancing columns of the Allied cavalry; and the infantry followed as fast as possible. When they came under the fire of Moller's guns, the Allied squadrons, which were now north of Reichardtswerben and well ahead of their own infantry, suffered somewhat heavily; but it was usual to employ heavy guns to protect a retreat, and they contented themselves with bringing some field-guns into action. They were, however, amazed when Seydlitz's thirty-eight squadrons suddenly rode down upon the head and right flank of their columns from the Pölzen Hügel "*avec une incroyable vitesse.*" Gallantly as the leading German regiments deployed to meet him,

[1] V. der Goltz (*Rossbach bis Jena,* 1906 edition) gives 41,000 Allies and 21,600 Prussians as the combatant strengths. Berndt's statistical work, *Zahl im Kriege,* gives the respective forces engaged as Allies 43,000, Prussians 21,000. Other accounts give the Allies' total strength as 64,000 and the Prussians' as 24,000.

the result was scarcely in doubt for a moment. Seydlitz threw in his last squadron, and then himself fought like a trooper, receiving a severe wound. The mêlée drifted rapidly southward, past the Allied infantry, and Seydlitz finally rallied his horsemen in a hollow near Tagewerben, ready for fresh service. This first episode was over in half an hour, and by that time the Prussian infantry, in échelon from the left, was descending the Janus Hügel to meet the already confused and disheartened infantry of the Allies. The latter, as their cavalry had done, managed to deploy some regiments on the head of the column, and the French in particular formed one or two columns of attack—then peculiar to the French army—and rushed forward with the bayonet. But Moller's guns, which had advanced with the infantry, tore gaps in the close masses, and, when it arrived within effective musketry range, the attack died out before the rapid and methodical volleys of the Prussian line. Meanwhile the Allies were trying in vain to form a line of battle. The two main columns had got too close together in the advance from Pettstädt, part of the reserve which had become entangled between the main columns was extricating itself by degrees and endeavouring to catch up with the rest of the reserve column away to the right, and the reserve artillery was useless in the middle of the infantry. The Prussian infantry was still in échelon from the left, and the leftmost battalions that had repulsed the French columns were quickly within musket-shot of this helpless mass. A few volleys directed against the head and left flank of the column sufficed to create disorder, and then from the Tagewerben hollow Seydlitz's rallied squadrons charged, wholly unexpectedly, upon its right flank. The Allied infantry thereupon broke and fled. Soubise and the duke, who was wounded, succeeded in keeping one or two regiments together, but the rest scattered over the countryside. The battle had lasted less than an hour and a half, and the last episode of the infantry fight no more than fifteen minutes. Seven Prussian battalions only were engaged, and these expended five to fifteen rounds per man. Seydlitz and Prince Henry of Prussia, the cavalry and the infantry leaders engaged, were both wounded, but the total loss of the king's army was under 550 officers and men as compared with 7,700 on the part of the Allies. (C. F. A.)

ROSSE, WILLIAM PARSONS, 3RD EARL OF (1800–1867), Irish astronomer and telescope constructor, was born at York on June 17, 1800, a son of the 2nd earl, Lawrence. Until his father's death he was known as Lord Oxmantown. Entered at Trinity college, Dublin, in 1818, he proceeded to Magdalen college, Oxford, in 1821, and in the same year he was returned as M.P. for King's County, a seat which he resigned in 1834. He was Irish representative peer from 1845, president of the British Association in 1843, president of the Royal Society from 1849 to 1854, being awarded the Royal Medal in 1851, and chancellor of the University of Dublin from 1862. He died at Monkstown on Oct. 31, 1867.

The first constructor of reflecting telescopes on a large scale, William Herschel, never published anything about his methods of casting and polishing specula, and Lord Rosse had no help towards his brilliant results. His speculum metal is composed of four atoms of copper (126·4 parts) and one of tin (58·9 parts), a brilliant alloy. Chiefly owing to the brittleness of this material, Lord Rosse's first larger specula were composed of a number of thin plates of speculum metal (16 for a 3-foot mirror) soldered on the back of a strong but light framework made of a brass (2·75 of copper to 1 of zinc), which has the same expansion as his speculum metal. In Brewster's *Edinburgh Journal of Science* for 1828 he described his machine for polishing the speculum, which in all essential points remained unaltered afterwards. In Sept. 1839 a 3-foot speculum was finished and mounted, but, though the definition of the images was good, its skeleton form allowed the speculum to follow atmospheric changes of temperature very quickly, so Lord Rosse decided to cast a solid 3-foot speculum. Hitherto a great difficulty in casting specula was the fact that they generally cracked while cooling. Rosse experimented, ingeniously overcame this difficulty, and successfully cast a solid 3-foot speculum in 1840. In 1842 he began a speculum of 6 ft. diameter, and in 1845 this great reflector was mounted and ready for work.

From 1848 to 1878 it was but with few interruptions employed for observations of nebulae (*see* NEBULA); and many previously unknown features in these objects were revealed by it, especially the similarity of "annular" and "planetary" nebulae, and the remarkable "spiral" configuration in many of the nebulae. A special study was made of the nebula of Orion, and the resulting large drawing gives an extremely good representation of this complicated object. (*See* TELESCOPE.)

See Ball, *Great Astronomers* (London, 1895).

ROSSELLINO, ANTONIO (1427–*c.* 1479), Florentine sculptor, was the son of Mateo Gamberelli, and had four brothers. The Gamberelli were a family of stonecutters of Settignano. Antonio's works are full of religious sentiment, and executed with the utmost delicacy of touch and technical skill. The style of Antonio and his brother Bernardo is a development of that of Donatello and Ghiberti; it possesses all the refinement and sweetness of the earlier masters, but is not equal to them in vigour or originality. Antonio's chief work, still in perfect preservation, is the lovely tomb of a young cardinal prince of Portugal, who died in 1459. It occupies one side of a small chapel, also built by Rossellino, on the north of the nave of San Miniato al Monte. The recumbent effigy of the cardinal rests on a handsome sarcophagus, and over it, under the arch which frames the whole, is a beautiful relief of the Madonna between two flying angels. The tomb was begun in 1461 and finished in 1466.

ROSSELLINO, BERNARDO (1409–1464), sculptor, the eldest brother of Antonio. In Sept. 1439 he acquired a house in the Via Proconsolo, Florence, and opened a botega with his four brothers. His finest piece of sculpture is the tomb, in the Florentine Santa Croce, of Leonardo Bruni of Arezzo, the historian of Florence, executed in 1443. In the church of S. Stefano at Empoli is an annunciation dated 1447. The tomb of Beata Villana at S. Maria Novella, Florence, was ordered in 1451. Bernardo's works as an architect were numerous and important. He was probably associated with Alberti in the construction of the Rucellai palace, Florence, and in extensive restorations and reconstructions of churches under Nicholas V. in Rome. Between the years 1461 and 1464 (when he died while engaged on the Lazzari monument at Pistoia) he occupied the important post of *capo-maestro* to the Florentine duomo.

See Wilhelm Bode, *Die Italienische Plastik* (1902).

ROSSETTI, CHRISTINA GEORGINA (1830–1894), English poet, was the youngest of the four children of Gabriele Rossetti. (*See* article on her brother DANTE GABRIEL ROSSETTI.) She was born at 38 Charlotte Street, Portland Place, London, on Dec. 5, 1830. She enjoyed the advantages and disadvantages of the strange society of Italian exiles and English eccentrics which her father gathered about him, and she shared the studies of her gifted elder brother and sister. As early as 1847 her grandfather, Gaetano Polidori, printed privately a volume of her *Verses,* in which the richness of her vision was already faintly prefigured. In 1850 she contributed to *The Germ* seven pieces, including some of the finest of her lyrics. In her girlhood she had a grave, religious beauty of feature, and sat as a model not only to her brother Gabriel, but to Holman Hunt, to Madox Brown and to Millais. In 1853–54 Christina Rossetti for nearly a year helped her mother to keep a day-school at Frome-Selwood, in Somerset. Early in 1854 the Rossettis returned to London, and the father died.

In poverty, in ill-health, in extreme quietness, she was now performing her life-work. She was twice sought in marriage, but each time, from religious scruples (she was a strong high-church Anglican), she refused her suitor; on the former of these occasions she sorrowed greatly, and her suffering is reflected in much of her early song. In 1861 she saw foreign countries for the first time, paying a six weeks' visit to Normandy and Paris. In 1862 she published what was practically her earliest book, *Goblin Market,* and took her place at once among the poets of her age. In this volume, indeed, is still to be found a majority of her finest writings. *The Prince's Progress* followed in 1866. In 1867 she, with her family, moved to 56 Euston Square, which became their home for many years. Christina's prose work *Commonplace*

appeared in 1870. In April 1871 her whole life was changed by a terrible affliction, known as "Graves's disease"; for two years her life was in constant danger. She had already composed her book of children's poems, entitled *Sing-Song,* which appeared in 1872.

After a long convalescence, she published in 1874 two works of minor importance, *Annus Domini* and *Speaking Likenesses.* The former is the earliest of a series of theological works in prose, of which the second was *Seek and Find* in 1879. In 1881 she published a third collection of poems, *A Pageant,* in which there was evidence of slackening lyrical power. She now gave herself almost entirely to religious disquisition. The most interesting and personal of her prose publications (but it contained verse also) was *Time Flies* (1885)—a sort of symbolic diary or collection of brief homilies. In 1890 the S.P.C.K. published a volume of her religious verse. She collected her poetical writings in 1891. In 1892 she was led to publish a very bulky commentary on the Apocalypse, entitled *The Face of the Deep.* After this she wrote little. Her last years were spent in retirement at 30 Torrington Square, Bloomsbury, which was her home from 1876 to her death. In 1892 her health broke down finally, and she had to endure terrible suffering. From this she was released on Dec. 29, 1894. Her *New Poems* were published posthumously in 1896.

In spite of her manifest limitations of sympathy and experience, Christina Rossetti takes rank among the foremost poets of her time. In the purity and solidity of her finest lyrics, the glow and music in which she robes her moods of melancholy reverie, her extraordinary mixture of austerity with sweetness and of sanctity of tone with sensuousness of colour, Christina Rossetti, in her best pieces, may challenge comparison with the most admirable of our poets. The union of fixed religious faith with a hold upon physical beauty and the richer parts of nature has been pointed to as the most original feature of her poetry. Hers was a cloistered spirit, timid, nun-like, bowed down by suffering and humility; her character was so retiring as to be almost invisible. All that we really need to know about her, save that she was a great saint, was that she was a great poet. (E. G.)

See the *Poetical Works* of C.G.R., with Memoir by W. M. Rossetti (1903); Edmund Gosse, *Critical Kit-Kats* (1896); an article by Ford Madox Hueffer in the *Fortnightly Review* (March, 1904); and another in *The Christian Society* (Oct. 1904). The *Family Letters of Christina Rossetti* were edited by W. M. Rossetti in 1908; *Selected Poems of Christina G. Rossetti,* edited by C. B. Burke (1913); T. Watts-Dunton, *Old Familiar Faces* (1916); Marjorie A. Bald, *Women Writers of the Nineteenth Century* (1923).

ROSSETTI, DANTE GABRIEL (1828–1882), English poet and painter, was born on May 12, 1828, at 38 Charlotte Street, London. He was the second of the four children of Gabriele Rossetti (1783–1854), Italian poet and liberal, a political refugee from Naples, who came to England about 1824, and married in 1826 Frances Mary (d. 1886), sister of Byron's physician, Dr. John Polidori. The elder Rossetti became professor of Italian at King's College, London, and was a subtle and original, if eccentric, commentator on Dante. His other children were Maria Francesca (1827–76), who eventually entered an Anglican sisterhood, and is known to scholars by her valuable *Shadow of Dante;* William Michael (*q.v.*); and Christina (*q.v.*) the poet.

Dante Gabriel Rossetti was educated at King's College School, London. On leaving school he went (1843) to Cary's Art academy (known as Sass's), near Bedford Square, and then (about 1846) to the Royal Academy Antique school. He did not find the instruction he desired in the Royal Academy schools, and asked Ford Madox Brown to take him as a pupil. Brown remained his friend even after Rossetti had transferred his admiration to Holman Hunt.

Pre-Raphaelite Brotherhood.—The point of Pre-Raphaelite crystallization which had so great though brief an influence upon Rossetti's life and art was found at a chance meeting, in 1848, between Rossetti, Millais and Holman Hunt in Millais's house in Gower Street, where certain prints from early Italian frescoes were studied. Rossetti proposed the formation of a "Brotherhood" with lofty aims, and they were joined by J. Collinson, F. G. Stephens, T. Woolner and W. M. Rossetti. Brown, though invited, declined to become a P-R.B. Rossetti's first effort was "The Girlhood of Mary, Virgin," which in March 1849 was exhibited at the "Free Exhibition," at Hyde Park Corner. The style of this famous picture was jejune, its handling was timid, while its coloration and tonality were dry, not to say thin. Its technique owed something to Brown, but its mysticism was Rossetti's own. Such was his advent in art under the Pre-Raphaelite banner. "Ecce Ancilla Domini!" the smaller picture which is now in the Tate Gallery, London, was his one perfect expression of the original motive of the "Brotherhood." He chose virginal white and its harmonies as its aptest coloration, and the intense light of morning sufficed for its tonality. There is real grace and sweetness in the figure of the Virgin, for which his sister Christina was the model. This picture was exhibited at the Portland Gallery in 1850 and was violently attacked by the critics at the time.

In December 1850 appeared the first of the four numbers of *The Germ,* the organ of the "Brotherhood," in which Rossetti had a leading place in verse and prose. He contributed to it some of his most famous poems—*The Blessed Damozel,* six sonnets and four lyrics.

The attack on the Pre-Raphaelites by the critics prejudiced their sales, and Rossetti turned to water-colours. His first considerable effort in this medium, which proved well-suited to his talent, was the illustration to Browning's poem "The Laboratory," depicting a lady's visit to an old poison-monger to obtain a fatal potion for her rival in love. This wonderful gem of colour marked the opening of the artist's second period, and his departure from that phase of Pre-Raphaelitism of which "Ecce Ancilla Domini!" was the crowning achievement. Other water-colours followed including the original (pen and ink) of "Hesterna Rosa," a gambling scene (1852), and "Dante drawing the Angel" (1852). "Found" was begun in 1853; but this piece of pictorial moralizing (the analogue of the poet's *Jenny*), vigorous and intensely pathetic as it is, was never really finished.

Marriage to Elizabeth Siddal.—Rossetti had now become acquainted with the beautiful Elizabeth Siddal, whose sumptuous and individual type moved Hunt, Millais and Rossetti to paint her. Rossetti painted her innumerable times, and they became engaged to be married about 1851. The friends called her "Lizzy" and "Guggums," though the names ill suited her tragic temperament and ominous beauty. By 1854 the Brotherhood, championed by John Ruskin, was respectable, but at the moment of success the group was broken up. Ruskin became Rossetti's patron and friend; it was rather a onesided friendship, for Rossetti was not prepared to accept Ruskin's pretensions. In May 1860 Rossetti and Elizabeth Siddal were married, but the two years of their marriage were painful years, for she was dying of tuberculosis. She gave birth to a still-born child, and on Feb. 11, 1862, she died of an overdose of laudanum, which she took from time to time to allay her sufferings. In the meantime Rossetti had met William Morris and Burne-Jones, both of them his enthusiastic disciples. To these new friendships are due Rossetti's part in the luckless decorations of the Oxford Union (1857–8). To the exhibition of the Pre-Raphaelites in 1857 he sent many works, including the "Wedding of St. George and Princess Sabra" and "Arthur's Tomb" (both in the Tate Gallery, London). "Bocca Baciata," the portrait (in oils) of a woman, a work of wonderful fire, and the pictures on the pulpit at Llandaff Cathedral, marked the close of the second epoch in Rossetti's art and the beginning of the third, last and most powerful of all the phases of his career. The picture "Dr. Johnson at the Mitre" (Tate Gallery), when the "pretty fools" consulted the lexicographer on Methodism, is a good example of his humour. In 1861 Rossetti published the exquisite translations in *The Early Italian Poets,* later revised as *Dante and his Circle* (1874).

Achievements in Painting.—With Morris he began to take a keen interest in decorative art. He produced several fine designs for stained glass, and had a large share in the revival of stained-glass painting as an art. The practice of designing on a large scale, and employing masses of splendid deep-toned colours, was probably largely responsible for the development of his powers in painting at this period (1862–63). He produced at this time a

striking and highly imaginative triptych (Tate Gallery), representing three events in the careers of Paolo and Francesca. The composition of the group of figures with the circular window behind them, is as fine as it was comparatively novel in Rossetti's practice. Other outstanding works are "Beata Beatrix" (Elizabeth Siddal as the blessed Beatrice contemplating the eternal) (1865), now in the Tate Gallery; "Proserpina in Hades" (1874), perhaps the most original, if not the most poetical and powerful of all his output; "Sibylla Palmifera" (1870); "Venus Verticordia," "Lilith," the better of the two versions is now referred to (1873); "Monna Vanna," in the Tate Gallery (1866); "Aurea Catena" (Janey Morris) (*c.* 1869); "La Ghirlandata" (1878); "Pandora," another study of Mrs. Morris (1871); "The Blessed Damozel" (1877); and the famous "Dante's Dream," now in the Walker Art Gallery at Liverpool. Nearly all Rossetti's last work was exhibited by the Royal Academy and at the Burlington Fine Art Club in 1883, after his death.

Development As a Poet.—The literary side of Rossetti developed *pari passu* with his achievements as a painter. After his wife's death he moved from Blackfriars to 16, Cheyne Walk, (The Queen's House), Chelsea, where for a short time A. C. Swinburne, W. M. Rossetti and Theodore Watts-Dunton lived with him. Rossetti had felt his wife's death—and perhaps his own remorse for having so frequently betrayed her—so acutely that in the first paroxysm of his grief he insisted upon his poems (then in manuscript) being buried in her coffin. But in 1869 they were disinterred and published in 1870. The volume contained the poems printed in *The Germ,* the sonnet-sequence *The House of Life,* very much enlarged at a later date. From this time to his death he continued to write poems and produce pictures—in the latter relying more and more upon his manipulative skill and less and less upon his inventive faculty. He depended also to some extent on the assistance of an artist whose name was Treffry Dunn.

In 1871 Robert Buchanan, in an unsigned article in the *Contemporary Review* on "The Fleshly School of Poetry," made a fierce attack on Rossetti's poems from a moral point of view, to which he answered by one on the "Stealthy School of Criticism." The attack was deeply felt by him, and his tendency towards gloomy brooding was further increased about 1868, by persistent insomnia. The result of this malady was a nervous shrinking from personal contact with any save a few intimate friends, which was aggravated by the use of narcotics, and at one time he saw scarcely anyone save his own family and Theodore Watts-Dunton. Fears were felt for his sanity, and in 1872 he was under medical care. He was frequently away with William Morris at Kelmscott, in Oxfordshire; indeed he was for some time (1872–74) a co-tenant of Kelmscott. This friendship was broken by the disputes arising out of the reorganization of the Morris firm, but Mrs. Morris was still an occasional visitor at Cheyne Walk.

While his *Ballads and Sonnets* was being printed (1881) his health began to give way and he died on April 9, 1882. His *Ballads and Sonnets* contained much of his best work, including the completed *House of Life,* and the fine ballads, *Rose Mary, The White Ship,* and *The King's Tragedy.*

BIBLIOGRAPHY.—*See* W. M. Rossetti—*Dante Gabriel Rossetti as Designer and Writer* (1889); *Ruskin, Rossetti, Pre-Raphaelitism* (1899); *Some Reminiscences* (1906) and *Rossetti, Classified Lists of his Writings with the Dates* (1906). Memoir by W. M. Rossetti prefixed to the *Collected Works* (1886, Revised edition 1911). Lady Burne-Jones's *Memorials of Edward Burne-Jones* (1904) is full of interesting sidelights. *See* also F. G. Stephens, *D. G. Rossetti;* "Portfolio" monograph (1894); H. C. Marillier, *D. G. Rossetti* (1899 and 1901); W. Sharp, *Dante Gabriel Rossetti: A Record and a Study* (1882); T. Hall Caine, *Recollections of Dante Gabriel Rossetti* (1882, revised and enlarged edition, 1928); W. Allingham, *Letters of Dante Gabriel Rossetti to William Allingham, 1854–70* (1807); A. C. Benson, *Rossetti,* in the "English Men of Letters" series (1904); E. Waugh, *Rossetti, his Life and Works* (1928); R. L. Mégroz, *Dante Gabriel Rossetti* (1929).

ROSSETTI, WILLIAM MICHAEL (1829–1919), English author and critic, born in London, second son of Gabriele and Frances Rossetti. In 1845, owing to pressure of family circumstances, he entered the Excise Office, afterwards the Inland Revenue Office, where he remained till 1894, retiring with the rank of under-secretary. He was a founder of the Pre-Raphaelite Brotherhood, and edited its organ *The Germ,* to which he contributed several papers of criticism and some verse. From 1850 onward, he wrote on matters of art and literature for *The Spectator* and other papers, defending the Pre-Raphaelite cause.

W. M. Rossetti is best remembered for his work in connection with Shelley (1869), Blake and Walt Whitman. His edition and memoir of Shelley (1869), with a carefully emended text and a dispassionate study of the poet's life, was invaluable at the time of its publication.

In 1874 he married Lucy (1843–1894), daughter of Ford Madox Brown, by whom he had five children.

W. M. Rossetti's most important works are: Blank verse translation of Dante's *Inferno* (1865); *Fine Art, Chiefly Contemporary* (1867); *Aldine Edition of Blake's Poems* (1874); *Lives of Famous Poets* (1878); *Collected Works of D. G. Rossetti* (1886–1904); *Life of Keats* (1887); *D. G. Rossetti: His Family Letters with Memoir* (1895); Memoir of D. G. Rossetti prefixed to *New Poems* (1896); *Ruskin, Rossetti, Pre-Raphaelitism* (1899), the first of a series of Family records; *Gabriele Rossetti—A Versified Autobiography* translated and supplemented (1901); *Some Reminiscences* (1906); *Democratic Sonnets* (1907).

ROSSI, PELLEGRINO LUIGI EDOARDO, COUNT (1787–1848), Italian economist, and statesman, was born at Carrara on July 13, 1787. He was educated at Pavia and Bologna. In 1815 he supported Joachim Murat, and on his fall left the country and went to Geneva, where he lectured on Roman law. He was made a citizen of Geneva, and as member of the extraordinary diet of 1832, was employed to draw up a revised Constitution, the *Pacte Rossi.* This was rejected, and Rossi went to France, where he was professor of political economy in the College de France, and in 1834 professor of constitutional law at Paris university. In 1839 he was given a peerage and in 1845 sent to Rome, where he became French ambassador. After the revolution of 1848 he stayed in Rome, and became minister of the interior under Pius IX. He was assassinated on the steps of the House of Assembly on Nov. 15, 1848.

As a statesman, Rossi was a man of signal ability and intrepid character, but it is as an economist that his name will be best remembered. His *Cours d'économie politique* (1838–54) gave in classic form an exposition of the doctrines of Say, Malthus and Ricardo. His other works were *Traité de droit pénal* (1829); *Cours de droit constitutionnel* (1866–67); and *Mélanges d'économie politique, d'histoire et de philosophie* (2 vols., 1857).

See le Comte Fleury d'Ideville, *Le Comte Pellegrino Rossi, sa vie, ses oeuvres, sa mort* (1887).

ROSSINI, GIOACHINO ANTONIO (1792–1868), Italian operatic composer, was born at Pesaro on Feb. 29, 1792. His father was town trumpeter and inspector of slaughter-houses, his mother a baker's daughter. The elder Rossini was imprisoned by the Austrians in 1796, and the mother took Gioachino to Bologna, earning her living as a *prima donna buffa* at various theatres of the Romagna, where she was ultimately rejoined by her husband. Gioachino remained at Bologna in the care of a pork butcher, while his father played the horn in the bands of the theatres at which his mother sang. The boy learned singing and the pianoforte, and at thirteen appeared at the theatre of the Commune in Paër's *Camilla*—his only appearance as a public singer (1805). He was also able to play the horn. In 1807 he was admitted to the Conservatorio of Bologna, but his insight into orchestral resources was gained rather by scoring the quartets and symphonies of Haydn and Mozart, than from his teachers. At Bologna he was known as "il Tedeschino" on account of his devotion to Mozart. His first opera, *La Cambiale di Matrimonio,* was produced at Venice when he was eighteen. Two years before he had received the prize at the Conservatorio of Bologna for his cantata *Il pianto d'armonia per la morte d'Orfeo.* Between 1810 and 1813, at Bologna, Rome, Venice and Milan, Rossini produced operas of which the successes were varying. *Tancredi,* produced at the Fenice, Venice (1813) made him famous. The libretto was an arrangement of Voltaire's tragedy by J. A. Rossi. Traces of Paër and Paisiello were undeniably present in frag-

ments of the music. But the sweetness and clarity of such melodies as "Mi rivedrai, ti rivèdrò" and "Di tanti palpiti," conquered Venice. Italians would sing "Mi rivedrai" in the law courts until called upon by the judge to desist. Rossini continued to write operas for Venice and Milan during the next few years, but without repeating the success of *Tancredi*.

In 1815 he retired to Bologna, where Barbaja, the impresario of the Naples theatre, engaged him as musical director of the Teatro San Carlo and the Teatro Del Fondo at Naples, on the understanding that he compose for each of them one opera a year. His payment was to be 200 ducats (about £35 or $175) per month; he was also to receive a share in the gaming-tables, also owned by Barbaja, amounting to about 1,000 ducats (£175 or $875) per annum. General enthusiasm greeted the court performance of his *Elisabetta regina d' Inghilterra,* in which Isabella Colbran, whom Rossini afterwards married, took a leading part. The opera was the first in which Rossini wrote the ornaments of the airs instead of leaving them to the fancy of the singers, and also the first in which the *recitativo secco* was replaced by a recitative accompanied by a quartet of strings. In *Almaviva* (Rome, 1816) the libretto, a version of Beaumarchais' *Barbier de Séville* by Sterbini, was the same as that already used by Paisiello in his *Barbiere,* an opera which had enjoyed European popularity for more than a quarter of a century. But Rossini had created such a masterpiece of musical comedy that the title of *Il Barbiere di Siviglia* passed inevitably to his opera.

Between 1815 and 1823 Rossini produced twenty operas. Of these *Otello* formed the climax, contrasting interestingly with the treatment of the same subject at a similar point of artistic development by Verdi. In deference to the taste of the day the story was made to end happily! The opera *Cenerentola* (1817) is to be ranked with the *Barbiere,* as a masterpiece in comedy. *Mose in Egitto* was produced at Naples in 1818. In 1821, Rossini married Isabella Colbran. In 1822 he directed his *Cenerentola* in Vienna, where *Zelmira* was also performed. After this he returned to Bologna; but an invitation from Prince Metternich to "assist in the general re-establishment of harmony" brought him to Verona at the opening of the Congress on Oct. 20, 1822. Here he made friends with Chateaubriand and Madame de Lieven.

In 1823, at the suggestion of the manager of the King's Theatre, London, he came to England, being much fêted on his way through Paris. In England he was given a generous welcome, which included an introduction to King George IV. and the receipt of £7,000 after a residence of five months.

In 1824 he became musical director of the Théâtre Italien in Paris at a salary of £800 per annum, and when the agreement came to an end he was appointed chief composer to the king and inspector-general of singing in France. The production of *Guillaume Tell* in 1829 brought his career as a writer of opera to a close. The libretto was by Étienne Jouy and Hippolyte Bis, but their version was revised by Armand Marrast. The music is free from the conventions discovered and utilized by Rossini in his earlier works, and marks a transitional stage in the history of opera. In 1829 he returned to Bologna on family business. His return to Paris was delayed by the July Revolution of 1830 until November 1830. Six movements of his *Stabat Mater* were written in 1832 and the rest in 1839, the year of his father's death, and the success of the work bears comparison with his achievements in opera; but his comparative silence during the period from 1832 to 1868 makes his biography appear almost like the narrative of two lives—the life of swift triumph, and the long life of seclusion, of which the biographers give us pictures in stories of the composer's cynical wit, his speculations in fish culture, his mask of humility and indifference. His first wife died in 1845, and political disturbances in the Romagna compelled him to leave Bologna in 1847, the year of his second marriage with Olympe Pelissier, who had sat to Vernet for his picture of "Judith and Holofernes." After living for a time in Florence he settled in Paris in 1855, where his house was a centre of artistic society. He died at Passy on Nov. 13, 1868.

See Stendhal, *Vie de Rossini* (1823); A. Azevedo, *G. Rossini, sa vie et ses oeuvres* (1865); H. de Curzon, *Rossini* (1920).

ROSSLYN, ALEXANDER WEDDERBURN, 1ST EARL OF (1733–1805), Lord Chancellor of Great Britain, was the eldest son of Peter Wedderburn (a lord of session as Lord Chesterhall), and was born in East Lothian on Feb. 13, 1733. He was educated at Edinburgh university and entered the Inner Temple in 1753. It was always his intention to practise at the English bar, but in deference to his father's wishes he qualified as an advocate in Edinburgh in 1754, and practised there for three years. In 1757, following a quarrel with Lockhart, then dean of faculty, he left the Scottish bar, and was called at the Inner Temple. He engaged Thomas Sheridan and Macklin to teach him oratory and to eliminate his native accent. His countrymen, Lords Bute and Mansfield, were also useful to him, and it was he who suggested to Bute a pension for Dr. Johnson. Bute's influence got him into parliament in 1761, and he took silk in 1763. In 1767 he married an heiress. His political career after this is complicated in the extreme. In 1768 he was a Tory, but next year he resigned his seat over the Wilkes business, thereby winning enormous popularity in the country, and getting a pocket-borough from Clive in 1770. His new associates, however, distrusted him, and with reason; in January 1771 he deserted to the North ministry and was made solicitor-general. As Junius said "there is something about him which even treachery cannot trust." Throughout the American war he savagely attacked the colonies, and in 1778 he was made attorney-general. In 1780 he became Chief Justice of the Common Pleas with the title of Baron Loughborough. During North and Fox's coalition he was a commissioner of the great seal, and appears as leader of the Whigs in the Lords, with full expectations of the Woolsack. The King's recovery, however, blighted their hopes, and in 1792 Loughborough seceded from Fox, and became Lord Chancellor in Pitt's Tory cabinet. In 1801, Pitt's resignation was the end of him; Addington had no room for him, but he received the earldom of Rosslyn, and retired. He died at his country house near Windsor on Jan. 2, 1805, and was buried in St. Paul's.

At the bar Wedderburn was the most elegant speaker of his time, and, although his knowledge of the principles and precedents of law was deficient, his skill in marshalling facts and his clearness of diction were marvellous; on the bench his judgments were remarkable for their perspicuity, particularly in the appeal cases to the House of Lords. For cool and sustained declamation he stood unrivalled in parliament, and his readiness in debate was universally acknowledged. In social life, in the company of the wits and writers of his day, his faculties seemed to desert him. He was not only dull, but the cause of dulness in others.

See Brougham's *Statesmen of the Reign of George III.;* Foss's *Judges;* Campbell's *Lives of Lord Chancellors.*

ROSTAND, EDMOND (1869–1918), French dramatist, was born on April 1, 1869, the son of a prominent Marseilles journalist and economist. His first play, a burlesque, *Les romanesques,* was produced on the 21st of May 1894 at the Théâtre Français. He took the motive of his second piece, *La Princesse lointaine* (Théâtre de la Renaissance, 5th April 1895), from the story of the troubadour Rudel and the Lady of Tripoli. The part of Mélisande was created by Sarah Bernhardt, who also was the original Photine of *La Samaritaine* (Théâtre de la Renaissance, 14th April 1897), a Biblical drama in three scenes taken from the gospel story of the woman of Samaria. The production of his "heroic comedy" of *Cyrano de Bergerac* (28th December 1897, Théâtre de la Porte Saint-Martin), with Coquelin in the title rôle, was a triumph. No such enthusiasm for a drama in verse had been known since the days of Hugo's *Hernani.* The play was quickly translated into English, German, Russian and other European languages. For his hero he had drawn on French 17th-century history; in *L'Aiglon* he chose for his theme the unhappy life of the duke of Reichstadt, son of Napoleon I. and Marie Louise, under the surveillance of Metternich at the palace of Schönbrunn. *L'Aiglon,* in six acts and in verse, was produced (March 15, 1900) by Sarah Bernhardt at her own theatre, she herself playing the part of the duke of Reichstadt, one of her most famous later rôles. In 1902 Rostand was elected to the French Academy. *Chantecler,* produced in February 1910, had Lucien Guitry in the title rôle. During the

World War he wrote chiefly patriotic verse. He died in Paris on Dec. 2, 1918.

His son, MAURICE ROSTAND, author of plays, made a sensation in 1928 by the production of *Napoléon IV.*, in which it was sought to ascribe responsibility for the death of the Prince Imperial to Queen Victoria.

The following works by Edmond Rostand were published posthumously: *La dernière nuit de Don Juan* (1921); *Le cantique de l'aile* (1922); *Le Vol de la Marseillaise* (1922). *See* G. Haraszti *Edmond Rostand* (1913); J. Suiberville, *Le Théâtre d'Edmond Rostand* (1919).

ROSTOCK, a town of Germany, in the republic of Mecklenburg-Schwerin, one of the most important commercial cities on the Baltic. It is situated on the estuary of the Warnow, 8 m. from the port of Warnemünde on the Baltic, 177 m. N.W. of Berlin by rail, 80 m. E.N.E. of Lübeck, and 106 m. S. of Copenhagen. Pop. (1925) 70,206. It is probable that the site was occupied by a village from very early times but the first definite mention of the settlement occurs in the 12th century. The town received its municipal charter in 1218. The earliest signs of commercial prosperity date from about 1260. In the 14th century it joined the Hanseatic League; and was one of the original members of the powerful Wendish Hansa, in which it exercised an influence second only to that of Lübeck. The most prosperous epoch of its commercial history began in the latter half of the 15th century. Rostock never entirely lost the independence which it enjoyed as a Hanse town; and in 1788, as the result of long contentions with the rulers of Mecklenburg, it secured for itself a peculiar and liberal municipal constitution. In 1880 this constitution was somewhat modified, and the city became less like a state within a state. It has belonged to Mecklenburg-Schwerin since 1695.

The town consists of three parts—the old town to the east, and the middle and new towns to the west—of which the first retains some of the antique features of a Hanse town. The town has four gates, one of them dating from the 14th century.

Rostock has five old churches: St. Mary's dating from 1398 to 1472, one of the most imposing Gothic buildings in Mecklenburg, with two Romanesque towers and containing a magnificent bronze font and a curious clock; St. Nicholas's, begun about 1250 and restored in 1450, and again in 1890–94; St. Peter's, with a lofty tower built in 1400, which serves as a landmark to ships at sea; St. James's, completed in 1588, and the church of the Holy Rood, begun in 1270. St. Mary's church contains a monument marking the original tomb of Hugo Grotius, who died in Rostock in 1645, though his remains were afterwards removed to Delft. Among other buildings are the curious 14th century Gothic town hall, the façade of which is concealed by a Renaissance addition; the former palace of the grand dukes, built in 1702; and the university buildings, erected in 1867–70. The university of Rostock was founded in 1418. From 1437 till 1443 it had its seat at Greifswald in consequence of commotions at Rostock; and in 1760 it was again removed, on this occasion to Bützow. The professors appointed by the city, however, still taught at Rostock, so that there were practically two universities in the duchy until 1789, when they were reunited at the original seat.

Rostock has a considerable trade, being the chief commercial town of Mecklenburg and vessels drawing 19 ft. of water are able to get up to the wharves. By far the most important export is grain; but bricks, sugar and salt are also shipped. The chief imports are coal, herrings, timber, wine and colonial goods. A train-ferry service to Denmark runs from Warnemünde, the outpost of Rostock.

ROSTOPTSCHIN, COUNT FEODOR VASSILIEVICH (1763–1826), Russian general, was born on March 23, 1763, in the government of Orel. The Tsar Paul made him in 1796 adjutant-general, grand-marshal of the court, then minister of the interior. He was disgraced in 1801 for his opposition to the French alliance, but was restored to favour in 1810, and was appointed military governor of Moscow. He was charged with its defence against Napoleon. He is alleged to have instigated the burning of Moscow the day after the French had made their entry; it is certain that the prisons were opened by his order, and that he took no means to stop the outbreak. He defended himself against the charge of incendiarism in a pamphlet printed in Paris in 1823, *La Vérité sur l'incendie de Moscou,* but he subsequently made grave admissions. Shortly after the Congress of Vienna, to which he had accompanied the tsar Alexander, he was disgraced. He only returned to Russia in 1825, and died at Moscow on Feb. 12, 1826.

His *Mémoires écrits en dix minutes* were posthumously published at St. Petersburg in 1853, his *Oeuvres inédites* in Paris in 1894. A partial account of his life was written by his grandson A. de Ségur (Paris, 1872). *See* also Varnhagen von Ense, *Denkwürdigkeiten,* vol. ix.; G. Tzenoff, *Wer hat Moskau im Jahre 1812 in Brand gesteckt* (1900).

ROSTOV-ON-DON, a seaport of Russia in the North Caucasian Area, in 47° 15′ N., 39° 40′ E., on the Sea of Azov, 25 m. from the point where the Don river reaches that sea by a number of mouths, only two of which are used, one for shipping and one for rafts. A channel through the former has been dredged with a minimum depth of 14 ft., and a stone quay exists along the river front 4,300 yd. long. The river is frost bound for 100 days per annum on an average. Trade consists of transit from rail or river vessels to lighters or local steamers on which cargoes are carried to Taganrog roads, there to be loaded for foreign voyages. Very few vessels from foreign ports reach Rostov itself. Imports and exports are thus practically the same as those of Taganrog (*q.v.*). Rostov is an industrial centre with shipbuilding yards, a dyeing industry, zinc, tobacco, boot and shoe factories, and other enterprises. There is a fishing industry. It is linked by rail with the north and west, with the Volga river and with the Caspian Sea. Pop. (1926) 233,491, much swollen in summer by seasonal hands coming in for the grain shipping industry.

ROSTOV VELIKIY, a town of Russia in the province of Yaroslavl, in 57° 14′ N., 39° 15′ E., near Lake Rostov or Nero. Rostov was founded by the Slavs about 862, and played a great part in early Russian history as the centre of the Rostov principality. Its pink washed Kreml (or citadel) walls have iron doors with quaint legends and paintings in each square, *e.g.,* a crow on a branch with the legend "I sing only to relieve my sorrow." Its ancient cathedral, with the famous peal of bells, its numerous church domes, its 12th century shrines and relics, the alleys and closes of its market, give a wonderful picture of mediaeval Russian life. After the Mongol invasion of 1239–42, it rapidly declined and in 1474 was purchased by Ivan III. and annexed to Moscow. It was repeatedly plundered by Tatars, Lithuanians and Poles in the 15th, 16th and 17th centuries. The population (19,952 in 1926) is mainly employed in the drying of vegetables and medicinal herbs, in coffee and chicory preparation and in flour-milling. There is fishing in the lake. The district was once famous for its enamelled *ikons.*

ROSTRA ("beaks"), in Roman antiquities, the orators' platform which stood in Rome between the Comitium and the Forum, opposite the Curia. In 338 B.C. it was decorated by Gaius Maenius with the prows of ships captured from the people of Antium. From that time it was called *Rostra,* having previously been known as *templum* (literally "consecrated place"), since it had been consecrated by the augurs. Here were exhibited the statues of famous Romans, and State documents and memorials (the laws of the Twelve Tables, etc.). Caesar had it pulled down, intending that it should be rebuilt on the west side of the Forum, but it was left for Augustus to carry out his plan. The use of the term *Rostra Vetera* by classical authors makes it doubtful whether the old platform was entirely demolished, unless the name was simply transferred to the new rostra of Augustus to distinguish it from the *Rostra Iulia.* This consisted of a rectangular platform, 78 ft. long, 11 ft. above the level of the Forum, reached by steps from the back; in front there was a marble balustrade with an opening in the centre where the speaker stood. In the existing remains, the holes in which the beaks of the ships were fastened are visible. *See* ROME: *Archaeology.*

BIBLIOGRAPHY.—For results of the excavations *see* C. Huelsen, *Das Forum Romanum* (Eng. tr. by J. B. Carter, Rome, 1906); *see* also O. Richter "Topographie der Stadt Rom" (1901), in I. von Mueller's *Handbuch der klassischen Altertumswissenschaft;* H. Thédenat, *Le Forum Romain,* (third ed. 1904); J. E. Sandys, *Companion to Latin Studies* (1921).

ROSWELL, a city of south-eastern New Mexico, U.S.A., the county seat of Chaves county; 150 m. N.W. of El Paso (Texas), at an altitude of 3,570 ft., near the Pecos river, on Federal highway 366 and the Santa Fe railway. Pop. (1920) 7,033 (94% native white); 11,173 in 1930 by the Federal census. It is a trade centre for fertile farmlands (40,000 ac. irrigated by artesian wells) and an extensive stock-raising region; the seat of the New Mexico Military Institute and junior college (a state institution, established in 1898); and the gateway to the Lincoln National Forest of 1,500,000 ac. in the Gallina, Capitan, White, Sacramento, and Guadalupe mountains. The Artesia oilfield is 40 m. south. Roswell was founded in 1885, as a cattle-trading point. The railway reached it from the S. in 1894 and from the E. in 1898. The city was incorporated in 1890.

ROSYTH, village and naval base of Fifeshire, Scotland, on the north shore of the Firth of Forth, 2¼ m. by rail from Dunfermline, with a halt on the L.N.E. line from Edinburgh to Dunfermline. The plans for the establishment of a large naval base here, drawn up in 1903, were modified in 1908; 285 ac. of foreshore and 1,184 of land behind were purchased, and work begun in 1909.

The original scheme included a high-level main basin covering an area of 55 ac., with an entrance lock from the fairway, a dry dock, a submarine tidal basin, and the construction of an entrance channel. A great sea-wall was built to form the southern boundary of the docks, the number of which was increased from one to three. Great progress had been made by the outbreak of the World War, and operations were pushed on vigorously. Rosyth was used as a secondary base to Scapa Flow, particularly for battle-cruisers. It was decided in 1925 to reduce the dockyard to the basis of a "care and maintenance" establishment.

ROTA, COURT OF, one of the departments of the mediaeval papal organization in the Vatican. The Rota was the supreme court of appeal of Christendom. It declined in importance when a special court of appeal for Italy was set above it, and more so as the geographical jurisdiction of the pope was gradually lessened. After the Council of Trent the old arrangements were replaced by the Congregations, permanent committees of cardinals which deal with definite branches of business. The Rota, however, was restored to its functions as supreme court of appeal by Pope Pius X. in 1908.

See CURIA ROMANA; and art. "Rota" in the *Catholic Encyclopaedia.*

ROTARY CLUB, a local organization of business men founded for the purpose of furthering business service and fostering social relations. The first Rotary was founded in the city of Chicago, Ill., on Feb. 23, 1905, by a lawyer, Paul P. Harris. The members met in rotation at the offices or places of business of the various members. This method suggested the name, Rotary Club. Similar clubs were organized in other cities of the United States of America, and in August 1910, at Chicago, the 16 clubs then in existence formed the National Association of Rotary Clubs. In 1912, after the formation of the Winnipeg, Canada, and the Dublin, Ireland, clubs the organization became the International Association of Rotary Clubs. In 1922 the name was changed to Rotary International. At the present time (June, 1928) Rotary International includes 2,923 clubs in 44 countries. There are about 137,000 members.

There is nothing secret about Rotary. Its constitution and by-laws can be obtained by anyone. Its aims and objects are to encourage and foster: 1. The ideal of service as the basis of all worthy enterprise. 2. High ethical standards in business and professions. 3. The application of the ideal of service by every Rotarian to his personal, business and community life. 4. The development of acquaintance as an opportunity for service. 5. The recognition of the worthiness of all useful occupations and the dignifying by each Rotarian of his occupation as an opportunity to serve society. 6. The advancement of understanding, goodwill and international peace through a world fellowship of business and professional men united in the ideal of service.

Membership in Rotary is based upon activity in a business or profession. One representative of each business, profession or institution in a community may be elected to membership. A second active member, who is a junior member of the firm or organization of which the first active member is a senior member, may be elected to membership. Men who have distinguished themselves by some meritorious service may be elected to honorary membership. The affairs of each club are administered by a board of directors assisted by various standing committees. The officers (president, vice-president, secretary and treasurer) are elected annually. Clubs hold weekly luncheon meetings. Membership in the club is forfeited if the required standard of attendance is not maintained. Clubs are banded together in districts. The club executives in each district meet in conference each year. Delegates and members of the clubs meet in annual district conference. In June, 1928 there were 69 such districts, not including those in the British Isles. The affairs of the district are administered by a governor, who is nominated by the district conference, and who is elected by the delegates at the international convention. The governor is the representative of Rotary International in his district. Each year representatives of all the clubs in Rotary International assemble in convention. The annual international convention elects a president who, with a board of directors, administers the affairs of Rotary International. The constitution provides that of the 12 directors, at least 5 must be from countries other than the United States of America. A permanent secretariat, consisting of the secretary, assistant secretaries, and staff, is maintained at Chicago, Ill. Branch secretariats are maintained in London, England, and at Zurich, Switzerland. The official publication is *The Rotarian,* published at Chicago.

(A. H. SA.)

IN THE BRITISH ISLES

The Rotary movement in the British isles was started in 1911. The first actual Rotary club was organised in Dublin by an Irish gentleman who had lived for many years in the United States. Shortly afterwards clubs were founded in London and Manchester by business men belonging to those cities who had seen something of the movement in America. Subsequently clubs were formed in Belfast, Glasgow, Edinburgh, Liverpool and Birmingham. These eight clubs formed, in May 1914, the British Association of Rotary Clubs, which was entrusted with the work of extending the movement and of preserving its aims and objects.

The British Rotary club differs in no essential way from that of North America. Its constitution provides for a membership limited to a single representative in each club of a given classification of trade or profession who must be either proprietor, active partner, or managing director, holding an executive position, or sole agent of a local branch. The club must meet weekly for luncheon and is expected at such meeting to provide a speaker on a topic of general interest, preferably one reflecting in some way the Rotary ideal of service in personal, business and community life. The club appoints its president and council at an annual meeting and is entirely autonomous so far as its local affairs are concerned. Party politics and sectarian religion are rigidly excluded from the proceedings. The fact that the member enjoys the exclusive privilege of representing his classification gives him no right to use his privilege for personal advantage. Mutual trading is in no way encouraged, but rather the reverse.

The Rotary clubs in Great Britain and Ireland have increased progressively in numbers since 1914 and there are now (1928) nearly 300. The governing body, formerly the British Association of Rotary Clubs, is now Rotary International, the clubs in Great Britain and Ireland, organized into fifteen districts, forming an administrative area organisation known as R.I.B.I. (Rotary International: Britain and Ireland). The headquarters are at 34, Norfolk Street, Strand, London. (V. C.)

ROTARY ENGINE. A type of steam engine in which the use of reciprocating parts is avoided with the object of saving the energy wasted in converting reciprocal or to-and-fro movement into rotary movement. The rotary principle has never had any practical success in competing with the smaller reciprocating engines, but steam turbines (which are really a class of rotary engine) have furnished the solution of the problem for moderate and large size installations. Many rotary mechanisms have been tried in the past. Some have comprised a flap piston

rotating within a cylinder, the pressure of the steam causing rotation. Sometimes the flap has a sliding action within the piston, the shaft of the latter being mounted eccentrically in relation to the bore. More or less complicated arrangements of levers and of gears have also been patented, with multiple pistons. Watt's famous attempt was really a semi-rotary engine, with a radial piston which swung to and fro and actuated a pinion and rack device for working the rods of pit pumps.

In the earlier periods of aeroplane construction rotary engines were much employed, notably the Gnome and the Le Rhone, but the radial engine forms the equivalent of these types now. Yet the rotary principle finds great success in certain other directions, such as pumps, blowers and gas-exhausters. The latter are in principle blowers reversed. In a well-known type the piston or drum is set with its axis eccentrically in the cylinder, and radial blades slide in its slots, making a gas-tight fit against the bore. The drum rotates and pumps the gas from the inlet which is at one side of the cylinder to the outlet at the other side. (*See* TURBINE.)

ROTARY TILLER: *see* CULTIVATING MACHINERY.

ROTATION OF CROPS. Rotation of crops cannot be planned and executed successfully without, at the same time, giving consideration to all other factors affecting successful farming. These are: (1) the crops and live stock that are naturally and economically adapted to the locality; (2) the type of farming best adapted to the size of the farm; (3) highest-profit combination of crops; (4) the economic balance of crop production with live stock; (5) the system of farming that best controls costs and best distributes power and labour demands throughout the year; (6) the maintenance of soil fertility; (7) the place given to less profitable enterprises in providing a better balanced business and in utilizing all the available resources; (8) the selection of high-yielding varieties, the control of plant and animal diseases and insects; (9) the production of high-quality marketable products; (10) the consideration of short-time adjustments in production, to meet market conditions without disrupting the planned economic procedure.

Every farm has some kind of cropping system, whether it be a single crop grown year after year on the same land, or several crops that change from field to field. It is only, however, when a series of crops are grown one after another in regular and orderly fashion, that there exists a crop rotation. While the more essential reasons for following a crop rotation hold in most localities, the most profitable combination of crops and live stock for different regions shows wide variation. In an eastern corn belt area of the United States, a comparison was made of the variation over a seven year period in the number of acres of crops on the successful and unsuccessful farms. This showed that the variation in crop acreage from year to year was much greater on the unsuccessful farms. The good farmer follows a well-considered plan of cropping his land.

Classes of Crops to Include in the Rotation.—In general a crop rotation is made up of three classes of crops, namely: (1) cultivated or intertilled crops; (2) small grain crops; (3) grass, or leguminous crops, grown in the order named. Some of the oldest observations in agricultural practice have shown the influence of a preceding crop on a succeeding one. It is also well known that certain legumes have a beneficial influence on crops succeeding them, and sometimes on the crops that accompany them. Poor lands that remain in sod for a few years are improved in physical condition and producing powers. Soil fertility can, therefore, best be maintained when the three classes of crops are grown in order and in recurring succession.

How to Plan a Rotation.—In planning a crop rotation, a rough map of the farm, showing each field, its acreage, and what crop is growing on it, should be made. If there are too many small fields, too few acres in leguminous crops, or other deficiencies, the map will help locate them. The number of fields and the number of years in rotation should correspond, if possible. Sometimes it is advisable to have two independent or separate rotations on the same farm. The varying conditions which exist on a farm with respect to soil, feeding requirements, etc., may call for a flexibility in cropping system, in order that the highest success in farming may be realized.

The cultivated crop or crops included in the rotation will give a chance to kill weeds that may become bad where uncultivated crops are grown. Since some weeds are much worse in cultivated crops, while others are worse in small grain or sod crops, they can be more easily managed by alternating these crops. Cotton, corn and potatoes represent the three cultivated crops that occupy the largest crop acreage. There are many others used in different areas that must be considered in planning a crop rotation. The important small grain crops are wheat, oats, rye and barley. The third essential class of crop to consider for the rotation is that of the grasses or legumes. These crops have the larger growth near the ground and when turned under are valuable for green manure. This supplies the soil with organic matter, makes more moisture available to crops in dry years, helps get rid of excess moisture in wet years, and will help check erosion of hilly or sloping lands and make all lands more easily tilled. Also by alternating deep-rooted and shallow-rooted plants, the plant food can be taken from different depths in the soil. Further, many plant diseases and harmful insects can be controlled by the practice of crop rotation. The distribution of labour and the amount and cost of equipment are also important considerations. The acreage and proportion of different crops must be so adjusted that the available labour can handle most of the work.

Applying sound business principles in determining the crop rotation is the key to its successful establishment and maintenance. The benefits accruing may be summarized as follows: the good crop rotation (1) takes care of and improves the soil; (2) helps control weeds, destroys insects and plant diseases; (3) supplies and removes plant food more evenly; (4) often results in saving labour; (5) aids in economical use of land, labour and capital; (6) makes farming more systematic; (7) when planned and developed with sufficient elasticity, adjustments can be made in acreages of cultivated crops, small grain crops or grass crops, to take advantage of market conditions. (H. M. DI.)

ROTHAMSTED EXPERIMENTAL STATION, an institution founded by J. B. Lawes (1816–1900) in 1843 on his estate of Rothamsted, an ancient manor at Harpenden, England. Coming early (1834) into possession, he began about 1838 to try the effects of various substances on plant growth. Among others he used bone meal, but, finding it inactive on turnips he treated it with sulphuric acid to obtain the soluble substance then known as superphosphate of lime. This had a high fertilizer value. He proved that the same product could be obtained by treating naturally occurring calcium phosphate with sulphuric acid and so he found a use for the vast deposits then being discovered. Other experiments showed the value of ammonium compounds as fertilizer, while the value of potassium compounds was already recognized. In 1843 he set up a factory near London to produce these "artificial fertilizers." The industry has since developed enormously and now several million tons are made annually. Wishing to continue the agricultural experiments, he invited a young chemist, J. H. Gilbert (1815–1901) to join him in the spring of 1843, and the two men worked together till 1900 when Lawes died: this is the longest partnership in the history of science. The first laboratory was in the barn; field plots were laid out to study the effects of the new fertilizers: in these a uniform system of cropping was and indeed still is followed year after year: thus on the Broadbalk field nothing but wheat has been grown, so that the 85th successive crop is now on the land: on Hoos field barley has been grown every year since 1852 and the Park grass has been hayed every year since 1856. The weights of the crop were carefully recorded and at subsequent dates measurements of weather and of soil conditions were started; the present day records are very elaborate.

Lawes and Gilbert also made experiments on the feeding of animals, adopting the original and then somewhat startling plan of killing and analyzing the animals at the end of the trial to ascertain the fate of the food. They were thus able to prove that animal fat was produced not only from vegetable fat, then regarded as its sole source, but from carbohydrates and proteins

and they thus established the basis for the quantitative studies of animal nutrition which have since yielded much knowledge. For many years their data remained the best and most complete. Later on, in 1879, Warington studied the nitrifying processes in the soil; these were the first soil bacteriological investigations in England.

In 1900 Lawes died, having previously set up a trust and endowed it with £100,000 for the continuance of the experiments: Gilbert died in 1901. A. D. Hall was thereupon appointed director and he immediately proceeded to bring the work into line with the needs of modern farming. One of the most lucid of English agricultural writers, he set out so clearly and concisely the lessons to be drawn from the Rothamsted experiments that they were at once apprehended by the best farmers and their advisers: he thus played a great part in establishing the enlightened attitude towards science now prevalent among the rural community. He recognized also that agricultural research had become too complex to be carried on by one or two men only but required groups of workers. His studies of soil and plant nutrition aroused considerable scientific interest, and, more important, showed how much science could do to help agriculture. Up till then no British Government had ever made any grants for agricultural research; in 1909, however, when the Development Commission was set up, the principle of Government assistance was recognized. This led to the need for organizing agricultural research and education in the United Kingdom and in 1912 Hall left Rothamsted to devote himself wholly to this work. Rothamsted became the recognized institution for the study of soil and plant nutrition and received grants from the Development Commission and other sources; in consequence expansion became possible. The present (1928) director, E. J. Russell, was then appointed. New departments were set up for studying the microbiology of the soil and the physical and chemical properties of the soils and serious efforts were begun to reduce the ancient art of cultivation to an exact science. The mass of field data had become so great that no ordinary scientific worker could deal with it: a Statistical department was therefore established to extract as much information as possible, notably to study the correlations between crop yields, weather and soil conditions, and fertilizer treatment. New methods of field experiments were introduced which largely eliminate the effects of soil heterogeneity, one of the chief difficulties of the field investigator. In 1919 laboratories for the study of plant pathology were added and to-day the total body of scientific workers numbers about fifty, aided by competent technical assistants. (E. J. R.)

ROTHE, RICHARD (1799–1867), Lutheran theologian, was born at Posen on Jan. 28, 1799. He studied theology in the universities of Heidelberg and Berlin (1817–20) under Karl Daub (1765–1836), Schleiermacher and Neander. In the autumn of 1823 he was appointed chaplain to the Prussian embassy in Rome, of which Baron Bunsen was the head. This post he exchanged in 1828 for a professorship in the Wittenberg theological seminary, of which in 1832 he became also second director and *ephorus*. In 1837 he became professor and director of a new clerical seminary at Heidelberg; in 1849 he was professor and university preacher at Bonn, but in 1854 he returned to Heidelberg as professor of theology, and afterwards became member of the Oberkirchenrath, a position he held until his death on Aug. 20, 1867. His removal to Heidelberg and the publication of his *Die Anfänge der christlichen Kirche und ihrer Verfassung* (1837), coincide with the attainment of the principal theological positions with which his name is associated.

Rothe's most important work is his *Theologische Ethik* (3 vols., 1845–1848; 2nd ed., 5 vols. 1867–71). The *Theologische Ethik* begins with a general sketch of the author's system of speculative theology in its two divisions, theology proper and cosmology, cosmology falling into the two subdivisions of *Physik* (the world of nature) and *Ethik* (the world of spirit). It is the last subdivision with which the body of the work is occupied. After an analysis of the religious consciousness, which yields the doctrine of an absolute personal and spiritual God, Rothe proceeds to deduce from his idea of God the process and history of creative development, which is eternally proceeding and bringing forth, as its unending purpose, worlds of spirits, partially self-creative and sharing the absolute personality of the Creator. The third section of his work —the *Pflichtenlehre*—is generally most highly valued; there full strength as an ethical thinker is displayed, without any mixture of theosophic speculation.

See F. Nippold, *Richard Rothe, ein christliches Lebensbild* (2 vols., Wittenberg, 1873–74); W. Hönig, *Richard Rothe, sein Charakter, Leben und Denken* (1898); Adolf Hausrath, *Richard Rothe und seine Freunde* (1902).

ROTHENBURG-OB-DER-TAUBER, a town of Germany, in the republic of Bavaria, 49 m. by rail W. of Nuremberg. Pop. (1925) 8,700. Rothenburg-ob-der-Tauber, mentioned in the chronicles in 804 as *Rotinbure*, first appears as a town in 942 and in 1108 passed to the family of Hohenstaufen. In 1172 it became a free imperial city and it attained the zenith of its prosperity under the famous burgomaster Heinrich Toppler (1350–1408). It is probably the finest surviving example of a mediaeval town, flanked by mediaeval walls, towers and gates. Perhaps the most interesting building is the town hall, one part of which dates from 1240 and the other from 1572. The latter is a beautiful Renaissance structure and contains a grand hall in which every Whit Monday a play, *Der Meistertrunk*, which commemorates the capture of the town by Tilly in 1631, is performed. Other buildings are the Gothic church of St. James, with curiously carved altars and beautiful stained-glass windows and the 15th century church of St. Wolfgang. The town possesses a library with some interesting archives. It has manufactures of toys, soap and agricultural machinery, and breweries, linen weaving establishments, sandstone and limestone quarries.

ROTHENSTEIN, WILLIAM (1872–), English artist, was born at Bradford, Yorks, on Jan. 29, 1872, and educated at Bradford. In 1888 he studied in the Slade school under Legros, and afterwards worked in Paris. In 1893 he began exhibiting at the New English Art Club. He was in 1917 elected professor of civic art at the University of Sheffield, and in 1920 principal of the Royal College of Art. His paintings include "The Browning Readers" (1900), "The Dolls' House" (1900) and "Jews Mourning" (1905), Tate gallery; "Aliens at Prayer" (1904), Melbourne art gallery; "Carrying the Law" (1910), "Morning at Benares" (1911), "Bourlon Church" (1919) and "The Last Phase: on the Rhine" (1919). Among his portraits may be mentioned those of Augustus John, Walker art gallery, Liverpool; Sir Francis Darwin (1905), Mr. Charles Booth (1908), Liverpool university; Prof. Alfred Marshall (1908), Cambridge; Mr. Bernhard Berenson (1910) and Sir Rabindranath Tagore (1912), besides a portrait of himself (1900), now in the Metropolitan museum, New York. His portrait drawings of distinguished men are notable for their sound draughtsmanship. He is one of the group of artists who decorated St. Stephen's hall, Westminster.

His published works include *Oxford Characters* (1896); *English Portraits* (1898); *The French Set, and Portraits of Verlaine* (1898); *Manchester Portraits* (1899); *Liber Juniorum* (1899); a *Life of Goya* (1900); *Plea for a Wider Use of Artists and Craftsmen* (1918); *Twenty-four Portraits* (first series 1920, second series 1923); *Ancient India* (1925).

ROTHERHAM, THOMAS (1423–1500), archbishop of York, also called THOMAS SCOT, was born at Rotherham on Aug. 24, 1423; he was educated in his native town and seems to have been connected with both the universities of Oxford and Cambridge. After holding various preferments Rotherham became, through the influence of Elizabeth Woodville, queen of Edward IV., keeper of the privy seal, bishop of Worcester, then bishop of Lincoln and in 1475 chancellor of England. In 1480 he was chosen archbishop of York. When Edward IV. died in April 1483 the archbishop remained true to his widow Elizabeth, and consequently lost the chancellorship and was put into prison by Richard III. He was soon set at liberty, and he died in 1500 at Cawood, near York. At Oxford Rotherham built part of Lincoln college and increased its endowment; at Cambridge, where he was chancellor and master of Pembroke hall, he helped to build the University Library. He founded a college at Rotherham, which was suppressed under Edward VI., and he was re-

sponsible for the building of part of the church of All Saints there.

ROTHERHAM, a county and parliamentary borough in the West Riding of Yorkshire, England, 5 m. N.E. of Sheffield, on the L.M.S. and L.N.E. railways. Pop. (1931) of county borough, 69,689. It lies at the confluence of the Don with its tributary the Rother, which affords a notable north-to-south route on the east side of the Pennine upland, and for more than 40 years a branch from Rotherham along the Don valley was Sheffield's only link with the main railway line. Rotherham is connected by the Don canal with Goole and the Humber and is an important railway and road junction. It is a small counterpart of Sheffield, possessing iron, steel and brass works, railway wagon works, potteries, glass works, breweries, saw-mills and rope-yards. Ironworks were established at Masborough on the opposite bank of the Don in 1746. At Templeborough, south-west of Rotherham, was a Roman fort, which has been identified as that of Morbium; its traces are now effaced. Rotherham came into some prominence as a city of mediaeval life and education. The 15th-century church on the site of Anglo-Saxon and Norman buildings is of Perpendicular style, though preserving some Norman work. One other mediaeval building survives in the Chantry chapel built upon the middle of the Chantry bridge, which spans the Don. It was desecrated at the Reformation, but was restored and reconsecrated in 1924. During the Civil War, Rotherham was taken by the royalists in 1643, but after the battle of Marston moor, it was surrendered to a detachment of parliamentary forces. It was incorporated as a municipal borough in 1871 and became a county borough in 1902.

ROTHERMERE, HAROLD SIDNEY HARMSWORTH, 1ST VISCOUNT (1868–), British newspaper proprietor, was the second son of Alfred Harmsworth, and brother of Viscount Northcliffe. He was born on April 26, 1868, London, was created a baronet in 1910, Baron Rothermere in 1914 and Viscount Rothermere of Hemsted, after his services as air minister, in 1918. He married in 1893 Mary Lilian, daughter of George Wade Share.

At the age of 21 he entered the publishing firm of which his brother, Alfred, was the principal, soon after the date when *Answers* was launched. He assisted in developing the business on sound and economic lines, and for the next 20 years was the close associate of his brother in all his great undertakings. He took an important part in the reorganisation of *The Evening News,* London, was one of the three principals in the establishment of *The Daily Mail* (1896) and was largely responsible for developing its methods of distribution. He founded *The Daily Record* (1895), bought *The Leeds Mercury* and shared in the purchase of *The Times* (1908). He became known also as a most generous benefactor of charities. By the gift of a large sum he enabled the Union Jack Club to provide worthy accommodation for sailors and soldiers in London; and he gave £10,000 to the Territorial Force County of London Association. In 1910 he founded the King Edward Chair of English literature at Cambridge, and in 1910 he ceased his connection with *The Times, The Daily Mail* and *The Evening News.* In 1914 he acquired *The Daily Mirror* from Lord Northcliffe and in 1915 he founded *The Sunday Pictorial,* the first fully illustrated Sunday newspaper in London. On the death of Lord Northcliffe, in Aug. 1922, Lord Rothermere by purchase acquired control of *The Daily Mail* and Associated Newspapers Ltd., the company which owns that newspaper among others; and subsequently bought large newspaper properties owned by Messrs. E. Hulton & Co., Ltd. In 1917 Rothermere became air minister. He at once declared himself "whole-heartedly in favour of reprisals," which were the best means of carrying the war into Germany and protecting British towns against air attacks. Suffering from precarious health and bereavements in the World War, he resigned April 25, 1918, after he had carried out the fusion of the air service into the Royal Air Force. (H. W. W.)

ROTHES, EARLS OF. The first earl of Rothes was George Leslie, son of Norman Leslie of Rothes in Moray and of Ballinbreich in Fife. In 1445 he was created Baron Leslie of Leven, and about 1458 earl of Rothes in the peerage of Scotland. His grandson GEORGE, the 4th earl (d. 1558), whose father, William, the 3rd earl, was killed at Flodden, was accused, but acquitted in 1546, of complicity in the murder of Cardinal Beaton, in which his brother and his two sons were undoubtedly implicated; he was one of the Scottish commissioners who witnessed the marriage of Mary queen of Scots with Francis, the dauphin of France.

His son ANDREW, 5th earl of Rothes (d. 1611), took an active part with the lords of the congregation, first against the queen-mother, Mary of Guise, when regent of Scotland, and afterwards against Mary queen of Scots in opposing her marriage with Darnley, and in devising the murder of Rizzio. He was, however, one of the peers who acquitted Bothwell of Darnley's murder; and going over to the side of the queen, he fought for her at Langside. He continued to occupy a position of some prominence in Scottish affairs until his death in 1611.

His great-grandson, JOHN, 7th earl of Rothes (1630–1681), held a command in the Royalist army at the battle of Worcester in 1651, and accompanied Charles II. to England at the Restoration, when he became lord president of the council in Scotland. He was lord treasurer of Scotland from 1663 till 1667, when he was made lord chancellor of Scotland for life. His estates having been sequestrated by the parliament in 1651, he received a re-grant in 1663 of the earldom of Rothes.

See Sir R. Douglas, *The Peerage of Scotland,* ed. Sir J. B. Paul; and G. E. C., *Complete Peerage.*

ROTHESAY, royal, municipal and police burgh, and the chief town of the county and island of Bute, Scotland. Pop. (1931) 9,346. It is situated on a beautiful bay, 40 m. S.W. of Glasgow, with which there is regular communication by steamers from Wemyss Bay, Gourock, Greenock, Craigendoran, Adrishaig, Inveraray, Glasgow, etc. It is a popular watering-place. The sheltered bay affords excellent anchorage, and is the headquarters of the Royal Northern Yacht Club. Rothesay is a centre for the herring fisheries, and the head of a fishery district. The town is under the jurisdiction of a provost and council. Owing to its mild and equable climate it is a resort of invalids. There is a tramway to Port Bannatyne, on the east horn of Kames Bay (now practically part of Rothesay), and to Ettrick Bay; and Craigmore, about 1 m. west of Rothesay, is a suburb. Ardbeg Point, Loch Fad, Loch Ascog and Barone Hill (530 ft.) are all within a mile and a half of the town, and the Kyles of Bute within a short sail.

In the centre of the town are the ruins of a castle erected in 1098 either by Magnus Barefoot, king of Norway, or by the Scots as a defence against the Norwegians, with whom during the 13th century, and earlier, there was constant strife. The village which grew up round the castle was made a royal burgh by Robert III., who, in 1398, created his eldest son David duke of Rothesay, a title which became the highest Scottish title of the heir-apparent to the crown of the United Kingdom. During the Commonwealth the castle was garrisoned by Cromwell's troops. It was burned by the followers of Argyll in 1685, and remained neglected till the rubbish was cleared away by the second marquess of Bute in 1816. It was repaired by the third marquess.

ROTHSCHILD, the name of a Jewish family which has acquired an unexampled position from the magnitude of its financial transactions. The original name was Bauer, the founder of the house being Mayer Anselm (1743–1812), the son of Anselm Moses Bauer, a Jewish merchant of Frankfort-on-the-Main. He set up as a money-lender at the sign of the "Red Shield" (*Rothschild*) in the Frankfort Judengasse, became agent to William, ninth landgrave, afterwards elector of Hesse Cassel, in 1801, and in the following year negotiated his first government loan for the Danish government. When the landgrave was compelled to flee from his capital on the entry of the French, he placed his treasure in the hands of Rothschild, who buried it, it is said, in a corner of his garden, whence he dug it up as opportunity arose for disposing of it. This he did to such advantage as to be able to return its value to the elector at 5% interest. He died at Frankfort on Sept. 19, 1812, leaving ten children, five sons and five daughters. Branches of the business were established at Vienna, London, Paris and Naples, each being

in charge of one of the sons, who received the privilege of hereditary landowners from Austria in 1815, and were created barons in 1822.

The charge of the Frankfort house devolved on the eldest, Anselm Mayer (1773–1855), born on June 12, 1773, who was a member of the royal Prussian privy council of commerce, and, in 1820, Bavarian consul and court banker. The Vienna branch was undertaken by Solomon (1774–1826), born on Dec. 9, 1774, whose intimate relations with Metternich contributed to bring about the connection of the firm with the allied powers.

The third brother, Nathan Mayer (1777–1836), born on Sept. 16, 1777, has, however, generally been regarded as the financial genius of the family, and the chief originator of the transactions which have created for the house its unexampled position in the financial world. He went to Manchester about 1800 to act as a purchaser for his father of manufactured goods; but at the end of five years he removed to London. The boldness and skill of his financial transactions, which caused him at first to be regarded as unsafe by the leading banking firms and financial merchants, later awakened their admiration. By the employment of carrier-pigeons and of fast-sailing boats of his own, he was able to utilize to the best advantage his special sources of information, while no one was a greater adept in the art of promoting the rise and fall of the stocks. The great influence of the house dates from his successful negotiation of some drafts made by Wellington on the English government, which the latter was unable to meet. From this time the allied powers negotiated loans chiefly through the house of Rothschild, who never lost faith in the ultimate overthrow of Napoleon on which he staked his all.

Rothschild was the first to popularize foreign loans in Britain by fixing the rate in sterling money and making the dividends payable in London and not in foreign capitals. Latterly he became the financial agent of nearly every civilized government, although persistently declining contracts for Spain or the American States. He did not confine himself to operations on a large scale, but took every opportunity of transacting business in all quarters of the globe. He died on July 28, 1836, and was succeeded in the management of the London house by his son Lionel (1808–1879), born on Nov. 22, 1808, whose name is associated with the removal of the civil disabilities of the Jews. He was elected a member for the City of London in 1847, and again in 1849 and 1852, but it was not till 1858 that the joint operation of an act of parliament and a resolution of the House of Commons, allowing the omission from the oath of the words objectionable to Jews, rendered it possible for him to take his seat. He continued to represent the City of London till 1874.

His eldest son, Nathan (b. 1840), was created a peer as Baron Rothschild in 1885. Jacob (1792–1868), the youngest of the original brothers, started business in Paris after the restoration of the Bourbons, for whom he negotiated large loans. At the Revolution of 1848 he was a heavy loser, and had to be protected for a time by a special guard. It was by his capital that the earliest railways were constructed in France; the profits he obtained from the speculation were very large. He died on Nov. 15, 1868. The Naples branch was superintended by another of the brothers, Karl (1780–1855). It was always the least important of the five, and after the annexation of Naples to Italy in 1860 it was discontinued.

See *Das Haus Rothschild* (1858); Picciotto, *Sketches of Anglo-Jewish History* (1875); Francis, *Chronicles and Characters of the Stock Exchange* (1853); Treskow, *Biographische Notizen über Nathan Meyer Rothschild nebst seinem Testament* (1837); Roqueplan, *Le Baron James de Rothschild* (1868); Count Corti, *The Rise of the House of Rothschild* (Eng. trans. by Brian and Beatrix Lunn, 1928).

ROTHSCHILD, NATHANIEL MAYER, 1ST BARON (1840–1915), Jewish financier, was born in London on Nov. 8, 1840, the son of Lionel Nathan de Rothschild, Austrian baron, head of the English branch of the famous financial family. He was educated at Trinity college, Cambridge, and in 1879 succeeded his father as Austrian baron. He was Liberal M.P. for Aylesbury from 1865 to 1885, when he was created a peer by Mr. Gladstone, the first of his race and religion to be raised to the House of Lords. He was known as an agriculturist as well as a financier, and was renowned for his charities. He died in London on March 31, 1915.

His brother, LEOPOLD DE ROTHSCHILD (1845–1917), who was associated with him in the management of the financial house, succeeded him as its head, and also took over most of his public offices, besides interesting himself especially in the Jewish community and becoming president of the United Synagogue. He was an art collector and owner of race-horses. He died at Ascott, Leighton Buzzard, on May 29, 1917.

ROTHWELL, an urban district in the West Riding of Yorkshire, England, 4 m. S.E. of Leeds. Pop. (1931) 15,639. Soon after the Conquest, Rothwell was a dependency of the castle of Pontefract, and a baronial residence, of which there are slight remains, was erected here. Coal and stone are obtained in the neighbourhood and the town possesses match-works and rope and twine factories in which the majority of the large industrial population is employed.

ROTIFERA (or Rotatoria), a well-defined class of aquatic animals of microscopic size, remarkable for the astonishing diversity of their forms, the vivacity and intelligence of their movements and the high level of their structural development. Being extremely transparent, the largest can hardly be detected by the unaided eye. In length they rarely exceed 1·7 mm. or $\frac{1}{15}$ in., ranging downwards to ·08 mm., and they probably average under ·25 mm., with breadth and thickness very considerably less. In general rotifers are compact in body and symmetrical in structure. They are plentiful in most weedy ponds and boggy pools, and are also to be found in lakes and reservoirs, canals and rivers, ditches and runnels,—in short, in any collection of water containing suitable food. The great majority live in fresh-water, yet many are seldom met with except in water either brackish or alkaline, and some are restricted to sea-water. Many flourish in places only intermittently wet, such as among the stems of land-growing mosses and liverworts. Some are parasitic within the cells of water-plants, or the bodies of other larger water-animals, living even in the gill-chambers of fresh-water crabs and crayfish. Others are literally "hangers-on" to the leaves and stems of water-weeds for the sake of a favourable position, or to the exteriors of water animals for the benefit of constant change of surroundings as their hosts move about. While they mostly live in waters of moderate temperature, they have been found established in hot springs. They can endure intense cold, being capable of reviving after being frozen in thick ice. Some appear only in the spring and summer, others carry on through the winter as well.

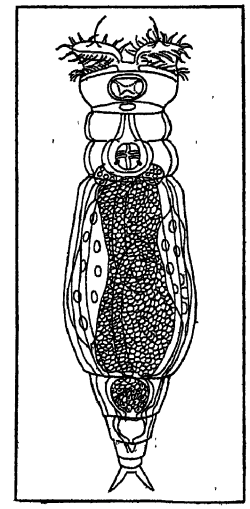
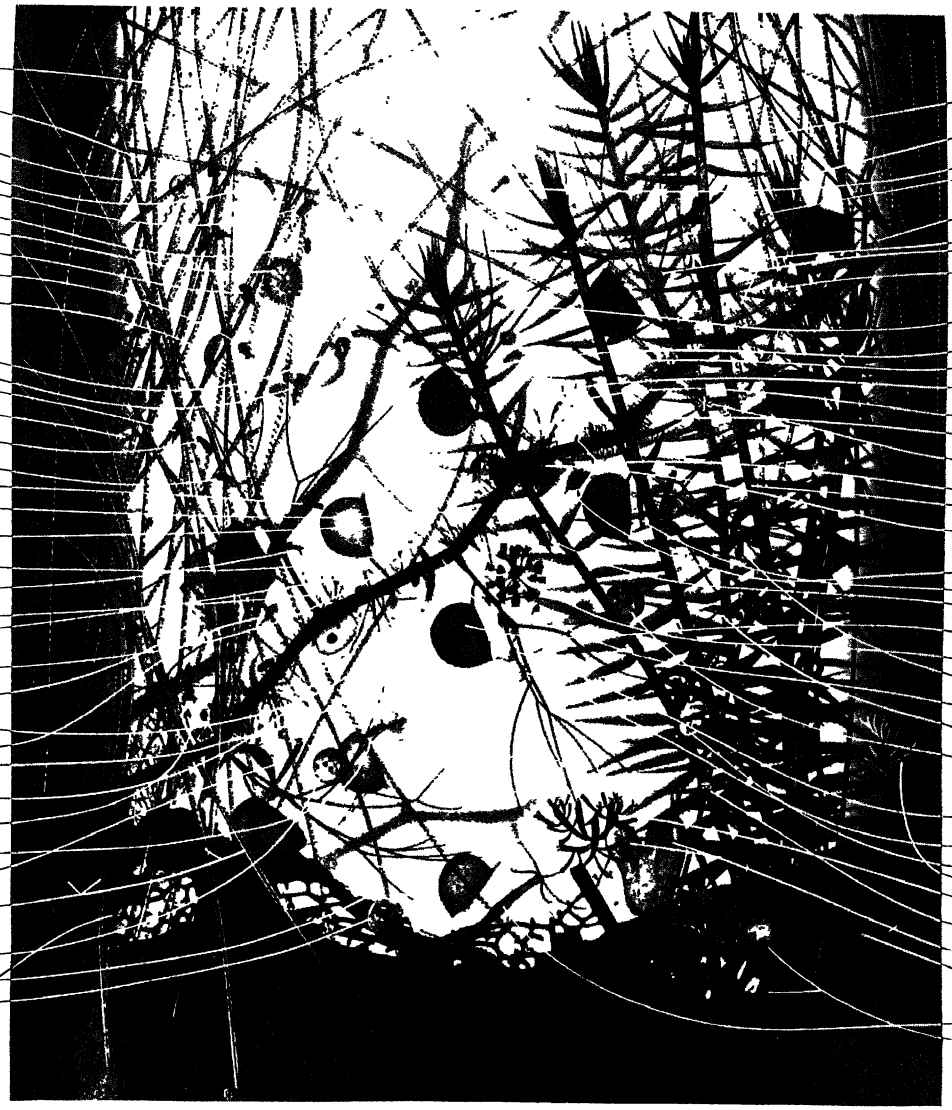


FIG. 1.—A BDELLOID ROTIFER (PHILODINA ACUTICORNIS)

The duration of their individual lives has been little studied, but some species are known to live a few days only, while others survive for at least three months. They are greatly dependent upon their immediate environment and the quality, no less than the quantity, of the water inhabited. Sudden changes of temperature, or in the density of the water, or, perhaps, a decrease in the proportion of oxygen held in solution, are quickly fatal to them.

Whatever the variations of their outward form, an arched back and a flattened ventral surface, two similar sides and a division of the body into head, trunk and foot, by shallow constrictions, can in general be readily distinguished, though the head is often merged into the trunk, and there is frequently no foot. The whole may be maggot-shaped, slender or elongate, ovoid or squat. Especially diversified in form are those species in which the skin is hardened to become an armour-like covering (lorica) which may be much flattened or laterally compressed. While mostly smooth and hyaline, the surface may be shagreened, faceted, grooved or otherwise obscured. It may carry defensive spines, supplemented by numerous prickles. It may consist of one or of several pieces connected by yielding skin. In species without a lorica, the skin is



GROUP 1..ROTIFERA
GROUP 2..CRUSTACEA
GROUP 3..ARACHNIDA
GROUP 4..INSECTA
GROUP 5..COELENTERA
GROUP 6..PROTOZOA
GROUP 7..FLOWERING PLANTS
GROUP 8..ALGAE
GROUP 9. DESMIDS
GROUP 10. DIATOMS

Y COURTESY OF THE AMERICAN MUSEUM OF NATURAL HISTORY

ROTIFER GROUP SEEN THROUGH A MICROSCOPE

General view of the marine inhabitants found in one-half inch of pond-bottom. Rotifers are invisible to the human eye and the group represented is magnified one hundred diameters, or, cubically one million times. In the centre of the group is a spray of the bladder-wort (*Utricularia vulgaris*), a flesh-eating water plant which ensnares tiny rotifers and other creatures by means of its bladder-shaped traps spread diagonally across the field of vision

ROTIFERA

BY COURTESY OF THE AMERICAN MUSEUM OF NATURAL HISTORY

ROTIFER GROUP SHOWING MINUTE INHABITANTS OF A POND

Detail of microscopic life found in ½ in. of pond-bottom. The bladderwort (*Utricularia vulgaris*), a water plant, is seen on the right, showing a single "utricle" about the size of a pin head in the living plant. At its upper right margin is a trap door, with a captured rotifer visible inside. The stem is covered with tiny algae. At the top, approximately in the centre, is shown a spherical colony of rotifers (*Conochilus hippocrepis*) which cling together by their stems. and below it, centre bottom, is a crescent-shaped desmid (*Closterium*)

generally smooth and flexible, but is sometimes tough and leathery, and may carry spines. The head, trunk and foot are often subdivided into smaller areas, segments or joints, by annular infoldings of the skin, frequently permitting the telescoping of one segment into that next to it.

Corona.—The collection of food and the swimming and gliding movements of rotifers are effected by the lashing action of numerous cilia crowded upon a particular area of delicate skin close to or encircling the mouth, or fringing several fleshy lobes or discs protrusible from it. The whole area, including the mouth itself, as seen when the cilia are active, is called the corona, and there are many varieties of the organ, differing widely in the arrangement of the cilia, etc. All these may be assigned to two leading types, the external and the evertile. In the main, the external type is characteristic of the hunting rotifers, which go about, swimming or gliding, in search of their food. The mouth is generally a little below the centre of the convex front of the head and the ciliated area, sometimes extending over various prominences, may be mainly before or mostly behind it. In certain species which only swim feebly by their ordinary cilia, these are often supplemented by auricles, small evertile pouches, one on each side of the head, lined with more powerful cilia. When the pouches are everted, these stronger cilia drive the rotifer along at greatly augmented speed. Other species rely almost entirely on their auricles. Certain footless species possess, besides the corona, from two to twelve leaping spines, attached to the "shoulders," which enable them, in emergencies, suddenly to spring several times their own length. In *Pedalia*, these spines are replaced by six limbs, having flattened ends fringed with stiff bristles.

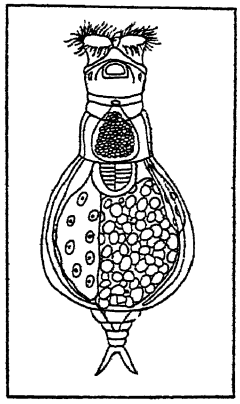


FIG. 2.—A PELLET MAKING BDELLOID ROTIFER (HABROTROCHA LATA)

The corona is much more complicated in the evertile type, characteristic of the stationary or sessile, and of the bdelloid rotifers, two groups very different otherwise, but alike in that they do not sally forth to seek their food, but wait for it to be brought to them by external currents or by those set up by themselves. The sessile rotifers are unique among the class in having an immature stage, lasting some days. When hatched, the young animals, little resembling their parents, and having a very simple corona, swim about for a while. Having chosen a position they affix themselves (for life) by the foot, and as they grow, develop the evertile corona proper to the adult. They are mostly independent, but certain of them form communities by affixing themselves, when young, close to others. Sometimes such communities are attached to plant-stems, sometimes they are free, the animals radiating from a common centre, and the community swimming through the water as a revolving sphere.

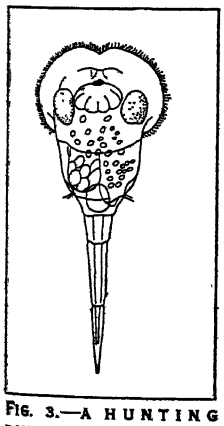


FIG. 3.—A HUNTING ROTIFER (MICROCODON CLAVUS)

The ciliated area is mostly disposed as a band fringing a shallow disc-like expansion, rounded, elliptic, heart-shaped, or two-, four-, or eight-lobed, into which the head opens as the corona unfolds. In one family the whole head opens out as a cup whose rim is drawn out into lobes beset with long hair-like setae arranged to form a living net, wherein the animals can draw their prey by the influence of cilia hidden in the depth of the cup. In one of the most beautiful of such forms, the "crown animalcule" (*Stephanoceros fimbriatus*), the rim is drawn out into erect arms with approximating tips and furnished with regularly placed tufts of cilia, closing the gaps between the arms and so forming a trap.

Among the bdelloids the corona consists mainly of two discs usually distinct, surmounting short pedicels arising from the back of the gaping mouth. The discs can be employed for swimming and for feeding while swimming, but most species feed when anchored by the foot, and when they desire to travel usually creep in leech-like manner; some exceptional species however, swim continuously, and some cannot swim at all.

In the typical form of the evertile corona, the cilia of the band fringing the upper surface of the lobes or discs are conspicuous and constitute the *trochus*. Almost parallel with it is another band, of much shorter cilia, the *cingulum*. Among the sessile species it passes round the under edge of the lobes or discs, and in the Bdelloida, round the bases of the pedicels and so to and around the lower lip on the inside, merging into the cilia of the mouth. Particles floating within reach of the trochus-cilia are struck by them within range of those of the cingulum, which in turn impel them to the mouth to be swallowed.

A curious illusory appearance of cogged wheels in rapid revolution, which greatly puzzled the early microscopists, is caused by the trochus-cilia. It happened that species showing this appearance were among the first rotifers discovered and that a long period elapsed before it was satisfactorily explained. Meanwhile it had led to all the known species being called "wheel animalcules" and thus to the later name of Rotifera (wheel-bearers) here employed. It is now believed that a succession of nerve-impulses, following each other at short and regular intervals, travel along the protoplasmic bases of the cilia, causing each of them, when reached, to lash violently downwards.

Among the many-segmented bdelloids, the first two segments form the rostrum, a structure peculiar to the group; the rostral tip, specially adapted, is employed to affix the body when creeping, the mouth, on the third or oral segment, being then closed with the corona hidden within. When it is desired to feed or to swim, the mouth is opened, the corona pushed forth, and the rostrum, in a collapsed condition, is thrust to the back and kept there while the corona continues active.

Mastax.—The food of rotifers consists in most cases of floating particles, excessively minute fragments of plant or animal tissues, bacteria, etc., but there are numerous exceptions. Many of the hunting rotifers will pounce upon weaker forms and gulp them down, tear them to shreds or suck out the soft interiors. Others successfully attack small Cladocera, such as *Chydorus*, and test-dwelling rhizopods are sometimes invaded and eaten. The contents of a water-snail's egg or of confervoid cells are obtained by piercing the investing shell or cell-wall. Diatoms, swallowed whole, are a favourite food of many forms and the smaller flagellates are also in request. Among the sessile rotifers the trap-making species prey upon the lesser animalcules and also upon flagellates. When secured, the food is passed down a short, distensible gullet to the mastax, or jaws.

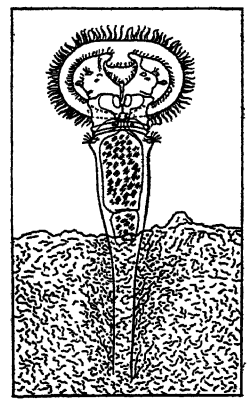
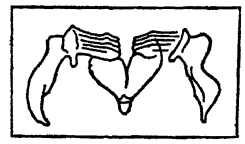


FIG. 4.—A SESSILE ROTIFER (PTYGURA STYGIS)

Important as are the functions of the mastax, they are by no means identical throughout the Rotifera, and the general plan of the organ has been very greatly modified in the various series of species according to the requirements of their respective habits of life. In itself the mastax is a complicated arrangement of seven principal hardened parts (adapted for biting, cutting, holding and crushing), of powerful muscles, of controlling nerves, and tiny glands, all enclosed in a stout-walled chamber, into whose upper cavity the food is carried. Each hardened part varies greatly in size, shape and relative prominence in the combination, and the parts that are dominant in the mastaces of one series of species may be of secondary importance or even suppressed, in those of another series. The different forms of the mastax have been grouped under six leading types.

In the malleate type, figured in ventral aspect (fig. 5), the seven hardened parts are all present and of average development. In the centre is the *incus*, or anvil, comprising the *fulcrum*, or base (now viewed edgewise), to whose upper portion are hinged two

rami, or branches, flattened parts whose free ends, mostly directed upwards, open and shut like shears. In lateral view, the fulcrum appears as a moderately wide plate. It is secured strongly to the mastax wall and has no independent motion. Outside the rami, to right and left and further dorsalwards, are two *mallei*, or hammers, each comprising a *manubrium*, or handle, nearly perpendicular, and an *uncus*, or striker, bent sharply inwards towards its fellow, and often ending in finger-like teeth. The two rami move in unison, as do also the two mallei, but generally independently of the rami. Only the two unci and the two rami come in contact with the food. This type of mastax obtains among numerous species of the hunting rotifers.



FROM HUDSON IN THE "QUARTERLY JOURNAL OF MICROSCOPICAL SCIENCE"

FIG. 5.—MALLEATE JAWS OF HUNTING ROTIFERA (BRACHIONUS SP.)

The other types can only be briefly indicated. In the virgate type, adapted for pumping, the manubria and the fulcrum are both elongate; the canal being distended, and its wall being supported by the hardened parts, a piston is supplied by a muscle. In the incudate, or seizing type, the whole incus (but especially the rami), is extremely developed; in the ramate, or bruising type, the unci are divided into several teeth and the fulcrum is reduced. The uncinate, or tearing type, has both manubria and fulcrum greatly reduced, whilst in the forcipate type, having somewhat elongate jaws, the mastax can be thrust forth from the mouth for at least half its length.

Stomach.—From the mastax the food passes next by a usually short oesophagus to the stomach, a fairly capacious organ, occupying in general a large part of the body cavity. It has a stout wall lined with cuticle, mostly ciliated, and on the outside a strong elastic covering. Between these is a dense layer of granular tissue, often divided into conspicuous cells and containing many oil globules. The interior of the stomach is mostly bag-like, but in the bdelloid group it is generally narrowly tubular with a very thick wall and is bag-like only in certain species, known as pellet-makers, because, in their case, while the food passes through the oesophagus, it is agglutinated into small pellets before entry into the stomach. Though fairly numerous, such species are mostly small and dwell in mosses.

In one small group of hunting rotifers the stomach is blind and the undigested residue of food is returned to the mouth for ejectment. In others the stomach is divided into two portions, the lower of which functions as intestine, but usually that organ is a separate dilation of the food canal, following closely behind the stomach, and much smaller, with thinner walls. Thence the residue passes through a short cloaca to the dorsally placed anus, whose position marks generally the hinder limit of the trunk. A pair, or more, of small glands, which secrete digestive juices, are linked to the food canal near its entrance into the stomach.

Foot.—The foot has mostly a secondary rôle and many species get on very well without one. In others it is highly important and is frequently longer than the remainder of the body, serving for some as a rudder, for others as a balancer, or as a highly contractile stalk. In loricated species and in some others, its cuticle is mostly hardened and divided off into several segments, sometimes telescopically retractile. In certain species the skin covering the muscular and very flexible core of the foot falls into numerous annular wrinkles.

Among the sessile group the foot commonly ends in a blunt point by which the rotifer can attach itself in any selected position. Among other forms the extremity most frequently carries one, two, or more processes, known as toes, having great variety of form and diversity of function. There are two distinct types, one having a single piece, the other having two, the lower retractile within the upper. The latter type is normal among bdelloid species, which have two, three or four toes, but in some they are replaced by a kind of sucking-disc. Among the hunting rotifers, the toes are always of one piece, sometimes furnished with somewhat claw-like tips. While many have but one, there are generally two, which may be alike in size and form, or very dissimilar. They may be straight, decurved or recurved, short or exceedingly long, slender or stout. Both types are hollow, with perforate tips, from which exudes a viscid secretion brought by tiny ducts from two glands in the upper foot, or lower trunk. By this secretion, the toes, or the sucking-disc, or the blunt point of the sessile foot, are attached to any surface touched, but can be freed at will. Among the bdelloids, the second last segment has two dorsal processes resembling the toes of the hunting rotifers and called spurs to distinguish them. They are mostly short yet vary much in shape and pose.

Nervous System.—A nervous system is well developed. Within the head lies a large ganglion, or brain, which is mostly of flattened form. From thence nerve-threads pass down each side and to the eyes, the antennae and other sense-organs. The bdelloids and many of the hunting rotifers have a single antenna behind the head, sometimes of conspicuous length, but frequently very minute. Others of the latter group and many of the sessile forms have two antennae on the head, and certain loricated species have one antenna on the head, and two more to right and left further to the rear. Finally, several largish species are furnished with four distinct antennae. There are often two eyes, either in front of the head or behind the brain, but a single eye is more usual, and while there are occasionally three, very many species have none. When examined the eyes show mostly a crystalline particle backed by ruby-red pigment. Among secondary sense-organs frequently present may be mentioned the trochal setae of the bdelloids, and the tactile setae of the Synchaetidae and allied forms. In many species, notably in the great family Notommatidae, there is conspicuous in close contact with the brain, the so-called retro-cerebral organ, of three principal parts, *viz.*—a central pendulous sac stretching some way behind the ganglion, having its interior filled with coarsely granular matter usually somewhat opaque, and flanked by two glands, sometimes larger, sometimes smaller, than the central sac. In many of the swimming species the organ has not been detected, and its function is not yet certain.

Excretion and Secretion.—An excretory system is represented by a very slender, much convoluted tube, which passes down each side of the body from the head rearwards. To the tubes are attached at intervals by short stalks a series of minute "flame-cells," tag-like in form, hollow and closed at the free end and enclosing a pulsating cilium. The tags, which usually number five to each tube, but in certain Asplauchnae are greatly in excess of this, are believed to draw out from the body the effete fluids, which are carried either to the cloaca or to a collapsible bladder near, whence they are discharged at short intervals.

Besides the special muscles, which operate the motions of the mastax, there are very numerous sinews, which pass freely through the body, each having its own course and office, and operate the movements of the several parts of the rotifer, apart altogether from those arising from ciliary action. The illoricated species, bdelloids and others, have also an exceptionally interesting system of muscles, nestling close under the skin, and somewhat difficult to see, but controlling the skin tension.

When there is no lorica, the skin-pores of the trunk exude a secretion, frequently so viscid that debris, etc., readily adhere to it. Sometimes this becomes a close-fitting coat, but it may be made into a loose case, often of flask-like shape, enclosing the rotifer, which can protrude its head from the open end and feed when it pleases. Among the sessile forms slightly conical cases are made, often of gelatinous substance, sometimes hardened. In one well-known species the skin secretion is not employed, but by a special organ connected with the corona, the rotifer prepares small pellets of unswallowed particles, and with these builds, brick by brick, a more permanent dwelling.

This same pore-secretion has been said to be the means employed by most bdelloid rotifers, when fearing desiccation, to encase their bodies, which they have retracted to the smallest possible compass, but doubt has again been cast on the accuracy of the usually accepted explanation, which in its day put an end to many long-winded discussions on the revivification of rotifers, etc. It seems more important to ascertain which species have the power of so avoiding sudden death, and it is certain that it is almost limited to bdelloid forms and is probably by no means universal among them.

Reproductive Organs.—More than four-fifths of the known species of Rotifera are represented only by females. The males of the others are in most cases extremely rare, much smaller and somewhat unlike their own females. They attract attention by their restless, rapid and seemingly aimless swimming. If one be examined, it will generally be found minus jaws, alimentary canal or bladder, but having a very simplified corona of rather long cilia, and as sex organs, a great sperm-sac, occupying much of the body, a seminal duct and mostly a protrusible penis. They survive a very few days. No male has yet been found among Bdelloida. As sex organs the females have only the two-fold ovary, usually conspicuous in the trunk. The larger part, the yolk-mass, contains generally eight large cells, which produce yolk material; the smaller and separated part, the germ-mass, containing germ-cells. Among the bdelloids and a small series of marine parasitic forms, there are two such ovaries; in all others one only. The combined organ is usually of ovoid shape, rarely elongate and band-like. From the ovary a long, collapsible tube leads to the cloaca.

Reproduction is in general oviparous, sometimes ovoviviparous, the eggs being retained until the embryos are well advanced. Three kinds of eggs are produced, always by different females, (1) Unfertilized or parthenogenetic, hatching in few days, having a thin shell, and producing females (*see* PARTHENOGENESIS); (2) Male, much smaller, also thin-shelled and parthenogenetic, hatching promptly and producing males; (3) Resting, as large as the unfertilized eggs but having a stouter shell, requiring fertilization and not hatching for a protracted period and then producing females, which later develop the ordinary unfertilized eggs. By means of the resting eggs, the species is carried over a danger period. Fertilization is internal; the males of certain species possess intromittent organs, but in other cases, the body-wall of the female is penetrated. The spermatozoa may be very large and in some species superficially resemble trypanosomes.

Ecology and Distribution.—Rotifers are doubtless food for fish and other inhabitants of the waters wherein they mostly live, but they are also attacked by various internal parasites, as Sporozoa and Bacteria, which grow within their bodies and in a few days cause their death.

With regard to their geographical distribution, they have been thought to be potentially cosmopolitan, and it is true that a relatively small number of species seem to occur in every country whose fauna has been investigated with respect to them. But for the overwhelming majority of known species there exist only isolated or few records, and while this is the case, such views seem lacking in foundation. Even in those countries which have been most carefully searched, a mere fraction of the possible investigation has yet been carried through. After discarding a host of imperfectly described and unrecognizable forms, there are over 1,000 reliable species known to present-day microscopists.

BIBLIOGRAPHY.—The literature relating to the Rotifera is somewhat voluminous and deals with them from every conceivable view-point, from that of the possessor of a microscope of moderate capacities to that of the highly trained zoologist equipped with the most modern instrument and the newest and most powerful lenses. A remarkably complete and useful bibliography of the subject, as at the end of 1912, is included in H. K. Harring's *Synopsis of the Rotatoria* (United States Nat. Museum, Washington, 1913) and comprises over 1400 titles of works of minor or major importance, mainly by European authors. In view of the vast improvement in lenses, instruments and technique, few works more than fifty years old have other than historical value or as the home of the original descriptions of particular genera or species. Of those of more recent date the following may be indicated as having greatly influenced current thought on structure and consequently on classification: C. Zelinka, *Studien ueber Raederthiere*, three papers (Leipzig, 1886, 1888, 1891); C. Wesemberg-Lund, *Danmarks Rotifera* (Copenhagen, 1899); P. D. Beauchamp, *Recherches sur les Rotifères, les formations tégumentaires et l'appareil digestif* (Paris, 1909).

On the faunistic side may be noted as outstanding: C. Wesenberg-Lund, *Contributions to the Biology of the Rotifera I: The Males of the Rotifera* (Copenhagen, 1923); and, in course of publication, in instalments, H. K. Harring and F. J. Myers, *The Rotifer Fauna of Wisconsin* (Madison, 1922 onwards). The latter, with a scope much wider than is implied in the title and embodying the very latest ideas as to classification, promises to be the standard work of its kind for a long period to come. (D. L. B.)

SYSTEMATIC AFFINITIES

The systematic affinities of the Rotifera have been much discussed without any general measure of agreement being arrived at. Since Ehrenberg in 1838 distinguished them from the ciliate Protozoa they have been approximated in turn to nearly every one of the major divisions of the animal kingdom except the Chordata. In 1851 Huxley compared them with the free-swimming ciliated larvae of Annelids and, more particularly, of Echinoderms. In 1858, Semper's discovery of *Trochosphaera* gave fresh support to the comparison with the larvae of Annelids and for a long time the view that the Rotifera were persistent trochophores may be said to have held the field. In 1871 *Pedalion* was described by Hudson, and this remarkable form with its three pairs of hollow limbs moved by muscles, giving it a superficial resemblance to a crustacean Nauplius larva, revived an older view that the Rotifera were in some way related to the Arthropoda. Lankester included them with the Annelida and Arthropoda in his phylum Appendiculata. But the resemblances between *Trochosphaera* and the trochophore larva break down when examined in detail until little more is left than the common possession of a preoral ciliary wreath which they share with the Peritrichous Infusoria; and on the other hand the fact that two of the appendages of *Pedalion* are median and unpaired seems to preclude any close comparison with the other "Appendiculata." More recently Wesenberg-Lund and de Beauchamp have argued that the ciliary wreath is a secondary development and that the most primitive Rotifers are those like *Notommata* in which there is a ventral uniformly ciliated field surrounding the mouth. From these it is easy to pass to the ventrally ciliated Gastrotricha and to imagine the derivation of both from a uniformly ciliated Turbellarian-like stock.

With organisms like the Rotifera, however, where palaeontology can give no help, phylogeny must remain a matter of speculation. All that we can be sure of is that they are unsegmented Metazoa without definite mesoderm or coelom, with branching excretory canals furnished with flame-cells, and having a single pre-oral nerve-ganglion. They are, therefore, on the same grade of organization as the Platyhelminths and the early larvae of several groups of higher Metazoa. It is likely that the exact arrangement of the locomotive appendages, whether ciliary or appendicular, is without any important phylogenetic significance. (W. T. C.)

ROTOGRAVURE: *see* PHOTOGRAVURE (MACHINE).

ROTOR SHIP. Wind propulsion for navigational purposes, in the commonly accepted sense, although suited for some particular trades, is practically obsolete for cargo carrying; and the sailing ship, pure and simple, cannot be said to have a definite future. Many sailing vessels are fitted with auxiliary propelling machinery, but, excluding fishing craft, these vessels have not proved an unqualified success.

Anton Flettner, the inventor of the rotor ship, originally intended to construct ships with metal sails, being convinced that the effect of metal sails is much greater than that of canvas sails. The idea was to build the metal sails with sections similar to those used in the construction of aircraft planes. It was intended that the sails should revolve freely around a pivot mast, and then be put by a special rudder blade in such a position that the wind would drive the ship ahead.

Experiments were carried out at the University of Göttingen with canvas sails, metal sails and model ships. The result of these experiments showed that the effect of metal sails could be made approximately double that of canvas sails, a necessary condition being, however, that a third part of the sail area should be turnable. Designs were got out, but the plans did not materialize.

In the case of the rotor ship the inventor states that it is not intended to drive ships solely by wind rotors, but that they shall serve as an auxiliary power upon steam and motor vessels. In the vessel under discussion, the power of the wind is not made use of by sails, but by means of large metal cylinders.

Revolving Cylinders.—In 1922 experiments were carried out at Göttingen with revolving cylinders, and it was then discovered that the pressure exerted upon a cylinder revolving in an

air current was considerably greater than had been supposed. Actually, the power exerted on a normal cylinder was about four or five times as large as that on a normal sail. When, however, discs of a larger diameter were provided at the ends of the cylinders, it was found possible to increase the effect to nine or ten times the amount of wind effect in the normal sail. One condition for this, however, is that the revolving speed of the cylinders is about 3 to 4½ times as great as that of the wind. An ordinary sailing vessel requires to take down all her canvas in a hurricane, but the rotor ship could continue sailing, with more stability for manoeuvring.

The vessel selected for the first tests was the three-masted schooner "Buckau." She had a displacement of 960 tons, and was fitted with an auxiliary motor of some 200 horse-power. The canvas rig of the vessel was dismantled, and in place of the fore and third masts, two very strong masts were erected. The new masts were shorter, being 42ft. in height. These masts were provided with bearings at the upper and lower ends to allow for the free rotation of the cylinders, which were placed over the masts. The cylinders were fitted with discs at either end, the discs being of greater diameter than the cylinders, but built as a part of them. In this particular case the cylinders are of sheet steel of 0·04in. thickness.

Naturally, the whole structure is suitably stiffened. The cylinders are rotated by means of electromotors, which will give the towers a speed of 125rev. per minute. Circumferential speed is approximately 60ft. per sec., and the power required to rotate the towers is nine horse-power. For working the plant one man only at the switch-board is required. By altering the circumferential speed of one or other of the cylinders the operator can correspondingly change the pressure exerted by the wind upon this, and so alter the vessel's course. When cruising, changing the wind side can be effected solely by the towers, when the ship can be stopped and driven astern.

The Magnus-effect.—The explanation of the phenomenon of the rotor ship may be traced to the so-called *Magnus-effect*, explained in 1853 by Prof. Magnus of Berlin, who found that a special power is exerted by an air current upon a revolving cylinder. The explanation of the reason for this effect was found, after more than 20 years of investigation, to be briefly as follows: When a cylinder revolves, the nearest stratum of air revolves with the cylinder, owing to the friction of the cylinder being much greater than the friction of the air molecules against each other. The nearest stratum induces the next one also to revolve, but, naturally, this is done at a much slower speed. In the same manner the strata lying more distantly from the cylinder are moved more and more slowly, until at a certain distance the influence stops. If such a rotating cylinder is impinged upon by an air current, the speed of which is slower than the circumferential speed of the cylinder, the streamlines are directed, so that at one side the air is rarefied by the frictional effect of the cylinder, and at the other side it is compressed. These changes of pressure are the causes of the *Magnus-effect*, and they create a power in a direction away from the side of the rarefied air, and through the centre of the densest air patch, or side in which the streamlines are compressed. Actually the real direction of the power is not always at right angles to the wind direction, but diverges in a measure which is dependent on the speed ratio of the wind current to that of the circumferential speed of the cylinder.

The sea-going trial of the rotor ship "Buckau," from Germany to the Forth, was claimed to be successful, but little has since been heard of the subject.

See *Marine Engineer Officers' Magazine* (Jan. 1925).

(F. J. D.)

ROTORUA, a town of Rotorua county, North Island, New Zealand. It lies in the midst of a remarkable volcanic district generally known as the Hot Spring district, which covers an area of 660 sq.m. and extends 160 m. from north-east to south-west from White Island, an active volcanic cone in the Bay of Plenty to the mountains of Tongariro, Ngaruhoe and Ruapehu in the interior of the island, S.W. of lake Taupo. Rotorua attracts many visitors on account of the beauty and scientific interest of the locality and the bathing in its various medicinal springs. It is a scattered township lying on the south-western shore of lake Rotorua, amid hills reaching 2,600 ft. in the immediate neighbourhood, with a rich growth of forest.

The springs are principally alkaline, alkaline and siliceous, acidic, or acidic and hepatic (sulphurous). The township includes the Maori village of Ohinemutu, an interesting collection of native dwellings. In the vicinity, on the lake-shore, is the government sanatorium. One mile south of the Rotorua is another native village, Whakarewarewa, where there are geysers as well as hot springs. Four miles from Rotorua, near the centre of the lake, the island of Mokoia rises to 1,518 ft. A short channel connects lake Rotorua with lake Rotoiti to the N.E. Both this lake and the smaller ones to the east, Rotoehu and Rotoma, have deeply indented shores, and are set in exquisite scenery. The waters of Rotoma are of a particularly vivid blue. To the south of Rotoiti is Tikitere, a sombre valley abounding in mud volcanoes, springs and other active volcanic phenomena. Mount Tarawera (16 m. S.E. of Rotorua) is noted for the eruption of June 1886, which changed the outline of several lakes, destroyed the famous Pink and White terraces on the adjoining lake Rotomahana.

ROTROU, JEAN DE (1609–1650), French tragic poet, born at Dreux on Aug. 19 or 20, 1609, became in 1632 playwright to the Hôtel de Bourgogne company. He was three years younger than Corneille, but began writing plays earlier than his great contemporary, for his first play *L'Hypochondriaque*, was printed in 1631. Most of his earlier plays were adaptations from the Spanish of Lope de Vega and by 1634 he is said to have produced 34 pieces. The importance of Rotrou in French dramatic literature lies in the fact that he sought to naturalize the romantic English and Spanish comedy in France, where the tragedies of Seneca and the comedies of Terence were still the only accepted models. *Diane* (acted 1630; pr. 1633), *Les Occasions perdues* (acted 1631; pr. 1635), praised by Richelieu; and *L'Heureuse Constance* (acted 1631; pr. 1635); praised by Anne of Austria, were all in the Spanish manner, but in *Les Menechmes* (pr. 1636), and in *Hercule Mourant* (pr. 1636) he followed the Latin authors Plautus and Seneca. In 1639 Rotrou bought the post of *lieutenant particulier au bailliage* at Dreux, where he married and settled. His four masterpieces were written after that date; they are: *Le Véritable Saint Genest* (acted 1646; pr. 1648), a story of Christian martyrdom containing some amusing by-play, one noble speech and a good deal of dignified action; *Don Bertrand de Cabrère* (1647), a tragi-comedy; *Venceslas* (1647; pr. 1648); *Cosroès* (1649), a play with an oriental setting, claimed as the only absolutely original piece of Rotrou. He died of the plague and was buried at Dreux on June 28, 1650.

A complete edition of Rotrou was edited in five volumes by Viollet le Duc in 1822. In 1882 M. de Ronchaud published a handsome edition of six plays—*Saint Genest, Venceslas, Don Bertrand de Cabrère Antigone, Hercule Mourant* and *Cosroès*. *See* further J. Jarry, *Essai sur les oeuvres dramatiques de Jean Rotrou* (Paris and Lille, 1868); Léonce Person, *Hist. du Venceslas de Rotrou, suivie de notes critiques et biographiques* (1882), in which many legends about Rotrou are discredited; *Hist. du véritable Saint Genest de Rotrou* (1882), *Les Papiers de Pierre Rotrou de Saudreville* (1883); Henri Chardon, *La Vie de Rotrou mieux connue* (1884); and Georg Steffens, *Jean de Rotrou als Nachahmer Lope de Vega's* (1891).

ROTTERDAM, a city of Holland in the province of South Holland, on both banks of the New Maas, at the confluence of the canalized Rotte, and a junction station 14½ m. by rail S.S.E. of The Hague. The population of the city, which is the principal Dutch port, was about 20,000 in 1632; 53,212 in 1796; 105,858 in 1860; 379,017 in 1905 and 562,991 in 1927.

Rotterdam probably owes its existence to two castles, which existed in feudal times. In 1299 John I., count of Holland, granted to the people of Rotterdam the same rights as were enjoyed by the burghers of Beverwijk, which were identical with those of Haarlem (K. Hegel, *Städte und Gilden*, 1891, Bd. ii.). This privilege marks the origin of the town. It continued to increase in size, various extensions of its boundaries being made, and its trading importance is to a large extent the result of its commercial intercourse with England. Its shipping facilities have made it the first commercial city of Holland, and the third largest port on

the continent. By means of the New Waterway (1869–90) to the Hook of Holland it is accessible for the largest ships. Ships drawing 24 ft. can come up at any time, and those drawing 24 to 32 ft. at high water. The length of the quays is about 16 m. The principal quay is the Boompjes ("little trees"), forming the river-front on the north side. The river is spanned by a road bridge (1878) and a railway bridge (1877) passing from the Boompjes to the North Island, whence they are continued to the farther shore by swing-bridges through which the largest ships can pass to the upper river. These bridges prove useful in breaking up the ice which forms above them in winter. On the south side of the river are numerous large docks and wharves, which have been enlarged since the World War, while the city proper on the north side consists of a labyrinth of basins and canals with tree-bordered quays.

In the centre of the town is the Beursplein or Exchange Square. Behind the exchange is the great market-place, built on vaulting over a canal, and containing a bronze statue of Erasmus, who was born in Rotterdam in 1467. The statue is the work of Hendrik de Keyser, and was erected in 1622 to replace an older one. Beyond the market-place is the High Street, which runs along the top of the Maas Dyke. On the west of the city a pretty road leads from the Zoological Gardens (1857), on the north to a small park, which contains a statue of the popular poet Hendrik Tollens (d. 1856), a native of the city. Among the churches of Rotterdam is an English church, originally built by the 1st duke of Marlborough, whose arms may be seen with the royal arms over the entrance. The Groote Kerk, or Laurens Kerk (end of the 15th century), contains a fine brass screen (1715), a celebrated organ with nearly 5,000 pipes, and the monuments of Admiral Witte de Witte (d. 1658), and other Dutch naval heroes. In the New Market adjoining is a fountain adorned with sculptures erected in 1874 to commemorate the jubilee of the restoration of Dutch independence (1813). The museums of the city comprise an ethnographical museum, the maritime museum established by the Yacht Club in 1874, and the Boyman's Museum (1867) containing pictures, drawings and engravings, as well as the town library. Of the original collection of pictures bequeathed by F. J. O. Boyman in 1847, more than half was destroyed by fire in 1864; but the collection has been enlarged since and is representative of both ancient and modern artists. Close to the museum is a statue of the statesman Gysbert Karel van Hogendorp (1762–1834), a native of the city. Among the remaining buildings must be mentioned the old town hall (17th century; restored 1823), the new town hall, the concert-hall of the "Harmonic" club, the record office (1900), the *leeskabuiet*, or subscription library and reading-rooms, and the ten-storeyed *Witte Huis* (1897), which is used for offices and is one of the highest private buildings on the Continent.

The industries comprise the manufacture of tobacco, cigars, margarine, rope, leather, etc., and there are breweries, distilleries and sugar refineries. Shipbuilding yards extend above and below the city, one of the earliest being that of the Netherlands Steamboat Company (1825). It is, however, as a commercial rather than as a manufacturing city that Rotterdam is distinguished, its progress in this respect having been very striking. Between 1850 and 1902 the area of the port was increased from 96 to more than 300 acres. Rotterdam has a great transit trade of goods in bulk, and, besides its maritime trade, it has an extensive river traffic, not only with Holland, but also with Belgium and Germany. Its overseas trade is principally with the Dutch colonies, New York, La Plata and the east and west coasts of Africa. The great harbour works on the south side of the river required to accommodate this growing trade were planned by Stieltjes (d. 1878). Besides being easily accessible from the river and connected with the railways, the docks are provided with every facility for coaling and loading or discharging cargoes. The larger passenger steamers of the Rotterdamsche Lloyd to Netherlands India and of the Holland-American Steamship Company (the two principal passenger and cargo steamship companies at Rotterdam) have their berths on the south side of the river in the centre of which are mooring buoys for 30 vessels.

ROTTWEIL, a town of Germany, in the republic of Württemberg, on the Neckar, 46 m. S.W. of Tübingen by rail. Pop. (1925) 10,556. In the 13th century Rottweil became a free imperial city and was subsequently the seat of an imperial court of law, the jurisdiction of which extended over Swabia, the Rhineland and Alsace. The functions of this tribunal came to an end in 1784. In 1803 Rottweil passed into the possession of Württemberg. It is partly surrounded by walls, and has a mediaeval town hall. The Gothic Heilige-Kreuz-kirche, built in the 14th century, was restored in 1840, and the Capellen-kirche has a Gothic spire.

ROTUMAH: *see* PACIFIC ISLANDS.

ROUBAIX, a manufacturing town of northern France, in the department of Nord, 6 m. N.E. of Lille on the railway to Ghent. Pop. (1926) 113,952. Roubaix is situated about a mile from the Belgian frontier on the Roubaix canal, which connects the lower Deule with the Scheldt by way of the Marcq and the Espierre. It unites with Wattrelos (pop. 26,987) to form a great industrial centre. The prosperity of Roubaix had its origin in the first factory franchise granted in 1469 by Charles the Bold, duke of Burgundy, to Peter, lord of Roubaix, a descendant of the royal house of Brittany. In the 18th century Roubaix suffered from the jealousy of Lille of which it was a dependency, and not till the 19th century did its industries acquire real importance. During the war of 1914–18 Roubaix was in the hands of the Germans, and the factories were emptied. As the mills were largely spared, work was started again, with Government help and bank credits, in 1919, and the town is again a prosperous centre.

The chief business of Roubaix is the woollen manufacture, but cotton, silk and other materials are also produced. The chief of these are fancy and figured stuffs for garments, velvet and upholstering fabrics. There are wool-combing and wool-dressing works, spinning and weaving mills, dye-houses and printing works, rubber-works, metal foundries and machinery-works in the town.

ROUBILIAC (more correctly ROUBILLAC), **LOUIS FRANÇOIS** (1695–1762), French sculptor, was born at Lyons and became a pupil of Balthasar of Dresden and of N. Coustou. It is generally stated that he settled in London about 1720, but as he took the second grand prize for sculpture in 1730, while still a pupil of Coustou, it is unlikely that he visited England at an earlier date. The date 1744, as given by Dussieux, is incorrect. He was at once patronized by Walpole and soon became the most popular sculptor in England, superseding the success of the Fleming Rysbraeck and even of Scheemakers. He died on the 11th of January 1762, and was buried in the church of St. Martin-in-the-Fields. Roubiliac was largely employed for portrait statues and busts, and especially for sepulchral monuments. His chief works in Westminster Abbey are the monuments of Handel, Admiral Warren, Marshal Wade, Mrs. Nightingale and notably that of the duke of Argyll, which established his fame. He possessed skill in portraiture and was technically a master, but lived at a time when his art had sunk to a low ebb. His figures are frequently uneasy, devoid of dignity and sculpturesque breadth, and his draperies treated in a manner more suited to painting than sculpture. There are, however, noteworthy exceptions, his bust of Pope, for example, reaching a high standard.

His most celebrated work, the Nightingale monument, in Westminster Abbey, a marvel of technical skill, is saved from being ludicrous by its ghastly and even impressive hideousness. The celebrated bust of Shakespeare, known as the Davenant bust, in the possession of the Garrick Club, London, is his.

See Le Roy de Sainte-Croix, *Vie et ouvrages de L. F. Roubillac, sculpteur lyonnais (1695–1762)* (Paris, 1882). (An extremely rare work, of which a copy is in the National Art Library, Victoria and Albert Museum, South Kensington, London.) Allan Cunningham, *The Lives of the Most Eminent British Painters, Sculptors, and Architects,* vol. 3, pp. 31–67 (London, 1830)—the fount of information of later biographies. (M. H. S.)

ROUBLE. The rouble is the monetary unit of Russia (U.S.S.R.), and before the World War it was divided into 100 kopeks. The par of exchange with sterling is R. 10=21*s.* 2*d.*, while, since 1922, a new unit called the tchervonetz has been created equivalent to ten roubles.

The main currency in circulation before the war were "credit

notes" issued by the State bank. Originally circulating at par with the rouble, they fell during the latter part of the 19th century to a heavy discount. By the law of 1899, this depreciation was legally recognized. Under that law, the ten and five rouble gold pieces were made legal tender for fifteen and seven and a half roubles respectively, thus being written up 50% in nominal value. As their gold content remained unaltered, this was equivalent to establishing a ratio of three to two between paper and gold.

The credit notes were successfully maintained at this ratio until 1914. In fact, at the outbreak of war, the "credit notes" had a gold backing of over 100%, as the State bank held 1,743 million paper roubles worth of gold against a note-issue of 1,630 roubles. Rather over 500 million roubles in gold and 230 millions in silver, too, were in circulation. Thus, the rouble was well protected against any ordinary shocks. Unfortunately, Russia, like many other countries, made little or no attempt to finance its war expenditure either by taxation or by long-term borrowing. Inflation was the chief method employed, and under inflation the gold standard was abandoned and the rouble steadily depreciated. This depreciation began prior to the revolutions of 1917, and by Jan. 1 of that year, the note issue had expanded to over 9,000 million roubles.

With the advent of the Bolsheviks to power, the final collapse of the old rouble took place. For a time the only use of the rouble was to enable the Government nominally to pay its way by continually issuing fresh notes. By Jan. 1, 1921, the total issue reached the astronomical figure of 1,168,000 million roubles. As a result the internal purchasing power of the rouble was exceedingly small and varied greatly from place to place.

The Tchervonetz, 1922.—One of the first points of the "New Economic Policy" of 1922 was the establishment of a new currency, the tchervonetz, created in Oct. 1922, and equal to ten pre-war gold roubles. The law creating it laid down that it should have a 25% cover of gold, platinum or stable foreign exchange, and that the remaining 75% cover should consist of marketable goods, short-term securities and approved bills of exchange. It was to be issued by the new State bank, itself also the offspring of the new economic policy.

Paper roubles were not withdrawn from circulation, and for a time the two currencies circulated side by side. The relation between the two was continually changing in favour of the tchervonetz, for although the old paper roubles had been replaced, at the ratio of one million to one, by "Soviet" or 1923 roubles, in themselves a paper currency, these in turn were sacrificed to balance the budget and to maintain the stability and value of the tchervonetz. By early 1924, the volume of Soviet roubles amounted to 178,000,000,000 millions, and their value had fallen to a point at which it took 200,000,000,000 of them to equal one tchervonetz.

New Roubles, 1924.—In Feb. 1924, the next step in monetary reform was taken. The commissariat of finance was authorized to issue currency rouble notes, which were made legal tender. Their volume was limited to half the number of tchervontsi in circulation, less those owed to the State bank by the Treasury. Apart from their limitation, no definite cover was provided, and no fixed ratio between "new roubles" and tchervontsi was laid down. The withdrawal of Soviet or 1923 roubles was then ordered at the ratio of 50,000 Soviet roubles to one new rouble.

Towards the end of 1924, a ratio of ten new roubles to the tchervonetz had been established, and on Oct. 1 the currency circulation amounted to 49 million roubles in silver coin, 202 million roubles in Treasury notes and 346 millions of tchervontsi —making, with various small coinage, a total circulation of roubles and tchervontsi combined of 622 millions. This was too small for the needs of the country, and during 1925 it expanded rapidly to 1,270 millions, or by rather more than 100 per cent. This increase was largely a natural one, due to trade demands and not to budget deficits, which, by then, had been reduced to manageable proportions. Nevertheless, the increase was too rapid, and during the next three months, the volume was reduced to 1,204 millions, only to rise again under demands for crop financing to 1,490 millions at the beginning of 1927. During that year, the position improved, as an increase in production led to a fall in prices and so to an improvement in the purchasing power of the currency. Up to a point, the new currency had, by early 1928, been re-established upon a gold basis. It must be remembered that foreign trade, and the import and export of currency, are rigidly controlled, and that if the tchervonetz is quoted at par against the pound or dollar in Moscow, unofficial rates in neighbouring foreign centres at times do not of necessity agree.

ROUEN, a city of France, capital of the department of Seine-Inférieure and the ancient capital of the province of Normandy, on the Seine, 87 m. N.W. of Paris by rail. Pop. (1926) 115,849.

History.—*Ratuma* or *Ratumacos,* the Celtic name of Rouen, was modified by the Romans into *Rotomagus,* and by the writers of mediaeval Latin into *Rodomum,* of which the present name is a corruption. Under Caesar and the early emperors the town was the capital of the Veliocasses, and it did not attain to any eminence till it was made the centre of Lugdunensis Secunda at the close of the 3rd century, and a little later the seat of an archbishop. Rouen owed much to its first bishops—from St. Mello, the apostle of the region, who flourished about 260, to St. Remigius, who died in 772.

Under Louis le Débonnaire and his successors, the Normans several times sacked the city, but after the treaty of St. Clair-sur-Epte in 912, Rouen became the capital of Normandy and the principal residence of the dukes. In 1087 William the Conqueror, mortally wounded at Mantes, died at Rouen. The succeeding Norman kings of England tended to neglect Rouen in favour of Caen and afterwards of Poitiers, Le Mans and Angers; but it maintained an importance during the 12th century indicated by the building of churches, notably that of St. Ouen. In 1203 Rouen was the scene of the murder of Arthur of Brittany at the hands of King John of England. Ostensibly to avenge the crime, Philip Augustus invaded Normandy and entered the capital unopposed. Philip confirmed its communal privileges and built a new castle.

A convention between the merchants of Rouen and those of Paris relating to the navigation of the Seine was followed by treaties with London, with the Hanseatic towns and with Flanders and Champagne. In 1302 the seat of the exchequer or sovereign court, afterwards the parlement, of Normandy was definitely fixed at Rouen. A stubborn resistance was offered to Henry V. of England who, after a long siege, occupied the town in 1419. The prosperity of Rouen continued under the English domination, and during this period the greater part of the church of St. Ouen was constructed. In 1431 Joan of Arc was tried and burnt in the city. From that year the French began attempts to recapture the town, which they did in 1449.

During the close of the 15th century and the first half of the 16th, Rouen was a metropolis of art and taste. In 1562 the town was sacked by the Protestants. This did not prevent the League from gaining so firm a footing there that Henry IV. besieged it unsuccessfully and only obtained entrance after his abjuration. The revocation of the edict of Nantes in 1685 greatly affected Rouen. During the Franco-German War the city was occupied by the invaders from December 1870 till July 1871. During the World War Rouen played a great part in the supporting organization of the British army in France.

Monuments.—The old city lies on the north bank of the river in an amphitheatre formed by the hills which border the Seine valley. It is surrounded by the suburbs of Martainville, St. Hilaire, Beauvoisine, Bouvreuil and Cauchoise; 2½ m. to the east is the industrial town of Darnétal (pop. 7,393), and on the opposite bank of the Seine is the manufacturing suburb of St. Sever with the industrial towns of Sotteville (pop. 22,476) and Petit Quevilly (pop. 17,839) in its immediate neighbourhood. Finally in the centre of the river, north-east of St. Sever, is the Ile Lacroix, which also forms part of Rouen. Communication across the Seine is maintained by three bridges, including a *pont transbordeur,* or moving platform, slung between two lofty columns and propelled by electricity. The central point of the old town is the *Place de l'Hôtel de Ville,* occupied by the church of St. Ouen and the *hôtel de ville.*

The cathedral was built on the site of a previous cathedral,

burnt in 1200, and its construction lasted from the beginning of the 13th century (lateral doors of the west portal), to the beginning of the 16th century (Tour de Beurre). The western façade belongs, as a whole, to the Flamboyant style. But the northern tower, the Tour St. Romain, is in the main of the 12th century, its upper stage having been added later. The southern tower, the Tour de Beurre, so named because funds for its building were given in return for the permission to eat butter in Lent, is of a type essentially Norman, and consists of a square tower pierced by high mullioned windows and surmounted by a low, octagonal structure, with a balustrade and pinnacles. These contrasted towers are the most striking feature of the wide façade. The portals of the transept are each flanked by two towers. The most remarkable part of the interior is the Lady Chapel (1302–20) behind the choir with the tombs (1518–25) of Cardinal Georges d'Amboise and his nephew, the statuary of which is of the finest Renaissance workmanship. Behind the cathedral is the archiepiscopal palace, a building of the 14th and 15th centuries.

St. Ouen was formerly the church of an abbey dating to the Roman period and reorganized by Archbishop St. Ouen in the 7th century. It was founded in 1318 in place of a Romanesque church which previously occupied the site and of which the only relic is the chapel in the south transept. The choir alone was built in the 14th century. The nave of the church belongs to the 15th century, by the end of which the central tower with its octagonal lantern and four flanking turrets had been erected. The western façade dates from 1846. The large stained glass windows are of the 14th, 15th and 16th centuries. The Portail des Marmousets, the entrance to the south transept, has a projecting porch, behind and above which rises a magnificent rose window. The north façade has no entrance.

The church of St. Maclou, behind the cathedral, begun in 1437 and finished early in the 16th century, is a rich example of the Flamboyant style, and has a rich portal with five arched openings. It is celebrated for carving attributed to Jean Goujon.

The church of St. Vinçent, near the Seine, is a building of the 16th century and contains very fine stained-glass windows at the end of the north aisle, by Engrand and Jean le Prince, artists of Beauvais. The stained glass in the churches of St. Patrice (16th century) and St. Godar (late 15th century) is inferior only to that of St. Vincent.

The most important secular building in Rouen is the Palais de Justice, once the seat of the exchequer and, later, of the *parlement* of Normandy. It is in the late Gothic style and consists of a main building flanked by two wings. The left wing, known as the Salle des Procureurs, was built in 1493 and has a lofty barrel-roof of timber. South of the Palais de Justice is the Porte de la Grosse Horloge, an arcade spanning the street and surmounted by a large clock of the 15th century with two dials. The Tour de la Grosse Horloge, which rises beside the arcade, was built in 1389. The tower known as the Tour de Jeanne d'Arc was the scene of her trial, and is all that remains of the castle built by Philip Augustus early in the 13th century. The Porte Guillaume-Lion, opening on to the Quai de Paris, is a handsome gateway built in 1749.

Rouen is the seat of an archbishop, a prefect, a court of appeal and a court of assizes, and headquarters of the III. army corps. Its public institutions also include a tribunal of first instance, tribunals of commerce and of maritime commerce, a board of trade-arbitrators and a chamber of commerce. All the more important nations have consulates in the city.

Rouen is an important centre for trade in wines, spirits, grain and cattle. Grain, wine, coal, timber and petroleum are leading imports. Besides its manufactures it exports plaster and sand. The principal industries of Rouen and its district are the spinning and weaving of cotton, notably the manufacture of *rouenneries* (cotton fabric woven with dyed yarn), the printing and dyeing of the manufactured material and the spinning of other fibres; shipbuilding and the making of various articles of clothing are also carried on, and there are distilleries, petroleum-refineries and manufactories of chemicals, soap, machinery, carding-combs and brushes. The port of Rouen comprises the marine docks below the Boïeldieu bridge, and the river dock, the timber dock and the petroleum dock above it. There is also a repairing dock. The Seine is tidal beyond Rouen. The port is accessible for ships drawing 19½ to 25 ft. of water, and its quays have a superficial area of about 194 acres. It is served by the lines of the Orléans, the Ouest-État and the Northern railways and these, in addition to the waterways connected with the Seine, make Rouen a convenient centre for the distribution of merchandise.

See A. Chervel, *Histoire de Rouen pendant l'époque communale* (Rouen, 1843); *id., Sous la domination anglaise* (Rouen, 1840); C. Enlart, *Rouen* (Paris, 1904); J. Levainville, *Rouen.*

ROUERGUE, formerly a French province, derives its name from the Gallic tribe of the *Rutheni.* It was bounded on the north by Auvergne, on the south and south-west by Languedoc, on the east by Gévaudan and the Cévennes and on the west by Quercy. It included (1) the county of Rodez, (2) Haute and Basse Marche; and it was divided between the dioceses of Rodez and Vabres (province d'Alby after this province had been separated from that of Bourges in 1678). Administratively it formed first a *sénéchaussée,* dependent on Languedoc (capital Villefranche, in the Basse Marche), and later it was attached to the military governments of Guienne and Gascony. It was then part of the departments of Aveyron and of Tarn-et-Garonne.

ROUGE, a French name applied to various colouring substances of a brilliant carmine tint, especially when used as cosmetics. The best of these preparations are such as have for their basis carthamine, obtained from the safflower (*q.v.*), *Carthamus tinctorius.* (*See* PAINTS, CHEMISTRY OF and COSMETICS.)

ROUGET DE LISLE, CLAUDE JOSEPH (1760–1836), French author, was born on May 10, 1760, at Lons-le-Saunier (Jura). He entered the army as an engineer, and attained the rank of captain. The song which has immortalized him, the *Marseillaise,* was composed at Strasbourg, where Rouget de Lisle was quartered in April 1792. He wrote both words and music in a fit of patriotic excitement after a public dinner. The piece was at first called *Chant de guerre de l'armée du Rhin,* and only received its name of *Marseillaise* from its adoption by the Provençal volunteers whom Barbaroux introduced into Paris, and who were prominent in the storming of the Tuileries. The author was a moderate republican, and was cashiered and thrown into prison; but the counter-revolution set him at liberty. He died at Choisy-le-Roi (Seine et Oise) on June 26, 1836. Rouget de Lisle published *Chants français* (1825), in which he set to music fifty songs by various authors. His *Essais en vers et en prose* (1797) contains the *Marseillaise,* a prose tale of the sentimental kind called *Adélaïde et Monville,* and some occasional poems.

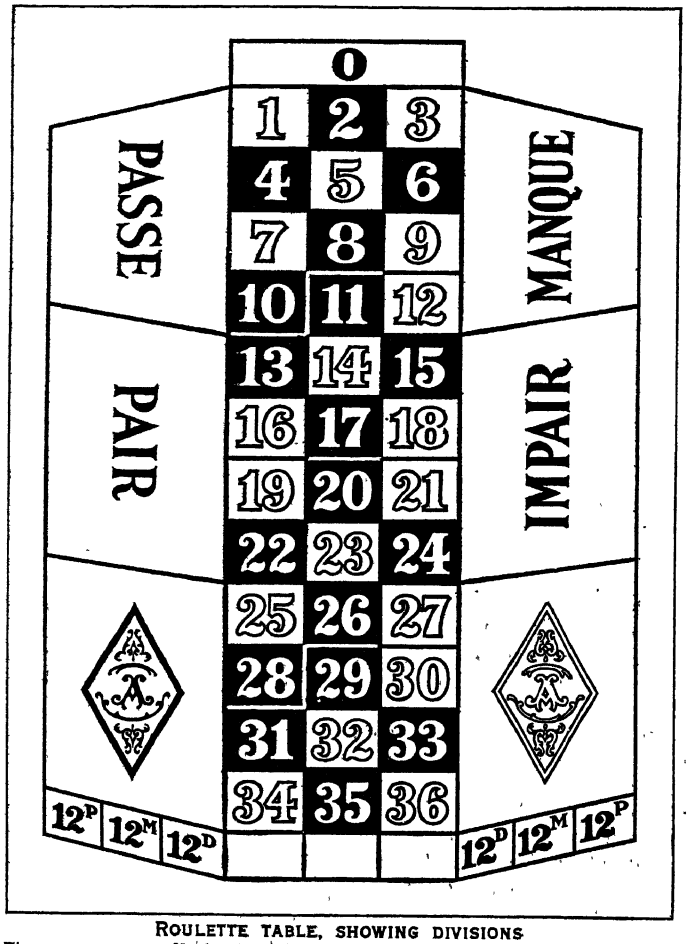
See J. Tiersot, *Histoire de la Marseillaise: oeuvres musicales de Rouget de Lisle* (1915).

ROUGH CAST, in architecture, a term used in England for any stucco or mortar combined with gravel and sand, employed as the finishing coat of covering plaster over a rough structure of masonry, and frequently decorated by the addition of pebbles of different colours, or even small pieces of glass. In American usage the term is limited to the rougher textures of a stucco surface, obtained either by throwing on the finished coat in unequal masses or by sprinkling over the finished surface, while still wet, a coating of coloured pebbles, tile or brick fragments, marble chips, etc.

ROUHER, EUGÈNE (1814–1884), French statesman, was born at Riom (Puy-de-Dôme) on Nov. 30, 1814. He entered the Chamber in his native department in 1848, and held office from 1849, with short intervals, until 1852. Napoleon entrusted him (1851) with the redaction of the new Constitution, and made him (1852) vice-president of the Council of State. As minister of agriculture, commerce and public works, from 1855 onwards, he greatly improved the economic situation of France, and in 1863 became minister president. He resigned in 1867, but shortly afterwards resumed office as finance minister. After the fall of the Empire he fled to England, but returned to France in 1872 to work for the interests of the Prince Imperial. He returned to the Chamber as deputy of Ajaccio, and, later, sat for Riom. After the death of the Prince Imperial, Rouher supported the claims of Prince Napoleon, son of the ex-king Jerome. He died on Feb. 3, 1884. (*See* the references under NAPOLEON III.)

ROULERS, a town in the province of West Flanders, Belgium, 13 m. N.W. of Courtrai, on the Mandel. Its Flemish name is Roeselaere. Pop. (1925) 26,657. Its weavers were already famous in the 11th–12th centuries and the neighbourhood cultivates flax. Lace, carpets and linen are manufactured.

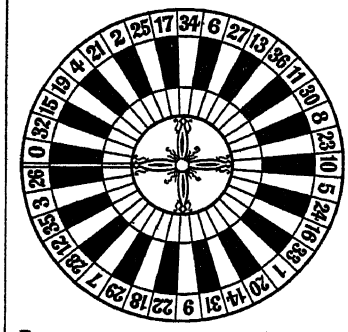
ROULETTE, a gambling game, of French origin. It is one of the two games played in the gambling-rooms at Monte Carlo, and the description here given, and the maximum and minimum stakes mentioned, are to be understood as applying to the game as it is there conducted. It is solely a game of chance, though so-called "systems" are innumerable, and some of them for a short period often appear to give the player an advantage. There is no possible system, however, which will assure success in the long-run, and it is herein that the ingenuity of the game consists. Every systematic method of play must depend upon increased stakes to retrieve past losses; and though a player with an unlimited capital might be practically certain to achieve his end in the course of time, the circumstance that there is always a maximum renders the bank invincible. The roulette table, covered with a green cloth, is made up of precisely corresponding halves with a circular space let into the middle holding the wheel, on either side of which the



ROULETTE TABLE, SHOWING DIVISIONS

There are many methods of staking, e.g., even chances may be taken on the winning number being red or black, odd or even, etc.; 2 to 1 chances may be taken on dozens, i.e., numbers falling between 1–12, 13–24, 25–36; while varying odds are given on combinations covering two or more numbers

cloth is divided into spaces marked *passe, pair, manque, impair,* and the black and red diamonds. The wheel at Monte Carlo is divided into 37 compartments, coloured alternately black and red, numbered from one to thirty-six, the 37th being zero. At many other places there are 38 compartments with a single and double o. This is largely the rule in America. *Pair* indicates even numbers, *impair* odd numbers, *manque* includes the numbers from 1 to 18; *passe,* from 19 to 36. The methods of staking are innumerable. The minimum stake is ten francs. *Rouge, noir, pair, impair, manque* and *passe* are even chances; *i.e.,* a stake put upon any of them is paid in corresponding coin should the player win, the exception being when the little ball which is spun around the wheel falls into zero, in which case the even money chances are put "in prison"—that is to say, laid aside until another spin, when if the bank wins they are lost, if the player wins he is allowed to retrieve his money. The maximum in the case of these chances is 6,000 francs. Any one who desires to play *en plein* puts his stake on one of the 37 numbers. If the ball falls into the corresponding number on the wheel, the stake is paid 35 times; and as there are 37 numbers on the board, with the advantage already described of imprisoning the even-money chances when zero comes up, it will be seen that there is a steady percentage in favour of the tables and consequently against the player. This percentage is of course greatly increased when, as is often the case, a second zero, called *double zéro,* is used. In some gambling-houses there is even a third one, called Eagle Bird. The maximum stake allowed *en plein* is 180 francs. The next most daring selection is *à cheval,* when the stake is placed on the line separating any two numbers, and if either of them wins the player is paid 17 times, the highest stake permissible being 360 francs. *Transversale pleine* covers any three numbers in a line, the coin or note being placed on the line dividing any one of the numbers from the neighbouring even-money chance, as, for instance, between 4 and *passe,* or 6 and *manque.* A *transversale simple* covers six numbers, as, for example, where the line between 4 and 7 joins *passe,* or between 6 and 9 joins *manque;* and if any one of these numbers wins, five times the value of the stake is paid, the maximum here being 1,200 francs. *En carré* includes four numbers, the coin being placed, for instance, on the cross between 1, 2, 4, 5 or 28, 29, 31, 32; eight times the value of the stake is paid, and the maximum is 760 francs. The dozens and the columns are also indicated on the board, the first dozen, of course, including 1 to 12. In each of the columns are twelve numbers in different order. A stake placed on either a dozen or a column is paid twice its value, the maximum here being 3,000 francs. A stake constantly played is called the *quatre premiers,* which includes zero, 1, 2 and 3, the stake being placed on the line where zero and 1 join *passe* or where zero and 3 join *manque.* If any one of these four numbers, including zero, wins, the stake is paid eight times; and four times eight being 32, there is a greater advantage to the table than when it loses *en plein* or on certain other chances. Zero can also be played in combination with any one or two of its neighbours; if with one of them the stake is paid 17 times, if with two of them 11 times. A croupier sits on either side of the wheel; there is also one at each end of the table, their business being to assist the players in staking and recovering their winnings. Behind each of the former pair an official on a high chair supervises the table. The croupier whose duty it is to spin the wheel waits for a time till stakes have been made, and then, exclaiming, *"Messieurs, faites vos jeux!"* sets the cylinder in motion, throwing the ball in the direction contrary to that in which the wheel revolves. When it is seen that the ball will soon fall at rest in one of the compartments of the cylinder the croupier gives the notice, *"Rien ne va plus,"* after which no stakes can be placed. When the ball finally rests in the compartment, the croupier announces the number and the even-money chances that win, as *rouge, impair* and *manque.*



ROULETTE WHEEL, SHOWING ARRANGEMENT OF NUMBERED, COLOURED DIVISIONS, INCLUDING THE ZERO

See "Scrutator," *The Odds at Monte Carlo* (1925).

ROUNDERS, a ball game played in England and the United States, but not attaining to any popularity before 1800. It was the immediate ancestor of Baseball (*q.v.*). Up to 1889 no code of rules existed, but two governing bodies were formed, the National Rounders Association of Liverpool and Vicinity and the Scottish Rounders Association. These, with the later Gloucester

Rounders Association, drew up the rules now recognized.

A hard ball similar to that used in baseball was adopted, and the rule by which a runner could be put out by hitting him with a thrown ball abandoned. The bat must not exceed 3½in. in diameter nor 35in. in length. The game is similar to baseball, but there are several important differences, the most radical being that the ball may be hit in any direction, as at cricket. The original pentagon has been discarded in favour of an elongated diamond, the home-base being at one end and 1st, 2nd and 3rd bases at the other points, while the 4th base is situated on the line of 3rd base towards home and 17yd. from the former, the sides of the diamond being 22yd. in length. The bowler stands in a space marked off in the centre of the diamond and tosses the ball to the batsman, who must hit at every "good" ball, *i.e.*, one that is straight over the home-base and between head and knee. Two bad balls score one for the batsman. If the latter hits the ball he must run to 1st base and then 2nd, and so on round to home again, resting at any base; but he may be put out if the batted ball be caught on the fly or first bounce or the backstop (wicket-keeper in cricket) catch a ball struck at but not hit, or the batsman be touched with a ball while running between bases. Ten players constitute a side and three innings apiece are played, every player batting once in each innings. Each base made counts one. The *backstop* is placed directly behind the batsman, and behind the backstop are placed *1st cover* (right), *longstop* (middle), and *4th cover* (left). The *1st, 2nd* and *3rd* basemen are stationed at the bases, while behind them in the field are placed the *2nd cover* (right), *centre cover and 3rd cover* (left). The bases are designated by light wooden posts. An umpire presides over the game.

ROUNDHEAD, a term applied to the adherents of the parliamentary party in England during the great Civil War. Some of the Puritans, but by no means all, wore the hair closely cropped round the head, and there was thus an obvious contrast between them and the men of fashion with their long ringlets. "Roundhead" appears to have been first used as a term of derision towards the end of 1641 when the debates in parliament on the Bishops Exclusion Bill were causing riots at Westminster. John Rushworth (*Historical Collections*) is more precise. According to him the word was first used on Dec. 27, 1641, by a disbanded officer named David Hide, who during a riot is reported to have drawn his sword and said he would "cut the throats of those round-headed dogs that bawled against bishops." Baxter ascribes the origin of the term to a remark made by Queen Henrietta Maria at the trial of Strafford; referring to Pym, she asked who the round-headed man was. The name remained in use until after the revolution of 1688.

ROUNDSMAN SYSTEM (sometimes termed the billet, or ticket, or item system), in the English poor law, a plan by which the parish paid the occupiers of property to employ the applicants for relief at a rate of wages fixed by the parish. It depended not on the services, but on the wants of the applicants, the employer being repaid out of the poor rate all that he advanced in wages beyond a certain sum. According to this plan the parish in general made some agreement with a farmer to sell to him the labour of one or more paupers at a certain price, paying to the pauper out of the parish funds the difference between that price and the allowance which the scale, according to the price of bread and the number of his family, awarded to him. It received the local name of billet or ticket system, from the ticket signed by the overseer which the pauper in general carried to the farmer as a warrant for his being employed, and afterwards took back to the overseer, signed by the farmer, as a proof that he had fulfilled the conditions of relief. In other cases the parish contracted with a person to have some work performed for him by the paupers at a given price, the parish paying the paupers. The system disappeared in 1834.

ROUND TABLE, the celebrated board of King Arthur (*q.v.*) around which he and his knights sat. The origin of the myth is obscure, and certainly cannot be said to have been yet settled; it has been traced by various scholars to Welsh, Irish, or Breton sources.

The story was at first independent of the Arthurian saga. The first known trace of it in an Arthurian connection is in the *Brut* of Wace (*q.v.*) in the reign of Henry II. Here the allusion is brief. Arthur made a round table at which, because of its shape, none of the "barons" could claim precedence over others. The size is left indefinite. Wace adds that the "Bretons" told many stories about the table; and this seems to indicate that there was a mass of Breton (or British) tradition about it known to Wace—a probability strengthened by the fact that elsewhere Wace shows signs of knowing many stories unknown to his main authority, Geoffrey of Monmouth (*q.v.*).

Half a century later, Layamon adds considerably to our information, and it would seem almost certain that he was drawing on Welsh tradition. There had been a great slaughter of the knights through disputes as to who should be greatest; and a Cornish carpenter, hearing of it, told Arthur he would make him a table at which more than 1,600 men could sit, so that there would be no more quarrels for the place of honour. Yet Arthur would be able to carry it about with him. It was finished in four weeks. "This," added Layamon, repeating Wace's words, "was the table about which the Britons told many tales." There is no reason to think that the poet was inventing; he makes over 30 additions to Wace, some of which are certainly not original; nor does he show anywhere a trace of inventive capacity.

Addition to the Legend.—Later romancists added many details. For example, the "Diot" *Perceval* (*see* PERCEVAL), tells us that just after Arthur's coronation Merlin related past history. A round table, said the seer, had been made for Joseph of Arimathea (*q.v.*) and a new one for Arthur's father, Uther Pendragon; let the king use it for his knights; without it the Romans could not be overcome. The table was also brought into connection with the Holy Grail (*q.v.*) and with the "Siege Perilous" which is so prominent a feature in the Percival legend; and became ultimately an inseparable adjunct of the Arthurian cycle.

Whether the tale reached Wace and Layamon directly from Wales or from Brittany, it is certainly of ancient Celtic origin: a round table seems to have been a feature of primitive Celtic life; a circular form was the rule in primitive Irish architecture, and the primitive Celtic watch house, both in Gaul and in Ireland, was circular. To what this in its turn is to be traced is more doubtful: it is not unlikely that it arose from sun-worship, or possibly (*cf.* the "four weeks") from the moon. The magical character of the table seems, again, to be of a peculiarly Celtic cast; it resembles that of the enchanted bowls, bushels and horns so often found in Irish and Welsh saga; and it was inevitable that when the attractive force of the Arthurian legend was felt, such a magical table should be assigned to the king along with his enchanted sword, boat, lance and shield.

The Table at Winchester.—The famous round table fixed in the wall of the great hall at Winchester is certainly of considerable antiquity. It is a table-top 18 ft. in diameter, divided into 25 sectors, one for the king and one for each of the knights (whose number had long been reduced from the 1,600 of Layamon). The present colouring of the sections (green and white successively is due to Henry VIII. Hardying, in his *Chronicle* (*c.* 1436), differing slightly from *Perceval,* says that it is the very table made by Joseph of Arimathea for the brethren of the Grail, which was transferred to Winchester by Uther to comfort Ygerne. He speaks in a manner that implies a great age for this table.

A good summary of the story is given by A. C. L. Brown in *Harvard Studies in Philology and Literature,* vol. vii., where other authorities are referred to. Incidental references will be found in the various works on different aspects of the Arthurian saga. (E. E. K.)

ROUNDWORM, the common name for the parasitic worms of the genus *Ascaris,* and especially for *A. lumbricoides,* which occurs in the intestine of man. Closely allied species inhabit the pig and the horse. The name roundworm is often extended to include all members of the class Nematoda (*q.v.*).

ROUS, FRANCIS (1579–1659), English Puritan, was born at Dittisham, in Devon in 1579, and educated at Oxford (Broadgates Hall, afterwards Pembroke College) and at Leyden. For some years he lived in seclusion in Cornwall and occupied himself with theological studies, producing among other books *The Arte of*

Happines (1619) and *Testis Veritatis*, a reply to Richard Montagu's *Appello Caesarem*. He entered parliament in 1625 as member for Truro, and continued to represent that or some neighbouring west country constituency in such parliaments as were summoned till his death. He obtained many offices under the Commonwealth, among them that of provost of Eton College. At first a Presbyterian, he afterwards joined the Independents. In 1657 he was made a lord of parliament. He died at Acton in January 1658–59. The subjective cast of his piety is reflected in his *Mystical Marriage . . . betweene a Soule and her Saviour* (1635), but he is best known by his metrical version of the Psalms (1643), which was approved by the Westminster Assembly and (in a revised form) is still used in the Scottish Presbyterian churches.

ROUSE, WILLIAM HENRY DENHAM (1863–), English educationist and classical scholar, was born at Calcutta, on May 30, 1863, and educated at the Grammar school, Haverfordwest, at Doveton college, Calcutta, and at Christ college, Cambridge, of which he was elected a fellow in 1888. After five years at Cheltenham college (1890–95) he obtained a travelling scholarship, and in the following year was appointed a master at Rugby. He held this post until 1901, when he became head-master of the Perse school, at Cambridge. In 1903 he was also appointed teacher of Sanskrit to Cambridge university. In 1912 he went to New York as acting Latin professor at the Columbia summer school, and demonstrated the direct method of teaching Latin.

His publications include *Greek Votive Offerings* (1902); *Latin on the Direct Method* (1925); translations from the Pali and various editions of the classics.

ROUSSEAU, JEAN BAPTISTE (1671–1741), French poet, was born at Paris on April 6, 1671. His earlier comedies, *Le Café* (1694), *Le Flatteur* (1696), and *Le Capricieux*, and the opera of *Venus et Adonis* (1697) were not successful. He was turned out of the Café Laurent, which was much frequented by literary men, on account of the libellous verse written by or attributed to him, but in 1701 he was made a member of the Académie des inscriptions, and in 1710 he presented himself as a candidate for the Académie française. But in 1712 he was prosecuted for defamation of character and, on his non-appearance in court, was condemned to perpetual exile. He spent the rest of his life abroad, refusing to accept permission to return in 1716, because it was not accompanied by complete rehabilitation. He died at Brussels on March 17, 1741.

ROUSSEAU, JEAN JACQUES (1712–1778), French philosopher, was born at Geneva on June 28, 1712. His family had established themselves in that city at the time of the religious wars, but they were of pure French origin. Rousseau's father Isaac was a watchmaker; his mother, Suzanne Bernard, was the daughter of a minister; she died in childbirth, and Rousseau, who was the second son, was brought up in a haphazard fashion. When the boy was ten years old his father got entangled in a dispute with a fellow-citizen, and being condemned to a short term of imprisonment abandoned Geneva and took refuge at Lyons. Rousseau was taken charge of by his mother's relations and was committed to the tutorship of M. Lambercier, pastor at Boissy. In 1724 he was taken into the house of his uncle Bernard, by whom he was shortly afterwards apprenticed to a notary. His master, however, found or thought him incapable and sent him back. After a short time (April 25, 1725) he was apprenticed afresh, this time to an engraver. He did not dislike the work, but was or thought himself cruelly treated, and in 1728 he ran away. Then began an extraordinary series of wanderings and adventures, for much of which there is no authority but his own *Confessions*. He first fell in with some proselytizers of the Roman faith at Confignon in Savoy, and by them he was sent to Madame de Warens (or Vuarrens) at Annecy, a young and pretty widow who was herself a convert. Her influence, however, was not immediately exercised, and he was passed on to Turin, where there was an institution specially devoted to the reception of neophytes. His experiences here were unsatisfactory, but he abjured duly and was rewarded by being presented with 20 francs and sent about his business. He wandered about in Turin for some time, and at last established himself as footman to a Madame de Vercellis. Here occurred the famous incident of the theft of a ribbon, of which he accused a girl fellow-servant. Madame de Vercellis died not long afterwards, but he found another place with the Comte de Gouvon. This he soon lost; he then resolved to return to Madame de Warens at Annecy. The chronology of all these events, as narrated by himself, is somewhat obscure, but they seem to have occupied about three years.

Even then Rousseau did not settle at once in the anomalous position of domestic lover to this lady, who, nominally a converted Protestant, was in reality a kind of deist, with a theory of noble sentiment and a practice of libertinism tempered by good nature. She thought it necessary to complete his education, and he was sent to the seminarists of St. Lazare to be improved in classics, and also to a music master. In one of his incomprehensible freaks he set off for Lyons, and, after abandoning his companion in an epileptic fit, returned to Annecy to find Madame de Warens gone. Then for some months he relapsed into the life of vagabondage, varied by improbable adventures, which (according to his own statement) he so often pursued. Hardly knowing anything of music, he attempted to give lessons and a concert at Lausanne; and he actually taught at Neuchâtel. Then he became, or says he became, secretary to a Greek archimandrite who was travelling in Switzerland to collect subscriptions for the rebuilding of the Holy Sepulchre; then he went to Paris, and, with recommendations from the French ambassador at Soleure, saw something of good society; then he returned on foot through Lyons to Savoy, hearing that Madame de Warens was at Chambéry. This was in 1732, and Rousseau, who for a time had unimportant employments in the service of the Sardinian Crown, was shortly installed by Madame de Warens, whom he still called Maman, as *amant en titre* in her singular household, wherein she diverted herself with him, with music and with chemistry. In 1736 Madame de Warens, partly for Rousseau's health, took a country house, Les Charmettes, a short distance from Chambéry. Here in summer, and in the town during winter, Rousseau led a delightful life, which he has delightfully described. In a desultory way he did a good deal of reading, but in 1738 his health again became bad, and he was recommended to go to Montpellier. By his own account this journey to Montpellier was in reality a *voyage à Cythère* in company with a certain Madame de Larnage. This being so, he could hardly complain when on returning he found that his official position in Madame de Waren's household had been taken by a person named Vintzenried. In 1740 he became tutor at Lyons to the children of M. de Mably, not the well-known writer of that name, but his and Condillac's elder brother. But Rousseau did not like teaching and was a bad teacher, and after a visit to Les Charmettes, finding that his place there was finally occupied, he once more went to Paris in 1741. He was not without recommendations. But a new system of musical notation which he thought he had discovered was unfavourably received by the Académie des sciences, where it was read in Aug. 1742, and he was unable to obtain pupils, though the paper was published in 1743 under the title of *Dissertation sur la musique moderne*. Madame Dupin, however, to whose house he had obtained the entry, procured him the honourable if not very lucrative post of secretary to M. de Montaigu, ambassador at Venice. With him he stayed for about 18 months, and had as usual infinite complaints to make of his employer and some strange stories to tell. At length he threw up his situation and returned to Paris (1745).

His Literary Triumphs.—Up to this time—that is to say, till his 33rd year—Rousseau's life, though continuously described by himself, was of the kind called subterranean, and the account of it must be taken with considerable allowances. From this time, however, his general history can be checked and followed with reasonable confidence. On his return to Paris he renewed his relations with the Dupin family and with the literary group of Diderot, to which he had already been introduced by M. de Mably's letters. He had an opera, *Les Muses galantes*, privately represented; he copied music for money, and received from Madame Dupin and her son-in-law M. de Francueil a small but regular salary as secretary. He lived at the Hotel St. Quentin

for a time, and once more arranged for himself an equivocal domestic establishment. His mistress, whom towards the close of his life he married after a fashion, was Thérèse le Vasseur, a servant at the inn, whom he first met in 1743. She had little beauty, no education or understanding, and few charms that his friends could discover, besides which she had a detestable mother, who was the bane of Rousseau's life. But he made himself happy with her, and (according to Rousseau's account, the accuracy of which has been questioned [*see* F. Macdonald, *J. J. Rousseau,* 1906]) five children were born to them, who were all consigned to the foundling hospital. This disregard of responsibility was partly punished by the use his critics made of it when he became celebrated as a writer on education and a preacher of the domestic affections. Diderot, with whom from 1741 onwards he became more and more familiar, admitted him as a contributor to the *Encyclopédie,* for which he wrote the articles on music and political economy. He formed new musical projects, and he was introduced by degrees to many people of rank and influence, among them Madame d'Epinay, to whom in 1747 he was introduced by her lover M. de Francueil.

It was not, however, till 1749 that Rousseau made his mark as a writer. The academy of Dijon offered a prize for an essay on the effect of the progress of civilization on morals. Rousseau took up the subject, developed his famous paradox of the superiority of the savage state, won the prize, and, publishing his essay (*Discours sur les arts et sciences*) next year, became famous. The anecdotage as to the origin of this famous essay is voluminous. It is agreed that the idea was suggested when Rousseau went to pay a visit to Diderot, who was in prison at Vincennes for his *Lettre sur les aveugles.* Rousseau says he thought of the paradox on his way down; Morellet and others say that he thought of treating the subject in the ordinary fashion and was laughed at by Diderot, who showed him the advantages of the less obvious treatment. Diderot himself, who in such matters is trustworthy, does not claim the suggestion, but uses words which imply that it was at least partly his. It is very like him. The essay, however, took the artificial and crotchety society of the day by storm. Francueil gave Rousseau a valuable post as cashier in the receiver-general's office. But he resigned it either from conscientiousness, or crotchet, or nervousness at responsibility, or indolence, or more probably from a mixture of all four. He went back to his music-copying, but the salons of the day were determined to have his society, and for a time they had it. In 1752 he brought out at Fontainebleau an operetta, the *Devin du village,* which was successful. He received 100 louis for it, and he was ordered to come to court next day. This meant the certainty of a pension. But Rousseau's shyness or his perversity (as before, probably both) made him disobey the command. His comedy, *Narcisse,* written long before, was also acted, but unsuccessfully. In the same year, however, a letter *Sur la musique française,* in which he indulged in a violent tirade against French music, again had a great vogue. Finally, for this was an important year with him, the Dijon academy, which had founded his fame, announced the subject of "The Origin of Inequality," on which he wrote a discourse which was unsuccessful, but at least equal to the former in merit. During a visit to Geneva in 1754 he abjured his abjuration of Protestantism and was enabled to take up his freedom as citizen, to which his birth entitled him and of which he was proud. Shortly afterwards, returning to Paris, he accepted a cottage near Montmorency (the celebrated Hermitage) which Madame d'Epinay had fitted up for him, and established himself there in April 1756. Here he wrote *La Nouvelle Héloïse;* here he indulged in the passion which that novel partly represents, his love for Madame d'Houdetot, sister-in-law of Madame d'Epinay. Here too arose the obscure triangular quarrel between Diderot, Rousseau and Frederick Melchior Grimm, which ended Rousseau's sojourn at the Hermitage. The supposition least favourable to Rousseau is that it was due to one of his numerous fits of half-insane petulance and indignation at the obligations which he was nevertheless always ready to incur. That most favourable to him is that he was expected to lend himself in a more or less complaisant manner to assist and cover Madame d'Epinay's passion for Grimm. At any rate, Rousseau quitted the Hermitage in the winter of 1757–58, and established himself at Montlouis in the neighbourhood.

Hitherto Rousseau's behaviour had frequently made him enemies, but his writings had for the most part made him friends. The quarrel with Madame d'Epinay, with Diderot, and through them with the *philosophe* party reversed this. In 1758 appeared his *Lettre à d'Alembert contre les spectacles,* written in the winter of the previous year at Montlouis. This was at once an attack on Voltaire, who was giving theatrical representations at Les Délices, on D'Alembert, who had condemned the prejudice against the stage in the *Encyclopédie,* and on one of the favourite amusements of the society of the day, and Rousseau was henceforward as obnoxious to the *philosophe* coterie as to the orthodox party. He still, however, had no lack of patrons—he never had—though his perversity made him quarrel with all in turn. The duke and duchess of Luxembourg made his acquaintance, and he was industrious in his literary work—indeed, most of his best books were produced during his stay in the neighbourhood of Montmorency. A letter to Voltaire on his poem about the Lisbon earthquake embittered the dislike between the two, being surreptitiously published. *La Nouvelle Héloïse* appeared in the same year (1760), and it was immensely popular. In 1762 appeared the *Contrat social* at Amsterdam, and *Émile,* which was published both in the Low Countries and at Paris. For the latter the author received 6,000 livres, for the *Contrat* 1,000.

Julie, ou La Nouvelle Héloïse, is a novel written in letters describing the loves of a man of low position and a girl of rank, her subsequent marriage to a respectable freethinker of her own station, the mental agonies of her lover, and the partial appeasing of the distresses of the lovers by the influence of noble sentiment and the good offices of a philanthropic Englishman. It is too long, the sentiment is overstrained; but it is full of pathos and knowledge of the human heart. The *Contrat social,* as its title implies, endeavours to base all government on the consent, direct or implied, of the governed, and indulges in much ingenious argument to get rid of the practical inconveniences of the theory. *Émile,* the second title of which is *De l'Éducation,* is much more of a treatise than of a novel.

Exile from France.—Rousseau's reputation was now higher than ever, but the term of the comparative prosperity which he had enjoyed for nearly ten years was at hand. The *Contrat social* was obviously anti-monarchic; the *Nouvelle Héloïse* was said to be immoral; the sentimental deism of the "Profession du vicaire Savoyard" in *Émile* irritated equally the *philosophe* party and the church. On June 11, 1762, *Émile* was condemned by the parlement of Paris, and two days previously Madame de Luxembourg and the prince de Conti gave the author information that he would be arrested if he did not fly. They also furnished him with means of flight, and he made for Yverdon in the territory of Berne, whence he transferred himself to Motiers in Neuchâtel, which then belonged to Prussia. Frederick II. was not indisposed to protect the persecuted when it cost him nothing and might bring him fame, and in Marshal Keith, the governor of Neuchâtel, Rousseau found a true and firm friend. He was, however, unable to be quiet or to practise any of those more or less pious frauds which were customary at the time with the unorthodox. The archbishop of Paris had published a pastoral against him, and Rousseau did not let the year pass without a *Lettre à M. de Beaumont.* The council of Geneva had joined in the condemnation of *Émile,* and Rousseau first solemnly renounced his citizenship, and then, in the *Lettres de la montagne* (1763), attacked the council and the Genevan constitution unsparingly. All this excited public opinion against him, and his unpopularity is said, on uncertain authority, to have culminated in a nocturnal attack on his house. At any rate he thought he was menaced if he was not, and migrated to the Île St. Pierre in the Lake of Bienne, where he once more for a short, and the last, time enjoyed that idyllic existence which he loved. But the Bernese Government ordered him to quit its territory.

David Hume offered him, late in 1765, an asylum in England, and he accepted. He passed through Paris, where his presence

was tolerated for a time, and landed in England on Jan. 13, 1766. Thérèse travelled separately, and was entrusted to the charge of James Boswell, who had already made Rousseau's acquaintance. Here he had once more a chance of settling peaceably. Severe English moralists like Johnson thought but ill of him, but the public generally was not unwilling to testify against French intolerance, and regarded his sentimentalism with favour. He was lionized in London to his heart's content and discontent, for it may truly be said of Rousseau that he was equally indignant at neglect and intolerant of attention. When, after not a few displays of his strange humour, he professed himself tired of the capital, Hume procured him a country abode in the house of Mr. Davenport at Wootton in Derbyshire. Here, though the place was bleak and lonely, he might have been happy enough, and he actually employed himself in writing the greater part of his *Confessions*. But his habit of self-tormenting and tormenting others never left him. His own caprices interposed some delay in the conferring of a pension which George III. was induced to grant him, and he took this as a crime of Hume's. The publication of a spiteful letter (really by Horace Walpole) in the name of the king of Prussia made Rousseau believe that plots of the most terrible kind were on foot against him. Finally he quarrelled with Hume because the latter would not acknowledge all his own friends and Rousseau's supposed enemies of the *philosophe* circle to be rascals. He remained, however, at Wootton during the year and through the winter. In May 1767 he fled to France, addressing letters to the lord chancellor and to General Conway, which show an unbalanced mind. He was received in France by the marquis de Mirabeau (father of the great Mirabeau), of whom he soon had enough, then by the prince de Conti at Trye. From this place he again fled and wandered about for some time in a wretched fashion, still writing the *Confessions*, constantly receiving generous help, and always quarrelling with, or at least suspecting, the helpers. In the summer of 1770 he returned to Paris, resumed music-copying, and was on the whole happier than he had been since he had to leave Montlouis.

Many of the best-known stories of Rousseau's life date from this last time, when he was tolerably accessible to visitors. He finished his *Confessions*, wrote his *Dialogues* (the interest of which is not quite equal to the promise of their curious sub-title, *Rousseau juge de Jean Jacques*), and began his *Rêveries du promeneur solitaire*, intended as a sequel and complement to the *Confessions*, and one of the best of all his books. It should be said that besides these, which complete the list of his principal works, he has left a very large number of minor works, the fragments of another opera, *Daphnis et Chloé* (printed in 1780), and a considerable correspondence. During this time he lived in the Rue Platière, which is now named after him. But his suspicions of secret enemies grew stronger, and at the beginning of 1778 he was glad to accept the offer of M. de Girardin, a rich financier, and occupy a cottage at Ermenonville. The country was beautiful; but his old terrors revived, and his woes were complicated by the alleged inclination of Thérèse for one of M. de Girardin's stable-boys. On July 2 he died in a manner which has been much discussed, suspicions of suicide being circulated at the time by Grimm and others, though there is no reason to doubt the original verdict of apoplexy.

His Character and Influence.—There is little doubt that for the last 10 or 15 years of his life Rousseau was not wholly sane—the combined influence of late and unexpected literary fame and of constant solitude and discomfort acting upon his excitable temperament so as to overthrow the balance, never very stable, of his fine and acute but unrobust intellect. His moral character was undoubtedly weak, but it is fair to remember that but for his astounding *Confessions* the more disgusting parts of it would not have been known, and that these *Confessions* were written, if not under hallucination, at any rate in circumstances entitling the self-condemned criminal to the benefit of considerable doubt. If Rousseau had held his tongue, he might have stood lower as a man of letters; he would pretty certainly have stood higher as a man. He was, moreover, really sinned against, if still more sinning. Like other men of letters of his time he had to submit to something like persecution. The conduct of Grimm to him was certainly bad; and, though Walpole was not his personal friend, a worse action than his famous letter, considering the well-known idiosyncrasy of the subject, would be difficult to find. Only excuses can be made for him; but the excuses for a man born, as Hume after the quarrel said of him, "without a skin" are numerous and strong.

His peculiar reputation increased after his death, when the paradox of Rousseauism, the belief in the superiority of "the noble savage" to civilized man, became more and more fashionable. The men of the Revolution regarded him with something like idolatry, and his literary merits conciliated many who were far from idolizing him as a revolutionist. His style was taken up by Bernardin de Saint Pierre and by Chateaubriand. Byron's fervid panegyric enlisted on his side all who admired Byron—that is to say, the majority of the younger men and women of Europe between 1820 and 1850—and thus different sides of his tradition were continued for a full century after the publication of his chief books. His religious unorthodoxy was condoned because he never scoffed; his political heresies, after their first effect was over, seemed harmless from the very want of logic and practical spirit in them, while part at least of his literary secret was the common property of almost every one who attempted literature.

In religion Rousseau was undoubtedly what he has been called above—a sentimental deist; but sentimentalism was the essence, deism the accident of his creed. In his time orthodoxy at once generous and intelligent hardly existed in France. There were ignorant persons who were sincerely orthodox; there were intelligent persons who pretended to be so. But between the time of Massillon and D'Aguesseau and the time of Lamennais and Joseph de Maistre the class of men of whom in England Berkeley, Butler and Johnson were representatives did not exist in France. Little inclined by nature to any but the emotional side of religion, and utterly undisciplined in any other by education, course of life, or the general tendency of public opinion, Rousseau took refuge in the nebulous kind of natural religion which was at once fashionable and convenient.

In politics Rousseau was a sincere and, as far as in him lay, a convinced republican. He had no great tincture of learning, he was by no means a profound logician, and he was impulsive and emotional in the extreme—characteristics which in political matters predispose the subject to the preference of equality above all political requisites. He saw that under the French monarchy the actual result was the greatest misery of the greatest number, and he did not look much further. The *Contrat social* is for the political student one of the most curious and interesting books existing. Historically it is null; logically it is full of gaping flaws, practically its manipulations of the *volonté de tous* and the *volonté générale* are clearly insufficient to obviate anarchy. But its mixture of real eloquence and apparent cogency is exactly what always carries a multitude with it, if only for a time. Moreover, in some minor branches of politics and economics Rousseau was a real reformer. Visionary as his educational schemes (chiefly promulgated in *Émile*) are in parts, they are admirable in others, and his protest against mothers refusing to nurse their children hit a blot in French life which is not removed yet, and has always been a source of weakness to the nation.

But it is as a literary man pure and simple—that is to say, as an exponent rather than as an originator of ideas—that Rousseau is most noteworthy, and that he has exercised most influence. The first thing noticeable about him is that he defies all customary and mechanical classification. He is not a dramatist—his work as such is insignificant—nor a novelist, for, though his two chief works except the *Confessions* are called novels, *Émile* is one only in name, and *La Nouvelle Héloïse* is as a story diffuse, prosy, and awkward to a degree. He was without command of poetic form, and he could only be called a philosopher in an age when the term was used with such meaningless laxity as was customary in the 18th century. If he must be classed, he was before all things a describer—a describer of the passions of the human heart and of the beauties of nature. In the first part of his vocation the novelists of his own youth, such as Marivaux, Richardson and Prévost,

may be said to have shown him the way; in the second he was almost a creator. In combining the two and expressing the effect of nature on the feelings and of the feelings on the aspect of nature he was absolutely without a forerunner or a model. And, as literature since his time has been chiefly differentiated from literature before it by the colour and tone resulting from this combination, Rousseau may be said to hold, as an influence, a place almost unrivalled in literary history. The defects of all sentimental writing are noticeable in him, but they are palliated by his wonderful feeling, and by the passionate sincerity even of his insincere passages.

BIBLIOGRAPHY.—The first complete edition of Rousseau's works appeared at Geneva in 1782–83 in 47 small volumes. There have been many since, the most important of them being that of Musset-Pathay (1823). Some unpublished works, chiefly letters, were added by Bosscha (1858) and Streckeisen Moulton (1861). *See* also the latter's *Rousseau et ses amis* (1865), and the edition of Rousseau's *Correspondance Générale* by Dufour and Plan (1924 *et seq.*). The chief biographies are: in French that of Saint Marc Girardin (1874), in English the *Life* by Viscount Morley (1873; new ed. 1915). But the materials for his biography are so controversial and so personal that the correct historical view can hardly be said yet to be standardized. Mrs. Frederika Macdonald, in her *Jean Jacques Rousseau* (1906), makes out a good case for regarding Mme. d'Epinay's *Memoirs* as coloured, if not actually dictated, by the malevolent attitude of Grimm and Diderot; and her study of the documents undoubtedly qualifies a good many of the assumptions that had previously been made. *See* also E. Ritter, *Famille et jeunesse de Rousseau* (1896); A. Houssaye, *Les Charmettes* (2nd ed., 1864); L. Ducros, *J. J. Rousseau de Genève à l'Hermitage, 1712–57* (1908). The *Annales de la Société J. J. Rousseau* began to appear in 1905; Albert Schinz, *La Pensée de J. J. Rousseau* (1929).

ROUSSEAU, PIERRE ÉTIENNE THÉODORE (1812–1867), French painter of the Barbizon school, was born in Paris on April 15, 1812, the son of a tailor. At the age of 15 he began his artistic education under the landscapist Charles Rémond and then under Guillon-Lethière. But his style was formed chiefly by his own efforts in working direct from nature in various parts of France. Théodore Rousseau shared the difficulties of the romantic painters of 1830 in securing for their pictures a place in the annual Paris exhibition. The influence of the classically trained artists was against them. He exhibited one or two unimportant works in the Salon of 1831 and 1834, but in 1836 his great work "La Descente des vaches" was rejected; and from then until 1848 he was persistently refused. He was not without champions in the press, and under the title of "le grand refusé" he became known through the writings of Thoré, the critic who afterwards resided in England and wrote under the name of Bürger. During these years of artistic exile Rousseau produced some of his finest pictures: "The Chestnut Avenue," "The Marsh in the Landes" (Louvre), "Hoar-Frost" (now in America); and in 1851, after the reorganization of the Salon in 1848, he exhibited his masterpiece, "The Edge of the Forest" (Louvre), a picture similar in treatment to the composition called "A Glade in the Forest of Fontainebleau," in the Wallace collection.

Up to this period Rousseau had lived only occasionally at Barbizon, but in 1848 he took up his residence in the forest village. At the Exposition Universelle of 1855, where all Rousseau's rejected pictures of the previous 20 years were gathered together, his works were acknowledged to form one of the finest groups. However, his struggles continued and his health began to give way. He was elected president of the fine art jury for the 1867 Exposition. Finally he began to sink, and he died, in the presence of his friend, J. F. Millet, on Dec. 22, 1867.

Rousseau's pictures are always grave in character, with an air of exquisite melancholy. He left a number of sketches and water-colour drawings. His pen work is rare; it is particularly searching in quality, he also executed four etchings and two heliogravures. There are a number of fine pictures by him in the Louvre, and the Wallace collection contains one of his most important Barbizon pictures. There is also an example in the Ionides collection at the Victoria and Albert museum.

See A. Sensier, *Souvenirs sur Th. Rousseau* (1872); E. Michel, *Les Artistes célèbres: Th. Rousseau* (1891); J. W. Mollett, *Rousseau and Diaz* (1890); D. Croal Thomson, *The Barbizon School of Painters: Th. Rousseau* (1892); E. Chesneau, *Peintres romantiques: Th. Rousseau* (1880); P. Burty, *Maîtres et petit-maîtres: Th. Rousseau* (1877); W. Gensel, *Millet und Rousseau* (Bielefeld, 1902); L. Delteil, *Le Peintre-Graveur* (1906); E. Michel, *La Forêt de Fontainebleau* (1909).

ROUSSEAU, VICTOR (1865–), Belgian sculptor, born at Feluy-Arquennes (Hainaut) on Dec. 16, 1865, became a member of the Belgian Royal Academy of Arts, and director and professor of the Brussels City Academy. He began to exhibit about 1890. Among his works are "Les Soeurs de l'Illusion" and "Démeter" (both in the Brussels Museum), the decorative figures on the Fragnée Bridge at Liége, the "Maturité" monument in the Place de la Chancellerie, Brussels, and the Max Waller memorial in the same city. Rousseau, who lived in London during the War, designed the monument, signifying Belgian gratitude to England, which stands on the Thames Embankment, London, close to Cleopatra's Needle. He also designed the War memorial at Forest, near Brussels.

ROUSSEAU DE LA ROTTIÈRE, JEAN SIMÉON (b. 1747), French decorative painter, was the youngest son of Jules Antoine Rousseau, "sculpteur du Roi." He studied at the Académie Royale in 1768 winning the medal given to the best painter of the quarter. He appears with his brother Jules Hugues to have been employed by his father for the decorative work executed by the family at Versailles. Many of the attributions are fairly determined by dates, Jules Antoine Rousseau having been at work at Versailles for years before the birth of his famous son. There can be little doubt that the "Bains du Roi," the "Salon de la Méridienne," part of the bedchamber of Madame Adelaïde, and the "Garde-robe of Louis XVI." were shared in by Rousseau de la Rottière. His most individual and most famous undertaking was, however, the decoration of the lovely "Boudoir de Madame de Sévilly," purchased for the Victoria and Albert Museum in 1869. There is no information as to Rousseau's later life. The last known mention of him is in 1792.

ROUSSEL, ALBERT (1869–), French composer, was born at Tourcoing on April 5, 1869. He left the navy in 1884 to study music in Paris, and in 1902 became professor at the Schola Cantorum. The delightful *Rustiques* (1904–06), the first symphony *Le Poème de la Forêt* (1904–06) and the charming ballet *Le Festin de l'Araignée* (1912) were all manifestly the work of a gifted composer. The *Divertissement* (piano and wind instruments, 1906), *Evocations,* three symphonic poems, one with chorus (1910–11), the orchestral prelude *Pour une Fête de Printemps* (1920), the second symphony (op. 23, 1919–20) and the opera-ballet *Padmâvati* (1923) are among his other works.

ROUSSILLON, formerly a French province, now comprised in the department of Pyrénées Orientales (*q.v.*). It was bounded S. by the Pyrénées, W. by the county of Foix, N. by Languedoc and E. by the Mediterranean. The province derived its name from a small place near Perpignan, the capital, called Ruscino (Rosceliona, Castel Rossello). It formed part of the Roman province of Gallia Narbonensis until in the 5th century it was ceded with the rest of Septimania to Theodoric II., king of the Visigoths. It has little distinctive history until the appearance of a line of hereditary counts late in the 9th century. The district does not seem to have formed a single lordship before the 12th century, when it passed under the rule of the counts of Barcelona and their successors, the kings of Aragon. Under the Aragonese monarchs the province was prosperous, and Collioure, the port of Perpignan, became a centre of Mediterranean trade. By the treaty of Corbeil (1258) Louis IX. surrendered the sovereignty of Roussillon and the ancient countship of Barcelona to Aragon, and from that time until the 17th century the province ceased to belong to France. In the first half of the 17th century the decay of Spain was France's opportunity, and on the revolt of the Catalans against the Castilians in 1641, Louis XIII. supported the former, and the treaty of the Pyrénées in 1659 secured Roussillon to the French crown.

BIBLIOGRAPHY.—*Privilèges et titres relatifs aux franchises, institutions et propriétés communales du Roussillon et de la Cerdagne depuis le XIe siècle jusqu'en 1600* (1878); A. Brutails, *Étude sur la condition des populations rurales du Roussillon au moyen âge* (1891). *See* also the publications of the *Société agricole, scientifique et littéraire des Pyrénées Orientales* (1834 *et seq.*).

ROUTH, EDWARD JOHN (1831–1907), English mathematician, was born at Quebec on Jan. 20, 1831. At the age of 11 he came to England, and after studying under A. de Morgan at University college, London, entered Peterhouse, Cambridge, in 1851. In the mathematical tripos three years later he was senior wrangler, J. Clerk Maxwell, who tied with him for the Smith's prize, being second. Elected a fellow of his college, he devoted himself to teaching. Routh also found time to make contributions to mathematics, and to write his classic works on dynamics and statics. He was elected F.R.A.S. in 1866 and F.R.S. in 1872. He died at Cambridge on June 7, 1907.

His works include: papers in *Proceedings of London Mathematical Society* and *Proceedings of the Royal Society; An Analytical View of Newton's Principia,* with Lord Brougham (1855); *Essay on the Stability of a Given State of Motion,* which won the Adams prize, 1877, and in which he used his modified Lagrangian function; *Dynamics of a Particle* (Cambridge, 1896); *Dynamics of Rigid Bodies, Elementary,* vol. i., *Advanced,* vol. ii. (1860, 6th enlarged ed. 1905); *Analytical Statics,* vol i. (1891, 2nd ed. 1896), vol ii. (1892, 2nd ed. 1902).

See *Roy. Soc. Proc.,* vol. lxxxiv.; *London Math. Soc. Proc.,* vol. v.; *Monthly Notices of Roy. Astron. Soc.,* vol. lxviii.; *Nature,* vol. xxviii.

ROUTLEDGE, GEORGE (1812–1888), English publisher, was born at Brampton in Cumberland on Sept. 23, 1812. He started in business for himself as a bookseller in London in 1836, and as a publisher in 1843. He was a pioneer of cheap classics; the shilling volumes called the "Railway Library" were an immense success, including as it did *Uncle Tom's Cabin.* He also published in popular form writings of Washington Irving, Fenimore Cooper, Bulwer Lytton and Benjamin Disraeli. A branch of Routledge's publishing business was established in New York in 1854. Routledge died in London on Dec. 13, 1888.

ROUVIER, MAURICE (1842–1911), French statesman, was born at Aix on April 17, 1842. He supported Gambetta's candidature at Marseilles in 1867, and in 1870 he founded an anti-imperial journal, *L'Égalité.* In July 1871 he was returned to the National Assembly for Marseilles at a by-election. He became a recognized authority on finance, and repeatedly served on the Budget Commission as reporter or president. In 1881 he joined Gambetta's cabinet as minister of commerce and the colonies, and in the 1883–85 cabinet of Jules Ferry he held the same office. He became premier and minister of finance on May 31, 1887, with the support of the moderate republican groups, the Radicals holding aloof in support of General Boulanger, who began a violent agitation against the government. Then came the scandal of the decorations in which President Grévy's son-in-law Daniel Wilson figured, and the Rouvier cabinet fell. Rouvier was minister of finance in a succession of ministries between 1889 and 1893. He was driven out of office by the Panama scandals; in 1902, after nearly ten years of exclusion from office, he joined the Radical cabinet of M. Combes; and on the fall of the Combes ministry in January 1905 he became premier, with Delcassé at the head of the foreign office. Delcassé, reproached with imprudence in the Morocco affair (*see* EUROPE: *History*), resigned, and the prime minister took over foreign affairs, and came to an agreement with the German government. His ministry fell in 1906 over questions connected with the Separation Law. Rouvier died at Neuilly on June 7, 1911.

ROUX, PIERRE PAUL EMILE (1853–), French bacteriologist, was born at Confolens, Charente, on Dec. 17, 1853. He studied medicine, and obtained an appointment to the Faculty of Medicine in Paris, which he held from 1874 to 1878. He then worked for ten years in Pasteur's laboratory, before being appointed to a post in the Pasteur institute. He was director of the Institute from 1904 to 1918. Roux did a great deal of research in collaboration with Pasteur, and studied the treatment of infectious diseases, including hydrophobia. He studied anthrax in conjunction with Pasteur and Chamberland, and produced vaccines against this disease. He was associated with Yersin in the study of the diphtheria bacillus and its toxins. With Behring he introduced the use of an antitoxin in diphtheria, and with him was awarded the Nobel prize for their work on serum therapeutics.

ROUYN, a new mining camp in north-western Quebec, Canada, east of the Porcupine district, and on the Canadian National and Nipissing Central railways, the centre of an area which promises to become one of the largest of the world's copper and gold fields.

In 1925 Rouyn was practically virgin bush, with a few scattered prospectors testing promising surface indications. Since the Canadian National railway completed its branch line to Rouyn in 1927 the town has grown rapidly.

Rouyn is in the centre of a mineral bearing area of approximately 10,000 sq.m., a continuation of the rocks which make up the Porcupine gold district and the Cobalt silver district of Ontario. The Noranda mine is still by far the most important in this field; over $50,000,000 worth of copper-gold ore is said to have been blocked out there.

ROVERETO, a town of the province of Trento, Italy, 15 m. by rail S.W. of the town of that name. Pop. (1921) 14,356 (town); 15,983 (commune). Built on the left bank of the Adige, in the widest portion of the valley, it is divided into two parts by the Leno torrent. Save in the newer quarter of the town, the streets are narrow and crooked, one being named after the most distinguished native of the place, Antonio Rosmini-Serbati (*q.v.*). The finest church is that of Santa Maria del Carmine, the old 14th-century church now serving as a sacristy to that built from 1678 to 1750. The church of San Marco dates from the 15th century, and so do the Municipal Palace and the Savings Bank. The town is dominated by the castle (now containing a war museum), which was reconstructed in 1492 by the Venetians, after it had been burnt in 1487 by the count of Tirol. It was very much damaged in the Great War, but its industries (silk, cotton, gloves, paper, metals, etc.) have begun to revive.

In 1132 the emperor Lothair found the passage of the gorge above the site of the town barred by a castle, which he took and gave to one of his Teutonic followers, the ancestor of the Castelbarco family. The first record of the town dates from 1154. In 1411 it was taken by the Venetians. In 1509 the town gave itself voluntarily to the emperor Maximilian, to whom it was ceded formally by Venice in 1517, and next year incorporated with Tirol.

ROVIGNO, a seaport of Italy, in Istria, 23 m. N.N.W. of Pola by rail. Pop. (1921) 10,863. It is situated on the west coast of Istria, and possesses a cathedral, built on the summit of the promontory Monte di Sant' Eufemia. Its campanile, built after the model of the famous campanile in Venice, is crowned with a bronze statue of St. Eufemia, the patron saint of the town, whose remains are preserved in the church. In the neighbourhood are vineyards, and olive gardens. Rovigno is the principal centre of the local sardine fishery and cannery. Rovigno is the ancient *Arupenum* or *Rubinum.* It became Venetian in 1283.

ROVIGO, a town of Venetia, Italy, capital of the province of Rovigo. It stands in the low ground between the lower Adige and the lower Po, 50 m. S.W. of Venice by rail and 27 m. S.S.W. of Padua, and on the Adigetto canal, 17 ft. above sea-level. Pop. (1926) 15,704. It is a station on the line between Bologna and Padua, with branches to Legnago and Chioggia. The architecture of the town bears the stamp both of Venetian and of Ferrarese influence. The finest church is the Madonna del Soccorso, an octagon with a lofty campanile, begun in 1594 by Francesco Zamberlan of Bassano, a pupil of Palladio. The town hall contains a library including some rare early editions and a fair picture gallery. The Palazzo Roncale is a fine Renaissance building by Sanmicheli (1555). Two towers of the mediaeval castle remain (920). Rovigo (Neo-Latin *Rhodigium*) is mentioned as Rodigo in 838.

ROVUMA, a river, about 500 m. long, forming the boundary between Tanganyika territory and Portuguese East Africa. The lower Rovuma is formed by the junction of two branches of nearly equal importance, the longer, the Lujenda, coming from the south-west; the other, the Rovuma, from the west. Its source lies on a plateau of Archaean rocks 3,000 ft. high, east of Lake Nyasa. In its eastward course the Rovuma flows near the base of the escarpment of an arid plateau to the north, from

which direction the streams, which have cut themselves deep channels in the plateau edge, have almost all short courses. On the opposite bank the Rovuma receives, besides the Lujenda, the Msenga and Luchulingo, flowing in broad valleys running from south to north. The Lujenda rises near Lake Chilwa, in the small Lake Chiuta (1,700 ft.), the swamps to the south of this being separated from Chilwa only by a narrow wooded ridge. The river, at its mouth about 1 m. wide, is fordable in many places in the dry season.

ROWE, NICHOLAS (1674–1718), English dramatist and miscellaneous writer, son of John Rowe (d. 1692), barrister and serjeant-at-law, was baptized at Little Barford in Bedfordshire on June 30, 1674. Nicholas Rowe was educated at Westminster school under Dr. Busby. He became in 1688 a King's scholar, and entered the Middle Temple in 1691. On his father's death he became the master of an independent fortune. His first play, *The Ambitious Stepmother,* the scene of which is laid in Persepolis, was produced in 1700, and was followed in 1702 by *Tamerlane.* In this play the conqueror represented William III., and Louis XIV. is denounced as Bajazet. It was for many years regularly acted on the anniversary of William's landing at Torbay. In *The Fair Penitent* (1703), an adaptation of Massinger and Field's *Fatal Dowry,* occurs the character of Lothario, whose name passed into current use as the equivalent of a rake. Calista is said to have suggested to Samuel Richardson the character of Clarissa Harlowe, as Lothario suggested Lovelace. Other plays are: *The Biter* (1704), *Ulysses* (1706), *The Royal Convert* (1707), *The Tragedy of Jane Shore* (1714) and *The Tragedy of Lady Jane Grey* (1715).

In 1715 Rowe succeeded Nahum Tate as poet laureate. He died on Dec. 6, 1718, and was buried in Westminster Abbey.

Rowe was the first modern editor of Shakespeare. It is unfortunate that he based his text (6 vols., 1709) on the corrupt Fourth Folio, a course in which he was followed by later editors. We owe to him the preservation of a number of Shakespearian traditions, collected for him at Stratford by Thomas Betterton. These materials he used with considerable judgment in the memoir prefixed to the *Works.* He divided the play into acts and scenes on a reasonable method, noted the entrances and exits of the players, and prefixed a list of the *dramatis personae* to each play.

Rowe's *Works* were printed in 1727, and in 1736, 1747, 1756, 1766 and 1792; his occasional poems are included in Anderson's and other collections of the British poets.

ROWELL, NEWTON WESLEY (1867–), Canadian politician, was born on Nov. 1, 1867, in Middlesex county, Ontario. He was called to the Bar in 1891, and became head of a law firm in Toronto. He was elected to the Ontario legislative assembly for North Oxford in 1911, and from that year to 1917 was leader of the liberal opposition in the Ontario legislature. In Oct. 1917 he entered the Federal Government as president of the council and vice-chairman of the war committee of the cabinet, and was elected to the Dominion lower house in 1917. He was a member of the Imperial war cabinet and Imperial War Conference, 1918; Canadian representative at the International Labour Conference at Washington, 1919; and a Canadian delegate to the first assembly of the League of Nations at Geneva, 1920, subsequently becoming vice-president of the League of Nations Society in Canada. He resigned his seat in parliament in May 1921. He wrote *The British Empire and World Peace* (1922), and *Canada, a Nation* (1923).

ROWING, the act of propelling a boat (*q.v.*) by two or more persons by means of a succession of strokes of oars.

An oar is a long shaft of wood with a blade, or thin enlarged surface, at one end, and a handle at the other, and is, in theory, a lever of the second order. With the blade immersed the water forms the fulcrum, and the resultant pressure against the handle applied at some intermediate point of the shaft to a rowlock, or fixed pin in the side of the boat, drives the boat forward. From the earliest days until the Spanish Armada it wielded a vast influence on the seas as an instrument both of war and of commerce. In the days of Queen Anne the river was still the highway of London. There were no fewer than 10,000 licensed watermen on the tidal reaches of the Thames above London Bridge.

The oldest race of which there are records, save the Chester Cup, is the sculling-race known to this day as "Doggett's Coat and Badge." Thomas Doggett, the famous comedian of the early 18th century, caused the following placard to be posted on London Bridge on the eve of August 1, 1715: "This being the day of his Majesty's happy accession to the Throne, there will be given by

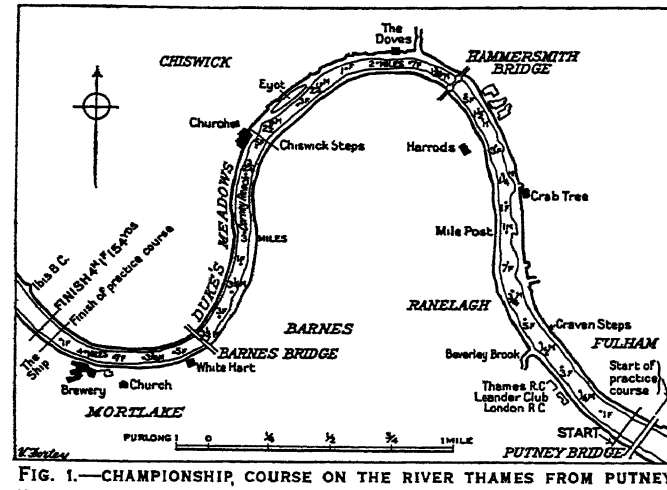


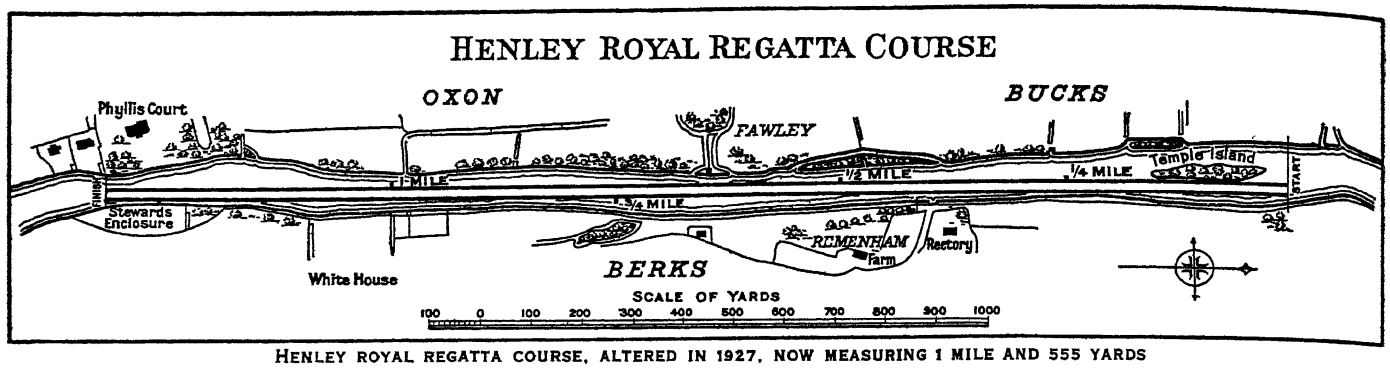
FIG. 1.—CHAMPIONSHIP COURSE ON THE RIVER THAMES FROM PUTNEY TO MORTLAKE

Mr. Doggett an orange livery, with a badge representing Liberty, to be rowed for by six watermen that are out of their time within the year past. They are to row from London Bridge to Chelsea. It will be continued annually on the same day for ever." True to his word Thomas Doggett left in his will, on his death in 1721, a sum of money in trust, and, with the exception of the years 1915–18 inclusive, the race has been rowed ever since under the administration of the Fishmongers' Company, and the list of winners is almost complete. In 1919 those who had not raced during the World War were then matched against each other, so there is really no break in continuity.

The first English regatta (*Ital. regata,* an entertainment introduced, as the Annual Register records, from Venice) of which we have evidence, took place on the Thames off Ranelagh Gardens in 1775. It attracted a great deal of public interest but no records of the races are preserved. Though there are numerous instances of professional matches at the beginning of the 19th century, it was not until the Napoleonic Wars were over that the "gentleman amateur" began to practise the sport to any extent. Westminster school *Water Ledger* is the first contemporary record of boat-racing. It commences in 1813 with the names of the crew of the six-oared "Fly," but it is only reasonable to suppose that the school-boys had manned craft and raced much earlier than that. Eton had a 10-oared boat "The Monarch" and three eight-oars as early as 1811, but no record exists of any racing until 1817. Eton challenged Westminster to row from Westminster to Kew against the tide in 1818, but the authorities refused to allow the race. This year is generally taken as the date of the foundation of the Leander club, which at once became the premier rowing club.

The records of college races at Oxford begin in 1815, but the very nature of the bumping races shows that evolution must have been gradual. It was apparently the custom for crews in eight-oared boats to row down to Sandford in company to supper. On the way home all would collect in Iffley lock. The broad, in-rigged wherries had a gang plank running from the bows to the stroke thwart. As soon as the lock gates were opened the stroke of the leading boat ran down the gang plank shoving the boat out of the lock with a boat-hook, and then, clear of the lock, dropped into his seat and raced away, followed as quickly as possible by the second boat and so on. If a crew were good enough to keep their lead, they kept their place, but if bumped they gave their position up to the boat that caught them on the next night's racing.

The year 1829 is the first great date in rowing history, for it saw the first University boat race and the first match between



HENLEY ROYAL REGATTA COURSE, ALTERED IN 1927, NOW MEASURING 1 MILE AND 555 YARDS

Eton and Westminster. Cambridge had founded a university boat club in 1827 but Oxford did not follow suit until 1839. The first race was, in all probability, suggested by Charles Wordsworth of Christ Church, whose father was the Master of Trinity, and who therefore knew personally the oarsmen on both Isis and Cam. A meeting of the C.U.B.C. was held in Mr. Gisbourne's rooms on Feb. 20, 1829, at which it was resolved: "That Mr. Snow, of St. John's, be requested to write immediately to Mr. Staniforth, Christ Church, Oxford, proposing to make up a University match" and on March 12 a formal challenge was issued as follows:—"That the University of Cambridge hereby challenge the University of Oxford to row a match at or near London, each in an eight-oared boat, during the ensuing Easter vacation." In the end the race was decided at Henley on June 10 over a course from Hambleden Lock to Henley Bridge against the stream, about 2m. distance. Oxford won easily in a time given as 14 minutes.

No other race could be arranged until 1836, when the course agreed upon was from Westminster to Putney. Cambridge won as easily as Oxford had done on the previous occasion. In 1837 and 1838 Oxford could not raise a crew and Cambridge met and defeated Leander club in both years. In '39, following the foundation of the O.U.B.C., and the three subsequent years races were rowed between Westminster and Putney, Oxford losing all save the last one. They were much assisted in turning the tide of defeat by the migration from Cambridge to Oxford of A. T. W. Shadwell, who helped F. N. Menzies, the O.U.B.C. president of 1842, to reorganize Oxford rowing. These two oarsmen with T. S. Egan, the Cambridge coxswain of 1836, '39 and '40 were largely responsible for laying the foundations of style and for the complete emancipation of the amateur from the toils of the professional.

There was still, however, the question of the professional coach. In 1849, Cambridge, in spite of the fact that they had a tried coach in T. S. Egan, decided to engage the celebrated professional sculler Robert Coombes. This year was famous in the annals of the race for the fact that there were two races and that in the second occurred the only foul. This foul has always been attributed to the instruction given to the coxswain by Coombes. From that date the universities avoided professional assistance.

From the year 1856, with the exception of the years 1915–1919 inclusive, owing to the World War, the University boat race has been an annual affair and is rowed a week or ten days before Easter. Since 1845 it has always been rowed on the Championship course from Putney to Mortlake, on the flood tide, with the exception of the years 1846, '56 and '63, when it was rowed on the ebb from Mortlake to Putney. Of the 81 races up to and including that of 1929, Oxford won 40 and Cambridge 40 races, whilst there was, in 1877, one dead heat. The course is just under 4¼m., to be exact 4m., 1fur. 154yds. Oxford has twice had a sequence of nine victories, 1861–69, and 1890–98, and in each case the balance was restored by Cambridge with the assistance of Oxford coaches. Cambridge has won nine times since 1920.

As it was in 1829, so to-day the University boat race is a match and is rowed under no rules. It is subject to conditions agreed on by the two presidents for the year, who also appoint the umpire. From the moment that the spin of the coin has decided which president shall have the choice of station, the race is put into the hands of the umpire and his decision has always been regarded as final and without appeal. The university boat clubs are composed of all the oarsmen who row in the inter-college races, that is to say that no oarsmen can represent his college unless he is first a member of the university club.

HENLEY ROYAL REGATTA

The reaches of the Thames at Henley are not only the most beautiful on the whole river but are the best adapted for boat-racing. From the earliest days, many important matches have been rowed there. In 1839 a meeting of "the landed gentry of the neighbourhood and the principal townspeople of Henley-on-Thames" was called in the town hall to establish an annual regatta. Subscriptions were raised and a cup of the value of 100 guineas, to be called the Grand Challenge Cup, was purchased, to be raced for annually by amateur crews in eight-oared boats. Another cup, called the Town Challenge Cup, for four-oared crews, the members of which resided within five miles of the town, was also to be competed for. The Grand Challenge Cup was won for the first time by Trinity college, Cambridge, who defeated Wadham college, Oxford, in their first heat, and the Oxford Etonian club (who had disposed of Brasenose college, Oxford) in the final. The Town Cup was won by a club called "The Wave" whilst there was also a pair-oared race for London watermen for a purse put up by "the Leander gentlemen," which was won by H. Campbell and J. Phelps, whose name is still famous on the tideway.

In 1841 "The Stewards Cup" was presented for four-oared boats under similar qualifications as the Grand Challenge Cup. The Ladies Challenge Plate was instituted in 1845 (though not so named until 1846), for eight-oared crews, but the qualification for entry was somewhat difficult of interpretation and led to several controversies. In 1857 the qualification was amended. There are now eight races and besides the Grand, the Stewards and the Ladies' Plate there are:—The Thames Cup for eight-oars, originally instituted in 1868, for which the qualification now is the same as for the Grand Challenge Cup, but previous winners of the latter or the Stewards Cup races, or those entered for these races in the same regatta are barred; the Visitors Challenge Cup for fours (given by the Stewards in 1847) with a similar qualification to that of the Ladies' Plate; the Wyfold Challenge Cup (presented by Mr. Donkin of Wyfold Court also in 1847) for fours, with a qualification as for the Thames Challenge Cup. The Silver Goblets and Nickalls Challenge Cup, instituted as the Silver Wherries in 1845, for pair-oars, and the Diamond Sculls founded in 1844, both of which are open to amateurs of the world, complete the programme.

The original regatta course started from "just above Temple Island and finished at the Bridge." In 1840 it was dropped down stream a little and started level with the Temple in the Bucks channel and finished some 50 or 60yds. below the bridge, a distance of about 1m. 550yds. The long bend some 200yds. from the finish in favour of the Berkshire station made this course very unfair, for a boat on the Bucks side had to have a very commanding lead at "the Point" if it was to make certain of winning. In 1884 a proposal to cut away "the Point" was dropped, but in 1886 the whole course was shifted down stream so that it started below the tail of the island and finished at the Point, or, as is more commonly said, at the top of Phyllis Court wall. The distance remained about 1m

550yds. It was also decided in that year that only two boats should contend in each heat. The course was piled and the regatta became a three-days' meeting.

Although there was agitation for a change in order to equalize the stations in the years immediately before the war, it was not until 1923 that the experiment of a straight course, starting on the Berkshire side of the island, was made. The narrowness of the river at this point necessitated the shortening of the course in this year to 1m. 440yds. So great was the success of the experiment that the Stewards, with the assistance of the Thames Conservancy and the landowners on both banks, decided to cut away the tow-path bank and part of the island to enable a straight course of the old length and of a width of 75ft. to be made. This course was used in the 1924 and ensuing regattas, and met with complete approval.

In the long history of the regatta there have been many memorable races. The most famous of these is perhaps the "seven-oar" victory of Oxford university over the Cambridge Subscription Rooms club in 1843. F. N. Menzies, the Oxford stroke, was taken so ill just before the final that it was impossible for him to row. Their opponents were asked to allow a substitute to row in his place, but the stringent rule passed after the previous regatta made it impossible for this privilege to be granted. Oxford re-organized their crew, putting G. E. Hughes stroke, and, rowing without a bow oar, led away from the start and won by a length. The year 1853 saw a marvellous race between Oxford and Cambridge in the Grand Challenge Cup. Cambridge led nearly all the way and at the Point had ⅓ of a length in hand. From this point, however, Oxford had the bend in their favour and, creeping up gradually, won by 18in. In 1862 W. B. Woodgate sculled a dead heat with E. D. Brickwood, the wind being against the latter and the station against the former, but in the "row off" Brickwood won with considerable ease. W. B. Woodgate's name is, however, more famous in connection with the regatta by his introduction of the art of coxswainless four-oared rowing. Rowing in the Brasenose college four, in 1868, he made it known that he intended to race without a coxswain. The Stewards passed a rule that no boat should compete without a coxswain and that no steering apparatus would be allowed. The crew, therefore, embarked a coxswain, but directly the word was given, he jumped overboard. Relieved of his weight the Brasenose crew went ahead fast and came in first, only to be disqualified. But the direct consequence was the establishment in 1869 of an extra race for coxswainless fours in addition to the Stewards Cup, and in 1873, although there had been no further contest without coxswains, the Stewards Cup was made a coxswainless race.

The splendid Leander crew of 1891 marked the definite re-establishment of the club at the head of the rowing world, but now a club with a university qualification, rather than a metropolitan one as in the old days. In the first round they rowed a dead-heat with Thames who led almost to the winning post, but next day in the re-row they won easily under faster conditions and in the final made the record which, though equalled, still stands. During the next 15 years they won the Cup 12 times, their failure on one occasion, 1895, being due to the fact that in their heat against Cornell they never started, owing to a misunderstanding with the umpire, and Cornell rowed over. It was satisfactory to British prestige, however, that Cornell met their superior in Trinity Hall on the following day. In 1897, Leander lost to New College by 2ft. in equal record time. They were beaten by a very fine Third Trinity crew in 1902, but for all the other years from 1891 to 1905 they were invincible. In 1906, however, it was found impossible to put on a Leander crew, and many trace the acceleration of the decline of English rowing to this fact. In that year the Grand Challenge Cup for the first time left England, being taken away by the Sport Nautique de Gand to Belgium. The Belgians again took the Cup in 1907, defeating Leander by ½ of a length after a very fine race in the second round. In 1908, owing to the Olympic games being held in England, the Royal regatta was closed to foreign crews, but in the Olympic regatta, which was held later on in the month on the Henley course, lengthened to 1½m., a very fine Leander crew, composed mainly of veterans, after serious training, defeated the Belgians by two lengths.

In 1912 both the Grand and the Thames Cups were lost by England, the former being won by a very fine Australian crew from Sydney, N.S.W., whilst a French club took the latter. Leander, however, after further training, gained their revenge over the Australians at the subsequent Olympic regatta, held at Stockholm, where they beat all nations. In 1913 Leander once more won the Grand, but in 1914, a few weeks before the World War commenced, England had the humiliation of seeing two crews from America fight out the final. In 1919 a special "Peace regatta" with Navy and Army qualifications was held, in which the Australians carried off the chief prize. The Henley regatta itself was held again in 1920, since when the gradual revival of rowing on metropolitan waters has been the most marked feature of the regatta. Thames R.C. won the Grand Challenge Cup in 1923, and again in 1927, fighting out the final with the London R.C. crew, a thing which had not been seen for exactly 50 years, when metropolitan rowing was at its height. Up to and including 1927 there have been 84 meetings, and the Grand Challenge Cup has been won by university and college crews 37 times, Leander 20, metropolitan clubs 21 (London R.C. 12, Thames R.C. 7 and Kingston R.C. 2), Royal Chester once. On five occasions it has gone abroad. The Browne and Nichols schoolboy crew, of Cambridge, Mass., won the Thames Challenge Cup at Henley, on July 7, 1929.

The Henley Stewards are the senior body of the sport in England but in 1882 the Amateur Rowing Association was formed to control the sport throughout the country. Its objects are defined as follows:—(1) To maintain the standard of amateur oarsmanship as recognized by the universities and principal boat clubs of the United Kingdom. (2) To promote the interests of boat racing generally. The Association consists of clubs which adopt the following definitions of an amateur, viz.:—No person shall be considered an amateur oarsman, sculler or coxswain:—(1) Who has ever rowed or steered in any race for a stake, money or entrance fee. (2) Who has ever knowingly rowed or steered with or against a professional for any prize. (3) Who has ever taught, pursued or assisted in the practice of athletic exercises of any kind for profit. (4) Who has ever been employed in or about boats, or in manual labour, for money or wages. (5) Who is or has been by trade or employment for wages a mechanic, artisan or labourer, or engaged in any menial duty. (6) Who is disqualified as an amateur in any other branch of sport.

The A.R.A. also laid down "The Laws of Boat Racing" and "Rules for Regattas," under which a large number of annual regattas are held on the Thames and provincial rivers. There was also established, in 1890, the National Amateur Rowing Association with an amateur definition in many ways as strict as the foregoing but omitting clauses 5 and 6. The N.A.R.A. has three main branches—the Lea, the Thames and the Midland—to which a large number of clubs are affiliated. The A.R.A. does not concern itself with the amateur status of foreign crews, who may wish to compete in this country, but the Henley Stewards have strict rules on the subject.

ROWING IN AUSTRALIA

Rowing, as a sport, began in Tasmania about 1830, when races were held in "short" (25ft.) fixed-seat fours. A race, of historical interest only, is still held annually in similar boats. On the mainland rowing became popular in the sixties and by 1880 eight-oared races between crews representing the various States had become annual fixtures. Limited at first to Tasmania, New South Wales and Victoria, this contest is now the most important event in the oarsman's almanac. Regularly attracting a crew from each State it is held alternately in the six capital cities.

Inter-university rowing originated in 1870 when a four-oared race was held between Melbourne and Sydney. It was repeated in the next year, but subsequently lapsed until 1888 when the first eight-oared race between Melbourne, Sydney and Adelaide took place. Omitting the war period this race has been held each year since that date. In 1893 university rowing received a great impetus when a number of Old Blues from Oxford and Cambridge presented the magnificent "Oxford and Cambridge Cup," to be con-

tested for annually by the three original universities, and others which may enter later. Queensland (1920), Tasmania (1924) and Western Australia (1927), have since joined in, and like the inter-state contest, the inter-university race is now between six crews and is rowed in each capital city in rotation. In the inter-state and inter-university races the crews row abreast over a three-mile course. Public school rowing flourishes chiefly in Melbourne and Sydney, where six and eight crews, respectively, race annually for the "Headship" of the river.

The great distances involved in travelling, to a large extent, kept Australia out of International contests. A Sydney Rowing club crew won the Grand at Henley-on-Thames in 1912, and was defeated in the final at the Olympic games in the same year, the Australian Army crew won the King's Cup at the Peace regatta (Henley, 1919) and this cup now constitutes the trophy for the annual inter-state race. In sculling, Australia has produced many world's champions. (G. C. D.)

THE UNITED STATES

The first race held in the United States was in 1811 between two barges, the "Knickerbocker" of New York and the "Invincible" of Long Island. The "Knickerbocker" proved to be the winner. It was from this humble start that rowing, after passing through many changes, reached its present magnitude. The interest in this race, presumably due to many side bets, was so great that it was not long before there were several rowing clubs formed in and around New York city. Finding the barge type of boat inadequate, shells were built. In 1834 a great number of these clubs amalgamated and became known as The Castle Garden Boat Club Association. The first race sponsored by this group was held at Poughkeepsie, N.Y., in 1837 and was for "six-oared" boats.

It was not long before the universities recognized the importance of rowing as a sport and in 1844 Yale purchased a "six-oar." Harvard followed suit the next spring but bought an "eight." In 1852 the first race between college crews was held on Lake Winnepesaukee, N.H. Yale entered three crews and Harvard one. This race resulted in a victory for Harvard. The next regatta, which took place in 1859, was for "six oars," Harvard again defeating Yale. The following day they both raced again and for a prize. This race was at the Worcester city regatta, and Yale turned the tables. Yale again prevailed over Harvard in 1864, but in 1866 Harvard came back and with a very fine crew won easily. Rowing at Harvard had progressed to such a degree that in 1869 she sent a challenge to Oxford and Cambridge to row a four-oared race on the Thames from Putney to Mortlake. Oxford accepted and on Aug. 27 the two crews matched blades. The thoughts of an American crew invading the sanctuary of British rowing caused much excitement, and the banks of the river were crowded with enthusiastic devotees. Harvard got away to a fine start and things began to look rather dark for the Oxonians; however, with their fine rowing background and superior knowledge, the Dark Blues overcame Harvard's lead and finished three lengths ahead.

This trip to England of Harvard's crew undoubtedly gave further impetus to rowing in the United States, Cornell, Princeton, Columbia and Pennsylvania adding it to their athletic activities. The first race in which a number of universities met and which possibly presaged the Poughkeepsie regatta was held in 1875 and included not less than 13 college crews. Cornell finished first, Columbia second and Harvard third. The first record of a college eight-oared race in the United States dates back to 1876 when Yale and Harvard tested their strength for a distance of four miles. In 1878 Columbia sent a four to England and won the race at Henley, bringing the Visitors' Challenge Cup to America. From 1878 to 1881 there were several inter-collegiate races and in 1881 Cornell sent a four-oared crew to Henley, but they were beaten.

At this time in the rowing history of the United States, Cornell forged to the front as the outstanding crew. Winning most of her races in America she decided to make another try for laurels at Henley and in 1895 put a crew on the Thames. In the first heat Leander was left at the post, due to a misunderstanding; the next day, however, Cornell suffered defeat at the hands of Trinity hall. Bob Cook, the grand old man of Yale rowing, was the next to invade Henley; but Yale lost to Leander. In 1895 an inter-collegiate rowing association was formed by Cornell, Columbia and Pennsylvania. This was the beginning of the Poughkeepsie regatta.

Rowing was established on the Pacific coast in 1899. The first race was held on Lake Washington in 1903 with California as Washington's opponent. The crews were fours and California won by about three lengths. California followed this victory with another over the James Bay Rowing club of Victoria, B.C. The next inter-collegiate regatta was to be a triangular affair held on the Oakland estuary, California. Three crews were entered, Washington, Stanford and California. For some reason Washington withdrew and the California four defeated Stanford; then a few days later raced Washington, adding another victory. The following year the race was repeated. Washington lost to California, but a few days later defeated Stanford. These four-oared races continued until 1906, the Golden Bears (California) winning without a challenge. In 1906 the San Francisco earthquake caused a cessation of rowing in the State, but in 1907 eight-oared crews appeared on the water at Lake Washington. The race was with California but the water was so rough that both shells swamped in the middle of the course. In 1910 Washington raced Wisconsin on Lake Mendota but was defeated. From 1912 until 1921 the Huskies (Washington) won all their races excepting in 1915 when Stanford was the victor. Washington went to Poughkeepsie in 1913 and 1914, finishing third and fifth respectively.

Rowing soon found its way to the preparatory and high schools which were fortunate enough to have a good body of water on which to row. St. Paul's, Exeter, Groton, St. Mark's, Kent, Choate and New Rochelle are among the better known schools which have added rowing to their athletic curriculum. St. Paul's followed the example of Oxford and Cambridge in that the school has been divided into several sections and each one has its own crew. In 1927 Kent defeated all comers, including the Columbia freshmen, and then went over to England to participate in the Henley for school crews. Their first two races were practice races with a crew from Brasenose college and the Leander club eight. Kent won the first by five lengths but lost to Leander by the matter of a few feet. This last race was remarkable in that Leander has always been known as one of the leading crews of England. Kent then went to the mark for the Thames Challenge Cup, a race in which there were 28 crews entered. The second crew of the Thames Rowing club was selected to race with Kent in the first heat. After a gruelling race, Thames triumphed by a quarter of a length. Kent's last race was with Radley, Kent winning by about five lengths.

The desire of college athletes to keep on with rowing after graduation has been met by rowing clubs all over the United States. Philadelphia has become the Henley of America and one can find the Schuylkill river lined with well equipped boat-houses where all manner of rowing is practised, from the eight down to the single-sculls A duplicate of the English Henley, called the American Henley, is held there every year in the latter part of May. Another famous centre of rowing in the United States is Duluth, Minn. Out on the Pacific coast there are two well-established rowing clubs, the Olympic club of San Francisco and the Portland Rowing club of Portland. At Philadelphia some of these clubs are old and consequently rich in rowing tradition and history.

The United States reached the pinnacle of the rowing world when the crew from the Naval academy went over to the Olympic Games (1920) and defeated a fine Leander crew by a narrow margin to win the Olympic championship. The following year Princeton sprang a surprise by winning against this crew in a short race. The year 1922 heralded the Pacific coast as a factor in American rowing. The University of Washington, after defeating the University of California by over 12 lengths, accepted the invitation of the Inter-collegiate Rowing Association to row in the Poughkeepsie regatta. On their way East they stopped off at the University of Wisconsin and defeated the crew of that institution by eight lengths. At Poughkeepsie the University of Washington finished second, forcing the Navy to smash the course record to

win. This race is still talked of as the most exciting one that has ever been witnessed on the Hudson. The following year the Navy finished second to Washington. In 1924 Washington won again and in 1925 Navy took first, these last two races being four miles. In 1926 Washington was the victor and in 1927 Columbia, with a crew made up mostly of sophomores, was the winner.

The great showing of the Washington crew of 1922 caused E. O. Leader, its coach, to become the head coach of Yale. This started the exodus of oarsmen from the University of Washington to other colleges as their coaches. Mr. Leader brought Yale up from a perpetual last place entry to a straight winner for the next four years. Yale represented the United States at the Olympic Games and won the championship. In 1927 Princeton was again destined to furnish a surprise by winning over Yale on Lake Carnegie. Harvard also defeated Yale on the Thames, thus breaking a six-year winning streak. (E. O. LE.)

SCULLING

A scull is a lever of the same nature as the oar, but smaller in all dimensions, enabling the user to hold one in each hand and so apply his power on both sides of the boat at one and the same time. "Sculling" is, therefore, the propulsion of a boat by one person with a pair of sculls.

In the early days of the 19th century sculling was a popular form of racing. In 1830 the Wingfield Sculls were founded. They carry the title of Amateur Champion of the Thames and are open to any amateur sculler of the United Kingdom of Great Britain and Ireland. They have their own constitution and are managed by a committee of past winners of the race. The first winner was J. H. Bayford, over the original course from Westminster to Putney. From 1849 to 1861 the course was from Putney to Kew, since when the race has been rowed on the Championship course from Putney to Mortlake.

The first professional championship was rowed in 1831 from Westminster to Hammersmith, C. Campbell defeating J. Williams. The Championship left England in 1876 when E. Trickett, of New South Wales, beat J. H. Sadler, and did not return until R. Arnst of New Zealand, in order to get a match, consented to race Ernest Barry on the Thames in 1912 and was beaten by him. Barry lost in 1919 to A. Felton, the Australian, but defeated him on the Parramatta river in 1920, and then resigned his title, since when it has been held by scullers from the Antipodes. In 1928 Major Goodsell, N.S.W., the holder was beaten by H. A. Barry.

The Diamond Sculls, instituted at Henley regatta in 1844, are the chief prize open to amateurs, and were first won by T. B. Bumpsted. Since 1872 many foreign aspirants have entered and England has lost them on seven occasions. In 1892, J. J. K. Ooms, of Amsterdam, won them, at his first and only attempt, with considerable ease. In 1897 Ten Eyck, of Worcester, U.S.A. won them, but in the following year his entry was refused owing to the fact that he had lost his amateur status. In 1904, L. F. Scholes of Toronto won them, beating, among others, F. S. Kelly, an Australian by birth, the greatest sculler who has yet been seen on the Henley course. Kelly was, however, also rowing in the Leander crew which won the Grand Challenge Cup and it was doubtless owing to this fact that he was beaten. In 1905, confining himself to sculling, he made the record for the course of 8min. 10sec., which still stands. In 1913 and '14, 1921 and '22, the trophy was won by C. McVilly, of Tasmania, G. Sinigaglia, of Italy, F. E. Eyken, of Delft university and W. M. Hoover, of the U.S.A. respectively. In the year 1927, the Diamond Sculls nearly fell to J. Wright, a young Canadian, of the Argonaut club of Toronto. He defeated T. D. A. Collett, the best English sculler of the year after a very hard race in the first heat, and was leading R. T. Lee, of Worcester college, Oxford, a few lengths from the finish, when he hit the booms, and before he was clear Lee had won the race. J. Wright, Canada won in 1928.

See the volumes on *Rowing* in the Badminton and Isthmian libraries; W. E. Sherwood, *Oxford Rowing* (1900); W. B. Woodgate, *Oars and Sculls* (1889); H. T. Steward, *Henley Royal Regatta* (1903); Sir Theodore Cook, *Racing at Henley* (1911); G. C. Bourne, *A Textbook on Oarsmanship* (1925); S. Fairbairn, *Notes on Rowing* (1926). (G. C. D.)

ROWLAND, HENRY AUGUSTUS (1848–1901), American physicist, was born at Honesdale, Pa., on Nov. 27, 1848. He graduated as a civil engineer at Rensselaer Polytechnic institute at Troy in 1870, and two years later returned there as instructor in physics, becoming assistant professor in 1877. While at Troy he made investigations on magnetic induction, permeability and distribution, which established fundamental results. In 1875 he was chosen to occupy the chair of physics in the newly-founded Johns Hopkins university, a position which he held until his death, at Baltimore, on April 16, 1901. Before beginning his work at Johns Hopkins he went to Europe, to visit the various physics research centres of the Continent, and to purchase laboratory apparatus. He studied under Helmholtz in Berlin, where he carried out experiments proving that an electrostatic charge carried at a high rate of speed had the same magnetic action as an electric current. At Johns Hopkins he carried on a long series of experiments in which he computed the accepted value of the mechanical equivalent of heat, experiments which necessitated more careful thermometric and calorimetric methods than had ever been used before. Similar refined apparatus and technique enabled him to make a more nearly accurate determination of the value of the ohm, than had been calculated before. Becoming interested in the study of spectrum analysis, he realized the importance of securing more accurate diffraction gratings, and to this end constructed a dividing engine which allowed from 14,000 to 20,000 grating lines to be ruled to the inch on a plane surface of either glass or speculum metal. He next investigated the action of a grating ruled on a spherical concave surface, and, discovering the advantages, proceeded to rule them. These gratings came to be used in physics laboratories the world over, and the modern study of spectroscopy as an exact science dates from this work. With these gratings Rowland studied and photographically mapped the solar spectrum for the first time. He then undertook the systematic study of the arc-spectra of all the elements so far as possible, and published his results between 1895 and 1900. In his last years he became interested in alternating currents and their practical application to motors, measuring instruments, etc. He devised a system of multiplex telegraphy depending upon synchronous motors which received a grand medal at the Paris Exposition of 1900. He was the recipient of many honours, including the Rumford and Draper medals.

See H. A. Rowland, *Physical Papers* (1902), which contains a bibliography of his writings.

ROWLANDSON, THOMAS (1756–1827), English caricaturist, was born in Old Jewry, London, in July 1756, the son of a tradesman or city merchant. On leaving school he became a student in the Royal Academy, but at the age of 16 he went to study in Paris, and afterwards made frequent tours on the Continent. In 1775 he exhibited at the Royal Academy a drawing of "Delilah visiting Samson in Prison." He took to drawing caricatures as a means of livelihood. His Academy drawing of Vauxhall (1784) had been engraved by Pollard, and the print was a success. Rowlandson was largely employed by Rudolph Ackermann, the art publisher, who in 1809–11 issued in his *Poetical Magazine* "The Schoolmaster's Tour"—a series of plates with verses by Dr. William Coombe which became very popular. Again engraved by Rowlandson himself in 1812, and issued under the title of the "Tour of Dr. Syntax in Search of the Picturesque," they had reached a fifth edition by 1813, and were followed (1820) by "Dr. Syntax in Search of Consolation," and (1821) by the "Third Tour of Dr. Syntax in Search of a Wife." The same collaboration of designer, author and publisher resulted in the English "Dance of Death" (1814–16), and the "Dance of Life" (1822). Rowlandson also illustrated Smollett, Goldsmith and Sterne. Other designs are in *The Spirit of the Public Journals* (1825), *The English Spy* (1825), and *The Humourist* (1831). He died in London on April 22, 1827.

Rowlandson's designs were usually executed in outline with the reed-pen, and delicately washed with colour. They were then etched by the artist on the copper, and afterwards aqua-tinted—usually by a professional engraver, the impressions being finally coloured by hand. As a designer the quality of his work suffered from haste and over-production.

See J. Grego, *Rowlandson the Caricaturist, a Selection from his Works*, etc. (2 vols., 1880).

ROWLEY, WILLIAM (*c.* 1585–*c.* 1642), English actor and dramatist, collaborator with several of the dramatists of the Elizabethan period, especially with Thomas Middleton (*q.v.*). He is not to be identified with the "Master Rowley," whom Francis Meres described in his *Palladis Tamia*. William Rowley is described as the chief comedian in the Prince of Wales's company. He joined the King's Servants in 1623, and retired from the stage about four years later. He is supposed to have died about 1642. The following plays attributed to his sole authorship are extant: *A new Wonder, A Woman never Vext* (printed, 1632); *A Match at Midnight* (1633); and a *Shoomaker a Gentleman with the Life and Death of the Cripple that stole the Weathercock at Paules* (1637). They are distinguished by effectiveness of situation and ingenuity of plot. It is recorded by Langbaine that he "was beloved of those great men Shakespeare, Fletcher and Jonson." With George Wilkins and John Day he wrote *The Travailes of the Three English Brothers* (1607); with Thomas Heywood he produced *Fortune by Land and Sea* (printed, 1655); he was associated with Thomas Dekker and John Ford in *The Witch of Edmonton* (printed, 1658); *A Cure for a Cuckold* (printed, 1661) and *The Thracian Wonder* (printed, 1661) are assigned to the joint authorship of Webster and Rowley; while Shakespeare's name was unjustifiably coupled with his on the title-page of *The Birth of Merlin: or, The Childe hath found his Father* (1662). Rowley also wrote an elegy on Hugh Attwell, the actor, and a satirical pamphlet describing contemporary London, entitled *A Search for Money* (1609).

SAMUEL ROWLEY, the dramatist, described without apparent reason by J. P. Collier as William Rowley's brother, was employed by Henslowe as a reader of plays. He wrote some scriptural plays now lost, with William Borne (or Bird, or Boyle) and Edward Juby. His only extant pieces are: *When you see me, You know me, Or the famous Chronicle Historie of King Henry the eighth, with the birth and vertuous life of Edward Prince of Wales* (1605), of interest because of its possible connection with the Shakespearian play of *Henry VIII.*, and *The Noble Souldier, Or, A Contract Broken, justly reveng'd* (1634), which was entered, however, in the Stationers' Register as the work of Thomas Dekker, to whom the major share is probably assignable.

ROWLEY REGIS, urban district, Kingswinford parliamentary division, Staffordshire, England, on the G.W. railway, 7 m. W. of Birmingham. Pop. (1931) 41,238. It lies in a hilly district rich in coal and iron, while a hard basaltic intrusion known as Rowley rag is largely quarried for road metal.

ROWLOCK (pronounced in England *rollock*), a device, on the gunwale of a boat, in or on which an oar rests, forming a fulcrum for the oar in rowing. The word is a corruption due to "row" of the earlier "oar-lock," O.E. *ārlōc*, a lock or enclosed place for an oar. The simplest form of rowlock is a notch, square or rounded, on the gunwale, in which the oar rests; other kinds are formed by two pins or pegs, "thole pins" (thole being ultimately the same word as Norw. *toll*, a young fir-tree), and by a swivel with two horns of metal, pivoted in the gunwale or on an outrigger. (*See* OAR.)

ROWNO, a town of Poland, in the province of Volhynia, situated on a tributary of the Goryn. Pop. (1921), 30,400. Though it never had the political importance of Luck or Ostrog, Rowno has grown to be a larger town than either of these. It is an important railway junction, the centre of an agricultural district, near the Volhynian forests and in a region famous for its horses and cattle. It is on the famous route west from Kiev along which many Russian conquerors, Tatar raiders and foreign armies have passed. It is first mentioned in 1282, and formerly possessed a royal palace. It has a large Jewish population.

ROWTON, MONTAGUE WILLIAM LOWRY-CORRY, BARON (1838–1903), son of the Right Hon. Henry Corry and Harriet, daughter of the 6th earl of Shaftesbury, was born in London on Oct. 8, 1838, educated at Harrow and at Trinity college, Cambridge, and called to the bar in 1863. His father, a son of the 2nd earl of Belmore, represented County Tyrone in parliament continuously from 1826–1873, and was a member of Lord Derby's cabinet (1866–68) as vice-president of the council and afterwards as first lord of the Admiralty. In 1866 he became private secretary to Disraeli, with whom he maintained intimate relations until the statesman's death in 1881. When Disraeli resigned office in 1868 Corry declined various offers of public employment in order to be free to continue his services, now given gratuitously, to the Conservative leader; and when the latter returned to power in 1874, Corry resumed his position as official private secretary to the prime minister. He accompanied Disraeli (then earl of Beaconsfield) to the congress of Berlin in 1878, where he acted as one of the secretaries of the special embassy of Great Britain. On the defeat of the Conservatives in 1880, Corry was raised to the peerage with the title of Baron Rowton, of Rowton Castle, Shropshire. After Beaconsfield's removal to the House of Lords, Rowton assisted him in keeping in touch with the rank and file of the party, and on Beaconsfield's death he was put in charge of his correspondence and papers.

Lord Rowton will long be remembered as the originator of the scheme known as the Rowton houses. Consulted by Sir Edward Guinness (afterwards Lord Iveagh) with regard to the latter's projected gift of £200,000 for endowment of a trust for the improvement of the dwellings of the working classes, Rowton made himself personally familiar with the conditions of the poorest inhabitants of London; and determined to establish "a poor man's hotel," which should offer better accommodation than the common lodging-houses, at similar prices. The first Rowton House was opened at Vauxhall in Dec. 1892, the cost (£30,000) being defrayed by Lord Rowton and it proved so successful that in 1894 a company, Rowton Houses (Limited), was incorporated to extend the scheme which was subsequently imitated throughout Great Britain, Europe and America. (*See* HOUSING.) Lord Rowton also devoted himself to the business of the Guinness Trust, of which he was a trustee. As he was unmarried the title became extinct on Lord Rowton's death on Nov. 9, 1903, at London.

See *Reports of the Rowton Houses, Ltd.*, 1895–1903; E. R. Dewsnup, *The Housing Problem in England* (1907); R. H. Vebch, *General Sir Andrew Clarke* (1905).

ROXANA or **ROXANE,** daughter of the Bactrian king Oxyartes, and wife of Alexander the Great. After the latter's death she gave birth at Babylon to a son (Alexander IV.), who was accepted by the generals as joint-king with Arrhidaeus. Having crossed over to Macedonia, and thrown in her lot with Olympias, mother of Alexander the Great, she was imprisoned by Cassander in the fortress of Amphipolis and put to death (310 or 309 B.C.). The marriage of Alexander and Roxana was the subject of a famous painting by Aëtion.

See Plutarch, *Alexander*, 47, 77; Arrian, *Anab.* iv. 18, vii. 27; Diod. Sic. xviii. 3, 38, xix. 11, 52, 105; Strabo xi. p. 517, xvii. p. 794.

ROXBURGHE, EARLS AND DUKES OF. ROBERT KER, 1st earl of Roxburghe (*c.* 1570–1650), was the eldest son of William Ker of Cessford (d. 1606) and the grandson of Sir Walter Ker (d. *c.* 1584), who fought against Mary queen of Scots both at Carberry Hill and at Langside. He was descended from Sir Andrew Ker of Cessford (d. 1526) who fought at Flodden and was killed near Melrose in Jan. 1526 by the Scotts of Buccleuch. After a turbulent life on the border Robert Ker became a Scottish privy councillor in 1599 and was made Lord Roxburghe about the same time; he accompanied King James to London in 1603, and was created earl of Roxburghe in 1616. He was lord privy seal for Scotland from 1637 to 1649, and in the Scottish parliament he showed his sympathy with Charles I.; but he took no part in the Civil War, although he signed the "engagement" for the king's release in 1648. His titles and estates passed by special arrangement to his grandson, WILLIAM DRUMMOND (d. 1675), the youngest son of his daughter Jean and her husband John Drummond, 2nd earl of Perth. William took the name of Ker, became 2nd earl of Roxburghe, and married his cousin Lord Ker's daughter Jean.

JOHN, 5th earl and 1st duke of Roxburghe (*c.* 1680–1741), received the dukedom in 1707 for his services in connection with the Union. This was the last creation in the Scottish peerage.

The duke was a representative peer for Scotland in four parliaments; George I. made him a privy councillor and keeper of the privy seal of Scotland, and he was loyal to the king during the Jacobite rising in 1715. He was again a secretary of State from 1716 to 1725.

His grandson JOHN, 3rd duke of Roxburghe (1740–1804), was a famous bibliophile. The duke's library, including a unique collection of books from Caxton's press, and three rare volumes of broadside ballads, was sold in 1812, when the Roxburghe Club was founded to commemorate the sale of Valdarfer's edition of Boccaccio. Roxburghe's cousin William, 7th Lord Bellenden (*c.* 1728–1805), who succeeded to the Scottish titles and estates, died childless in October 1805, and for seven years the titles were dormant.

Then in 1812 SIR JAMES INNES, Bart. (1736–1823), a descendant of the 1st earl, established his claim to them, and taking the name of Innes-Ker, became 5th duke of Roxburghe. In his family the dukedom remained. Its holder has a seat in the House of Lords as Earl Innes in the peerage of the United Kingdom.

ROXBURGHSHIRE, border county, Scotland, bounded west by Berwickshire, east and south-east by Northumberland, south by Cumberland, south-west by Dumfriesshire and north-west by Selkirkshire and Midlothian. It has an area of 426,028 ac. (excluding water). The only low ground is in the north and in the valleys of the larger rivers, and the whole of the south is markedly hilly, though the Cheviots, forming for a considerable distance the natural boundary with England, mostly belong to Northumberland. The Tweed flows through the north of the shire for 26 out of its total run of 97 m., though for about 2 m. (near Abbotsford) it is the boundary stream with Selkirkshire, and for 10 m. lower down with Berwickshire. On the right its affluents are the Bowden and the Teviot, and on the left the Allan and the Eden. The Teviot is the principal river entirely in Roxburghshire. From its source near Causeway Grain Head on the Dumfriesshire border, it follows mainly a north-easterly direction of 37 m. to its confluence with the Tweed at Kelso. The Liddel is the main stream in the S. Rising near Peel Fell in the Cheviots it flows south-west to the Esk after a course of 27 m., receiving on the right Hermitage Water, on the left Kershope Burn. The Kershope and Liddel, during part of their run, serve as boundaries with Cumberland. Excepting the Liddel, which drains to the Esk, much the greater portion of the surface is drained, by the Tweed, to the North Sea. Teviotdale, Liddesdale, Tweedside and Jedvale are the principal valleys. The county contains a considerable range of sedimentary rocks from the Ordovician to the Carboniferous systems, and with these are associated large tracts of volcanic rocks. The Ordovician and Silurian rocks occupy the N.W. and W. part of the county. Two divisions of the Old Red Sandstone occur; the lower is confined to the Cheviots; the strata are unconformable upon the upturned Silurian beds. The upper division, which in its turn is unconformable upon the lower, occupies about one-third of the county, being well developed in the north, where volcanic rocks come in. Carboniferous rocks are represented by the Calciferous sandstone series in the south-west in Liddesdale and on the uplands of Carter Fell, etc. An interesting series of volcanic "necks" belonging to the Carboniferous period is exemplified in Dunain Law, Black Law, Maiden Paps, Ruberslaw and other hills. Glacial deposits are represented by boulder clay and beds of sand and gravel.

Agriculture and Industries.—The soil is chiefly loam in the level tracts along the banks of the larger streams, where it is also very fertile. In other districts a mixture of clay and gravel is mostly found, but there is besides a considerable extent of mossy land. Of the area under grain about three-quarters are occupied by oats, the remainder being principally barley. Among green crops turnips and swedes are most generally cultivated, potatoes covering a comparatively small acreage. In different parts of Tweedside and Jedvale several kinds of fruit are successfully grown. Both in the pastoral and arable localities agriculture is in an advanced condition. The hill country is everywhere covered with a thick green pasturage admirably suited for sheep, which occupy the walks in large quantities. The herds of cattle are also heavy, horses are kept mostly for farming operations, and pigs are raised in moderate numbers. About ⅓ of the holdings are large, the average being 150 acres. Many districts on the Tweed and Teviot are beautifully wooded.

The county is a principal seat of the tweed and hosiery manufactures in Scotland. Ironfounding and dyeing are also carried on at Hawick and tanning at Jedburgh, and agricultural implements, chemical manures and fishing tackle are made at Kelso. The salmon fisheries on the Tweed are of considerable value.

The Waverley route of the L.N.E. railway runs through the county from near Melrose in the north to Kershopefoot in the south. At St. Boswells branches are sent off to Duns and Reston, and to Jedburgh and Kelso via Roxburgh. There is also a line from Berwick to Kelso, via Coldstream and Carham.

Population and Administration.—The population in 1931 was 45,787, and there were 99 persons who spoke Gaelic and English, but none Gaelic only. The principal towns are Hawick (pop. 17,059), Kelso (3,855), Jedburgh (3,057), Melrose (2,052). The county returns a member to parliament with Selkirkshire. Jedburgh, the county town, is a royal burgh, and Hawick, Kelso and Melrose are police burghs. The shires of Roxburgh, Berwick and Selkirk form a sheriffdom, and a resident sheriff-substitute sits at Jedburgh and Hawick. The county is under school-board jurisdiction, and there are secondary schools at Hawick and Jedburgh.

History and Antiquities.—Among the more important remains of the original inhabitants are the standing stones and circles at Plenderleath between the Kale and Oxnam; on Hownam Steeple, a few miles to the north-west; and at Midshiels on the Teviot. The stones on Ninestane Rig, near Hermitage Castle, and on Whisgill are supposed to commemorate the Britons of Strathclyde who, under Aidan, were defeated with great slaughter by Ethelfrith, king of Bernicia, at the battle of Degsanstane or Dawstane in 603. There are hill forts in Liddesdale on the Allan, in the parish of Oxnam, and on the most easterly of the three Eildons. This last is said to be the largest example of its kind in Scotland. One of the most important and most mysterious of British remains is the Catrail, or Picts' Work Dyke. In its original condition it is supposed to have consisted of a line of double mounds or ramparts, with an intervening ditch 6 ft. broad. It is now far from perfect and in places has disappeared for miles. Beginning at Torwoodlee, north-west of Galashiels, it ran south-west to Yarrow church, whence it turned first south and then south-east, following a meandering course to Peel Fell in the Cheviots, a distance of 48 miles.

Roman remains are also of interest. Dere Street crossed the border north of Brownhart Law in the Cheviots, then took a mainly north-western direction across the Kale, Oxnam, Jed and Teviot to Newstead, near Melrose, where it is conjectured to have crossed the Tweed and run up Lauderdale into Haddingtonshire. Another so-called Roman road is the Wheel Causeway or Causey, a supposed continuation of the Maiden Way which ran from Overburgh in Lancashire to Bewcastle in Cumberland, and so to the Border. It entered Roxburghshire north of Deadwater and went (roughly) north as far as Wolflee, whence its direction becomes a matter of surmise. Of Roman camps the principal appear to have been situated at Cappuck, to the south-east of Jedburgh, and near Newstead, at the base of the Eildons, the alleged site of *Trimontium*. After the retreat of the Romans the country was occupied by the Britons of Strathclyde in the west and the Bernicians in the east. It was then annexed to Northumbria for over four centuries until it was ceded, along with Lothian, to Scotland in 1018.

David I. constituted it a shire, its ancient county town of Roxburgh (*see* KELSO) forming one of the Court of Four Burghs. The castle of Roxburgh, after changing hands more than once, was captured from the English in 1460 and dismantled. Other towns were repeatedly burned down, and the abbeys of Dryburgh, Jedburgh, Kelso and Melrose ultimately ruined in the expedition of the earl of Hertford (the Protector Somerset) in 1544–45. The Border freebooters—of whom the Armstrongs and Elliots were the chief—conducted bloody frays on their own account.

On the union of the crowns the county gradually settled into what was comparatively a state of repose, disturbed to some extent during the Covenanting troubles and, to a much slighter degree, by the Jacobite rebellions.

ROXBURY, formerly a city of Norfolk county, Massachusetts, U.S.A., situated between Boston and Dorchester, but since 1868 a part of Boston. It is primarily a residential district. The town of Roxbury (at first usually spelled Rocksbury) was founded in 1630 by some of the Puritan immigrants who came with Governor John Winthrop; the settlers were led by William Pynchon, who in 1636 led a party from here and founded Springfield, Mass. At the home of Thomas Welde (d. 1662), the first minister, Anne Hutchinson (*q.v.*) was held in custody during the winter of 1637–38. Associated as teacher with Welde and his successors, Samuel Danforth and Nehemiah Walter, was John Eliot, the apostle to the Indians, who removed to Roxbury in 1632 and died here in 1690. Roxbury was the home also of Thomas Dudley, of his son Joseph and of his grandson Paul; of Robert Calef (d. 1719), the leader of the opposition to the witchcraft craze; of Gen. Joseph Warren, and of William Eustis (1753–1825), who was U.S. secretary of war (1809–12), and governor of Massachusetts (1823–25); and from 1837 to 1845 Theodore Parker was the pastor of the Unitarian church of West Roxbury. Of special interest in the old Roxbury burial-ground is the "Minister's Tomb," containing the remains of John Eliot, and the tomb of the Dudleys. West Roxbury was the scene of the Brook Farm experiment (*see* BROOK FARM).

See F. S. Drake, *The Town of Roxbury, its Memorable Persons and Places* (Boston, 1878 and 1905).

ROYAL AGRICULTURAL SOCIETY: *see* AGRICULTURAL SOCIETIES AND SHOWS.

ROYAL DUTCH OIL COMPANY. The Company was established in 1890 at The Hague (Netherlands) with a share capital of 1,300,000 guilders. Though the first years were difficult ones for the Royal Dutch Company it succeeded in keeping its footing, managed by Mr. J. B. Aug. Kessler who in December 1900 died, and was succeeded by Mr. H. W. A. Deterding, since 1920 Sir Henri W. A. Deterding, who has been managing the Company ever since.

With the new oil companies set up in the Netherlands Indies the Royal Dutch established relations.

In 1903 a selling company, the Asiatic Petroleum Company, was formed by the Royal Dutch and the companies with whom they had contracted, also in conjunction with the Moeara Enim, the Moesi Ilir, and the Nederlandsche Industrie and Handel Maatschappij, in co-operation with the Shell Transport and Trading Company, the Dordtsche Petroleum Maatschappij, and the principal Russian producers-exporters headed by the Soc. Comm. et Ind. de Naphte Caspiènne et de la Mer Noire.

In 1907 an amalgamation was effected with the Shell Transport and Trading Company. Two new companies were formed, a Dutch one, De Bataafsche Petroleum Maatschappij, The Hague, for the winning and refining of oil and preparation of its products, and an English Company, The Anglo Saxon Petroleum Company, London, to attend to transport and storage. The "Royal Dutch" and "Shell" still retained their separate existence, but the possessions of both companies were combined under the two newly formed companies. The Royal Dutch and Shell shares in these concerns were 60% and 40% respectively.

The expansion of the Royal Dutch-Shell group was no longer confined to the Indies but it gradually succeeded in acquiring interests in nearly all producing centres of the world.

The statutory capital of the Royal Dutch was (1929) 600,000,000 guilders, the issued capital 527,123,600 guilders.

The crude oil production of the Royal Dutch-Shell group in 1928 amounted to 22,108,972 metric tons. (J. E. F. DE K.)

ROYAL FERN, in botany, the common name for the fern *Osmunda regalis,* native to Asia, Europe, including Great Britain, North America and Mexico, growing usually in bogs and marshy woods. It is a handsome plant with bi-pinnate fronds 2 to 6 ft. long and 1 ft. or more broad; the tops of the fronds are fertile, the fertile pinnae being cylindrical and densely covered with the spore-cases, giving the appearance of a dense panicle of flowers, whence the plant is known as the flowering fern. There are various cultivated forms—*O. cristata* has the ends of the fronds and the pinnae finely crested, and *O. corymbifera* has curiously forked and crested fronds. Several related species, among them *O. cinnamomea* and *O. Claytoniana,* natives of North America, are known in Great Britain as handsome greenhouse ferns.

ROYAL MAIL STEAM PACKET COMPANY. This British shipping company was incorporated in 1839, at a time when energetic efforts were being made to reform the postal services. (*See* HILL, SIR ROWLAND.) Representations were made from the West Indian colonies to the government, and in September, 1839, a charter of incorporation was granted to the Royal Mail Steam Packet company, which was formed, with a capital of £1,500,000. Fourteen "steam packets" were laid down. these being paddle steamers, fully equipped with sails, and on Jan. 1, 1842, the first vessel, named "Thames," left on her maiden voyage for the West Indies. The opening of 1846 found this service fully established; indeed, it proved so successful that an extension to the port of Colon was provided by steamers running once a month. In the same year, the company undertook further pioneer work by the establishment of a regular service of mules and canoes across the 50 miles of land that separated Colon from the Pacific side of the Isthmus of Panama. This proving inadequate, a railroad across the isthmus was completed in 1855 by the Panama Railroad company, to which the Royal Mail Steam Packet company lent considerable pecuniary assistance.

In 1850, a contract was concluded with the British government for the conveyance of the mails from the United Kingdom to Brazil. After the new Brazil service had been in operation for 19 years, the expansion of trade with South America necessitated the extension of the main service to the Argentine republic.

Since then the story of the company's South American service has been one of steady progress. The fleet has rapidly grown, each vessel constructed being larger than its predecessor, until in 1928 "Asturias" and "Alcantara" were Great Britain's largest motor liners. In the World War, 56 of the company's ships were requisitioned and 13 of them were sunk. The 29,237 tons owned by the company in 1839 had grown in 1928 to 373,527 tons, which figure includes the tonnage of the fleet of R.M.S.P. Meat Transports, Ltd. The fleets of the other companies affiliated with the Royal Mail Steam Packet company aggregated in 1928 2,328,426 gross registered tons, making a total of 2,701,953 tons. (L.C.M.)

ROYAL OAK, a residential village of Oakland county, Michigan, U.S.A., on Federal highway 10 and the Grand Trunk railway, 12 m. N.W. of Detroit. The population was 6,007 in 1920 (85% native white); in 1930 it was 22,904.

ROYAL PALM (*Oreodoxa regia*), a tropical American palm, extending northward to southern Florida, much planted as an ornamental, especially in avenues. (*See* PALM.)

ROYAL SOCIETY, THE, the oldest scientific society in Great Britain, and one of the oldest in Europe. The Royal Society (more fully, The Royal Society of London for Improving Natural Knowledge) is usually considered to have been founded in the year 1660, but a nucleus had in fact been in existence for some years before that date. As early as the year 1645 weekly meetings were held in London of "divers worthy persons, inquisitive into natural philosophy and other parts of human learning, and particularly of what hath been called the *New Philosophy* or *Experimental Philosophy,*" and there can be little doubt that this gathering of philosophers is identical with the "Invisible College" of which Boyle speaks in sundry letters written in 1646 and 1647.

Some of these "Philosophers," resident in Oxford about 1648, formed an association there under the title of the Philosophical Society of Oxford, and used to meet, most usually in the rooms of Dr. Wilkins, warden of Wadham College. A close intercommunication was maintained between the Oxford and London Philosophers; but ultimately the activity of the society was concentrated in the London meetings, which were held principally at Gresham College.

On Nov. 28, 1660, the first journal book of the society was

opened with a "memorandum," from which the following is an extract: "Memorandum that Novemb. 28, 1660, These persons following, according to the usuall custom of most of them, mett together at Gresham Colledge to heare Mr. Wren's lecture, viz., The Lord Brouncker, Mr. Boyle, Mr. Bruce, Sir Robert Moray, Sir Paul Neile, Dr. Wilkins, Dr. Goddard, Dr. Petty, Mr. Ball, Mr. Rooke, Mr. Wren, Mr. Hill. And after the lecture was ended, they did, according to the usuall manner, withdrawe for mutuall converse. Where amongst other matters that were discoursed of, something was offered about a designe of founding a Colledge for the promoting of Physico-Mathematicall Experimentall Learning." It was agreed at this meeting that the company should continue to assemble on Wednesdays at three o'clock; an admission fee of ten schillings with a subscription of one schilling a week was instituted; Dr. Wilkins was appointed chairman; and a list of forty-one persons judged likely and fit to join the design was drawn up. On the following Wednesday Sir Robert Moray brought word that the king (Charles II.) approved the design of the meetings; a form of obligation was framed, and was signed by all the persons enumerated in the memorandum of Nov. 28 and by seventy-three others. On December 12, another meeting was held at which fifty-five was fixed as the number of the society—persons of the degree of baron, Fellows of the College of Physicians, and public professors of mathematics, physics and natural philosophy of both universities being supernumeraries.

Gresham College was now appointed to be the regular meeting-place of the society. Sir Robert Moray (or Murray) was chosen president (March 6, 1661), and continued from time to time to occupy the chair until the incorporation of the society, when Lord Brouncker was appointed the first president under the charter. In Oct. 1661 the king offered to be entered one of the society, and next year the society was incorporated under its present title. The name "Royal Society" appears to have been first applied to the Philosophers by John Evelyn, in the dedication of his translation of a book by Gabriel Naudé, published in 1661.

The charter of incorporation passed the Great Seal on July 15, 1662, to be modified, however, by a second charter in the following year, repeating the incorporating clauses of the first charter, but conferring further privileges on the society. The second charter passed the Great Seal on April 22, 1663, and was followed in 1669 by a third, confirming the powers granted by the second charter, with some modifications of detail, and granting certain lands in Chelsea to the society. The council of the Royal Society met for the first time on May 13, 1663.

At this early stage of its history the "correspondence" which was actively maintained with continental philosophers formed an important part of the society's labours, and selections from this correspondence furnished the beginnings of the *Philosophical Transactions* (a publication now of world-wide celebrity). At first the publication of the *Transactions* was entirely "the act of the respective secretaries." The first number, consisting of 16 quarto pages, appeared on Monday, March 6, 1664–65, under the title of *Philosophical Transactions: giving some Accompt of the present undertakings, studies and labours of the Ingenious in many considerable parts of the world,* with a dedication to the Royal Society signed by Henry Oldenburg, the first secretary of the Royal Society. The society also from its earliest years published, or directed the publication of, separate treatises and books on matters of philosophy; most notable among these being the *Philosophiae naturalis principia mathematica Autore Is. Newton. Imprimatur: S. Pepys, Reg. Soc. Praeses. Julii 5, 1686, 4to Londini 1687.*

In 1887 the *Philosophical Transactions* were divided into two series, labelled A and B respectively, the former containing papers of a mathematical or physical character, and the latter papers of a biological character. More than 225 quarto volumes have been published. In 1832 appeared the first volume of *Abstracts of papers, printed in the Philosophical Transactions from the year 1800.* This publication developed in the course of a few years into the *Proceedings of the Royal Society,* which has been continued up to the present time.

It is, however, certain that one of the most important functions of the society from the beginning was the performance of experiments before the members. In the royal warrant of 1663 ordering the mace which the king presented to the society, it is described as "The Royal Society for the improving of Natural Knowledge by experiments"; and during its earlier years the time of the meetings was principally occupied by the performance and discussion of experiments. The society early exercised the power granted by charter to appoint two "curators of experiments," the first holder of that office being Robert Hooke, who was afterwards elected a secretary of the society.

Another matter to which the society gave attention was the formation of a museum, the nucleus being "the collection of rarities formerly belonging to Mr. Hubbard," which, by a resolution of council passed in 1666, was purchased for the sum of £100. This museum, at one time the most famous in London, was presented to the trustees of the British Museum in 1781, upon the removal of the society to Somerset House. A certain number, however, of instruments and models of historical interest have remained in the possession of the society, and some of them, more peculiarly associated with its earlier years, are still preserved at Burlington House. The remainder have been deposited in the Victoria and Albert Museum, South Kensington.

After the Great Fire of London in September 1666 the apartments of the Royal Society in Gresham College were required for the use of the city authorities, and the society was invited by Henry Howard (later duke of Norfolk) to meet in Arundel House. At the same time he presented them with the library purchased by his grandfather, Thomas earl of Arundel, and thus the foundation was laid of the important collection of scientific works, now exceeding 60,000 volumes, which the society possesses. Of the Arundel mss. the bulk was sold to the trustees of the British Museum in 1830 for the sum of £3,559, the proceeds being devoted to the purchase of scientific books. These mss. are still kept in the British Museum as a separate collection. The society, however, still possesses a valuable collection of scientific correspondence, official records and other manuscripts, including the original manuscript, with Newton's autograph corrections, from which the first edition of the *Principia* was printed.

Under date December 21, 1671, the journal-book records that "the lord bishop of Sarum proposed for candidate Mr. Isaac Newton, professor of the mathematicks at Cambridge." Newton was elected a Fellow Jan. 11, 1671–72, and in 1703 he was appointed president, a post which he held till his death in 1727. During his presidency the society moved to Crane Court, their first meeting in the new quarters being held Nov. 8, 1710. In the same year they were appointed visitors and directors of the Royal Observatory at Greenwich, a function which they continued to perform until the accession of William IV., when by the new warrant then issued the president and six of the Fellows of the Royal Astronomical Society were added to the list of visitors.

In 1780, under the presidency of Sir Joseph Banks, the Royal Society removed from Crane Court to the apartments assigned to them by the government in the new Somerset House, where they remained until they removed to Burlington House in 1857. The policy of Sir Joseph Banks was to render the Fellowship more difficult of attainment. A step in pursuance of the same policy was taken in the year 1847, when the number of candidates recommended for election by the council was limited to fifteen, and the election was made annual. This limitation has remained in force up to the present time. Concurrent with the gradual restriction of the Fellowship was the successive establishment of other scientific bodies. The founding of the Linnean Society in 1788 under the auspices of several Fellows of the Royal Society was the first instance of the establishment of a distinct scientific association under royal charter; and this has been followed by the formation of the large number of societies now active in the promotion of special branches of science.

From the time of its royal founder onwards the Royal Society has constantly been appealed to by the government for advice in connection with scientific undertakings of national importance. The following are some of the principal matters of this character upon which the society has been consulted by, or which it has

successfully urged upon the attention of, the government: the improvement and equipment of the Royal Observatory, Greenwich, in 1710, when it was placed in the sole charge of the society; the change of the calendar in 1752; ventilation of prisons; protection of buildings and ships from lightning; measurement of a degree of latitude; determination of the length of a pendulum vibrating seconds; comparison of the British and French standards of length; the Geodetic Survey in 1784, and the General Trigonometrical Survey begun in 1791; expeditions to observe the transits of Venus in 1761, 1769 (commanded by Captain Cook), 1877 and 1882; the Antarctic expeditions of 1772 (under Captain Cook, whose voyage extended to the circumnavigation of the globe), of 1839 (under Ross), and 1900; help with the reports of the British Antarctic Expedition of 1910–13; observations for determining the density of the earth; Arctic expeditions of 1817 (in search of the North-West Passage), of 1819 (under Parry), of 1827 (Parry and Ross), of 1845 (Franklin) of 1874 (under Nares); numerous expeditions for observing eclipses of the sun; 1822, use of coal-tar in vessels of war; best manner of measuring tonnage of ships; 1823, corrosion of copper sheathing by sea-water; Babbage's calculating machine; lightning-conductors for vessels of war; 1825, supervision of gas-works; 1832, tidal observations; 1835, instruments and tables for testing the strength of spirits; magnetic observatories in the colonies; 1862, the great Melbourne telegraph; 1865, pendulum observations in India; 1866, reorganization of the meteorological department; 1868, deep-sea research; 1872, "Challenger" expedition; 1879, prevention of accidents in mines; 1881, pendulum observations; cruise of the "Triton" in Faroe Channel; 1883, borings in delta of Nile; 1884, Bureau des Poids et Mesures; international conference on a prime meridian; 1888, inquiry into lighthouse illuminants; 1890, the investigation of colour-blindness; 1895, examination of the structure of a coral reef by boring; 1896, inquiry into cylinders for compressed gases; the establishment of an International Geodetic Bureau; 1897, determination of the relations between the metric and imperial units of weights and measures; and, more recently, an inquiry into the volcanic eruptions in the West Indies; international seismological investigation; international exploration of the upper atmosphere; measurement of an arc of the meridian across Africa. During 1913–17 the society completed a magnetic survey of the British Isles. In 1920 it sent two expeditions to observe the total solar eclipse of May 29th, and to note any deflection of rays of light by the sun's gravitational field, as required by Einstein's general theory of relativity. In recent years also the society, acting at the request of the government, has taken the leading part in investigations, in the course of which important discoveries have been made, in relation to various tropical diseases, beginning with the tsetse-fly disease of cattle in Africa, followed by investigations into malaria, Mediterranean fever and sleeping-sickness. In 1924 the society received a bequest of £10,000 for medical research on tropical diseases, etc., and sent an expedition to Kala Azar in North China. The society has also shown an active interest in problems of respiration and circulation in high altitudes (Peru expedition, 1921), and in investigations into glass workers' cataract. The society has standing committees which advise the Indian government on matters connected with scientific inquiry in India and on the observatories of India. The society has taken a leading part in the promotion of the *International Catalogue of Scientific Literature,* and of the International Association of Academies.

In addition to the occasional services enumerated above, the Royal Society has exercised, and still exercises, a variety of important public functions of a more permanent nature. It still provides seven of the board of visitors of the Royal Observatory at Greenwich, has eleven representatives on the Joint Permanent Eclipse committee, and has a Solar Research committee of its own. From 1877 until the reconstitution of the Meteorological Office in 1906 the society nominated the meteorological council, which had the control of that office. The Gassiot and other committees of the society continued to co-operate with the Meteorological Office. Since 1919, when the Meteorological Office was attached to the Air Ministry, the society has two representatives on the Meteorological Committee. The society has the custody of standard copies of the imperial standard yard and pound. The president and council have the scientific control of the National Physical Laboratory, an institution established in 1899 in pursuance of the recommendations of a treasury committee appointed by H.M. government in response to representations from the Royal Society (the financial control was transferred to the Department of Scientific and Industrial Research in 1918). It also appoints the British delegates to the meetings of the International Research Council.

One of the most important duties which the Royal Society performs on behalf of the government is the administration of the annual grant of £6,000 for the promotion of scientific research. This grant originated in a proposal by Lord John Russell in 1849 that at the close of the year the president and council should point out to the first lord of the treasury a limited number of persons to whom the grant of a reward or of a sum to defray the cost of experiments might be of essential service. This grant of £1,000 afterwards became annual, and was continued until 1876. In that year an additional sum of £4,000 for similar purposes was granted, and the two funds of £1,000 and £4,000 were administered concurrently until 1881, in which year the two were combined in a single annual grant of £4,000 under new regulations. In 1920 the annual grant was increased to £6,000. Since 1896 parliament has also voted annually a grant of £1,000 to be administered by the Royal Society in aid of scientific publications, not only those issued by itself, but also scientific matter published through other channels. This grant was raised to £2,500 in 1925. One of the most useful of the society's publications is the great catalogue of scientific papers—an index now in twelve quarto volumes, under authors' names, of all the memoirs of importance in the chief English and foreign scientific serials from the year 1800 to the year 1883.

A statement of the trust funds administered by the Royal Society will be found in the *Year Book* published annually, and the origin and history of these funds will be found in the *Record of the Royal Society.*

Five medals (the Copley medal, two Royal, the Davy and the Hughes) are awarded by the society every year; the Rumford and the Darwin medals biennially, the Sylvester triennially and the Buchanan quinquennially. The first of these originated in a bequest by Sir Godfrey Copley (1709), and is awarded "to the living author of such philosophical research, either published or communicated to the society, as may appear to the council to be deserving of that honour"; the author may be an Englishman or a foreigner. The Rumford medal originated in a gift from Count Rumford in 1796 of £1,000 3% consols, for the most important discoveries in heat or light made during the preceding two years. The Royal medals were instituted by George IV., and are awarded annually for the two most important contributions to science published in the British dominions not more than ten years nor less than one year before the date of the award. The Davy medal was founded by the will of Mr. John Davy, F.R.S., the brother of Sir Humphry Davy, and is given annually for the most important discovery in chemistry made in Europe or Anglo-America. An enumeration of the awards of each of the medals and the conditions of the awards are published in the *Year Book.*

Under the existing statutes of the Royal Society every candidate for election into the society must be recommended by a certificate in writing signed by six or more Fellows, of whom three at least must sign from personal knowledge. From the candidates so recommended the council annually select fifteen by ballot, and the names so selected are submitted to the society for election by ballot. Princes of the blood, however, and not more than two persons selected by the council on special grounds once in two years, may be elected by a more summary procedure. Foreign members, not exceeding fifty, may be selected by the council from among men of the greatest scientific eminence abroad, and proposed to the society for election.

The anniversary meeting for the election of the council and officers is held on St. Andrew's Day. The council for the ensuing year, out of which are chosen the president, treasurer, principal

secretaries, and foreign secretary, must consist of eleven members of the existing council and ten Fellows who are not members of the existing council. These are nominated by the president and council previously to the anniversary meeting. The session of the society is from November to June; the ordinary meetings are held on Thursdays during the session, at 4.30 P.M. The selection for publication from the papers read before the society is made by the "Committee of Papers," which consists of the members of the council for the time being aided by committees appointed for the purpose. The papers so selected are published either in the Society's *Philosophical Transactions* (4to) or *Proceedings* (8vo).

BIBLIOGRAPHY.—T. Sprat, *History of the Royal Society* (4th ed., 1734); T. Thomson, *Hist. of the Royal Society* (1812); A. B. Granville, *The Royal Society in the 19th Century* (1836); C. R. Weld, *Hist. of the Royal Society*, 2 vols. (1848); H. B. Wheatley, *Early Hist. of the Royal Society* (1905); Sir W. Huggins, *The Royal Society* (1906); A. H. Church, *Some Account of the "Classified Papers" in the Archives* (1907, etc.); *Signatures in the First Journal Book and the Charter Book of the Royal Society* (1912); T. G. Bonney, *Annals of the Philosophical Club of the Royal Society* (1919); *see* also the Society's *Record* (3rd ed., 1912) and *Year Book*.

(R. W. F. H.; A. Wo.)

ROYALTIES. Payment by royalties based on a percentage of the published price has now become the customary method of sharing receipts between publisher and author from sales of a book. The amount of royalty agreed upon depends on the cost (including advertising) and the estimated sale of the book, as well as on the respective bargaining powers of publisher and author. British publishers are accustomed to contracts calling for payment to the author of 10% of the original published price —usually 7/6d.—of a novel by a new author, with provision that the royalty shall rise by agreed-upon stages to 15 or 20%. The successful British author whose sales are already established ordinarily gets a percentage beginning at 15 or 20, and rising to 25 after a sale of from 10,000 to 20,000 at the original price. The royalties on non-fiction books published at higher prices are as a rule somewhat higher than the royalties on novels.

Most British contracts for fiction now contain a provision for publication in cheaper form after the sales at the original published price have ceased. Royalties on these cheap editions range from a farthing a copy on sixpenny editions to 10% on 2/6d. editions.

Another phase of royalties is the advance. When it became apparent that the royalty system was fairer to publisher and author than the old system of payment outright for all rights, the author was prompt to point out that he might starve while waiting for his money—hence the publishers' custom of paying an advance on account of royalties on the day of publication. Authors whose previous sales had been large commanded proportionately large advances.

In the United States, where costs of distribution and advertising are greater than in the British Isles, royalties are lower. Whereas 20% was not uncommon for a successful writer, 15% is now the rule, though 20% after a sale of 10,000 at the original price in America is not unknown, despite the declaration of most of the American publishers that they cannot now go above 15%. The tendency is to begin at 10% of the advertised price, rising to 12½% or 15% after a sale of 5,000 copies at the original price.

When advances are paid to the author before any royalties are earned they are customarily made (a) upon the signing of the agreement, (b) upon delivery of the complete manuscript ready for publication and (c) on the publication date.

It is not the general custom of American publishers to bring out cheap editions of their own novels, though more publishers are bringing out these cheaper editions than ever before. The more usual practice is to sell the cheap edition rights, when possible, to firms who specialize in such editions, the original publisher providing the plates and giving the author half of the royalties, which usually yields to the author a royalty of 5% of the published price of the cheap edition.

As regards royalties on the Continent, it is only within recent years that this system of payment has been generally adopted, and even yet in some of the central European countries and in Holland it is only for particularly important books that royalties can be obtained. As a rule the percentages are lower than those prevailing in England. In Germany and Austria the royalty is not paid on the retail published price but on the "Broschiert," that is to say, on the retail price to the bookseller of the stitched and unbound copy.

A compromise between the percentage royalty on the retail price of every copy sold and the outright payment for the copyright has now been extensively adopted by foreign publishers; the system being the payment of an outright sum for every 1,000 copies printed. The advance on such payment usually covers the number of copies printed in the first edition.

Recent Developments.—The royalty system has undergone a notable change since the beginning of the twentieth century. It was formerly customary for the publisher to contract for the world rights of his author, reselling on a basis of half receipts to himself and half to the author such rights as he could not use—*e.g.*, foreign rights, serial rights, dramatic rights and, at first, moving-picture rights. But such contracts are now rare, the author selling each right separately.

The same tendency is observable in play sales. Here the normal royalty in England and America has become fixed at approximately 5% of the gross weekly receipts up to £500 or $2,500; 7½% on the next £200 (or $1,000) and 10% on all gross weekly receipts above £1,000 or $5,000, with an advance on account of these royalties, payable on the signing of the contract, of from £100 to £200. If the play is sold first in England, the English manager claims a share in the American rights and the film rights —and vice versa if the play is sold in America. If the author is in a strong position he claims and gets a separate royalty in each country for each right, with somewhat lower royalties for translation rights on account of the cost of translation and possibly adaptation. He even reserves the royalties obtainable on his amateur rights, broadcasting rights, and book publication rights.

When moving pictures first presented themselves to the authors as a possible source of suddenly augmented income, an attempt was made to apply the royalty system to payment per foot of film for what soon came to be known as "film rights": but the difficulties of collection and checking became such that the system has been practically abandoned for outright payment. However, the preference for profit-sharing has brought forth a new form of royalty payment that may presently prevail—*i.e.*, payment on signature of contract of an advance on account of a royalty of usually from 5 to 10% on the "bookings," *i.e.*, the purchases of exhibitors of the rights to show the film for varying periods.

A normal agreement for publication of music is 10% per copy of the retail selling price; half royalty on copies sold for export; half of any broadcasting fees, and half of the moneys received by the publishers as royalties on mechanical reproduction rights. These royalties on mechanical contrivances for the performance of musical works were altered in Great Britain in 1928 by order of the Board of Trade from 5% to 6¼%.

Earlier Systems.—The royalty system became general only in the last century, although before that authors were occasionally paid a stipulated sum for the first impression of a book, and a further sum if a further impression were called for. Samuel Simmonds paid Milton £5 for *Paradise Lost* and agreed to pay a further £5 at the end of the sale of each of the first three impressions. Richard Baxter records that he arranged with Thomas Underhill and Francis Tyton to publish his *Saints' Everlasting Rest*, a quarto of nearly 1,000 pages, for a payment of £10 for the first impression and £20 for every subsequent impression up to 1665.

Sidney Lee records that the highest price known to be paid before 1599 to an author for a play by the manager of an acting company was £11. "A small additional gratuity, rarely exceeding 10s., was bestowed on a dramatist whose piece on its first production was especially well received, and the author was customarily awarded, by way of benefit, a certain proportion of the receipts of the theatre on the production of a play for the second time. The 19 plays which may be set to Shakespeare's credit between 1591 and 1599 combined with such revising work as fell to his lot during those nine years cannot consequently have

brought him less than £200 or some £20 a year. Between 1599 and 1611 his remuneration as both actor and dramatist was on the upward grade. The fees paid dramatists rose rapidly. The exceptional popularity of Shakespeare's work after 1599 gave him the full advantage of the higher rates of pecuniary reward in all directions. The 17 plays that were produced by him between that time and the close of his professional career could not have brought him less on an average than £25 each, or some £400 in all." But the pound of that day had over five times its present value. Later on prices improved and Fielding, for example, received £1,000 from Andrew Miller for *Amelia*, while Gibbon received two-thirds of the proceeds on his history.

Edward Chapman, of Chapman and Hall, in a letter to Forster (1837) said: "There was no agreement about *Pickwick* except a verbal one. Each number was to consist of a sheet and a half, for which we were to pay 15 guineas, and we paid him for the first two numbers at once, as he required the money to go and get married with. We were also to pay more according to the sale, and I think *Pickwick* cost us altogether £3,000." Forster adds: "I had always pressed so strongly the importance to him of some share in the copyright that this at last was conceded in the deed above mentioned (though five years were to elapse before the rights should accrue) and it was only yielded as part consideration for a further agreement entered into on the same date (Nov. 19, 1837) whereby Dickens engaged to write a new work (*Nickleby*) the first number of which was to be delivered on the 15th of the following March and each of the numbers on the same day of each of the successive 19 months, which was also to be the date of the payment to him by Chapman and Hall, and 20 several sums of £150 each for five years' use of the copyright, the entire ownership in which was then to revert to Dickens."

On July 2, 1840, Dickens wrote to Chapman and Hall: "Your purchase of *Barnaby Rudge* is made upon the following terms: It is to consist of matter sufficient for ten monthly numbers of the size of *Pickwick* and *Nickleby*, which you are, however, at liberty to divide and publish in 15 smaller numbers if you think fit. The terms for the purchase of this edition in numbers and for the copyright of the whole book for six months after the publication of the last number are £3,000. At the expiration of six months, the whole copyright reverts to me." (C. Bn.)

See Copinger's *Law of Copyright* (6th ed., 1927); Michael Joseph, *The Commercial Side of Literature* (1925); Stanley Unwin, *The Truth about Publishing* (1926).

ROYALTIES, IN MINING. In some countries the ownership of the minerals is vested in the State which may grant concessions (*e.g.* France) to private individuals or corporations to work them. In others (*e.g.* Great Britain and the United States) the owner of the land is deemed to own everything over, on, or under the surface down to the centre of the earth. The only exception (apart from special custom) is (in Great Britain) in respect of mines of gold and silver, which are the property of the Crown, *i.e.* "royal" metals (hence the term "royalty").

Sometimes the landowner works the minerals himself, but usually (in Great Britain) he leases them to others who pay a rent or "royalty." In the case of metalliferous ores the royalty is usually a proportion of the value of the dressed ore, *e.g.* 1/20 to 1/30. In regard to coal, which is the substance worked to the greatest extent in Great Britain (*see* Coal and Coal Mining), the right to work is conceded in return for a "fixed," "certain" or "dead" rent per annum, which merges into the royalty rent.

The certain rent is commonly determined by the capacity of working an agreed minimum number of tons per annum at an agreed tonnage or royalty rent. When in any year the number of tons worked at this rent exceeds in value the certain rent, the surplus is paid as "overworkings" or "overs." When it falls short, the deficiency is carried forward as "short working" to next year's account.

The royalty rent may be payable: (1) as a tonnage rate pure and simple, (2) as a sum per acre per foot thick of seam or, (3) simply a sum per acre as a proportion of the value of the mineral raised or, (4) by way of a sliding scale. The average of the coal royalties, in terms of so much per ton, inclusive of way-leaves (the right of passage over or through another's land), for coal raised over the United Kingdom was estimated to be in 1889 (Report of Royal Commission) 5⅝d. per ton of coal worked, and as way-leaves may be taken as averaging about ¼d. per ton, the actual royalty would then be 5¼d. per ton.

In the United States the landowner very frequently works the minerals himself, but he may also lease them to others upon the payment of a rent or royalty. In regard to coal, the royalty in the United States is usually based upon a fixed rate per ton, which in the case of bituminous coal would be a uniform rate for all coal sold, but in the case of anthracite, the rate per ton frequently varies with the size, a larger royalty being paid upon larger sizes, and in some cases, the royalty is a sliding scale varying with the sales price. Such royalties vary from a few cents per ton in the case of bituminous, to as much as $1.00 per ton for the highest grades and largest sizes of anthracite.

Royalties are also payable in Britain in respect of china clay, ganister, other "clays," oil shale, ironstone, slate and building stones, metalliferous ores, etc. Natural petroleum does not occur in commercial quantity in Great Britain, but in the United States, where it is produced in vast quantities, and where oil lands are usually leased on a royalty basis, the royalty being paid to the owner of the land, the amount in the Eastern and Mid-continental territories being ⅛ or 12½ per cent of the oil obtained, and in California ⅙ or 16⅔ per cent. In the United States, in the case of natural gas, royalties are rarely paid on a percentage basis, except in districts where there is a great demand for the gas (where the price is so much per 1,000 cubic feet calculated at an absolute of one atmosphere and a temperature of 60° F); instead, the Company agrees to pay a stipulated amount for the right to pipe and sell the gas, *e.g.* from $50 to $200 per well per annum.

In Canada the royalty is 10% of the crude oil, in British India 5%, France and Algeria 20%, Rumania from 8% when output per well per day averages 10 metric tons up to 35% when it exceeds 150 metric tons, payable to the State which allows 20% of the receipts to the surface owner; in Colombia and Peru, from 10 to 6 per cent; in Argentina and Venezuela, 10 per cent. Crude oil for royalty purposes usually means crude oil after deduction of water, foreign substances, and oil consumed in production.

See J. H. Cockburn, *The Law of Coal and Minerals* (1902); R. A. S. Redmayne and G. Stone, *The Ownership and Valuation of Mineral Property* (1920); Ernest R. Willey, *The Oil Industry* (1926). (R. R.)

ROYALTY, kingly state or personality, hence a royal person, or number of persons of royal birth collectively, a member of a royal family (O. Fr. *realte, reialte, royaulté,* from Med. Lat. *regalitas,* the substantive of regalis, of or belonging to a king, *rex*). More particularly "royalty" is used of the rights and attributes of a sovereign, and especially of dues paid to the Crown, which belong to the sovereign *iure coronae*.

ROYAN, a town of W. France, in the department of Charente Inférieure, on the right bank of the Gironde, at its mouth 63 m. below and N.N.W. of Bordeaux. Pop. (1926) 8,657.

Royan belonged to the family of la Trémoille, in whose favour it was made first a marquisate and then a duchy. During the first half of the 15th century it was held by the English. During the wars of religion it was a centre of Calvinism and in 1622 was besieged by Louis XIII. At the end of the 18th century it was a "bourg" of about 1,000 inhabitants, noticeable only for its priory. Its prosperity dates from the Restoration, when steamboat communication was established with Bordeaux.

ROYCE, JOSIAH (1855–1916), American philosopher and teacher, was born at Grass Valley, a California mining town, on Nov. 20, 1855. At 16 he entered the newly-opened University of California, inclined to the study of engineering. But the teaching of Joseph LeConte, the geologist, and of Edward Rowland Sill, the poet, roused his extraordinary speculative power; and on receiving his baccalaureate degree, 1875, he gave himself to the study of philosophy, first in Leipzig and Göttingen (under Lotze) and then, as one of the first fellows of Johns Hopkins university, with William James and Charles Peirce. Here he received the degree of Ph.D., 1878. After teaching English for four years in

the University of California he was called to Harvard university as lecturer in philosophy, becoming assistant professor in 1885, professor in 1892 and succeeding George Herbert Palmer as Alford professor in 1914. He received various honorary degrees and was made in 1916 Honorary Fellow of the British Academy. He died at Cambridge, Mass., Sept. 14, 1916.

His effect as teacher and writer was profound: no previous American thinker had so united moral energy with wide historical learning, command of scientific method and intense interest in logical technique. His versatile mind concerned itself effectively with a wide range of subjects; he contributed to mathematical logic, psychology, social ethics, literary criticism and history as well as to metaphysics. His thought was massive and intimately human; yet it was sustained with a dialectical skill of such evident virtuosity as, on the one hand, to excite the critical opposition first of pragmatic and then of realistic schools, and, on the other hand, to set a new standard in the systematic treatment of philosophy. In this latter respect, Royce did for American philosophy what his older contemporary, F. H. Bradley, did for British philosophy: in many ways the views of these thinkers are akin. Like Bradley, Royce teaches a monistic idealism. Scientific laws he describes—anticipating certain developments of recent physics—as statistical formulae of average behaviour. His absolute idealism is supplemented, not corrected, by the ethical and social teachings of his later years and, in particular, by the conception of the world of human selves as the Great Community, the literally personal object of moral loyalty.

BIBLIOGRAPHY.—Among his more important publications (selected from a far greater number) are: *The Religious Aspect of Philosophy* (1885); *The Spirit of Modern Philosophy* (1892); *The Conception of God* (1895), with Supplementary Essay (1897); *Studies of Good and Evil* (1898); *The World and the Individual* (Gifford Lectures), vols. i., ii. (1900–01); *The Conception of Immortality* (1900); *Outlines of Psychology* (1908); "The Relation of the Principles of Logic to the Foundations of Geometry," in *Transactions of the American Mathematical Soc.*, vi., 3 (1905); *The Philosophy of Loyalty* (1908); *The Sources of Religious Insight* (1912); "Prinzipien der Logik," *Enzyklopädie der Philosophischen Wissenschaften*, Bd. i. (1912), English translation in *Encyclopaedia of the Philosophical Sciences*, vol. i. (1913); *The Problem of Christianity* (lectures delivered at the Lowell Institute, Boston, and at Manchester college, Oxford), vols. i., ii. (1913); "The Mechanical, the Historical and the Statistical," *Science*, n.s. xxxix. (1914); *Lectures on Modern Idealism* (1919). For a bibliography (exclusive of posthumous publications) *see* B. Rand, *Philosophical Rev.*, xxv. (1916). (M. W. C.; W. E. H.)

ROYDEN, AGNES MAUDE (1876–), British social worker and preacher, youngest daughter of Sir Thomas Royden, 1st Bart. of Frankby Hall, Cheshire, was educated at Cheltenham and Lady Margaret Hall, Oxford. Until 1914 edited *The Common Cause*, the organ of the National Union of Women's Suffrage Societies. In 1917 she became assistant preacher at the City Temple, London, and thus became the first woman in Great Britain to occupy the pulpit of a regular place of worship.

Miss Royden's numerous books and pamphlets include *Women and the Sovereign State* (1917); *Sex and Commonsense* (1922); *Prayer as a Force* (1922); *Political Christianity* (1922); *The Church and Woman* (1924) and *Modern Sex Ideals* (1926).

ROYER-COLLARD, PIERRE PAUL (1763–1845), French statesman and philosopher, was born on June 21, 1763, at Sompuis, near Vitry le Français (Marne), the son of Antoine Royer, a small proprietor. He was sent to the college of Chaumont of which his uncle, Father Paul Collard, was director. He followed his uncle to Saint-Omer, where he studied mathematics. At the outbreak of the Revolution he was practising at the Parisian bar. He was returned by the Island of Saint Louis to the Commune, of which he was secretary from 1790 to 1792. After the revolution of Aug. 10, 1792, he was replaced by J. L. Tallien. His sympathies were now with the Gironde, and after the insurrection of the 12th Prairial (May 31, 1793) he was in danger of his life. He returned to Sompuis, and was saved from arrest possibly by the protection of Danton. In 1797 he was returned by his department (Marne) to the Council of the Five Hundred. He made one great speech in the council in defence of the principles of religious liberty, but retired into private life at the *coup d'état* of Fructidor (Sept. 4, 1797).

From that time until the Restoration Royer-Collard devoted himself to the study of philosophy. His opposition to the philosophy of Condillac arose from the study of Descartes and his followers, and from his early veneration for the fathers of Port-Royal. He desired to establish a system which should provide a moral and political education consonant with his view of the needs of France. From 1811 to 1814 he lectured at the Sorbonne.

Royer-Collard was the moving spirit of the "Doctrinaires," led by Guizot, P. F. H. Serre, Camille Jordan and Charles de Rémusat, who met at the house of the comte de Ste. Aulaire and in the salon of the duchesse de Broglie. In 1820 Royer-Collard was excluded from the council of State by a decree signed by his former ally Serre. In 1827 he was again elected; in 1828 he became president of the chamber, and fought against the reactionary policy which precipitated the Revolution of July. In March 1830 he presented the address of the 221. From that time he took no active part in politics, although he retained his seat in the chamber until 1839. He died at his estate of Châteauvieux, near Vitry, on Sept. 2, 1845. He had been a member of the Academy since 1827.

Fragments of Royer-Collard's philosophical work are included in Jouffroy's translation of the works of Thomas Reid. The standard life of Royer-Collard is by his friend Prosper de Barante, *Vie politique de M. Royer Collard, ses discours et ses écrits* (2 vols., 1861). There are also biographies by M. A. Philippe (1857), L. Vingtain (1858), E. Spuller (1895), in *Grands écrivains français*. *See* E. Faguet, *Politique et morale du xixe siècle* (1891); H. Taine, *Les Philosophes français du xixe siècle* (1857); L. Séché, *Les Derniers Jansénistes* (1891); and Lady Blennerhasset, "The Doctrinaires" in the *Cambridge Modern History* (vol. x. chap. ii., 1907).

ROYSTON, a town in Hertfordshire, England, near the border of Cambridgeshire, 48 m. N. of London. Pop. (1931) 3,831. The town lies on the Roman Ermine Street. Roman relics have been found, and several barrows and earth-mounds occur on the neighbouring hills. A monastery of Augustinian canons was founded here towards the close of the 12th century. The church of St. John the Baptist is mainly Early English.

ROYTON, urban district, Royton parliamentary district, Lancashire, England, on L.M.S. railway. Pop. (1931) 16,687.

ROZAS, JUAN MARTÍNEZ DE (1759–1813), the earliest leader in the Chilean struggle for independence, was born at Mendoza in 1759. In early life he was a professor of law, and of theology and philosophy at Santiago. He held the post of acting governor of Concepción at one time, and was also colonel in a militia regiment. In 1808 he became secretary to the last Spanish governor, Francisco Antonio Carrasco, and used his position to prepare the nationalist movement that began in 1809. After resigning his position as secretary, Rozas was mainly responsible for the resignation of the Spanish governor, and the formation of a national Junta on Sept. 18, 1810, of which he was the real leader. Under his influence many reforms were initiated, freedom of trade was established, an army was organized and a national congress was called together in July 1811. He died at Mendoza on March 3, 1813.

RUANDA-URUNDI is a mandated territory in East Africa lying between the first and fourth degrees of south latitude and 29° to 31° east longitude. It is bounded on the north by Uganda, on the east and south by Tanganyika Territory, and on the west by the Belgian Congo. It comprises that portion of the former German colony of East Africa which was assigned under mandate to Belgium after the World War, an area of about 22,000 sq. miles. There was much delay in issuing the mandate—for which the concurrence of the United States had to be obtained—and this was further prolonged by the readjustment of the frontier. It was not therefore until Oct. 1924, that the mandate was formally accepted by the Belgian parliament. A law was then passed by which the territory should be administered as an integral part of the Congo colony but with a separate budget.

The country is divided into two distinct units—Ruanda and Urundi. Each is supervised by a resident with headquarters at Kigali and Kiteja respectively, the capital being at first at Usumbura on Tanganyika lake. The site for a new capital, in a healthy part of the highlands, was selected in 1927 and was named Astrida after the Duchess of Brabant. It is the declared policy of Belgium to support the authority of the native chiefs and to rule through

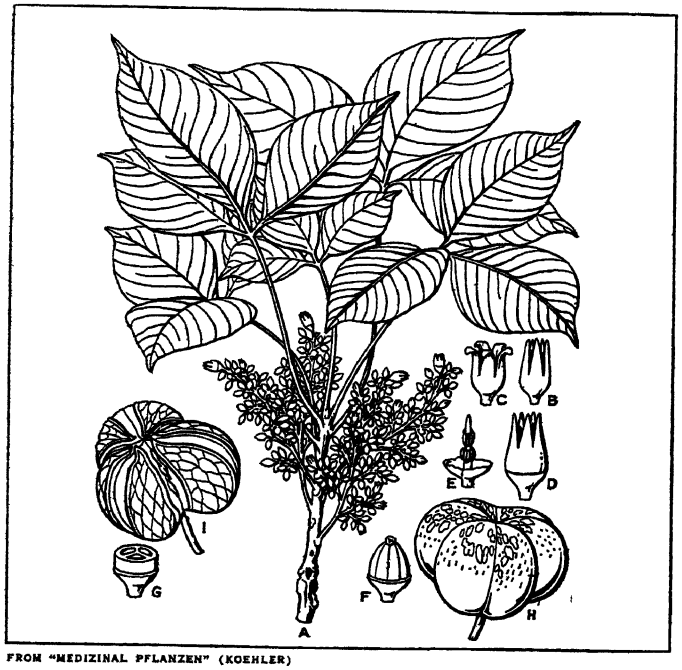
them. Early in 1928 there was a revolt against Musinga, the king of Ruanda. The movement was also anti-white and spread across the border into the south-west corner of Uganda. Belgian and British forces restored order. The European population in 1927 was: Ruanda 164; Urundi, 192.

The greater part of the country is mountainous and lies at a high altitude. Lakes Tanganyika and Kivu form part of its frontiers and there are numerous other small lakes—one, Karago, at an altitude of 6,000 feet. The population is estimated at 5,000,000, the density in some areas being upwards of 300 to the sq. mile. The bulk of the people are of Bantu stock, but the ruling caste are of the pastoral Wahima race, as in Uganda, Bunyoro and Ankole. The wealth of the country consists in its flocks and herds. A movement of large numbers of natives into the Belgian Congo was noted in 1928.

The local revenue, derived in part from a direct tax on the natives, is supplemented by a grant from Belgium. Owing to its distance from the sea and the lack of cheap transport, the trade of the country developed but slowly. A quantity of foodstuffs with livestock and hides is exported. The trade figures for 1927 were, exports 19,500,000 francs; imports 30,087,000 francs (*see* MANDATES). (LU.)

RUBATAH: *see* ARABS.

RUBBER: BOTANY, CULTIVATION AND CHEMISTRY. During his second visit to South America, Columbus was astonished to see the native Indians amusing themselves with a black, heavy ball made from a vegetable gum. Later explorers were equally impressed by these balls, and an historian of the time remarked that they rebounded so much that they appeared alive. Three centuries elapsed before the material was brought into commercial use in Europe, and it was then marketed not for its elastic properties but to rub out lead pencil marks—hence the name indiarubber or rubber. Since then the principal constituent (caoutchouc) of this material has been found as a vegetable product in many parts of the world, sometimes mixed with as little as one twentieth and sometimes with eight times its own weight of other substances. Some of these mixtures are strong and elastic, others are weak and brittle, but they are all classified as rubber. In addition, the term has been broadened by common use to include a wide range of vulcanised products derived from rubber by heating with sulphur, generally after mixing with large proportions of powders and plastic solids.



FROM "MEDIZINAL PFLANZEN" (KOEHLER)

FIG. 1.—HEVEA BRASILIENSIS

(A) Sprig bearing trifoliate leaves and several inflorescences, (B, C, D) detached naked unisexual flowers, (E) androecium, (F) gynaecium, (G) section through the trilocular ovary, (H) ripe, (I) dehiscent capsule, showing the large oleaginous seeds

Although raw rubber is a coherent, elastic solid, it is obtained from a milky liquid known as *latex*, which occurs in special tubes in the roots, stem, branches, leaves and fruit of a wide variety of trees growing for the most part in the tropics. Rubber latex consists of a watery solution (serum), in which float small globules of rubber visible under a microscope. Although neither the rubber nor the serum is definitely opaque in thin layers, the many reflecting surfaces presented by these globules cause the latex to have the appearance of cows' milk, but whereas cows' milk contains only about 12% solid matter, rubber milk contains 30–40%. When rubber milk is suitably treated the globules unite (coagulate) and float in the serum as a soft, doughy mass (coagulum), which can be easily rolled to a sheet or other convenient form. On drying the coagulum loses its doughy character and becomes the firm, elastic solid known as raw or crude rubber.

Sources of Supply.—The numerous varieties of trees which contain rubber latex belong to many different botanical families, but nearly the whole of the world's rubber supply is obtained from a tree known as *Hevea brasiliensis* belonging to the family Euphorbiaceae. The rubber obtained from the latex of this tree usually contains over 90% caoutchouc of excellent quality. Few other trees furnish rubber of a purity and quality approaching this. In some cases the latex yields a product which consists chiefly of resin. Jelutong rubber, for example, obtained from *Dyera costulata*, a large tree growing in the East Indies, is very resinous, as also is the rubber produced from shrubby species of *Euphorbia* indigenous to South Africa.

Certain tropical African plants yield rubber of good quality, but the methods of preparation employed by the natives are crude and tend to degrade the product. The most important are *Funtumia elastica*, a tall and stately tree, and various species of *Landolphia*, which are big woody climbers.

A tree which is well known because it is cultivated in Europe as an ornamental plant under the name of the indiarubber tree is *Ficus elastica*, indigenous to Assam and Burma, where it grows to a considerable size. It yields moderately resinous rubber.

Guayule rubber from *Parthenium argentatum*—a silvery-leafed shrub found in north Mexico and is also moderately resinous.

The tropical American rubbers include Ceara rubber from *Manihot Glaziovii*, a tree of moderate size growing in Brazil, and Caucho rubber from *Castilloa elastica*, a large tree found in Central America and portions of Brazil. In both cases the rubber is of fairly good quality. The purest and best, however, is undoubtedly the Para rubber obtained chiefly from *Hevea brasiliensis* and to a lesser extent from *Hevea Benthamiana*. Both these trees are found in the Amazon valley, the former around the southern and the latter around the northern tributaries. *Hevea Benthamiana* is not so widely distributed as *Hevea brasiliensis*, but both yield rubber which is classed as "hard fine para"—the highest grade on the market.

Origin of Plantations.—In spite of huge natural resources the demand for Para rubber is far in excess of the quantity which the Amazon can supply. At one time there was no other source of *Hevea* rubber, but as long ago as 1834 Thomas Hancock, the English discoverer of vulcanisation and a rubber manufacturer, called attention to the high price of rubber and the possibility of growing it in the East. The requisite climate conditions appeared to be a heavy, well-distributed rainfall (about 100ins. per annum) and a temperature of 70°–90° F. These conditions are obtained over wide areas in the East. Eventually Sir Joseph Hooker, Director of the Royal Botanical Gardens, Kew, London, interested himself in the problem, and in 1873 2,000 Hevea seeds from the Amazon were delivered to Kew by a Mr. Farris. Only a dozen germinated, and six sent to the Royal Botanical Gardens, Calcutta, did not thrive. Arrangements were then made for further supplies of seeds. The most successful collector was H. A. Wickham (now Sir Henry Wickham) who displayed much enterprise and care in successfully bringing to Kew a consignment of 70,000 seeds of *Hevea brasiliensis*. Hot houses were summarily emptied, and within two weeks of the arrival of

the seeds in England there were over 2,000 young plants, nearly all of which were despatched to Ceylon, where they proved very successful.

After the establishment of Hevea trees in Ceylon steps were taken to distribute plants and seeds to other countries. Difficulties were experienced in exporting seeds in a sound condition, and the problem was studied by H. N. Ridley in the Botanical Gardens at Singapore. He found that seeds packed in moist, powdered charcoal retained their fertility for a long time, and when shortly after the beginning of the twentieth century planters began to take an increasing interest in rubber, large quantities of seeds were distributed by this means from Malaya.

The countries producing the largest quantities of plantation rubber are Malaya, the Dutch East Indies, and Ceylon. Smaller amounts are also obtained from India, Sarawak, Borneo, French Indo-China, Siam and various parts of Africa. Owing chiefly to the demands of the motor car industry the production of plantation rubber has made phenomenal progress. The first occasion on which a considerable amount of plantation rubber was offered on the market was in 1910, when the output reached 11,000 tons. By 1920 it was nearly 317,000 tons and in 1927 it amounted to 567,000 tons. In this period there were wide fluctuations in price, ranging from 12s. 0d. per lb. in 1910 to 7½d. per lb. in 1921.

While the production of plantation rubber has continued to increase that of wild rubber has decreased until in 1927 the world's production of all grades of wild rubber was only 6% of that produced on plantations. The reason for this is that not only is plantation rubber of good quality, comparable with that from the Amazon, but it is put on the market in a clean, dry condition.

Description of Principal Rubber Tree.—*Hevea brasiliensis* is a large tree which on occasions grows to a height of over 100ft. with a well developed trunk more than 12ft. in circumference. The usual height on plantations is from 60 to 80ft. The leaves are three-lobed, the segments being long and narrow and tapering at each end. The flowers are usually pale green and inconspicuous, separate male and female flowers being borne on the same tree. The fruit is a capsule containing three seeds which are oval and have a mottled brown, smooth coat. When ripe the capsules explode violently and eject the seeds to a distance of 20yd. or more, well beyond the shadow cast by the parent tree.

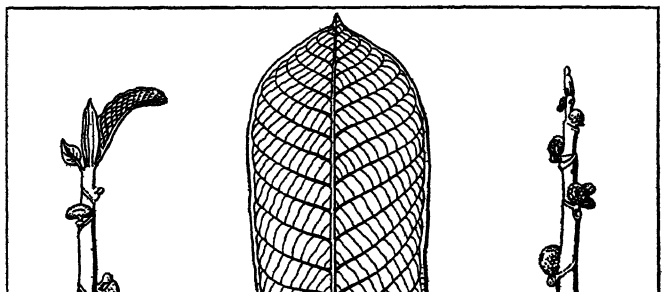


FIG. 2.—CASTILLOA ELASTICA
(A) Sprig bearing male flowers, (B) a seed, (C) a leaf, (D) twig bearing female flowers

The structure of what is popularly known as the bark is of considerable importance in *Hevea brasiliensis*, because, as already indicated, the latex vessels in this part of the tree are the chief source of the world's rubber supply. The trunk of a tree may be divided roughly into an inner portion of wood and an outer portion of bark. At the junction of the bark and the wood is a layer of cells about the thickness of a sheet of paper, known as the cambium, which appears as a slimy layer when the bark is torn away from the tree. This layer is the seat of growth, on the one hand adding new cells to the wood and on the other new cells to the bark. Next to the cambium and in the soft portion of the bark are found the latex tubes. Outside the soft bark is a hard portion where there are comparatively few latex tubes. The whole is protected by an external layer of cork. The diameter of the latex tubes is considered to be about 0·0015 inch.

Cultivation.—*Hevea brasiliensis* is planted on many types of soil and thrives remarkably well as long as reasonable precautions are taken to avoid swampy, undrained or exposed lands. It is sometimes grown at an altitude of over 2,000ft., but the trees do not flourish so well at this altitude as at a lower level.

In opening up a new plantation the land is cleared of all growth as soon as possible not only to make room for the rubber trees but also to avoid the possibility of disease from rotting timber.

At one time it was the practice on rubber plantations to remove all weeds and leave bare the ground between the trees, but this is no longer regarded as an attribute of a well-kept estate. It is still the practice to remove the weeds, but heavy tropical rains have caused such loss of top-soil, particularly on sloping land, that many estates find it necessary to plant cover crops. Shrubby types of plants such as species of *Crotalaria* and *Tephrosia* which are periodically lopped and mulched into the soil, or herbaceous types such as *Centrosema pubescens* and *Vigna oligosperma* are among those used.

On sloping land cover crops are not sufficient to prevent the loss of valuable top-soil. In Ceylon for example stone walls are sometimes built across the hills. As a general rule however it is considered better to level the land in a series of contours about 15 to 20ft. apart, cutting into the side of the hill at a slight gradient to a depth of about six feet.

The loss of top-soil can also be reduced by drains which prevent the accumulation of a continuous stream of water during heavy rain. In Ceylon a series of lateral drains empty into main drains (herring-bone drains) which carry the water away, but in Malaya and Sumatra the water is trapped in blind drains (silt pits) from which it ultimately percolates into the soil.

Where considerable erosion has taken place or the soil has been impoverished by previous cultivation it is sometimes possible to effect great improvement in the health of the trees by the addition of manures, particularly those containing nitrogen and phosphorus. This increased health is reflected in a more vigorous canopy of leaves, better replacement of bark removed for collection of latex, and a greater yield of latex.

The number of trees planted per acre on estates is largely dictated by local conditions, such as the quality of the soil and the contour of the land. Most estates plant out more trees than will eventually be required and thin them out, removing weak ones or those which prove low yielders, leaving about 90 trees per acre.

The rubber tree is by no means free from disease but a careful watch is kept by scientific officers, and nowhere in the East have the diseases assumed serious proportions. The most troublesome are an abnormal leaf-fall (not to be confused with that which occurs while the trees are wintering) and a pathological condition of the bark often associated with heavy tapping. Measures have been devised to counteract both, but they still occur.

Selection of Planting Material.—Most trees on estates yield 4 to 5lb. of rubber per annum, but there are a few which yield as much as 30lb. growing by the side of others which yield only 2 lb. As yield capacity is partly hereditary, it seems probable that the yield per acre may be greatly increased by propagating from high-yielding trees only. For this purpose two methods of propagation have received considerable attention. In one the plants are raised from seeds from carefully selected high yielding mother-trees. In the other a bud from a high yielding mother-tree is grafted on to a vigorous young plant grown from seed. Unless special care is taken a high yielding mother tree is liable to be fertilised by pollen from neighbouring low yielders, so that the daughter trees grown from seed may not be particularly good yielders. On the other hand it is to be expected that the budded material will have the vegetative characteristics of the mother tree.

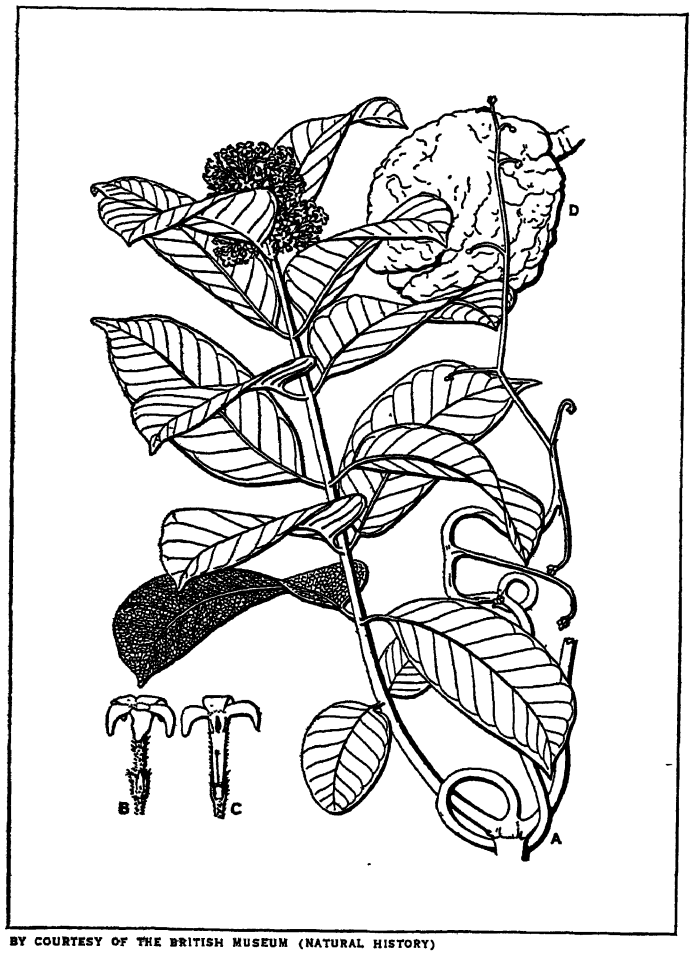
Tapping.—The trees are ready for tapping for latex when about five years old, but the yield of latex and the quality of rubber obtained are not so good as when the trees are a few years

older. Tapping is a very delicate and important operation, consisting in the removal of a shaving of bark with a sharp knife. The cut passes through the latex tubes and there is a flow of latex in consequence. If the cut is too deep, it penetrates into the cambium and bark renewal is hindered, but if it is not deep enough only a portion of the latex tubes are pierced and the yield of latex is reduced. For perfect tapping it is necessary to cut within $\frac{1}{25}$ in. of the wood, an operation requiring practice and skill.

The only tapping tools in general use on the plantations are a gouge (straight or bent) and the ordinary farrier's knife (or its modification).

It is the usual practice to make the first cut at between two and four feet from the ground. A shaving is then taken at definite intervals of time from the lower edge of the exposed bark. The thickness of the shaving removed is so arranged that the consumption of bark is between half an inch and one inch per month, some districts, such as Ceylon, preferring thin shavings while others, such as Malaya, prefer thicker shavings.

The length of the shaving varies from one-half to one-quarter of the circumference, some estates employing a single spiral cut at an angle of about 30° to the horizontal and some a V cut. In Ceylon it is the practice to change the tapping panel every six or twelve



BY COURTESY OF THE BRITISH MUSEUM (NATURAL HISTORY)

FIG. 3.—LANDOLPHIA COMORENSIS

(A) Sprig bearing leaves and inflorescence, (B) detached flower, (C) vertical section through flower, (D) fruit

months, but elsewhere it is customary to continue tapping on one panel down to the ground before commencing a fresh panel. Tapping is generally carried out every alternate day, one portion of an estate being rested while the other is tapped.

After the bark has been cut away, it is regenerated complete with latex vessels in a few years. With the most conservative system it is eventually necessary to tap on renewed bark. As the replacement of bark becomes more difficult each time a panel is tapped, there is a limit to the economic life of the tree, but the industry is too young for definite information on this point.

Tapping operations are always carried out in the early morning when the flow of latex is greatest. The latex from each tree is collected in a cup, transferred to a pail and taken to the factory as quickly as possible. Sometimes sodium sulphite is added to prevent premature coagulation. When the latex has ceased to drip there remains on the bark a thin film which dries in the sun leaving a strip of rubber. This is collected, washed in the factory and sold as "tree scrap"—an inferior grade.

Preparation.—The details of the methods employed in the preparation of plantation rubber depend upon the shape and appearance of the product to be put on the market, but in nearly all cases the outlines of the procedure adopted are the same. The sieved and diluted latex containing 15–25% rubber is treated with a coagulant such as acetic or formic acid or sodium silicofluoride. This causes the rubber to rise to the surface as a wet, white, doughy coagulum leaving in solution a small quantity of mineral and organic matter. The coagulum is then pressed between rollers until it is the required consistency, thickness and shape. After that it is hung to dry and eventually packed in wooden cases and shipped to its destination.

The two most important forms of plantation rubber are sheet and crêpe. Sheet is generally dark brown in colour because it is dried in smoke, whilst crêpe is a straw colour and is dried in air.

Sheet is obtained from latex coagulated in shallow tanks divided into compartments of suitable dimensions, each piece of coagulum being pressed by light machinery to the required thickness.

In the preparation of crêpe the coagulum is machined much more drastically, heavy rollers being necessary. During this process the coagulum is torn and pressed until it is sufficiently thin to dry in air without artificial heat. The rubber is dried by hanging on racks in well ventilated sheds for about a week.

Sheet is thicker than crêpe and requires artificial heat to dry it in a reasonable time. It is therefore exposed to the smoke of a wood fire for about 14 days. It was at one time presumed that smoking had a beneficial effect on quality because the highest grade rubber was obtained from the Amazon where the latex is coagulated with smoke, a wooden paddle being repeatedly dipped into the latex and exposed to the smoke of burning Urucuri nuts until a fairly large sized ball of rubber is built up. Experimental evidence does not support this view however and it is probable that as firewood becomes more difficult to obtain other means of drying sheet rubber will be developed on estates.

Both crêpe and sheet are sold largely on appearance. It is customary therefore to add sodium bisulphite to latex when preparing crêpe so that the rubber may be as pale as possible, and p-nitrophenol to latex in the preparation of sheet so that the development of mould may be prevented. Sheet rubber contains more mechanically enclosed serum substances than crêpe and is therefore a more suitable medium for the growth of mould. Not even drying in smoke entirely prevents this when conditions are favourable, but p-nitrophenol is an effective safeguard.

A considerable proportion of plantation rubber is prepared on native estates without machinery of any kind. In these cases the latex is coagulated with a convenient coagulant, not necessarily a suitable one. Sulphuric acid and alum have been used for this purpose although they affect adversely the behaviour of the rubber during manufacturing processes. The coagulum is lightly pressed by hand and whilst still wet is sent to a central factory where it is milled to crêpe and sold as an inferior grade of rubber.

Chemistry.—The microscope has been particularly useful in yielding information concerning the structure of rubber latex. The array of globules dancing here and there (Brownian movement) are easily seen at moderate magnifications, and it is possible to measure them and show that they vary in shape and size. In Hevea latex the globules are shaped like a pear and vary in length from 0·00002in. to six times that size. In spite of their minute size the expert has been able to ascertain that the globules in Hevea latex consist of an outer skin of non-rubber material, enclosing a viscous rubber shell surrounding semifluid rubber.

When Hevea latex is treated with any but very weak acids, the Brownian movement of the globules ceases, and they unite to form a coherent coagulum. Dehydrating agents such as alcohol and pro-

tein precipitants such as tannic acid also cause Hevea latex to coagulate.

In the presence of suitable proportions of an alkali such as ammonia or caustic soda, Hevea latex retains its liquid condition for many years, but in the absence of such additions bacterial action occurs, acids are developed and the latex quickly coagulates. Disinfectants also have a preserving effect on latex.

As already indicated, undiluted Hevea latex usually contains 30–40% of rubber. There are also present a number of other substances, amongst which by a remarkable chance are small quantities of compounds essential to the commercial applications of the product. When latex is coagulated with an acid only a portion of the accessory substances are coagulated with the rubber. The rest remains in the serum. The active non-rubber substances still mixed with the rubber are ample, however, to satisfy commercial requirements. For this reason methods of preparing rubber by evaporating latex have not met with general approval. In such cases the pure rubber may only amount to 85% of the solid material, whereas commercial crêpe and sheet prepared by acid coagulation may contain as much as 95%.

The following table shows the average percentage of the different non-rubber substances in dried Hevea latex in comparison with the amounts present in crêpe and sheet.

Non-rubber constituent	*Amount present in*	
	Dried latex per cent	*Crêpe and Sheet* per cent
Protein and nitrogenous matter	4–5	2
Constituents soluble in acetone	4–5	3
Mineral matter (ash)	1½	0·3
l-methyl inositol	1½	traces
Sugars	½	traces

Some of the constituents of the accessory substances are particularly active in accelerating vulcanisations and are therefore of great importance to the rubber manufacturer. A similar effect may also be produced by another of the accessory substances, viz., the ash which consists chiefly of potassium compounds.

Constituents soluble in acetone (a solvent which does not affect the rubber portion of the product) contain an appreciable amount of fatty acids such as oleic and stearic which dissolve and disperse some of the mineral powders mixed with rubber during commercial operations. The acetone-soluble material also contains a substance (allied in chemical composition to the sterols) which is particularly useful in preserving vulcanized rubber goods against the effects of atmospheric oxidation, so that they remain supple and elastic for a longer period than they otherwise would.

Pure rubber (caoutchouc) is a compound containing carbon and hydrogen only, in the proportion corresponding to five atoms of carbon and eight of hydrogen (C_5H_8). It belongs to the class of bodies known as terpenes and is related in chemical composition to the constituents of turpentine.

The specific gravity of rubber is a little less than that of water. It decreases regularly with increase of temperature except between 30 and 35° C when the decrease is greatly accelerated. At the temperature of liquid air rubber is transparent and brittle like glass. At 0–10° C it is hard and opaque, but quickly reverts to a soft and translucent condition above 20° C. As the temperature increases the rubber becomes softer, stickier, weaker and less elastic. These changes are greatly accelerated at temperatures of 50–60° C. At a little below 200° C rubber decomposes yielding liquid hydrocarbons of the terpene series.

When rubber is repeatedly pressed between rollers it becomes more plastic and sticky and less elastic. While in this condition large quantities of powders and plastic solids may be mixed with the rubber merely by repeatedly passing through rollers.

Rubber is insoluble in water and is unaffected by alkalis or moderately strong acids, but these substances may react with the non-rubber accessory substances present. Rubber is dissolved by benzol, petrol, carbon disulphide, chlorinated hydrocarbons, etc. It forms compounds with halogens, halogen acids, ozone, certain oxides of nitrogen, chromyl chloride and certain metallic halides. It is oxidised by nitric acid, potassium permanganate and hydrogen peroxide. It is also slowly affected by atmospheric oxygen, particularly in the presence of copper salts. It is reduced by hydrogen in the presence of a catalyst.

When rubber is heated at 120–160° C with sulphur it forms a product known as vulcanized rubber, which is stronger, more elastic and less affected by changes of temperature than the raw material. It is also insoluble in all the usual solvents. These changes are considerably modified by the amount of sulphur and heat applied and also (although to a lesser extent) by powders and other substances which may have been mixed with the rubber. With suitable adjustments it is possible to obtain from the raw materials a product which is as soft and elastic as an inner tube or as hard and brittle as a piece of vulcanite.

BIBLIOGRAPHY.—H. Brown, *Rubber, its sources, cultivation and preparation* (1914); O. de Vries, *Estate rubber, its preparation, properties and testing* (1920); G. Stafford Whitby, *Plantation rubber and testing of rubber* (1920), full information concerning chemistry of non-rubber accessory substances, physical tests, technical; T. Petch, *The diseases and pests of the rubber tree* (1921), technical; Sydney Morgan and Henry P. Stevens, *The preparation of plantation rubber* (1922), a practical account written for the planter; W. Bobilioff, *Anatomy and physiology of Hevea brasiliensis* (Zurich, 1923) suitable for non-technical as well as advanced readers; C. W. Bedford and H. A. Winkelmann, *Systematic survey of rubber chemistry* (1923), complete bibliography; S. P. Schotz, *Synthetic rubber* (1926), optimistic review of methods of preparation. (G. MAR.)

RUBBER: PRODUCTION AND MANUFACTURE.

Between 1900 and 1911 the increase in the world's rubber production averaged only about 3,000 tons per year. Between 1911 and 1926, due mainly to the development of automotive transportation, the increase in crude rubber consumption increased enormously, averaging about 34,000 tons per year during the interval.

The 622,676 long tons of crude rubber produced in 1927 were distributed for use throughout the world as follows:—

TABLE I.

	Tons	Percentage
United States	397,278	63·8
*United Kingdom	60,248	9·7
France	36,000	5·8
Germany	40,000	6·4
Italy	11,000	1·8
Canada	26,000	4·2
Japan	20,169	3·2
Russia	12,000	1·9
Other countries	19,981	3·2
Total	622,676	100·0

*Actual consumption and in manufacturers' hands, 44,659 tons.

In 1925 about 74% of the total world's production of crude rubber, 387,629 long tons, was imported into the United States. During that year the value of rubber goods manufactured in the United States was $1,255,414,000 and the number of men and women employed in the industry was 164,230 in 498 different manufacturing establishments. The rubber industry is, therefore, among the largest in the United States.

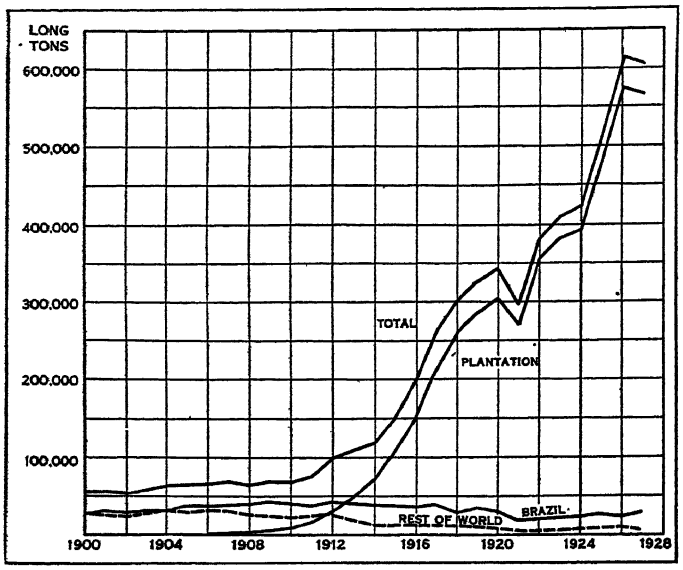
The most important underlying development of the industry was the discovery of hot vulcanization of rubber made in 1839 by Charles Goodyear, of New Haven, Conn. The second important development was the art of compounding—the blending with crude rubber of various mineral powders, oils, waxes, tars, asphalts, fibres, etc., to secure in the finished goods special properties. The third great development was the art of combining rubber compositions with other structural materials, such as textile fabrics, metals and alloys, concrete, wood, glass, or asbestos, to secure in commercial articles the combined benefits of the rubber portion and the superior structural strength or rigidity of the auxiliary materials. The various processes of reclaiming scrap vulcanized rubber have resulted in supplying a plastic rubber material which can be processed with the equipment used for compositions of crude rubber, which will blend smoothly with crude rubber, and which makes economically possible the manufacture and sale of many articles that would not find a ready market at the higher prices of crude rubber compositions.

Since 1906 organic accelerators of vulcanization have constantly increased in use, saving millions of dollars annually to the indus-

try and to consumers through economies in manufacture and improvement in quality of goods. Within the last few years the latest development has been made—the retarding of deterioration of rubber compositions by admixture with them of small quantities of age-resisters.

MATERIALS USED IN THE INDUSTRY

Practically the only original source of rubber materials to-day is the latex of certain plants (*see* RUBBER: BOTANY, CULTIVATION AND CHEMISTRY). Preserved latex alone or compounded with other ingredients to cause vulcanization or to modify the characteristics of the rubber has been used for impregnating the cord fabric used in pneumatic tyres. Toy balloons and surgeons' gloves have been produced by dipping into latex compounded with water dispersions of pigments, sulphur and accelerator, porous forms which absorb water, leaving a thin film of vulcanizable stock on the form. The articles thus formed are then dried and vulcanized, giving a product of excellent quality. Philip Schidrowitz, of London, developed and patented in 1922 a process for vulcanizing the rubber while still dispersed in the form of latex, of forming articles from the vulcanized suspension and drying them. The anode process of electro-deposition of rubber compositions, invented independently by Paul Klein and S. E. Sheppard, utilizes latex also. Concentrated latices have been placed on the market in small quantities. That prepared by centrifuging according to the process of W. L. Utermark contains 60% to 65% of rubber; the product prepared by evaporation of some of the water according to the process of E. Hauser may contain as much as 85%.



BY COURTESY OF THE B. F. GOODRICH COMPANY

GRAPH OF THE WORLD'S PRODUCTION OF CRUDE RUBBER

A successful method has been brought into practical use by Trumbull, Dickson and Pratt for the production of aqueous dispersions of crude rubber or of rubber compositions containing vulcanizing and compounding ingredients. These dispersions have found commercial applications in the manufacture of artificial leather and of rugs made of sisal fibre. They have also been used for impregnating fabric prior to the application of a thin rubber coating by the usual process of calendering (*see* below).

Materials Used in Dry Mixing.—The ordinary practice of blending rubber with other materials is carried out with dry materials—coagulated rubber, reclaimed rubber, mineral powders, softeners such as oils or tars and waxes, accelerators of vulcanization, age resisters and sulphur. Hundreds of materials are used in rubber compounding and thousands of combinations are in commercial use. They may be classified, however, into relatively few groups.

I. *Rubber Materials.*—*A.* Crude Rubber.—The sources and commercial forms are discussed in the article RUBBER: BOTANY, CULTIVATION AND CHEMISTRY.

B. Reclaimed Rubber.—Vulcanized rubber scraps may be plasticized and made available for reprocessing by the ordinary methods of rubber goods manufacture. The process of treatment is known as reclaiming and the product as reclaimed rubber, reclaim or shoddy. Many methods have been devised but the one most extensively used is that of heating ground scrap with a dilute solution of caustic soda at temperatures about 350° F for 12 to 20 hours. This is the alkali process of A. H. Marks, patented in 1889. During the past four years the use of reclaimed rubber in the United States has increased much more rapidly than the consumption of crude rubber. From 1924 to 1927 crude rubber consumption increased only 31% as compared with a 137% increase in the use of reclaimed rubber.

C. Scrap.—Unvulcanized trimmings containing no fabric or other materials are not waste. They may be blended with fresh stocks of the same composition and utilized with no loss of material value. Unvulcanized waste containing fabric may be treated to pulverize the fabric and utilized in rubber compositions with some reduction in value. Even vulcanized waste is incorporated in certain goods.

II. *Dry Pigments.*—*A.* Reinforcing and Filling Pigments.—Powdered materials are blended with rubber materials in order to modify the stiffness, strength, resistance to abrasion or chemical action of the vulcanized rubber compositions. These may be divided into "reinforcing" pigments and "fillers." Reinforcing pigments possess the property of stiffening and strengthening rubber compositions so that the total energy necessary to extend a strip of the compound to its breaking point is greater than that necessary to stretch a similar rubber-sulphur-accelerator mix to the breaking point. Fillers are characterized by the fact that, though they may stiffen the vulcanized compound, they do not increase the total energy necessary to extend a strip of the compound to the breaking point. Carbon black (gas black), zinc oxide, certain clays and magnesium carbonate are common reinforcing pigments. Whiting, barytes and ground slate are extensively used as fillers.

B. Colours.—Most of the colours for rubber goods are used in powdered form, and few colours soluble in rubber are used. For white goods, zinc oxide, lithopone, titanium oxide and zinc sulphide are used. Reds, blues, yellows and other colours and shades are secured with pigments such as ferric oxide, ultramarine blue and zinc chromate. The most recent development of special colours for the rubber industry is the utilization of metallic salts of organic azo- or other coloured compounds. These are produced in many beautiful shades, have high tinting values, and are not changed in colour by sulphur or heat during vulcanization.

III. *Other Compounding Ingredients.*—*A.* Softeners.—For modifying the characteristics of the vulcanized rubber mixtures and more especially for improving their properties for ease in processing, many kinds of softening materials are incorporated in rubber stocks. Petroleum products varying in consistency from oils to paraffin wax, tars, oxidized petroleum residues (mineral rubber), rosin, pine tar, stearic acid and many others are common to the industry.

B. Vulcanizing Agents.—By far the commonest vulcanizing agent is sulphur, used in the form of ground brimstone. The proportion used depends upon the character of the product required. Soft rubber goods carry from 2½% to 10% of sulphur, with the majority of compounds carrying from 3% to 5%. Hard rubber compositions carry 10% to 50% of sulphur. Some organic sulphur compounds which liberate sulphur at vulcanizing temperatures have been used in special cases without addition of sulphur itself. Selenium will produce vulcanization, also, and has been used to some extent, usually, however, with some sulphur.

C. Accelerators of Vulcanization.—Vulcanization of rubber by sulphur alone proceeds at a slow rate and almost invariably suitable materials, called accelerators, are added to the rubber mixes to hasten the process. From the time of Goodyear's experiment, in which he used white lead, until 1906, the only accelerators used were inorganic oxides or hydroxides—litharge, white lead, quick or slaked lime, magnesia. In 1906 George Oenslager, of Akron, O.,

RUBBER: PRODUCTION AND MANUFACTURE















BY COURTESY OF (1, 2, 4-7) THE U.S. RUBBER COMPANY, (3) THE GOODYEAR TIRE AND RUBBER COMPANY

CULTIVATION OF RUBBER

1. Jungle to be cleared for the establishment of a rubber plantation
2. Rubber plantation laid out, with young trees planted
3. Natives at work on young plantation. The low-growing plants prevent soil wash in heavy tropical rains
4. Woman collecting latex, the milky liquid from which raw rubber is obtained
5. Tapping the trees to obtain latex. The tapping, a very delicate operation, consists in the removal of shavings of bark with a sharp knife
6. Young flowers of the rubber tree grouped among old leaves
7. Instruments and containers used for tapping rubber trees

PLATE II

RUBBER: PRODUCTION AND MANUFACTURE

BY COURTESY OF (1, 4) THE U S RUBBER COMPANY; (2, 3) THE GOODYEAR TIRE AND RUBBER COMPANY

PREPARING RUBBER FOR COMMERCIAL USES

1. Latex, brought from the trees in containers resembling milk cans, is poured into large vats, as shown in the illustration
2. Machines used for washing rubber, to remove dirt, bark and other impurities
3. Sorting and folding sheets of crepe crude rubber, preparatory to packing
4. Grinding and washing mill, showing smoked Pará rubber going through the machine, before being made into sheet. Pará rubber is now produced in great quantities in the East as well as in the Amazon valley where it originated

discovered that organic amines shortened the time necessary to produce the changes due to vulcanization. Aniline was one of the first used. Later thiocarbanilid and para-amino-dimethyl aniline were used. The investigations in this field extended rapidly and in 1928 organic accelerators of vulcanization are essential ingredients of most rubber mixtures. They may be classified in various ways,—according to activity, to the range of temperatures at which they give the best results, or according to chemical composition. The activity of many accelerators is improved by the presence in the mix of secondary accelerators, such as zinc oxide, litharge, or magnesia. These are often further assisted by acid materials, such as oleic or stearic acids or pine tar. Pneumatic tyres, formerly requiring three hours for vulcanization without accelerators, are now vulcanized by the action of organic accelerators in less than an hour.

D. Anti-oxidants.—The natural deterioration of vulcanized rubber or its deterioration in service may be retarded by incorporating in the mixture, before vulcanization, ½% to 2% of certain materials which have no effect on the vulcanization rate but greatly retard the rate of oxidation or deterioration of the vulcanized product. Those already placed on the market are para-amino phenol, phenyl alpha naphthylamine, phenyl beta naphthylamine, symmetrical diphenylamino ethane and certain aldehydeamine reaction products. The development of these materials is relatively recent and other types of compounds may later be found to be serviceable. The anti-oxidants are added as ingredients of the rubber mixtures along with the pigments, accelerators, and sulphur. Commercial Pale Crêpe rubber contains about ¼% of natural anti-oxidants.

E. Other Materials.—A few other materials are used which do not fall under any of the classifications mentioned. Probably the most important of these is "substitute" or "factice." Factice is made either by the action of sulphur chloride on vegetable oils,—white substitute,—or by the action of sulphur on these oils,—brown substitute. White substitute is used almost exclusively in cold vulcanized goods (*see* below), brown substitute in hot vulcanized goods. Skilful selection and blending of other materials with rubber is necessary to alter the characteristics of vulcanized rubber products to meet specific conditions of service. It is estimated that approximately 150,000 tons of non-rubber materials are used each year for this purpose in the United States alone.

Art of Compounding.—Study of the effect of different materials upon the physical characteristics of rubber mixtures has developed an art of compounding. Experienced compounders, by the selection of materials as to kinds and relative quantities, can secure vulcanized mixtures of specific properties to resist flexure, abrasion, steam, oil or acids. Rubber is modified by compounding with carbon black to resist the abrasive wear of roads upon vehicle tyres. Rubber, an excellent electric insulator, by incorporation of graphite and other carbon pigments may be modified to conduct an electric current.

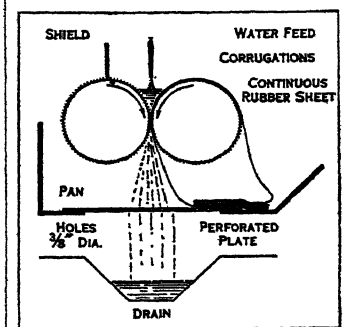
Auxiliary Materials in Rubber Manufacture.—Rubber compositions may be fabricated with other materials to secure the peculiar advantages of the rubber stocks, together with the mechanical strength or rigidity of other substances, or to secure serviceable articles at low cost. Cotton fabric, for example, lends strength to conveyor and transmission belting, to hose, and to pneumatic tyres. Wool or metal (in the form of wire or tape) is also used to secure improved strength or rigidity. Rubber may be used, moreover, as a coating inside steel tanks, to protect them from the action of various acids. Rubber compositions have been used for lining concrete tanks for the storage of corrosive solutions.

PROCESSING

The machinery for processing rubber is of various types. The rubber compositions must be mixed, formed, combined with other materials, fabricated into articles and vulcanized. By far the greatest quantity of materials is handled in the dry state. Some articles, however, utilize rubber materials in the form of rubber solutions (cements) or of water dispersions (latex mixtures or artificial dispersions). For making cements, churns up to 250 gal. capacity are used. They consist essentially of vertical cylinders with a centre, rotating shaft on which are fastened arms to stir the contents of the churn. Stationary arms are usually fastened either to the cylinder walls or top of the mixer. The rubber or rubber compound is placed in the churn with a small amount of solvent, benzene (benzol) or gasolene, and the centre shaft driven by power. A heavy dough of the rubber swelled with the solvent first forms. Additional quantities of the solvent are added in small increments, each blending with and thinning the mixture in the churn before the addition of the next, until a cement of the desired consistency is obtained. Considerable heat is generated in the early stages of the process and tight lids must be provided to avoid loss of solvent by evaporation. Tightly closed internal mixers which handle the rubber cement in the form of thick doughs have very recently come into use for making cements, with great economy in consumption of power and avoidance of solvent losses. The viscosity of a definite composition of cement of milled rubber decreases with the time of milling, up to a certain point. Conversely, when milled rubber is used more of it must be incorporated into a fixed quantity of solvent to obtain a cement of definite viscosity. Therefore, for spreading purposes, when it is desired to apply as much rubber as possible with a minimum quantity of solvent, milled rubber mixtures are used. When strong adhesion is required, on the other hand, the rubber is milled as little as possible.

Spreading.—The fabric is drawn over a roller under a spreader knife which can be set at varying distances from the roll carrying from a cement feed a thin layer of the cement, and then over steam heated pipes to evaporate the solvent. This process is repeated until the required thickness of rubber coating is built up. By this method the rubber surfacing is applied to nursery and hospital sheetings, printers' blankets for offset work, and similar products. Thin coatings similarly applied are used to improve the adhesion to fabric of rubber layers later applied on a calender. Cements applied by brushing are extensively used in the manufacture of rubber articles, notably footwear.

Washing.—Some grades of rubber—wild varieties and low-grade plantation rubber—must be washed to remove sand, bark, or other inpurities, before they can be utilized in the manufacture of rubber goods. For this purpose mechanical washers are used. The ordinary two-roll washer is the commonest type (fig. 1). The rubber is first formed into a relatively thick sheet by passing through a "cracker," a small mill with coarsely corrugated rolls. No water is used on the rubber in this operation. It is then passed repeatedly between more finely corrugated rolls on a washer while a stream of cold water plays over it, loosening the dirt and washing it into the sewer. Finally the rubber is sheeted out thin on a similar washer with the rolls set close together,—the "finisher."



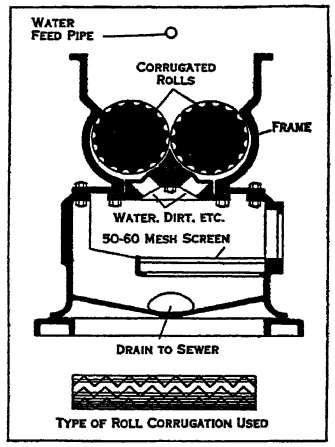
BY COURTESY OF THE B. F. GOODRICH COMPANY

FIG. 1.—TWO-ROLL RUBBER WASHER

The rubber is ready for the drier after leaving the "finisher." Another type is the internal washer illustrated in fig. 2. In this machine the rubber is torn into numerous small chunks which are shredded between the rolls and the walls of the machine. It is said to be more rapid in its action than the two-roll washer.

Drying.—After washing, rubber must be dried before it is used in the mixing operation. Three methods of drying are in common use, forced drying, vacuum drying and humidified air drying. Forced drying consists in forcing air at 90° to 100° F through chambers in which sheets from the washers are suspended from wooden rods. The time of drying varies from 2 to 12 days, dependent upon the kind of rubber and the purpose for which it is to be used. Vacuum drying consists of heating the sheeted rubber laid in pans on steam plates in a vacuum chamber. Time and temperature of drying vary. High-grade plantation rubber

will dry in 2½ hr. under a vacuum of 27 in. with steam in plates at 281° F. Ordinary vacuum drying units will accommodate 2,500 lb. per charge. Humidified air drying is secured by circulating air at a relative humidity of 30% to 35% at 170° F through a chamber containing rubber in trays placed in racks. In a unit of 50,000 lb. capacity the rubber will dry in 12 to 14 hours under these conditions. Reclaimed rubber comes to the rubber goods manufacturer in dry condition. In rare cases it is dried in a vacuum drier at low temperature, 240° to 260° F. Damp pigments are easily dried by storage in a hot room at 160° to 170° F for 10 to 15 hours. Oils, waxes, tars and other fusible materials may be readily dried by holding them in the melted state at 250° to 270° F for a few hours. Fabric is dried by passing over a series of heated rolls or plates. These are known as "drum" ("can") driers or "shelf" driers. The fabric is passed through the driers at the rate of 35 yd. to 55 yd. per minute. Two passes through the drier are necessary for ordinary belt fabrics and in exceptional cases three or more passes are required.



BY COURTESY OF THE B. F. GOODRICH COMPANY

FIG. 2.—INTERNAL RUBBER WASHER (16"X40")

Cracking and Grinding.—Fairly large quantities of vulcanized rubber waste are used in cheap articles without treatment by any chemical reclaiming process. Preparation for incorporation in rubber mixtures is carried out on grinders consisting of two horizontal rolls of different diameters, the larger rotating with peripheral speed about three times as rapidly as the smaller. The rolls are set tight together and coarsely pulverized material fed into the machine. The small clearance between the rolls and the great difference in surface speed produce a powerful grinding action. The material is passed between the rolls repeatedly until sufficiently fine for use. To facilitate handling of the material, fluxes,—pine tar, pitches or rubber,—may be run through with the vulcanized scrap during the last few passes. This causes the material to form a sheet. A cracker, similar to that used in washing but having only one roll corrugated, is used for breaking up large masses of vulcanized rubber and similar waste rubber material in preparation for the grinders. Hard rubber dust is employed very extensively in the preparation of various ebonite mixtures.

Mastication of Rubber.—Rubber is softened permanently by repeated passages between cool mill rolls. In order to reduce labour cost, large quantities of rubber are milled in preparation for the mixing operations in which they are blended with other materials. Masticating is performed on mixing mills to be described later. In order to secure better dispersion of material or to prevent loss of ingredients used in small quantities in a mixture, master batches containing rubber or reclaimed rubber mixed with pigments,—especially colours,—or with accelerators are prepared ready for the regular mixing operation.

Mixing.—The mixing operation is the most important of all through which the rubber compositions pass in the fabrication of goods. In fact, proper running in all subsequent operations depends upon the mixing operation having been properly performed. Mixing mills vary in size from 24 in. to 84 in. in width. The 84 in. mills are the largest in common use. They consist of two parallel, horizontal rolls set close together side by side and revolving in opposite directions. The back roll is fixed in position and geared directly to a drive shaft; the front roll is floating. The clearance between the rolls is adjustable by means of set screws near the ends of the front roll. Rolls are made of cast iron with chilled surface. The rolls of 84 in. mills are 24 in. or 26 in. in diameter, cast hollow and fitted for service with internal perforated pipes for the introduction of cooling water. Large quantities of heat are generated in the milling of rubber materials and this must be rapidly carried off to prevent vulcanization during the mixing operation (scorching). Cooling water from 50° to 55° F is desirable. The safety device for stopping mills in emergencies consists of a magnetic clutch opened instantly with the breaking of the magnetizing circuit and a magnetic brake on the line shaft actuated by a weighted arm held in position by an electromagnet wound from the same circuit as the clutch.

The methods of mixing are complicated and dependent upon the materials to be blended. In general, the rubber materials are softened on the mill rolls first and the softeners and powdered ingredients added only after the rubber is plasticized to a smooth sheet on the roll. The procedure for batches containing crude rubber is somewhat different from those using reclaimed rubber only. It is essential, however, in all cases, that all parts of the batch be uniformly blended. This blending is secured by cutting the sheet on the mill roll with a sharp knife, beginning at one end and rolling it on itself until the sheet has been cut almost entirely across. The roll thus formed is permitted to sheet out again on the mill and the process repeated in the opposite direction. This is repeated six or seven times to secure uniform mixtures. Mills of 84 in. face will mix batches from 150 to 300 lb. in 25 to 40 minutes. Several types of internal mixers have been introduced as improvements over mills for mixing purposes. Machines of 600 to 1,000 lb. capacity are in common use. Batches mixed in internal mixers run hotter than on mills and it is often necessary to mix the sulphur separately on mills to avoid danger of scorching.

Calendering.—Calenders of various types and sizes are used in the rubber industry. The usual type is the three-roll calender, consisting of three rolls of equal diameter mounted vertically one above the other. The centre roll is direct-driven and the top and bottom rolls may be run at the same speed or at slower speeds than the middle roll. At one side of the calender the three rolls are geared together with pinions of the same diameter, at the opposite end of the rolls the pinion on the centre roll is smaller than those on the top or bottom rolls. Calender rolls are bored and ground true on their bearings to insure uniform wall thickness to resist the mechanical pressures and the heating and cooling to which they are subject in service. The middle roll is usually a true cylinder, the upper roll convex and the bottom roll either straight or concave. The "crown" of the upper roll varies from ·005 in. to ·008 in. depending upon the service, and the concavity of the lower roll from ·002 in. to ·004 inches. The distance between rolls is adjustable to suit various operating demands. Three kinds of operations are performed on calenders—sheeting, frictioning and coating.

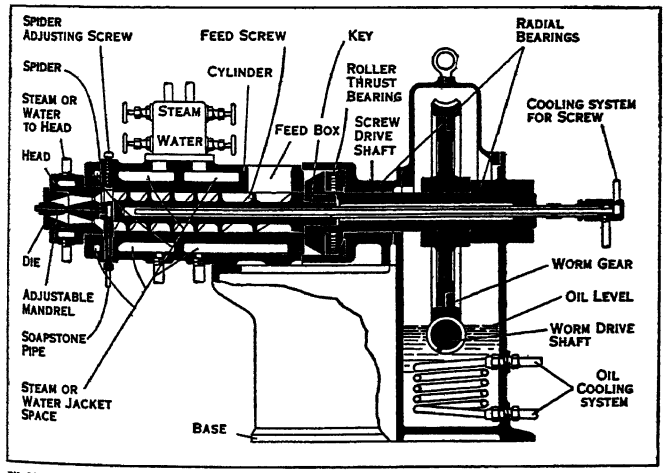
Sheeting.—Rubber is sheeted on calenders by feeding between the upper two rolls material previously plasticized on a mill. The rubber sheet passes half-way round the middle roll and is removed and wound in rolls with cloth (liners) to prevent the layers from adhering. All but extremely thin sheets are ordinarily run in plies. One ply is sheeted and wrapped in a liner. To add a second ply the first ply with its liner passes between the lower two calender rolls, meeting and adhering to the second ply as it runs from the calender. This process may be repeated so that the final sheet consists of three, four or even more layers. The top roll may run at the same speed as the middle roll or slower, depending upon the quality of the rubber stock or the quality demanded of the product. Sheeting calenders are run from 10 to 30 yd. per minute, driven by variable speed, direct current motors. Calenders 100 in. wide with rolls 30 in. in diameter are the largest used in the industry. Sheets varying in thickness from point to point and sheets with specially embossed surfaces are also run on calenders. Treads for pneumatic tyres and soles and uppers for footwear are examples of such sheets. Footwear calenders are four-roll machines. The engraved or embossed rolls are mounted in such a manner that they are quickly removable and replaceable. As many as 50 rolls bearing different designs are used in a day's run of shoe stocks.

Frictioning.—Frictioning consists in squeezing rubber into cloth as it passes between the lower two calender rolls carefully

adjusted to permit the cloth to pass between them without additional clearance. The rubber is fed between the upper two rolls, passes in a thin sheet around the middle roll, meeting the fabric as it passes between the lower two. The rubber is thus forced into the meshes of the cloth, but, because of its high viscosity, little penetration into the threads around the fibres is secured. The frictioning process may be repeated on the opposite side of the fabric. In the frictioning operation the lower roll is always run slower than the middle roll. Before frictioning, the fabric is dried as described above and delivered hot to the calender. Frictioning speeds vary from 7 to 40 yd. per minute.

Coating.—Coating consists in laying a sheet of rubber composition on bare fabric or on fabric which has been previously frictioned or spread. As in the frictioning operation, the rubber stock is fed between the upper two rolls and the fabric passes between the lower two. For coating, however, the lower two rolls must run at the same speed. The rubber sheet passing around the centre roll is pressed firmly against the cloth as it passes through the calender but is not forced completely through the meshes of the fabric as in frictioning. Coating calenders run at speeds of 10 to 40 yd. per minute. Shoe linings and facing cloth are coated without previous frictioning. Combined operations of frictioning and coating are frequently applied to the same fabric; *i.e.*, frictioned two sides and coated one side, frictioned one side and coated two, etc.

Tubing Operations.—Tubing machines, or extruding machines, are devices for forcing continuous strips of rubber from a die. These strips may be tubular, rectangular, or any one of a great variety of irregular cross-sectional shapes. The tubing machine consists of a horizontal cylinder in which a power-driven screw rotates, forcing the rubber stock through a die inserted at the end of the machine. Fig. 3 shows the essential features of tubing machine design. They are used for the production of tubing, hose tubes, pneumatic tyre treads, solid tyre treads, inner tubes for pneumatic tyres, channel rubber slides for the windows of automobiles and many other articles. By special setting of the die and mandrel and regulation of the rate of extrusion, tubes may be made to leave the machine not in straight lengths but in curves. Specially designed tubing machines are used for extruding tubes of one colour striped with rubber compositions of another colour. Tubing machines are designed, also, to apply a tube directly on



BY COURTESY OF THE B. F. GOODRICH COMPANY

FIG. 3.—TUBING MACHINE

poles fed through a hollow screw, or for covering hose run through the head at right angle to the axis of the screw.

Vulcanization (Curing).—Before vulcanization, rubber is weak, softened by moderate heat, rendered stiff by cold, soluble in gasolene or benzol, and easily plasticized and sheeted between warm rolls. After vulcanizing it is strong, not greatly softened by heat nor stiffened by cold, insoluble in gasolene, and will crumble if run between rolls. Unvulcanized rubber is easily deformed to assume new shapes permanently; vulcanized rubber returns to its original form after deformation. Hot vulcanization, the process most generally used, is brought about in a number of ways.

Mold Cures.—Many articles are given their final form and vulcanized at the same time by application of heat and pressure to the rubber material in metal molds. Pneumatic and solid tyres are placed in engraved molds which are then stacked one above the other in a vertical cylindrical heater fitted with an hydraulic ram. When the molds are all loaded on the plate at the top of the ram a cover is firmly fixed on the vulcanizer and the stack of molds pushed by hydraulic pressure against the cover. Steam is admitted into the vulcanizer around the molds. The heat softens the rubber compositions, which flow into the depressions in the molds to form the tyre with its special tread design and its lettering, and, as the temperature rises, causes vulcanization to occur. After vulcanization is complete the steam is blown off, the molds are cooled with water, the ram is lowered, the cover of the vulcanizer removed, and the ram again slowly raised as the molds are removed one by one. Pneumatic tyre vulcanizers 54 in. in diameter, 17 ft. high, with a 14 ft. ram stroke, take from 12 to 32 molds in each heat. Pneumatic tyres are cured from 50 min. to 225 min., depending upon size. Solid tyres are cured in much longer periods,—from three to eight hours.

Press Curing in Molds.—Presses consist of parallel-faced, steam-heated plates between which are placed metal molds in which the articles are formed. Pressure between the plates is secured, as in heater molding, by hydraulic pressure, but the article receives its heat only by transfer through the hollow metal plates and through the metal molds. Steam does not come into direct contact with the molds. The platens may be rectangular plates cast hollow or may be bored with a series of cylindrical channels through which the steam passes. Originally, presses contained but two steam-heated plates. More recently several plates one above the other, with molds between adjacent plates, are used. Hollow articles, such as syringe bulbs and tennis or toy balls, are vulcanized in molds. The rubber is forced against the metal mold by internal steam or air pressure or by nitrogen formed by heating pellets of a mixture of sodium nitrite and ammonium chloride inserted inside the article before vulcanization. Sheets of sponge rubber are vulcanized between plates separated to permit the composition to expand, as bicarbonate of soda or other blowing agent incorporated in it forms bubbles of gas on heating. Sponge rubber blown to twice the thickness of the unvulcanized sheet is said to have a "100% blow," to three times the thickness, a "200% blow," etc. Special presses are made for curing long belts, a section of 20 to 36 ft. being cured at one time, and the belt moved and another section vulcanized.

Lead Coating for Curing.—Garden hose made in long lengths, formerly cured in a manner similar to that used for belts, is now commonly cured by an entirely different method. The assembled hose is run through a lead press and covered with a lead sheath. A 500 ft. length thus covered is wound on a drum and water connections leading outside the heater are made at both ends. A number of the drums are placed side by side in a horizontal, cylindrical vulcanizer and hot water under pressure run through the hose, while steam is admitted to the vulcanizer. In this manner heat is applied simultaneously from both sides of the rubber structure and the internal water compacts the hose against the lead sheath. The lead covering is stripped, melted and used again for covering. The lead covering method may be also applied to other articles such as buggy tyres.

Open Steam Curing.—Articles which require no further forming than is produced in building operations may be vulcanized without enclosure in molds. Steam is permitted to come into contact either with the bare goods or with wet fabric wrappings around them. Tubes of stationers' band stock are hung on metal rods placed in a horizontal heater and vulcanized by steam coming into direct contact with the rubber. Air brake hose is built on mandrels, wrapped tightly with wet cloth and vulcanized by steam directly surrounding the wrapped hose. Pressure may be applied during vulcanization in open steam to articles built on hollow forms. Boots and shoes, for example, built on hollow, perforated lasts, each of which is connected in the vulcanizer with a vent to

the atmosphere, receive from the steam around them not only the heat necessary for vulcanization, but mechanical pressure which forces out the air between the shoes and the forms and between the separate pieces composing the goods.

Water Curing.—Some rubber goods are cured immersed in hot water under pressure. The pressure may be equal to or greater than that of saturated steam at the same temperature. In recent years inner tubes for pneumatic tyres have been extensively cured under water at 150 lb. pressure at 280° F. This treatment compacts the rubber against the forms on which the tubes are built and practically eliminates defects due to expansion of air trapped in the rubber structure. Rubber sheet to be cut into thread is wrapped with wet cloth on drums, covered with a vulcanized rubber sheet and cured under water.

Air Curing.—Varnished footwear and shoes containing wool fabrics have long been cured by heating in air. Originally the goods were heated simply by air at atmospheric pressure rising from steam pipes in the bottom of a large chamber holding several cars. Several hours were required for these cures. More recently, horizontal vulcanizers have been used of the same construction as open steam vulcanizers. The air is circulated under pressure by pumps and is heated before it enters the vulcanizer. This method not only shortens the time of vulcanization but improves the quality of the rubber compositions. By use of perforated lasts vented to the atmosphere outside the heater, or by connecting the vents with vacuum pumps, differential pressure outside and inside the lasts is secured, with a beneficial compacting of the goods against them. Litharge used in rather large proportions was once considered necessary to produce vulcanization of "dry heat" compositions. Nowadays organic accelerators have been found more effective and much cheaper. Auto topping, sheetings and other goods are also cured in air. Carbon dioxide has been used instead of air on the theory that it would prevent deterioration of the rubber caused by the action of oxygen in the air. It has not, however, found general commercial application.

Combination Air and Steam Curing.—Rubber goods which stain when vulcanized in open steam by the usual procedure have been cured by first warming in air and then introducing steam. This reduces or eliminates condensation of water on the surface of the goods and prevents staining.

Sulphur Chloride Curing.—Vulcanization by means of sulphur mono-chloride (S_2Cl_2) may be carried out as "cold vulcanization" in solutions of this agent or by passing the vapour around the goods in a vulcanizing chamber. Cold vulcanization is used for thin articles, such as surgeons' gloves and finger cots. The articles are made by repeated dipping of forms in a rubber cement, allowing the solvent of the cement to evaporate after each dip. When the desired thickness is attained, the vulcanization is secured by dipping the articles on the forms into a 2% to 3% solution of sulphur chloride. This process of vulcanization was discovered by Alexander Parker, of Birmingham, England, in 1846. Sulphur chloride is used also in vapour form for curing gloves, dental dam, or dress-shield stock. The goods are placed in a closed vulcanizing room and the sulphur chloride vapour, produced by warming the liquid, is allowed to act on them. To remove excess curing agent, ammonia gas is introduced into the room before the goods are removed.

Another special method of cold vulcanization is the Peachey process, devised and patented by Stanley J. Peachey, of London. This process consists in exposing the rubber goods to sulphur dioxide gas for a definite time, followed by exposure to hydrogen sulphide gas. Sulphur is liberated by the action of the hydrogen sulphide upon the sulphur dioxide held in the goods from the first treatment. This sulphur, liberated in a finely divided and extremely active condition, causes vulcanization to take place at ordinary temperatures. The commercial applications of this process are of necessity limited to thin rubber articles.

PROPERTIES OF VULCANIZED RUBBER

Relatively little rubber is used in the unvulcanized state. Rubber cements for adhesive purposes, sealing can ends, surgical adhesive tape, electrical insulating tape (either all rubber or rubberized fabric) and crepe-soled footwear are among the most important uses of unvulcanized rubber. By skilful compounding of rubber with other materials the properties of vulcanized rubber may be varied to meet a great diversity of conditions of service and the applications of vulcanized rubber compositions in promoting human comfort, health and pleasure. Economic processes now number many thousands. Probably the outstanding property which has been secured in vulcanized rubber compositions is resistance to abrasive wear. Their superiority for this purpose has long been utilized in vehicle tyres, heels and soles, and in conveyor belts for carrying ore, sand, gravel, coal and even broken glass trimmings (cullet) in glass works. More recently, gravel chutes, grinding mills and mixers for abrasive materials have been lined with rubber. Flexibility, combined with one or more of other desirable properties, renders rubber goods superior to metal or other materials under certain conditions of service for equipment to convey gases or liquids, for invalid or operation cushions, and for many other purposes. Pneumatic tyres, hose of various kinds, valve discs, paper machine rolls, clothes wringer rolls, rubber stoppers, insulated wire, universal joint parts, nursing nipples and milking machine parts may be mentioned as articles in which flexibility adds to the usefulness of the product.

Extensibility of rubber has been utilized as the dominantly valuable property in stationers' bands and in elastic webbing. Soft rubber compositions vary in extensibility to the breaking point, according to composition, up to 1,000% of the original length. Hard rubber compositions ordinarily stretch not over 20%. Absorption of shock is a valuable property in vehicle tyres, in shock-absorber cord for aeroplanes, in engine supports and shackles for automobiles, in heels, in matting and flooring and in steam hammer cushions. Resistance to diffusion of gases is utilized in air brake hose, balloons, vacuum hose, football bladders, tennis balls, jar rings for preserving foods, sealing of cans, gas masks for mines or chemical plants and in air mattresses and pillows. Waterproofness is one of the properties of rubber first recognized and adapted to human needs, even before vulcanization was discovered. Coats, capes, hats, footwear, gloves, aprons, diving clothing, bathing caps, hose, dental dam, etc., find their value in this property. On dry surfaces rubber exhibits an enormously high frictional resistance. Advantage is taken of this property in transmission belting, which transmits power satisfactorily under many conditions where leather belting can not be used, in pulley lagging for belt drives and for band saws, tyres, pencil erasers, non-slip footings for ladders and flooring. On wet surfaces, on the other hand, rubber compositions give rather low frictional resistance. This has led to the development of rubber bearings for propellor shafts and for deep well pumps where oil lubrication is difficult. Sealing rings in hydraulic pumps not only run with low frictional resistance but deliver water with greater operating efficiency. Rubber has replaced metal or lignum vitae for bearings in installations where silt in the water has caused rapid wear, rubber resisting the cutting action of the silt or sand far better than the other materials.

The electrical resistance of soft rubber insulation is well recognized. Gloves, rubber shoes of special construction and protective blankets for linemen are also serving useful purposes in the electrical industry. Hard rubber compositions are also used extensively for electrical purposes. Telephone receivers, many parts of telephone station equipment, insulators, plugs and sockets, storage battery containers, and many other articles are made of hard rubber. The heat conductivity of rubber is only about $\frac{1}{300}$ the conductivity of steel. Therefore, at temperatures not so high as to cause decomposition, it is a good heat insulator. Rubber-lined pipe for carrying hot distilled water has been used in preference to non-corrosive metal covered with heat insulating pipe lagging. Hard rubber sponge is an excellent heat insulator but its relatively high cost limits its use for this purpose. Resilience of rubber lends value in connection with some of the other properties already enumerated. Tyres, valve discs, universal joint equipment, nursing nipples, milking machine cups, golf balls, tennis balls, elastic webbing and aeroplane shock-

absorber cord, already mentioned, would be of little value if they were not resilient as well as possessing the other properties under which they are listed. Rubber compositions are used for resisting solvent or chemical action of many substances. Car-heating hose for railroad trains and steam hose for many industrial purposes, steam packing for flanged pipe joints or digestor heads exemplify the value of rubber in resisting the action of steam. Air hose, distillate (petroleum) hose and printing press rolls of rubber illustrate its use for resisting oil. Railroad and storage tanks lined with rubber are used for muriatic acid in any strength, for dilute sulphuric or phosphoric acids, and for aluminium sulphate solutions. Belts are used in canneries for carrying food products of various kinds and also in creameries where it is necessary to use rubber covers resistant to butter fat. Salt solutions of many kinds, which corrode metal, can safely be handled in rubber-lined equipment. Rubber-lined pipes and valves are now produced, permitting the installation of apparatus rubber-lined throughout. Hard rubber pumps, pipes and fittings, and metal apparatus lined with hard rubber serve the chemical industry for certain types of service where soft rubber is unsatisfactory. Hard rubber may be used at higher temperatures than soft rubber and will resist greater concentrations of corrosive materials. The tensile strength of soft rubber materials based on dimensions before stresses are applied will vary according to composition up to 4,500 lb. per square inch. Hard rubber compositions vary from 1,000 to 10,000 lb. per square inch. As already mentioned, however, rubber may be combined with other materials to secure articles of greater strength.

SYNTHETIC RUBBER

Synthetic rubber of properties and cost comparable with the natural product has long been sought. Laboratory studies produced rubber-like materials by polymerization of isoprene, dimethyl butadiene and other dienes, but it was not until 1916, when the Germans were unable to secure natural rubber, that a synthetic product was made for commercial use. Two varieties were made, methyl rubber *W* (*weich*) for soft rubber goods, and methyl rubber *H* (*hart*) for hard rubber compositions. Their method of production utilized lime and coke as the primary materials. These were heated in the electric furnace to form calcium carbide, which by the action of water yielded acetylene. Under proper conditions this reacted with water to form acetic acid. The other steps involved the formation in sequence of calcium acetate, acetone, pinacone and dimethyl butadiene by well-known chemical reactions. The dimethyl butadiene polymerized hot (five months at 70° C) yielded methyl rubber *W*, and polymerized cold (three months at 30° C) the methyl rubber *H*. Only about 2,400 tons were thus produced and manufacture of the products was discontinued as soon as natural rubber again became available. Synthetic rubbers deteriorate rapidly in air and must be preserved with antioxidants. The properties of the vulcanized mixtures lack the snap and resilience of those produced from natural rubber. There is no essential reason, from the commercial viewpoint, for demanding that synthetic rubber should have the same composition as the natural product. The production, at sufficiently low cost, of a product of proper *physical* properties is essential for ready adoption by the industry.

(J. W. Sc.)

RUBBER ACCELERATORS are substances which increase the rate or lower the temperature of the vulcanization of rubber (*see* RUBBER: PRODUCTION AND MANUFACTURE).

RUBBER SHOES. The manufacture of indiarubber galoshes, shoes, fishing boots, etc., forms an important branch of the indiarubber industry, especially in America, where rubber overshoes, colloquially known as "rubbers," are extensively worn, and where one factory alone produces fully 12,000 different styles and sizes. So far back as 1831 the Roxbury India Rubber Company was constituted to work the discovery that indiarubber dissolved in turpentine and mixed with lampblack formed a varnish which gave a hard waterproof surface when applied to leather, but the process failed because the varnish melted with heat and cracked with cold. This defect was remedied by Charles Goodyear (1800–60), who found that when sulphur was combined with the rubber by the aid of heat the product ("vulcanized rubber") was not only stronger but retained its elasticity through a wide range of temperature. His discovery, made in 1839, was the foundation of various American rubber industries including that of rubber boots and shoes. Guttapercha has also been used instead of leather for the outer soles of boots. Rubber footwear is manufactured from a combination of rubber and fabric parts. The U.S. census report for 1925 gives the following data for the industry in the United States: Rubber boots produced, 4,739,423 pairs; rubber shoes and overshoes, 52,338,782 pairs; rubber-soled canvas shoes, 24,999,932 pairs; with a total value of about $120,000,000.

RUBBER TYRE MANUFACTURE: *see* TYRE.

RUBBLE, broken stone, of irregular size and shape. This word is closely connected in derivation with "rubbish," which was formerly also applied to what we now call "rubble."

"Rubble-work" is a name applied to several species of masonry (*q.v.*). One kind, where the stones are loosely thrown together in a wall between boards and grouted with mortar almost like concrete, is called in Italian *muraglia di getto* and in French *bocage.*

RUBELLITE, a red variety of tourmaline (*q.v.*) used as a gem-stone. It generally occurs crystallized on the walls of cavities in coarse granitic rocks, where it is often associated with a pink lithia-mica (lepidolite). The most valued kinds are deep red; the colour being probably due to the presence of manganese. Some of the finest rubellite is found in Siberia. The mills at Ekaterinburg, where it is cut and polished, draw most of their supplies from the Urals—chiefly from Mursinka, Sarapulskaya and Shaitanka—but specimens are occasionally found at Nerchinsk in Transbaikalia. Burma is famous for rubellite; the pits which yield it are dug in alluvial deposits in the Mönglong valley, some miles to the S.E. of Mogok, the centre of the ruby country. Very fine rubellite is found in the United States, notably at Mount Mica, near Paris, Oxford Co., Maine, where the crystals are often red at one end and green at the other. Mount Rubellite, near Hebron, and Mount Apatite at Auburn, are other localities in the same State from which fine specimens are obtained. Chesterfield and Goshen, Mass., also yield red tourmaline, frequently associated with green in the same crystal. Pink tourmaline also occurs, with lepidolite and kunzite, in San Diego Co., California. In Europe rubellite occurs sparingly at a few localities, as at San Piero in Elba and at Penig in Saxony.

RUBENS, PETER PAUL (1577–1640), Flemish painter, was born at Siegen, in Westphalia, on June 29, 1577. His father, Johannes Rubens, a druggist, although of humble descent, was a man of learning, and councillor and alderman in his native town (1562). A Roman Catholic by birth, he adopted the Reformed faith, and we find him spoken of as *le plus docte Calviniste qui fust pour lors au Bas Pays.* After the plundering of the Antwerp churches in 1566, Johannes Rubens hastily quitted Spanish soil, ultimately settling at Cologne (October 1568) with his wife and four children.

Here he became legal adviser to Anne of Saxony, the second wife of the prince of Orange, William the Silent. Before long it was discovered that their relations were not purely of a business kind. Rubens was imprisoned at Dillenburg for two years, and after that he was confined to the small town of Siegen. Here he lived with his family from 1573 to 1578, and here Maria Pypelincx gave birth to Peter Paul. A year after (May 1578) he returned to Cologne, where he died on March 18, 1587.

Rubens went to Antwerp with his mother when he was scarcely ten years of age. He was an excellent Latin scholar. Part of his boyhood he spent as a page in the household of the countess of Lalaing at Audenarde but soon his mother allowed him to follow his proper vocation, choosing as his master Tobias Verhaecht, a landscape painter. From 1592–96 he worked under Adam Van Noort, whose aspect of energy is well known through Van Dyck's beautiful etching, the highly esteemed master of numerous painters —among them Jordaens, later his son-in-law. Rubens thereafter studied under Otto Vaenius of Van Veen, a gentleman by birth

and a court painter to archduke Albrecht, sovereign of the Spanish Netherlands. In 1598, Adam Van Noort acting as dean of the Antwerp gild of painters, Rubens was officially recognized as "master." His style at this early period may be judged from the "Annunciation" in the Vienna Museum.

Italian Period.—From 1600 to the latter part of 1608 Rubens belonged to the household of Vincenzo Gonzaga, duke of Mantua. The duke, who spent some time at Venice in July 1600, had his attention drawn by one of his courtiers to Rubens's genius, and induced him to enter his service. The influence of the master's stay at Mantua was of extreme importance to his artistic development. Sent to Rome in 1601, to take copies from Raphael for his master, he was also commissioned to paint several pictures for the church of Santa Croce, by archduke Albrecht. "St. Helena with the Cross," "The Crowning with Thorns" and "The Crucifixion" are to be found in the hospital at Grasse in Provence.

At the beginning of 1603, "The Fleming," as he was termed at Mantua, was sent to Spain with a variety of presents for Philip III. and his minister the duke of Lerma, and thus had opportunity to spend a whole year at Madrid and become acquainted with some of Titian's masterpieces. Among his own works, known to belong to the same period, in the Madrid Gallery, are "Heraclitus" and "Democritus." Of Rubens's abilities so far back as 1604 we get a more complete idea from an immense picture now in the Antwerp Gallery, the "Baptism of Our Lord," originally painted for the Jesuits at Mantua. Here may be seen the influence of Italian surroundings on the painter. Vigorous in design, he reminds us of Michelangelo, while in decorative skill he seems to be descended from Titian and in colouring from Giulio Romano. Executed simultaneously with this picture, were "The Transfiguration," now in the museum at Nancy, and the portraits of "Vincenzo and his Consort, kneeling before the Trinity," in the library at Mantua. To 1606 belong a large altar-piece of "The Circumcision" at St. Ambrogio at Genoa, the "Virgin in a Glory of Angels," and two groups of Saints, painted on the wall, at both sides of the high altar in the church of Santa Maria in Valicella in Rome.

Return to Antwerp.—While employed at Rome in 1608, Rubens received alarming news of his mother's health. He at once set out for the Netherlands. When he arrived in Antwerp, Maria Pypelincx was no more. His wish to return to Italy was overruled by the express desire of his sovereigns, Albrecht and Isabella, to see him take up a permanent residence in the Belgian provinces. On Sept. 23, 1609, Rubens was named painter in ordinary to their Highnesses, with a salary of 500 livres, and "the rights, honours, privileges, exemptions," etc., belonging to persons of the royal household, not to speak of the gift of a gold chain. Not least in importance for the painter was his complete exemption from all the regulations of the gild of St. Luke, entitling him to engage any pupils or fellow-workers without being obliged to have them enrolled—a favour which has been of considerable trouble to the historians of Flemish art. By order of the municipality he painted the first among the numerous repetitions of the "Adoration of the Magi," a picture in the Madrid Gallery, measuring 12 ft. by 17, and containing 28 life-size figures, many in gorgeous attire, warriors in armour, horsemen, slaves, camels, etc.

Apart from his success, another powerful motive had helped to detain the master in Antwerp—his marriage with Isabella Brant (Oct. 13, 1609). Many pictures have made us familiar with Isabella. We meet her at The Hague, Leningrad, Berlin, Florence, but more especially at Munich, where Rubens and his wife are depicted at full length on the same canvas. "His wife is very handsome," observes Sir Joshua Reynolds, "and has an agreeable countenance"; but the picture, he adds, "is rather hard in manner." This, it must be noted, is the case with all those pictures known to have immediately followed Rubens's return, when he was still dependent on the assistance of painters trained by others than himself. Even in the "Raising of the Cross," now in the Antwerp cathedral, and painted for the church of St. Walburga in 1610, the dryness in outline is striking. The picture is tripartite, but the wings only serve to develop the central composition, and add to the general effect. In Witdoeck's beautiful engraving the partitions disappear. Thus, from the first, we see Rubens quite determined upon having his own way, and it is recorded that, when he painted the "Descent from the Cross," "St. Christopher," the subject chosen by the Arquebusiers, was altered so as to bring the artistic expressions into better accordance with his views. Although the subject was frequently repeated by the great painter, this first "Descent from the Cross" has not ceased to be looked upon as his masterpiece. Begun in 1611, the celebrated work was placed in 1614. Rubens received 2,400 florins for this picture. In many respects, Italian influence remains conspicuous in the "Descent from the Cross." Rubens had seen Ricciarelli's fresco at the Trinità de' Monti, and was also acquainted with the grandiose picture of Baroccio in the cathedral of Perugia. But in Rubens strength of personality could not be overpowered by reminiscence; and the "Descent from the Cross" may be termed thoroughly Flemish.

If Sir Dudley Carleton could speak of Antwerp in 1616 as *Magna civitas, magna solitudo,* there was no place nevertheless which could give a wider scope to artistic enterprise. Spain and the United Provinces were for a time at peace; almost all the churches had been stripped of their adornments; monastic orders were powerful, and corporations eager to show the fervour of their Catholic faith, now that the "monster of heresy" seemed for ever quelled. Gothic churches began to be decorated according to the new fashion adopted in Italy. Altars magnified to monuments, sometimes reaching the full height of the vaulted roof, displayed, between their twisted columns, pictures of a size hitherto unknown. No master seemed better fitted to be associated with this kind of painting than Rubens. The church of St. Charles, erected by the reverend fathers in Antwerp, was almost entirely the painter's work, and if he did not, as we often find asserted, design the front, he certainly was the inspirer of the whole building. Hitherto no Fleming had undertaken to paint ceilings with foreshortened figures, and blend the religious with the decorative art after the style of those Italian buildings which owe their decorations to masters like Titian, Veronese and Tintoretto. Thirty-nine ceiling-panels were composed by Rubens, and painted under his direction in the space of two years. All were destroyed by fire in 1718.

Rubens delighted in undertakings of the vastest kind. "The large size of a picture," he writes to W. Trumbull in 1621, "gives us painters more courage to represent our ideas with the utmost freedom and semblance of reality. . . . I confess myself to be, by a natural instinct, better fitted to execute works of the largest size." The correctness of this appreciation he demonstrated by a series of twenty-four pictures, illustrating the life of Marie de' Medici, queen-mother of France. The gallery at the Luxembourg Palace, which these paintings once adorned, has long since disappeared, and the complete work is now exhibited in the Louvre. The sketches of all these paintings—now in the Munich Gallery—were painted in Antwerp, a numerous staff of distinguished collaborators being entrusted with the final execution. But the master himself spent much time in Paris, retouching the whole work, which was completed within less than four years. On May 13, 1625, Rubens writes from Paris to his friend Peiresc that both the queen and her son are highly satisfied with his paintings, and that Louis XIII. came on purpose to the Luxembourg, "where he never has set foot since the palace was begun sixteen or eighteen years ago." We also gather from this letter that the picture representing the "Felicity of the Regency" was painted to replace another, the "Departure of the Queen," which had caused some offence. Richelieu gave himself some trouble to get part of the work, intended to represent the life of Henry IV., bestowed upon Cavalier d'Arpina, but did not succeed. The queen's exile, however, prevented the undertaking from going beyond a few sketches, and two or three panels, one of which the "Triumph of Henry IV.," now in the Uffizi Gallery, is one of the noblest works of Rubens or of any master.

Rubens's comprehension of religious decorative art is disclosed in the "Assumption of the Virgin" at the high altar of Antwerp cathedral, finished in 1626. Every outline is bathed in light, so that the Virgin is elevated to dazzling glory. Rubens penetrates

into the spirit of his subjects more deeply than, at first sight, seems consistent with his prodigious facility in execution. The "Massacre of the Innocents," in the Munich Gallery, is a composition that can leave no one unmoved.

Diplomatic Activity.—In the midst of his activity as a painter, Rubens was now engaged on diplomatic business. The truce concluded between Spain and the Netherlands in 1609 ended in 1621; Archduke Albrecht died the same year. His widow wished to prolong the arrangement, still hoping to see the United Provinces return to the Spanish dominion, and in her eyes Rubens was the fittest person to bring about this conclusion. The French ambassador writes from Brussels in 1624—"Rubens is here to take the likeness of the prince of Poland, by order of the infanta. I am persuaded he will succeed better in this than in his negotiations for the truce." But, if Rubens failed to bring about an arrangement with the Netherlands, other events enabled him to render service to the state.

Rubens and Buckingham met in Paris in 1625; a correspondence of some importance had been going on between the painter and the Brussels court, and before long it was proposed that he should endeavour to bring about a final arrangement between the Crowns of England and Spain. The infanta willingly consented, and King Philip acceded on hearing that the negotiator on the English side, Sir Balthasar Gerbier—a Fleming by birth—was likewise a painter. Rubens and Gerbier met in Holland, and Rubens volunteered to go to Spain and lay before the council the result of his negotiations (1628). The nine months then spent at Madrid rank among the most important in Rubens's career. He had brought with him eight pictures as presents from the infanta, and he was also commissioned to paint several portraits of the king and royal family. Philip delighted to see Rubens at work in the studio prepared for him in the palace, where he not only left many original pictures, but copied for his own pleasure and profit the best of Titian's. In Spain Rubens and Velazquez met, to the delight and advantage of both.

The king now commissioned Rubens to go to London as bearer of his views to Charles I., and the painter, honoured with the title of secretary of the king's privy council in the Netherlands, arrived in London just as peace had been concluded with France. He induced Charles to engage in no undertakings against Spain so long as the negotiations remained unconcluded, and he remained immovable in this resolution. The tardiness of the Spanish court in sending a regular ambassador involved the unfortunate painter in distressing anxieties, and the tone of his despatches is very bitter. But he speaks with the greatest admiration of England. On September 23, 1629, the University of Cambridge conferred upon him the honorary degree of master of arts, and on February 21, 1630, he was knighted. During his stay in England Rubens, besides his sketches for the decoration of the Banqueting Hall at Whitehall, painted the admirable picture of "The Blessings of Peace" now in the National Gallery.

Rubens was now fifty-three years of age, he had been four years a widower, and in December 1630 he contracted a second marriage with a beautiful girl of sixteen, named Helena Fourment. She was an admirable model, and often appears in his works.

Later Works.—Rubens's return was followed by an almost incredible activity. Inspired more than ever by the glorious works of Titian, he now produced some of his best paintings. Brightness in colouring, breadth of touch and pictorial conception, are specially striking in these later works. Could anything give a higher idea of Rubens's genius than, for example, the "Feast of Venus," the portrait of "Helena Fourment ready to enter the Bath," or the "St. Ildefonso" in the Vienna gallery?

Isabella died in 1633, and we know that to the end Rubens remained in high favour with her, alike as an artist and as a political agent. The painter was one of the gentlemen she deputed to meet Marie de' Medici at the frontier in 1631, after her escape from France.

Ferdinand of Austria, the cardinal-infant of Spain, the new governor of the Netherlands, arrived at Antwerp in May 1635. The streets had been decorated with triumphal arches and "spectacula," arranged by Rubens. Several of the paintings detached from the arches were offered as presents to the new governor-general, which accounts for the presence of many of these works in public galleries (Vienna, Dresden, Brussels, etc.). The painter was confirmed in his official standing. The last years of his life, however, were employed in working much more for the king than for his brother. About a hundred and twenty paintings of considerable size left Antwerp for Madrid in 1637, 1638 and 1639; they were intended to decorate the pavilion erected at the Pardo, and known under the name of Torre de la Parada. Another series had been begun, when Ferdinand wrote to Madrid that the painter was no more, and Jordaens would finish the work. Rubens breathed his last on May 30, 1640.

Rubens left the world in the midst of his glory. Not the slightest failing of mind or skill can be detected even in his latest works, such as the "Martyrdom of St. Peter" at Cologne, the "Martyrdom of St. Thomas" at Prague, or the "Judgment of Paris" at Madrid, where his young wife appears for the last time.

Rubens was a Fleming throughout, notwithstanding his frequent recollections of those Italian masters whom he most admired. But it must be borne in mind how completely his predecessors were frozen into stiffness through italianization, and how necessary it was to bring back the Flemish school to life and nature. In no other school do we find these animated hunts of lions, tigers, and even the hippopotamus and the crocodile, in which life and nature are displayed with the utmost power. "His horses are perfect in their kind," says Reynolds; his dogs are of the strong Flemish breed, and his landscapes the most charming pictures of Brabantine scenery, in the midst of which lay his seat of Steen. As a portrait painter, he shows Van Dyck the way; and his pure fancy subjects, as the "Garden of Love" (Madrid and Dresden) and the "Village Feast" (Louvre), have never been equalled.

Paintings by Rubens are found in all the principal galleries in Europe.

In America, the Metropolitan Museum of Art contains his "Return of the Holy Family from Egypt," "The Holy Family," and others; the Frick Collection, also in New York City, has his "Ambrose Spinola." The Cleveland Museum of Art contains his "Triumph of the Holy Sacrament over Folly"; the Joseph Widener Collection, Philadelphia, his "Rape of the Sabine Women"; the Detroit Institute of Arts, his "Abigail Meeting David with Presents"; and the Gardner Museum, Boston, his "Thomas Howard, Earl of Arundel."

LITERATURE.—E. Gachet, *Lettres inédites de P. P. Rubens* (Brussels, 1840); W. Noel Sainsbury, *Original Unpublished Papers concerning Rubens in the State Paper Office* (1859); A. Michiels, *Rubens et l'école d'Anvers* (1877); Gachard, *Histoire politique et diplomatique de P. P. Rubens* (Brussels, 1877); Max Rooses, *Titres et portraits gravés d'après P. P. Rubens, pour l'imprimerie plantinienne* (Antwerp); *L'oeuvre de P. P. Rubens* (5 vols. Antwerp, 1886–92); *Rubens* (English trans. 1904); Max Rooses and Rubens, *Codex Diplomaticus Rubenianus* (Antwerp, 1887); J. Smith, *Catalogue raisonné of the Works of the most eminent Dutch and Flemish Painters* (1842); Waagen, *Peter Paul Rubens* (trans. by R. Noel, 1840); H. Hymans, *Histoire de la gravure dans l'école de Rubens* (Brussels, 1879); C. G. Voorhelm Schneevoogt, *Catalogue des estampes gravées d'après Rubens* (Haarlem, 1873); R. A. M. Stevenson, *P. P. Rubens* (Portofolio Monograph, 1898); Émile Michel, *Rubens: his Life, his Work and his Time* (1899); H. Knackfuss, *Rubens* (English trans. 1904) and E. Dillon, *Rubens* (1909); R. Oldenbourg, *P. P. Rubens, Abhandlungen, etc.* (1922). For illustrations of his paintings *see* A. Rosenberg, *P. P. Rubens* (Klassiker der Kunst, Leipzig, 1906); and of his drawings G. Glück and F. M. Haberditzl, *Die Handzeichnungen von U. Rubens* (1928).

(H. Hy.; X.)

RUBIACEAE, in botany, a large family of seed plants, belonging to the series Rubiales of the subclass Sympetalae (Gamopetalae) of dicotyledons, and containing about 450 genera with about 5,500 species. It is mainly a tropical family of trees, shrubs and herbs, but some of the tribes, especially Galieae, to which the British representatives belong and which contains only herbs, are more strongly developed in temperate regions; some species of *Galium* reach the Arctic zone.

The most striking characteristic of the family are the opposite-decussate, generally entire, stipulate leaves. The stipules are very varied in form; they generally stand between the petiols of a pair of leaves (interpetiolar). The two stipules of adjacent leaves are usually united, and in the Galieae, as well shown in the British

species, are enlarged and leaf-like, forming with the two leaves an apparent whorl; by fusion or branching of the stipules the number of leaves in the whorl varies from four to eight or more. The flowers are mostly arranged in cymes or panicles or crowded into heads, and are frequently showy. The flowers are hermaphrodite and regular with parts in fours or fives; the four or five sepals, petals and stamens are placed above the ovary, which consists of two carpels and is crowned by a simple style usually ending in a head or in two lobes. The sepals are often small, sometimes reduced to a narrow ring encircling the top of the ovary or altogether absent. The united petals form a corolla which varies widely in form in the different genera; it is often funnel- or salver-shaped. The stamens are fixed to the corolla-tube and alternate in position with its segments; the flowers are often dimorphic (or heterostyled) with short-styled and long-styled forms.

The fruit also varies widely in form and is dry or fleshy. When dry it forms a capsule with septicidal or loculicidal dehiscence or is a schizocarp separating when dry into two one-seeded mericarps which, as in the British cleavers (*Galium Aparine*), sometimes bear hooked appendages which aid their dispersal.

The family is divided into a large number of tribes based on the number of ovules in each ovary-chamber, the character of the fruit seed and ovule, and the aestivation of the corolla. These may be arranged in two classes as follows:—

Cinchonoideae, often woody plants with scale-like stipules, and numerous ovules in each ovary-chamber; the fruit is generally a capsule. To this belong *Cinchona* (*q.v.*), a genus of large trees with handsome flowers containing about 40 species in the Andes of South America—it is well known as a source of quinine. An allied genus, *Bouvardia* (*q.v.*), is cultivated for its flowers.

Coffeoideae, often woody or shrubby plants with scale-like stipules; each ovary-chamber contains only a single ovule. *Coffea,* a genus of shrubs with about 45 species in the Old World tropics, includes the coffee plant (*C. arabica* and *C. liberica*); the fruit is a two-seeded drupe, the seed is the "coffee-bean." The thickened root of *Uragoga Ipecacuanha* yields ipecacuanha. In this class is the tribe *Stellateae,* herbaceous plants with leaf-like stipules; each ovary-chamber contains one ovule only. Includes the four British genera: *Rubia,* one species of which, *R. tinctorum,* is madder; *Galium,* including *G. verum* (lady's bedstraw), *G. Aparine* (goose-grass or cleavers), and other British species; *Asperula,* including *A. odorata* (woodruff) and *Sherardia.*

The most common representatives in eastern North America are *Galium* (cleavers, goose grass, wild licorice, etc.), *Houstonia* (bluets, innocence), and *Mitchella* (partridge berry). In western North America, in addition to a few species of *Galium,* the genus *Kelloggia* is very characteristic.

RUBICON, a small stream of ancient Italy, which flowed into the Adriatic between Ariminum and Caesena, and formed the boundary between Italy and the province of Cisalpine Gaul in Republican times, while Augustus adopted the Marecchia, a few miles farther south. Hence Caesar's crossing of it in 49 B.C. meant a declaration of war against Pompey and the Senate. The historic importance of this event gave rise to the phrase "crossing the Rubicon" for a step which definitely commits a person to a given course of action. Its upper course is represented by that of the Pisciatello (called Rubigone in the 11th or 12th century and now Rugone or Urgone), and its lower portion by the Fiumicino, which the Urgone once joined. The point was marked by a station on the Via Aemilia below their confluence, 12 m. N.W. of Ariminum, bearing the name *ad Confluentes;* and here is still preserved a three-arched bridge.

RUBIDIUM, a metallic element belonging to the group of the alkali metals (symbol Rb, atomic number 37, atomic weight 85·44). It is found in the minerals lepidolite, petalite and in various specimens of mica and of carnallite, and in some mineral waters. It also occurs in tea, cocoa, coffee, tobacco and in the ashes of beetroot. It was discovered by R. Bunsen and Kirchhoff (1860) in the spectroscopic examination of the residues obtained on evaporation of water from a mineral spring at Dürkheim, being characterized by two distinctive red lines. The best source of rubidium salts is the residue left after extracting lithium salts from lepidolite, the method of separation being based on the different solubilities of the platinichlorides of potassium, rubidium and caesium in water. A somewhat similar process based on the varying solubilities of the corresponding alums has also been devised by Redtenbacher (1865). The metal is prepared by distilling the carbonate with carbon (an explosive compound similar to that obtained from potassium and carbon monoxide is liable to be formed simultaneously); by reducing the hydroxide with aluminium: $4RbOH+2Al=Rb_2OAl_2O_3+2Rb+2H_2$; by reducing the carbonate or the hydroxide with magnesium; and by heating the fused chloride with calcium in an exhausted glass tube at 400–500° C. The metal was first obtained electrolytically in 1910 by electrolysing the fused hydroxide in a nickel vessel, with an iron wire cathode and iron cylinder anode; the product on cooling being opened under pyridine cooled by a freezing mixture (G. von Hevesy). It is a silvery white metal which melts at 39° C, boils at 696°, and has a specific gravity of 1·52. It oxidizes rapidly on exposure to air, and decomposes cold water very rapidly. It closely resembles caesium and potassium in its general properties. The rubidium salts are generally colourless, mostly soluble in water and crystallographically are similar to the corresponding potassium and ammonium salts, especially the latter. The acid tartrate is very sparingly soluble.

Rubidium hydride, RbH, was obtained in the form of colourless needles by H. Moissan from the direct combination of its constituent elements. It rapidly dissociates when heated *in vacuo* to 300° C. Several oxides have been described; the composition depends upon the conditions of oxidation and is doubtful in the case of Rb_2O and Rb_2O_3 but is well substantiated for Rb_2O_2 and Rb_2O_4. Rubidium hydroxide, RbOH, is a colourless solid which is formed by the action of rubidium on water, or by the addition of baryta water to a solution of rubidium sulphate. It is readily soluble in water, the solution being very alkaline and caustic. It melts at 301°. Evaporation of the aqueous solution at 15° C deposits a crystalline hydrated hydroxide of composition $RbOH{\cdot}2H_2O$. Rubidium chloride, RbCl, is formed on burning rubidium in chlorine, or on dissolving the hydroxide in aqueous hydrochloric acid. It crystallizes in colourless cubes and volatilizes when heated very strongly. It is soluble in water and combines with many metallic chlorides to form double salts.

RUBINSTEIN, ANTON GRIGOROVICH (1829–1894), Russian pianist, born of Jewish parentage on Nov. 28, 1829 at Wechwotynetz, Podolia, was the son of a pencil manufacturer who migrated to Moscow. Besides his mother Anton had but one teacher, the piano master Alexander Villoing, of whom he declared at the end of his own career that he had never met a better. In July 1838 Rubinstein appeared in the theatre of the Petrowski Park at Moscow; and in the following years in the principal centres of Europe, including London. He then studied in Berlin and Vienna. The years 1848 to 1854 were spent in St. Petersburg in performing and composing. His opera *Dmitri Donskoi* was produced there in 1851, and *Toms der Narr* in 1853. *Die Sibirischen Jäger,* written about the same time, was not produced. In 1857 he paid his second visit to London where, at a Philharmonic concert he introduced his own concerto in G. In the following year he was in London again, having in the meantime been appointed Concert Director of the Royal Russian Musical Society. In 1862, in collaboration with Carl Schuberth, he founded the St. Petersburg Conservatorium, of which he was director until 1867, and again from 1887 to 1890. For twenty years from 1868 he made prolonged concert tours in Europe and America, enjoying prodigious success wherever he went and being accounted by some the superior even of Liszt. He died on Nov. 20, 1894. Rubinstein left compositions in almost every known form. But it is as one of the greatest of all pianists that he will be remembered.

His brother NICHOLAS RUBINSTEIN (1835–1881) was also a fine pianist. He founded the Moscow Conservatorium in 1864, and was its director until his death. There he founded a school of piano-playing which produced many great artists.

See Anton Rubinstein's own *Autobiography* (Eng. trans., 1890) and monographs by Bernhard Vogel, Alexander MacArthur, Eugen Zabel and Anton von Halten, W. Baskin and U. Lissowski.

RUBRUQUIS (or RUBROUCK), **WILLIAM OF** (*c.* 1215–1270; *fl.* 1253–55), Franciscan friar, one of the chief mediaeval travellers and travel-writers. Nothing is known of him save what can be gathered from his own narrative, and from Roger Bacon, his contemporary and brother Franciscan. The name of Rubruquis ("Fratris Willielmi de Rubruquis," probably meaning "of Rubrouck," Flanders) is found in the imperfect ms. printed by Hakluyt in his collection, and followed in his English translation, as well as in the completer issue of the English by Purchas. (*Itinerarium fratris Willielmi de Rubruquis de ordine fratrum Minorum*, Galli, *Anno gratiae* 1253, *ad partes Orientales.*)

Friar William went to Tartary under orders from Louis IX. (St. Louis). That king, at an earlier date, viz., December 1248, when in Cyprus, had been visited by alleged envoys from Elchigaday (Ilchikadai, Ilchikdai), who commanded the Mongol hosts in Armenia and Persia. The king then despatched a return mission consisting of Friar Andrew of Longjumeau or Lonjumel and other ecclesiastics, who carried presents and letters for both Ilchikadai and the Great Khan. They reached the court of the latter in the winter of 1249–50, when there was no actual khan on the throne; and they returned, along with Tatar envoys, bearing a letter to Louis from the Mongol regent-mother which was couched in terms so arrogant that the king repented sorely of having sent such a mission. The envoys reached the king at Caesarea, between March 1251 and May 1252. But not long after the king, hearing that the Tatar prince Sartak, son of Batu, was a "baptized Christian," felt moved to open communication with him, and for this purpose deputed Friar William of Rubrouck. The former rebuff had made the king chary of sending formal embassies, and Friar William on every occasion, beginning with a sermon delivered in St. Sophia's on Palm Sunday (*i.e.*, April 13) 1253, disclaimed that character.

Friar William apparently received his commission at Acre, but he travelled by way of Constantinople and there received letters to some of the Tatar chiefs from the emperor, Baldwin de Courtenay, the last of the Latin dynasty.

Rubrouck and his party landed at Soldaia, or Sudak, on the Crimean coast, then a centre of intercourse between the Mediterranean world and what is now S. Russia. Equipped with horses and carts for the steppe, they travelled successively to the courts (*i.e.*, the nomad camps) of Scacatai (Kadan?), Sartak and Batu, thus crossing the Don and arriving at the Volga: of both these rivers Friar William gives vivid and interesting sketches. Batu Khan (*q.v.*) kept the travellers for some time in suspense, and then referred them to the Great Khan himself, an order involving the enormous journey to Mongolia. The actual travelling of the party from the Crimea to the khan's court near Karakorum cannot have been, on a rough calculation, less than 5,000 m., and the return journey to Lajazzo in Cilicia would be longer by 500 to 700 m. The envoys embarked on the "Euxine" on May 7, 1253. They were at the camp of the Great Khan from Dec. 27, 1253, to about July 10, 1254. They reached Tripoli on the way home on Aug. 15, 1255.

Roger Bacon, in the geographical section of the *Opus Maius* (*c.* 1262), cites the traveller repeatedly and copiously, describing him as "frater Wilhelmus quem dominus rex Franciae misit ad Tartaros, Anno Domini 1253 . . . qui perlustravit regiones orientis et aquilonis et loca in medio his annexa, et scripsit haec praedicta illustri regi; quem librum diligenter vidi et cum eius auctore contuli." (See *Opus Maius*, Oxford edition of 1897, i. 353–66.) Add to this William's own incidental particulars as to his being—like his precursor, Friar John de Plano Carpini—a very heavy man (*ponderosus valde*), and we know no more of his personality, except the abundant indications of character afforded by the story itself. These paint for us an honest, pious, stout-hearted, acute and most intelligent observer, keen in the acquisition of knowledge, the author of one of the best narratives of travel in existence. His language indeed is dog-Latin of the most un-Ciceronian quality; but it is in his hands a pithy and transparent medium of expression. In spite of all the difficulties of communication, and of the badness of his *turgemannus* or dragoman, he gathered a mass of particulars, wonderfully true or near the truth, not only as to Asiatic nature, geography, ethnography and manners, but as to religion and language.

The narrative of Rubrouck, after Roger Bacon's copious use of it, seems to have dropped out of sight, though five mss. are still known to exist: the chief of these are (1) Corp. Chr. Coll., Cambridge, No. 66, fols. 67 v.–110 v. of about 1320; (2) No. 181 of the same library, fols. 321–98, of about 1270–90; (3) Leiden Univ. Libr., No. 77 (formerly 104), fols. 160 r.–190 r. of about 1290. It has no place in the famous collections of the 14th century. It first appeared imperfectly in Hakluyt (1598 and 1599), as we have mentioned. *See* the two editions in the Hakluyt Society's publications, (i.) *William of Rubrouck . . . John of Pian de Carpine*, trans. and edited by William W. Rockhill (London, 1900); (ii.) *Texts and Versions of . . . Carpini and . . . Rubruquis . . .*, edited by C. Raymond Beazley (London, 1903). *See* also Beazley, *Dawn of Modern Geography*, ii. 266, 278–79, 281, 298–99, 303, 320–82, 421, 449–52; iii. 17–18, 31–32, 46, 69, 84–85, 88, 98, 101, 105, 188, 336–37, 544.

RUBY, the most valued of all gem-stones, a red transparent variety of corundum, or crystallized alumina (Lat. *rubeus*, red). It is sometimes termed "oriental ruby" to distinguish it from the spinel ruby (*q.v.*), which is a stone of inferior hardness, density and value.

The ruby crystallizes in the rhombohedral system (*see* CORUNDUM); the crystals have no true cleavage, but tend to break along certain gliding planes. The colour varies from deep cochineal to pale rose-red, in some cases, with a tinge of purple, the most valued tint being that called by experts pigeon's-blood colour. The oriental ruby is a mineral of very limited distribution. It most famous localities are in Upper Burma, principally in the neighbourhood of Mogok, 90 m. N.N.E. of Mandalay. It occurs in bands of a crystalline limestone, associated with granitic and gneissose rocks, some of which are highly basic; the limestone also contains spinel, garnet, graphite, wollastonite, scapolite, felspar, mica, pyrrhotite and other minerals. The ruby, like other kinds of corundum, suffers alteration under certain conditions, and passes by hydration into gibbsite and diaspore, which by further alteration and union with silica, etc., may yield margarite, vermiculite, chlorite and other hydrous silicates.

Rubies have been produced artificially (*see* GEMS, ARTIFICIAL) with much success. It was once the practice to make "reconstructed rubies" by fusing together small fragments of the natural stone; but this process has given way to Prof. A. Verneuil's method of forming artificial ruby from purified ammonia-alum with a certain proportion of chrome-alum. The finely powdered material is caused to fall periodically into an oxyhydrogen flame, the heat of which decomposes the alum, and the alumina thus set free forms liquid drops which collect and solidify as a pear-shaped mass. When of the characteristic pigeon's-blood colour, the synthetical ruby contains about 2·5% of chromic oxide. The manufactured ruby possesses the physical characters of corundum, but may generally be distinguished by microscopic bubbles and striae. The manufacture of synthetic rubies is carried out commercially.

RÜCKER, SIR ARTHUR (1848–1915), English physicist, was born at Clapham on Oct. 23, 1848, and educated at Clapham grammar school and Brasenose college, Oxford. He became professor of mathematics and physics at the Yorkshire college, Leeds, in 1874, and professor of physics at the Royal College of Science in 1886. In 1901 he was appointed principal of the University of London. He was a secretary of the Royal Society from 1896 to 1901, receiving its Royal medal in 1891, and was knighted in 1902. He died at Newbury, Berks., on Nov. 1, 1915. Rücker's most important work in physics was a magnetic survey of the British Isles carried out in conjunction with Professor T. E. Thorpe; the results were published in a series of papers between 1883 and 1890. In conjunction with Professor Reinold he carried out investigations on thin liquid films; their work was published between 1877 and 1893. Rücker also made contributions to the theory of direct current dynamos and motors.

RŪDAGĪ (d. 954). Farīd-eddīn Mohammed ʿAbdallāh, the first great literary genius of modern Persia, was born in Rūdag, a village in Transoxiana, about 870–900. Most of his biographers assert that he was totally blind, but the accurate knowledge of colours shown in his poems makes this very doubtful. The fame

of his accomplishments reached the ear of the Sāmānid Nasr II. bin Ahmad, the ruler of Khurāsān and Transoxiana (913–42), who invited the poet to his court. Of the 1,300,000 verses attributed to Rūdagī, there remain only 52 kasīdas, ghazals and rabā'īs; of his epic masterpieces we have nothing beyond a few stray lines in native dictionaries. But the most serious loss is that of his translation of Ibn Mokaffa's Arabic version of the old Indian fable book *Kalilah and Dimnah*. Fragments are preserved in the Persian lexicon of Asadī of Tus (ed. P. Horn, Göttingen, 1897).

There is a complete edition of all the extant poems of Rūdagī, in Persian text and metrical German translation, together with a biographical account, based on forty-six Persian mss., in Dr. H. Ethé's "Rūdagī der Sāmānidendichter" (*Göttinger Nachrichten*, 1873, pp. 663–742); *see* also his "Neupersische Literatur" in Geiger's *Grundriss der iranischen Philologie* (ii.); P. Horn, *Gesch. der persischen Literatur* (1901), p. 73; E. G. Browne, *Literary History of Persia*, i. (1902); C. J. Pickering, "A Persian Chaucer" in *National Review* (May 1890).

RUDD (*Scardinius erythrophthalmus*), a Cyprinid fish of Europe and western and northern Asia, deep-bodied, with reddish fins, and with the dorsal fin farther back than in the roach. It reaches a length of 18 in. and a weight of 3½ pounds.

RUDDER, that part of the steering apparatus of a ship which is fastened to the stern outside, and on which the water acts directly (O.E. *Rother, i.e.,* rower). The word may be found to be used as if it were synonymous with "helm." But the helm (A.S. *Hillf,* a handle) is the handle by which the rudder is worked. The tiller, which is perhaps derived from a provincial English name for the handle of a spade, has the same meaning as the helm. In the earliest times a single oar, at the stern, was used to row the vessel round. In later times oars with large blades were fixed on the sides near the stern. In Greek and Roman vessels two sets were sometimes employed, so that if the pitching of the ship lifted the after pair out of the water, the foremost pair could still act. As these ancient ships were, at least in some cases, sharp at both ends and could sail either way, steer (or steering) oars were fixed both fore and aft. The steer oar in this form passed through a ring on the side and was supported on a crutch, and was turned by a helm, or tiller. Norse and mediaeval vessels had, as far as we can judge, one steer oar only placed on the right side near the stern—hence the name "starboard," *i.e.,* steerside, for the right side of the ship looking forward. In the case of small vessels the steer oar possesses an advantage over the rudder, for it can bring the stern round quickly. Therefore it is still used in whaling boats and rowing boats which have to work against wind and tide, and in surf when the rudder will not act. The side rudder was generally displaced by the stern rudder in the 14th century. (*See* SHIPBUILDING.)

RÜDESHEIM, a town in the Prussian province of Hesse-Nassau, on the Rhine, 19 m. S.W. of Wiesbaden. Pop. (1925) 4,394. It lies at the lower end of the vineyard district of the Rheingau, opposite Bingen and just above the gorge of the Rhine, and is a popular tourist centre. Rüdesheim has some interesting towers: the Brömserburg, or Niederburg (13th century), formerly belonging to the archbishops of Mainz; the Boosenburg, or Oberburg; the Adlerturm, a relic of the fortifications of the town; and the Vorderburg, the remains of an old castle.

RUDINÌ, ANTONIO STARABBA, MARQUIS DI (1839–1908), Italian statesman, born at Palermo on April 6, 1839, joined the revolutionary committee in 1859. After spending a short time at Turin as attaché to the Italian foreign office he was elected mayor of Palermo. In 1866 he quelled a separatist insurrection. He was then appointed prefect of Palermo, and put down brigandage throughout the province; in 1868 he was prefect of Naples. In October 1869 he became minister of the interior in the short-lived Menabrea cabinet. On the death of Minghetti in 1886, he became leader of the Right. Early in 1891 he succeeded Crispi as premier and minister of foreign affairs by forming a coalition cabinet with a part of the Left under Nicotera; his administration initiated the economies by which Italian finances were put on a sound basis, and also renewed the Triple Alliance. He was overthrown in May 1892 by a vote of the Chamber and succeeded by Giolitti. Upon the return of his rival, Crispi, to power in December 1893, he resumed political activity, allying himself with the Radical leader, Cavallotti. The crisis consequent upon the disaster of Adowa (March 1, 1896) brought Rudinì back to power as premier and minister of the interior in a cabinet formed by the veteran Conservative, General Ricotti. He concluded peace with Abyssinia, but endangered relations with Great Britain by the unauthorized publication of confidential diplomatic correspondence in a Green-book on Abyssinian affairs. To satisfy the anti-colonial party he ceded Kassala to Great Britain, provoking thereby much indignation in Italy. He was overthrown in June 1898. His conduct of affairs had gravely divided his party. He died on Aug. 6, 1908, leaving a son, Carlo, who married a daughter of Henry Labouchere.

RUDOLF (otherwise known as BASSO NOROK and GALLOP), a large lake of eastern equatorial Africa, forming the centre of an inland drainage system, occupying the south of the Abyssinian highlands and a portion of the great equatorial plateau. The lake itself lies towards the north of the great East African rift valley, between 2° 26′ and 5° N., while the meridian of 36° E. passes through the lake. The lake is in part in Uganda, in Kenya, in Abyssinia and in Anglo-Egyptian Sudan. The length along the curved axis is 185 m., the maximum width 37 m. Its altitude is 1,250 ft. Towards the south it is deep, but comparatively shallow in the north. Its water is brackish, but drinkable. The country bordering the lake on almost every side is composed of Archaean metamorphic rock and is sterile and forbidding. The southern end is shut in by high cliffs—the escarpments of a rugged lava-strewn country, which shows abundant signs of volcanic activity. In particular, the great Teleki volcano stands at the southern end of the lake. The highest point of the south-east side of the lake is Mt. Kulal, 7,812 ft., while the culminating height within the basin of the lake is Mt. Sil, 9,280 ft., which lies about 20 m. south of Lubburua. Farther north, on the west side, sandy plains alternate with lines of low hills. Lagoons cut off from the lake are the haunt of great numbers of water-birds. In 3° 8′ N. the dry bed of the Turkwell approaches the lake. Near the northern end mountains again approach the shores, the most prominent being Mt. Lubur (5,200 ft.), an extinct volcano with a well-preserved crater. At the extreme north-west a bay some 35 m. long (Sanderson gulf) is almost separated from the rest of the lake by two long points of land On the east side, open arid plains, with few trees, occupy most of the north country. One hill, in 3° 20′ N., has a height of 3,470 ft., and at the north-east end, separating the lake from Lake Stefanie, is a hilly country, the highest point between the lakes being 3,524 ft. Immediately north of these hills rises the Hummurr range, with one peak exceeding 7,000 ft. Near the south end is the volcanic island of Elmolo, 10 m. long, and there are a few small islets. Just north of 4° N. is a small volcanic island with highest point 2,100 ft. At the north end of the lake a level swampy plain is traversed by various arms of the lake and by the Nianam river (identical with the Omo). Lake Rudolf was discovered in 1888 by Count Samuel Teleki and Lieutenant Ludwig von Höhnel.

BIBLIOGRAPHY.—Ludwig von Höhnel, *Discovery of Lakes Rudolf and Stefanie* (London, 1894); A. Donaldson Smith, *Through Unknown African Countries* (London, 1897); L. Vannutelli and C. Citerni, *L'Omo* (Milan, 1899); M S. Wellby, *'Twixt Sirdar and Menelik* (London, 1901); H. H. Austin, *Among Swamps and Giants in Equatorial Africa* (1902); C. H. Stigand, *To Abyssinia through an Unknown Land* (1910); and the reports of the Colonial office (annual).

RUDOLPH II. (1552–1612), Roman emperor, son of the emperor Maximilian II. by his wife Maria, daughter of the emperor Charles V., was born in Vienna on July 18, 1552. In 1563 he was sent to Spain, where he was educated. In 1572 he was crowned king of Hungary, in 1575 king of Bohemia; and in Oct. 1575 he was chosen German king, at Regensburg, becoming emperor on his father's death in Oct. 1576

The more active part of the emperor's life was the period from his accession to about 1597. During that time he attended the infrequent imperial diets, and took an interest in the struggle in the Netherlands and the defence of the empire against the Turks. He was at times suspicious of the papal policy, while his relations with Spain were somewhat inharmonious. He forwarded the progress of the counter-reformation, and in general the tolerant

policy of Maximilian II. was reversed. Political as well as religious privileges were attacked; and discontent became very pronounced about the opening of the 17th century. Meanwhile Rudolph had become increasingly subject to attacks of depression, which bordered on insanity. In 1604, after a war with Turkey had been in progress since 1593, many of the Hungarians rebelled against Rudolph and chose Stephen Bocskay as their prince. In April 1606 the Habsburg family declared Rudolph incapable of ruling, and recognized one of his younger brothers, the archduke Matthias, afterwards emperor, as their head; and in the following June Matthias, having taken over the conduct of affairs, made peace by granting extensive concessions to the rebellious Hungarians, and concluded a treaty with the sultan in November of the same year. Then shaking off his lethargy Rudolph prepared to renew the war with the Turks, a move which Matthias met by throwing himself upon the support of the national party in Hungary. Matthias also found adherents in other parts of his brother's dominions, with the result that in June 1608 the emperor was compelled to cede to him the kingdom of Hungary together with the government of Austria and Moravia. Rudolph now sought the aid of the princes of the empire, and even of the Protestants; but he had met with no success in this direction when trouble arose in Bohemia. Having at first rejected the demand of the Bohemians for greater religious liberty, the emperor was soon obliged to yield to superior force, and in 1609 he acceded to the popular wishes by issuing the Letter of Majesty (*Majestätsbrief*), and then made similar concessions to his subjects in Silesia and elsewhere. A short reconciliation with Matthias was followed by further disorder in Bohemia, which was invaded by Rudolph's cousin, the archduke Leopold (1586–1632). The Bohemians invoked the aid of Matthias, who gathered an army; and in 1611 the emperor, practically a prisoner at Prague, was again forced to cede a kingdom to his brother. Rudolph died at Prague, his usual place of residence, on Jan. 20, 1612, and was succeeded as emperor by Matthias.

Rudolph was greatly interested in chemistry, alchemy, astronomy and astrology; he was a patron of Tycho Brahe and Kepler, and was himself something of a scholar and an artist. He was the greatest collector of his age, his agents ransacking Europe to fill his museums with rare works of art. His education at the Spanish court and an hereditary tendency to insanity, however, made him haughty, suspicious and consequently very unpopular.

The sources for the life and times of Rudolph II. are somewhat scanty, as many of the official documents of the reign, which were kept at Prague and not at Vienna, were destroyed, probably during the Thirty Years' War. The best authorities, however, are: *Rudolphi II. epistolae ineditate,* edited by B. Comte de Pace (Vienna, 1771); M. Ritter, *Quellenbeiträge zur Geschichte des Kaisers Rudolf II.* (Munich, 1872); and *Deutsche Geschichte im Zeitalter der Gegenreformation und des dreissigjährigen Krieges* (Stuttgart, 1887 fol.); L. von Ranke, *Zur deutschen Geschichte: Vom Religionsfrieden bis zum 30-jährigen Kriege* (Leipzig, 1868); A. Gindely, *Rudolf II. und seine Zeit* (Prague, 1862–68); F. Strieve, *Die Verhandlungen über die Nachfolge Kaiser Rudolfs II.* (Munich, 1880); in the *Allgemeine Deutsche Biographie,* Band xxix. (Leipzig, 1889); and *Der Ursprung des dreissigjährigen Krieges* (Munich, 1875); F. von Bezold, *Kaiser Rudolf II. und die heilige Liga* (Munich, 1886); J. Janssen, *Geschichte des Deutschen Volks seit dem Ausgang des Mittelalters* (Freiburg, 1878 fol.), of which there is an English translation by M. A. Mitchell and A. M. Christie (1896 fol.); and H. Moritz, *Die Wahl Rudolfs II.* (Marburg, 1895).

RUDOLPH or RAOUL (d. 936), king of the Franks and duke of Burgundy, was a son of Richard duke of Burgundy, and was probably a member of the Carolingian family. He succeeded his father in 921, married Emma, daughter of Robert duke of the Franks, and assisted his father-in-law to drive the Frankish king, Charles III. (the Simple), from his throne. Robert then became king of the Franks, but was killed in battle in June 923 and was succeeded by Rudolph. At Limoges Rudolph defeated the Normans, the Aquitanians and Herbert of Vermandois. Rudolph died at Auxerre, leaving no sons, on Jan. 14, 936.

See W. Lippert, *König Rudolf von Frankreich* (Leipzig, 1886).

RUDOLPH (d. 1080), German king, and duke of Swabia, was a son of Kuno, count of Rheinfelden, who possessed estates in both Burgundy and Swabia. He received the duchy of Swabia from Agnes, regent and mother of the young king, Henry IV., in 1057, and two years later married the king's sister Matilda, and was made administrator of the kingdom of Burgundy. When Henry was excommunicated and deposed by Pope Gregory VII., the princes met at Forchheim, and elected Rudolph as German king. He renounced the right of investiture, disclaimed any intention of making the crown hereditary in his family, and was crowned at Mainz, on March 27, 1077. He found no support in Swabia, but, uniting with the Saxons, won two victories over Henry's troops, and, in 1080, was recognized by the pope. On Oct. 15, 1080, Rudolph was severely wounded at Hohenmölsen, and died the next day. He was buried at Merseburg, where his beautiful bronze tomb is still to be seen.

See O. Grund, *Die Wahl Rudolfs von Rheinfelden zum Gegenkönig* (Leipzig, 1880).

RUDOLPH I. (1218–1291), German king, son of Albert IV. count of Habsburg, and Hedwig, daughter of Ulrich count of Kyburg, was born at Limburg, on May 1, 1218. At his father's death in 1239 Rudolph inherited the family estates in Alsace, and in 1245 married Gertrude, daughter of Burkhard III. count of Hohenberg. A partisan of the emperor Frederick II. and his son Conrad IV., he was richly rewarded by them, but in 1254 was excommunicated by Pope Innocent IV. In the general disorder after the fall of the Hohenstaufen, he increased his estates largely at the expense of his uncle, Hartmann of Kyburg, and the bishops of Strassburg and Basle, becoming the most powerful prince in south-western Germany. His election as German king at Frankfurt (Sept. 29, 1273) was largely due to the efforts of his brother-in-law, Frederick III. of Hohenzollern, burgrave of Nuremberg. The support of Albert duke of Saxe-Lauenburg, and of Louis II. count palatine of the Rhine and duke of upper Bavaria, had been purchased by betrothing them to two of Rudolph's daughters; so that Ottakar II. king of Bohemia, a candidate for the throne, was almost alone in his opposition. Rudolph was crowned at Aix-la-Chapelle on Oct. 24, 1273. To win the approbation of the pope Rudolph renounced all imperial rights in Rome, the papal territory and Sicily, and promised to lead a new crusade; and Pope Gregory X., in spite of Ottakar's protests, not only recognized Rudolph himself, but persuaded Alphonso X. king of Castile, who had been chosen German king in 1257, to do the same. From 1274–78 Rudolph was engaged in an intermittent struggle with Ottakar, which ended with the latter's death. (*See* AUSTRIA.) Rudolph then set about consolidating his authority in Austria and the adjacent countries, where he met much opposition. At length in Dec. 1282 Rudolph invested his sons Albert and Rudolph with the duchies of Austria and Styria at Augsburg, and so laid the foundations of the greatness of the house of Habsburg.

In 1281 Rudolph compelled Philip I. count of upper Burgundy to cede some districts to him, forced the citizens of Berne to pay tribute, and in 1289 marched against Philip's successor, Otto IV., and compelled him to do homage. He was much less successful, however, in maintaining order in Germany, although in 1289 he led an expedition into Thüringia and destroyed some robber castles. In 1281 his first wife died, and on Feb. 5, 1284 he married Isabella, daughter of Hugh IV. duke of Burgundy. In 1291 he attempted to secure the election of his son Albert as German king; but without success, although Albert, the only son who survived him, was crowned German king after Rudolph's death. Rudolph died at Spires on July 15, 1291 and was buried in the cathedral of that city. His reign is memorable rather for the house of Habsburg than for the kingdom of Germany.

See K. Hagen, *Deutsche Geschichte von Rudolf von Habsburg bis auf die neueste Zeit* (Frankfort, 1854–57); O. Lorenz, *Geschichte Rudolfs von Habsburg und Adolfs von Nassau* (Vienna, 1863–67); A. Huber, *Rudolf von Habsburg vor seiner Thronbesteigung* (Vienna, 1873); J. Hirn, *Rudolf von Habsburg* (Vienna, 1874); H. von Zeissberg, *Ueber das Rechtsverfahren Rudolf von Habsburg gegen Ottokar von Böhmen* (Vienna, 1882); H. Otto, *Die Beziehungen Rudolfs von Habsburg zu Papst Gregor X.* (Erlangen, 1893); A. Busson, *Der Krieg von 1278 und die Schlacht bei Dürnkrut* (Vienna, 1880); and O. Redlich, *Rudolf von Habsburg* (Innsbruck, 1903). *See* also GERMANY; AUSTRIA; HABSBURG.

RUDOLPH or RAOUL, known as RUDOLPH GLABER (Rudolph the Bald) (d. *c.* 1050), French chronicler, was born in Burgundy

about 985, and was in turn an inmate of the monasteries of St. Leger at Champeaux and St. Bénigne at Dijon, afterwards entering the abbey of Cluny, and becoming a monk at St. Germain at Auxerre before 1039. He also appears to have visited Italy. His *Historiarum sui temporis libri V.*, dedicated to St. Odilon, abbot of Cluny, purports to be a universal history from 900 to 1044; but is an irregular narration of events in France and Burgundy.

The *Historiarum* was first printed in 1596, and published by A. Duchesne in the *Historiae Francorum Scriptores*, tome iv. (1639–49). Extracts are printed in the *Monumenta Germaniae historica*, Band vii.; but perhaps the best edition of the work is the one edited by M. Prou in the *Collection de textes pour servir à l'étude et l'enseignement de l'histoire* (1886). Rudolph also wrote a *Vita S. Gulielmi, abbatis S. Benigni*, published by J. Mabillon in the *Acta Sanctorum*, tome vi. (1668).

See A. Molinier, *Les Sources de l'histoire de France*, tome ii. (Paris, 1902); and A. Potthast, *Bibliotheca historica* (Berlin, 1896).

RUDOLPH OF HABSBURG (1857–1889), crown prince of Austria, was born on Aug. 21, 1857, the only son of the emperor Francis Joseph of Austria (*q.v.*) and his wife Elizabeth. Great hopes centred on the boy, who possessed unusual talents. Although his father was chiefly intent on his military education, Rudolph's own chief interests were natural history and literature. The monumental description of the Austro-Hungarian monarchy, *Oesterreich-Ungarn in Wort und Bild*, was truly his conception and in part his work; he also wrote some minor works of his own. He early developed an interest in modern literature and thought; became known as a free-thinker, and even a revolutionary, and made no secret of his anti-clerical views. He thus drifted into increasing opposition to his father, which was accentuated by his notoriously easy morality. His marriage with Stephanie, daughter of the king of the Belgians, took place on May 10, 1881, and was at first happy, although its only fruit—unfortunately for the Austrian succession—was one daughter, Elizabeth (afterwards Princess Windischgrätz). Later he developed a deep passion for the young and beautiful Baroness Marie Vetser, and on Jan. 30, 1889, the sudden and appalling news reached Vienna that the bodies of the two lovers had been found in Rudolph's hunting lodge of Mayerling, near Vienna. It was at once officially announced that the pair had committed suicide. All persons in any way connected with the story were sworn to secrecy, and the official dossier was excluded from the State archives. Numerous extraordinary rumours naturally arose, connecting the death with the Jesuits, the Hungarian nobles, or an injured husband; but it is generally accepted that the crown prince actually shot his lover, and afterwards committed suicide in a fit of despair, partly due to his father's order to break off the liaison. (C. A. M.)

RUDOLSTADT, a town of Germany, in the republic of Thuringia, on the left bank of the Saale, 18 m. S.W. of Jena, by the railway to Saalfeld. Pop. (1925) 16,064. The name of Rudolstadt occurs in an inventory of the possessions of the abbey of Hersfeld in the year 800. After passing under various rulers, it came into the hands of the counts of Schwarzburg in 1335. Its civic rights were confirmed in 1404, and from 1599 it was the residence of the ruling house of Schwarzburg-Rudolstadt. The town is a favourite tourist resort. The former residence of the prince is the Heidecksburg, a palace which was rebuilt after a fire in 1735 on an eminence 200 ft. above the Saale. The Ludwigsburg is another palace in the town built in 1742. The town also has a hydropathic establishment. The industries of the place include the manufacture of porcelain, chemicals, machinery, dyestuffs and thermos flasks.

RUDRA, a minor god in Vedic India who doubtless personified lightning (the "red" one, probably), but also protected cattle against it. In the *Rig Veda* he is identified with Agni (*q.v.*), but in the later *Vedas* he is called an archer and his malevolence emphasized. Best known as father of the storm-gods (Maruts, *q.v.*), in the Epic period he becomes many Rudras and in modern Hinduism is identified with Siva (*q.v.*).

RUE, the name of a woody or bushy herb, belonging to the genus *Ruta* (family Rutaceae), especially *R. graveolens*, the "common rue," a plant with bluish green spotted leaves and greenish yellow flowers, native to Europe and sparingly naturalized in eastern North America. It has a strong pungent smell and the leaves have a bitter taste. The plant was much used in mediaeval and later medicine as a stimulative and irritant drug. It was commonly supposed to be much used by witches. From its association with "rue," sorrow, repentance, the plant was also known as "herb of grace," and was taken as the symbol of repentance.

RUEDA, LOPE DE (1510?–1565), Spanish dramatist, was born at Seville, where, according to Cervantes, he worked as a metal-beater. His name first occurs in 1554 as acting at Benavente, and between 1558 and 1561 he was manager of a strolling company. Rueda's more ambitious plays, such as *Eufemia, Armelina* and *Los Engañados*, are mostly adapted from the Italian. They follow the original so closely that they give no idea of his talent; but in his *pasos* or prose interludes he displays an abundance of riotous humour, great knowledge of low life, and a most happy gift of dialogue. Rueda, with his strollers, created a taste for the drama which he was able to gratify, and he is admitted both by Cervantes and Lope de Vega to be the true founder of the national theatre.

RUEIL, a town of north France, in the department of Seine-et-Oise, at the west foot of Mt. Valérien, 6 m. W. of Paris. Pop. (1926) 15,500. Rueil has a church rebuilt by Napoleon III. in the original Renaissance style, and containing the tombs of the Empress Josephine and her daughter Hortense de Beauharnais. Rueil has important photographic works and manufactures of lime and cement, etc. Close to the town is the 18th century château of Malmaison, the residence of the Empress Josephine.

RUFA'A: *see* ARABS.

RUFF, a limicoline bird, taking its name from the frill of elongated feathers round the neck of the breeding male, to which the name is properly confined; the female, a much smaller bird, is termed the reeve. The plumage of the male is extremely variable, but the same markings are reproduced after every moult in each individual bird. The ruff (*Machetes pugnax*) no longer breeds in Britain, but its range extends across the whole of N. Europe and Asia, and it migrates south to India, Ceylon and Africa in winter. Except for its remarkable frill and its polygamous habit, the ruff does not differ in any marked manner from the ordinary sandpipers. The extraordinary courtship antics of the cock bird (*see* plate in article COURTSHIP OF ANIMALS) are described in Montagu's *Ornithological Dictionary*, Stevenson's *Birds of Norfolk*, Selous' *Realities of Bird Life* (Constable & Co., London, 1926), and elsewhere. The nest is made on the ground and, as in almost all polygamous animals, the male takes no interest in his offspring.

RUFFO, FABRIZIO (1744–1827), Neapolitan cardinal and politician, was born at San Lucido, Calabria, on Sept. 16, 1744. His father, Litterio Ruffo, was duke of Baranello, and his mother, Giustiniana, was a Colonna. Ruffo was placed by pope Pius VI. among the *chierici di camera*—the clerks who formed the papal civil and financial service. He was later promoted to be treasurer-general, a post which carried with it the ministry of war. In 1791 he was removed from the treasurership, but was created cardinal on Sept. 29, though he was not in orders. He never became a priest. Ruffo went to Naples, and, when in December 1798 the French troops advanced on Naples, he accompanied the royal family to Palermo. He was chosen to head a royalist movement in Calabria, where his family exercised large feudal powers. He was named vicar-general on Jan. 25, 1799. On Feb. 8, he landed at La Cortona with a small following, and began to raise the so-called "army of the faith" in association with Fra Diavolo.

Ruffo had no difficulty in upsetting the republican government established by the French and by June had advanced to Naples. (*See* NAPLES and NELSON.) But he lost favour with the king by showing a tendency to spare the republicans. He resigned his vicar-generalship to the prince of Cassero, and during the second French conquest and the reigns of Joseph Bonaparte and Murat he lived quietly in Naples. During the revolutionary troubles of 1822 he was consulted by the king, and was even in office for a very short time as a "loyalist" minister. He died on Dec. 13, 1827.

The account of Ruffo given in Colletta's *History of Naples* (English trans., Edinburgh, 1860) is biased. *Cf.* the duca de Lauria, *Intorno alla storia del Reame di Napoli di Pietro Colletta* (Naples, 1877). Ruffo's own side of the question is stated in *Memorie Storiche sulla vita del Cardinale Fabrizio Ruffo*, by Domenico Sacchinelli (Naples, 1836). *See* also Baron von Helfert, *Fabrizio Ruffo: Revolution and Gegen-Revolution von Neapel* (Vienna, 1882).

RUFIJI, a large river of Tanganyika Territory, East Africa, entering the sea by a delta, between 7° 45′ and 8° 13′ S. Its upper basin is drained by three main branches, of which the two southern, the Luwegu and the Ulanga, though shorter than the northernmost (the Ruaha), carry more water, as they come from a more rainy region, and by their junction in 8° 35′ S., 37° 25′ E., the Rufiji proper may be said to be formed.

The Luwegu rises 10° 50′ S., 35° 50′ E., and flows in a narrow wooded valley and in its lower course it is 100 to 150 yd. wide. The Ulanga is formed by a number of streams descending from the escarpment which runs north-east from Lake Nyasa and in Uhehe becomes broken up in ranges of mountains. The most important head-stream is the Ruhuje. As a whole, the Ulanga valley is broad, level and swampy, the meandering river sending off many diverging arms. It is navigable throughout the greater part of its course, having in the dry season a general depth of 3 to 12 ft, with a width of 40 to 120 yd. In April and May nearly all the streams overflow their banks. Below the junction of the Luwegu and Ulanga, the Rufiji flows through a narrow pass by the Shugali falls, and continues to the junction of the Ruaha, in 7° 55′ S., 37° 52′ E. The most remote branches of the Ruaha rise in the Livingstone Mountains. The united stream sweeps round the N. of the Uhehe Mountains, finally flowing to the Rufiji. Below the junction the Rufiji is broken by the Pangani falls, but is thence navigable by small steamers to its delta, receiving no large tributaries but sending out divergent channels. The country on either side is a generally level plain, inundated, on the south, in the rains, and the river varies in width from 100 to 400 yd. The main mouth of the river is that known as Simba Uranga, the bar of which can be crossed by ocean vessels at high water, but all the branches are very shallow as the apex of the delta is approached. Much of the delta is suited for rice-growing. (For geology *see* TANGANYIKA TERRITORY.)

RUFINUS, TYRANNIUS, presbyter and theologian, was born at or near Aquileia at the head of the Adriatic, probably between 340 and 345. In early manhood he entered the cloister as a catechumen, receiving baptism about 370. About the same time a visit of Jerome to Aquileia led to a close friendship between the two, and shortly after Jerome's departure for the East Rufinus also was drawn thither (in 372 or 373) by his interest in its theology and monasticism. He first settled in Egypt. There, if not even before leaving Italy, he had become intimately acquainted with Melania, a wealthy and devout Roman widow; and when she removed to Palestine, taking with her a number of clergy and monks on whom the persecutions of the Arian Valens had borne heavily, Rufinus (about 378) followed her. While his patroness lived in a convent of her own in Jerusalem, Rufinus, at her expense, gathered together a number of monks in a monastery on the Mount of Olives, devoting himself at the same time to the study of Greek theology. When Jerome came to Bethlehem in 386, the friendship formed at Aquileia was renewed. Another of the intimates of Rufinus was John, bishop of Jerusalem, and formerly a Nitrian monk, by whom he was ordained to the priesthood in 390. In 394, in consequence of the attack upon the doctrines of Origen made by Epiphanius of Salamis during a visit to Jerusalem, a fierce quarrel broke out, which found Rufinus and Jerome on different sides; and, though three years afterwards Jerome and John were reconciled, the breach between Jerome and Rufinus remained unhealed

In the autumn of 397 Rufinus embarked for Rome, where he published a Latin translation of the *Apology* of Pamphilus for Origen, and also (398–99) a somewhat free rendering of the *περὶ ἀρχῶν* (or *De Principiis*) of that author himself. In the preface to the latter work he referred to Jerome as an admirer of Origen, and as having already translated some of his works with modifications of ambiguous doctrinal expressions. This led to a bitter dispute between Jerome and Rufinus. At the instigation of Theophilus of Alexandria, Anastasius (pope 398–402) summoned Rufinus from Aquileia to Rome to vindicate his orthodoxy; but he excused himself from a personal attendance in a written *Apologia pro fide sua.* The pope in his reply expressly condemned Origen, but left the question of Rufinus's orthodoxy to his own conscience. He was, however, regarded with suspicion in orthodox circles (*cf.* the *Decretum Gelassii,* § 20) in spite of his services to Christian literature. In 408 we find Rufinus at the monastery of Pinetum (in the Campagna?); thence he was driven by the arrival of Alaric to Sicily, being accompanied by Melania in his flight. In Sicily he was engaged in translating the *Homilies* of Origen when he died in 410.

The original works of Rufinus are—(1) *De Adulteratione Librorum Origenis*—an appendix to his translation of the *Apology* of Pamphilus, and intended to show that many of the features in Origen's teaching which were then held to be objectionable arise from interpolations and falsifications of the genuine text; (2) *De Benedictionibus XII. Patriarcharum Libri II.*—an exposition of Gen. xlix.; (3) *Apologia s. Invectivarum in Hieronymum Libri II.*; (4) *Apologia pro Fide Sua ad Anastasium Pontificem;* (5) *Historia Eremitica*—consisting of the lives of thirty-three monks of the Nitrian desert[1]; (6) *Expositio Symboli,* a commentary on the creed of Aquileia comparing it with that of Rome, which is valuable for its evidence as to church teaching in the 4th century. The *Historiae Ecclesiasticae Libri XI.* of Rufinus consist partly of a free translation of Eusebius (10 books in 9) and partly of a continuation (bks. x. and xi.) down to the death of Theodosius the Great.

See W. H. Freemantle in *Dict. Chr. Biog.* iv. 555–60; A. Ebert, *Allg. Gesch. d. Litt. d. Mittelalters im Abendlande,* i. 321–27 (Leipzig, 1889); G. Krüger in Herzog-Hauck's *Realencyk. für prot. Theol.,* where there is a full bibliography.

RUFUS, LUCIUS VARIUS (*c.* 74–14 B.C.), Roman poet of the Augustan age. He was the friend of Virgil, after whose death he and Plotius Tucca prepared the *Aeneid* for publication, and of Horace, for whom he and Virgil obtained an introduction to Maecenas. Horace and Virgil speak highly of his epic poetry. From Macrobius (*Saturnalia,* vi. 1, 39; 2, 19) we learn that Varius composed an epic poem *De Morte,* some lines of which are quoted as having been imitated or appropriated by Virgil. But his most famous literary production was the tragedy *Thyestes,* which Quintilian (*Inst. Orat.* x. 1. 98) declares equal to any of the Greek tragedies. It was presented at the games of 29 B.C.

Fragments in E. Bährens, *Frag. Poetarum Romanorum* (1886); monographs by A. Weichert (1836) and R. Unger (1870, 1878, 1898); M. Schanz, *Geschichte der römischen Literatur* (1899), ii. 1; Teuffel, *Hist. of Roman Literature* (Eng. trans., 1900), 223.

RUGBY, a market town in Warwickshire, England, finely situated on a tableland rising from the south bank of the Avon, near the Oxford canal. Pop. of urban district (1931) 23,824. Rugby was originally a hamlet of the adjoining parish of Clifton-on-Dunsmore, and is separately treated of as such in Domesday Book. Ernaldus de Bosco (Ernald de Bois), lord of the manor of Clifton, erected the first chapel in Rugby, in the reign of Stephen, about 1140. It was afterwards granted by him, with certain lands, to endow the abbey of St. Mary, Leicester, which grant was confirmed by his successors and by royal charter of Henry II. In the second year of King John (1200) a suit took place between Henry de Rokeby, lord of the manor of Rugby, and Paul, abbot of St. Mary, Leicester, which resulted in the former obtaining possession of the advowson of Rugby, on condition of homage and service to the abbot of Leicester. Rugby is an important junction on the L.M.S. railway, by which it is 82½m. N.W. from London.

The boys' school, ranking as one of the first public schools in England, was founded and endowed under the will (1567) of Laurence Sheriff of Rugby. The endowment consisted of the parsonage of Brownsover, Sheriff's mansion house in Rugby and one-third (8 ac.) of his estate in Middlesex, which, being let on building leases, gradually increased to about £5,000 a year. The full endowment was obtained in 1653. The school originally stood opposite the parish church, and was removed to its present site on the south side of the town between 1740 and 1750. In 1809 it was rebuilt from designs by Henry Hakewill (1771–1830); the chapel, dedicated to St. Lawrence, was added in 1820. The

[1]On this work *see* Dom Butler in *Texts and Studies,* vi. i. pp. 10 ff.

chapel was rebuilt and reconsecrated in 1872, and additions were made in 1898. The Temple observatory, containing a fine equatorial refractor by Alvan Clark, was built in 1877, and the Temple reading-room with the art museum in 1878. The workshops underneath the gymnasium were opened in 1880, and a new big school and class-rooms were erected in 1885.

RUGE, ARNOLD (1802–1880), German philosopher and political writer, was born at Bergen, in the island of Rügen, on Sept. 13, 1802. As a student he joined the national movement, and was confined for five years in the fortress of Kolberg, where he studied Plato and the Greek poets. On his release in 1830 he published *Schill und die Seinen,* a tragedy, and a translation of *Oedipus at Colonus.* In 1837 with E. T. Echtermeyer he founded at Halle the *Hallesche Jahrbücher für deutsche Kunst und Wissenschaft,* in which he advocated the Hegelian philosophy. The *Jahrbücher* was detested by the orthodox party in Prussia; and was finally suppressed by the Saxon Government in 1843. In the 1848 revolution he organized the Extreme Left in the Frankfurt parliament, and for some time he edited *Die Reform* in Berlin. The Prussian Government intervened and Ruge soon afterwards left for Paris, and then for London. Here, with Ledru-Rollin and Mazzini, he formed a "European Democratic Committee." Ruge, however, soon withdrew. In 1866 and 1870 he vigorously supported Prussia against Austria, and Germany against France. In his last years he received a pension from the German Government. He died on Dec. 31, 1880. After the publication of his *Gesammelte Schriften* (10 vols., 1846–48) he wrote, among other books, *Unser System, Revolutionsnovellen, Die Loge des Humanismus,* and *Aus früherer Zeit* (his memoirs). His *Letters and Diary* (1825–80) were published by Paul Nerrlich (1885–87).

RUGELEY, market town, urban district, Lichfield parliamentary division of Staffordshire, England, in the Trent valley. Pop. (1931) 5,263. Rugeley is on the L.M.S. railway, 124½m. N.W. of London, and on the Grand Trunk canal. To the south-west is Cannock Chase. A grammar school was founded in 1611. There are ironfoundries, corn-mills and tanneries; and the parish includes several collieries.

RÜGEN, an island of Germany, in the Baltic, immediately opposite Stralsund, 1½ m. off the north-west coast of Pomerania in Prussia, from which it is separated by the narrow Strelasund, or Bodden. Its shape is exceedingly irregular, and its coast-line is broken by numerous bays and peninsulas, sometimes of considerable size. The general name is applied by the natives only to the roughly triangular main trunk of the island, while the larger peninsulas, the landward extremities of which taper to narrow necks of land, are considered to be as distinct from Rügen as the various adjacent smaller islands which are also included for statistical purposes under the name. The chief peninsulas are those of Jasmund and Wittow on the north, and Mönchgut, at one time the property of the monastery of Eldena, on the south-east; and the chief neighbouring islands are Ummanz and Hiddensöe, both off the north-west coast. Rügen is the largest island in Germany. Its greatest length from north to south is 32 m.; its greatest breadth is 25½ m.; and its area is 377 sq.m. The surface gradually rises towards the west to Rugard (335 ft.)—the "eye of Rügen"—near Bergen, but the highest point is the Hertaburg (505 ft.) in Jasmund. Erratic blocks are scattered throughout the island, and the roads are made with granite. The most beautiful and attractive part of the island is the peninsula of Jasmund, which terminates to the north in the Stubbenkammer (Slavonic for "rock steps"), a sheer chalk cliff, the summit of which, the Königsstuhl, is 420 ft. above the sea. The east of Jasmund is clothed with an extensive beech wood called the Stubbenitz, in which lies the Borg, or Herta Lake. Connected with Jasmund by the narrow isthmus of Schabe to the west is the peninsula of Wittow, the most fertile part of the island. At its north-west extremity rises the height of Arcona, with a lighthouse.

A ferry connects the island with Stralsund, and from the landing-stage at Altefähr a railway traverses the island, passing the capital Bergen to Sassnitz, on the north-east coast. The other chief places are Garz, Sagard, Gingst and Putbus, the last being the old capital of a barony of the princes of Putbus. Sassnitz, Göhren, Sellin, Binz and Lauterbach-Putbus are favourite bathing resorts. Schoritz was the birthplace of the patriot and poet, Ernst Moritz Arndt. The inhabitants of Rügen are distinguished from those of the mainland by peculiarities of dialect, costume and habits; and even the various peninsulas differ from each other in these particulars. The inhabitants raise some cattle and Rügen has long been famous for its geese; but the chief industry is the herring-fishery. With the rest of Western Pomerania Rügen has belonged to Prussia since 1815.

See Fock, *Rügensch-pommersche Geschichten* (6 vols., Leipzig, 1861–72); R. Baier, *Die Insel Rügen nach ihrer archäologischen Bedeutung* (Stralsund, 1886); R. Credner, *Rügen, Eine Inselstudie* (Stuttgart, 1893); Edwin Müller, *Die Insel Rügen* (17th ed., Berlin, 1900); Schuster, *Führer durch die Insel Rügen* (7th ed., Stettin, 1901); Boll, *Die Insel Rügen* (Schwerin, 1858); O. Wendler, *Geschichte Rügens seit der ältesten Zeit* (Bergen, 1895); A. Haas, *Rügensche Sagen und Märchen* (Greifswald, 1891); U. John, *Volkssagen aus Rügen* (Stettin, 1886); and E. M. Arndt, *Fairy Tales from the Isle of Rügen* (London, 1896).

RUGS AND CARPETS. The term "carpet" is usually understood to mean a textile floor-covering and it is in this sense that the word is used here. The best fabric yet devised for use under foot is one in which a heavy woven foundation is fortified with extra threads forming a pile.

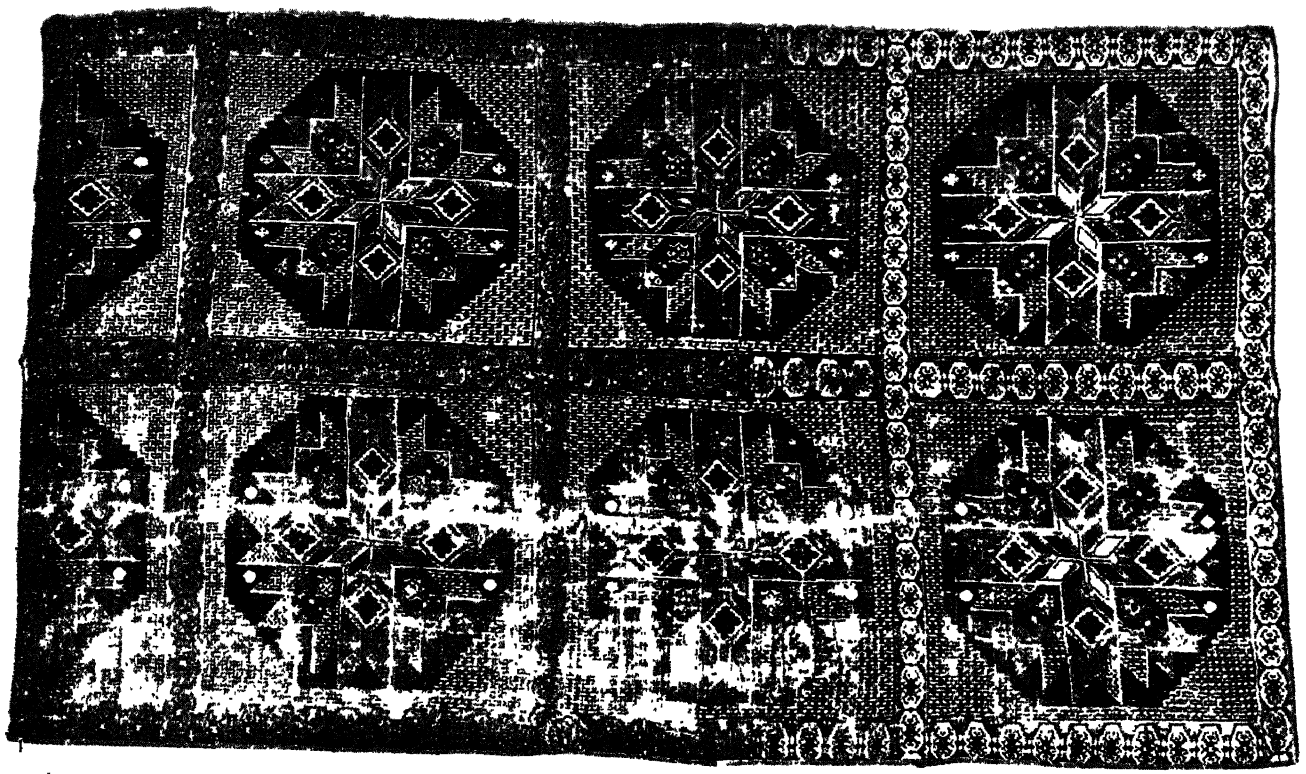
Early History.—The real home of the hand-woven carpet is to be found in the wide region of the East that stretches from Turkey to China, and the oriental carpet holds a most important place in the field of decorative art.

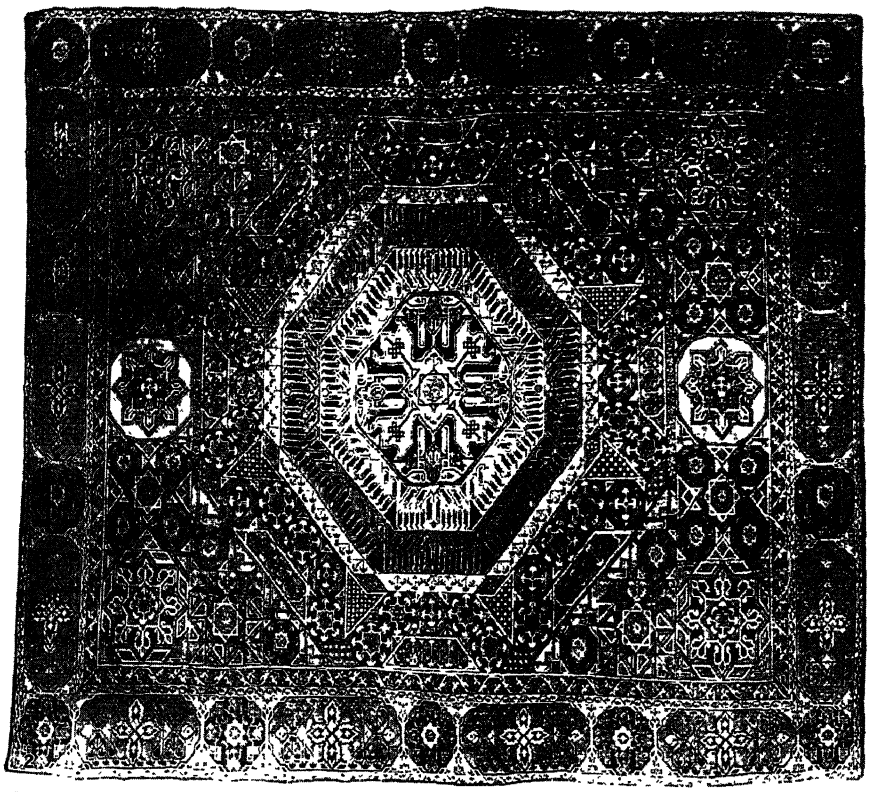
Nothing is definitely known about the origin or early history of carpet-weaving and a discussion of the basis of the most plausible theories on the subject cannot be entered into here. It seems however very possible that the art had its cradle among the nomadic peoples living to the north of India, that it was practised for centuries before the date of the oldest carpets still remaining and that the knowledge of it spread outwards, but more especially in a westerly direction. On general grounds it is likely that smooth-faced carpets of tapestry-weaving preceded those with a pile, for the former is a much simpler and more obvious process. As actual specimens of tapestry-weaving (other than rugs) dating from at least 1500 B.C. are known, and pile fabrics of at least the 3rd century A.D., there is no reason on technical grounds for denying to carpets a very early origin.

Perhaps the oldest pieces of carpet are certain fragments excavated by Sir Aurel Stein in Turkestan. These are attributed to about the beginning of the Christian era but their exact date and significance are not established. A western wall-hanging resembling a carpet, made at Quedlinburg about the end of the 12th century, suggests strongly that oriental carpets were not unknown in Europe at that date and that the technique of one had been copied by the Quedlinburg weavers, but it is not quite out of the question that the art may have been independently invented especially as a modified form of the oriental technique is adopted. Three carpets in the mosque of Ala-ed-Dîn at Konia are attributed with some certainty to the early 13th century, and the historical evidence is supported by the nature of their patterns which, while differing from those of any other known carpets, may well be primitive forms of later and better known ornament.

With the exception of these isolated pieces and perhaps a few others not as yet recognized as early, it is doubtful whether we still have carpets much earlier than the 16th century. By that date however it is certain not only that the art was well established, but that it had in fact already reached its highest level of achievement in both Persia and Turkey; and further it is known that carpets from the latter country had been exported to Spain, England and other European countries in the previous century and that their introduction had soon led to successful attempts at knotting in the western world. It is probable also, if not certain, that during the 16th century carpets were made in the Caucasus, India, Turkestan and China.

A brief outline of the later history of carpet-knotting can be given more conveniently when the carpets of particular countries are described.





BY COURTESY OF (1) THE METROPOLITAN MUSEUM OF ART, NEW YORK, (2) SARRE AND TRENKWALD FROM "OLD ORIENTAL CARPETS" (ANTON SCHROLL AND CO., VIENNA, AND KARL W. HIERSEMANN, LEIPZIG), ISSUED BY OESTERREICHISCHES MUSEUM FUR KUNST UND INDUSTRIE

SPANISH AND TURKISH RUGS, 15TH–16TH CENTURY

1. Spanish rug, 15th or 16th century. Knotted in woollen pile on a woollen warp

2. Turkish carpet, possibly woven in Egypt, 16th century, formerly in the Austrian Imperial collection. About 10 ft. x 9 ft. 6 in. It is made of wool; the colours are: ground tone, a deep cherry red; on it, sky-blue and yellowish green

RUGS AND CARPETS



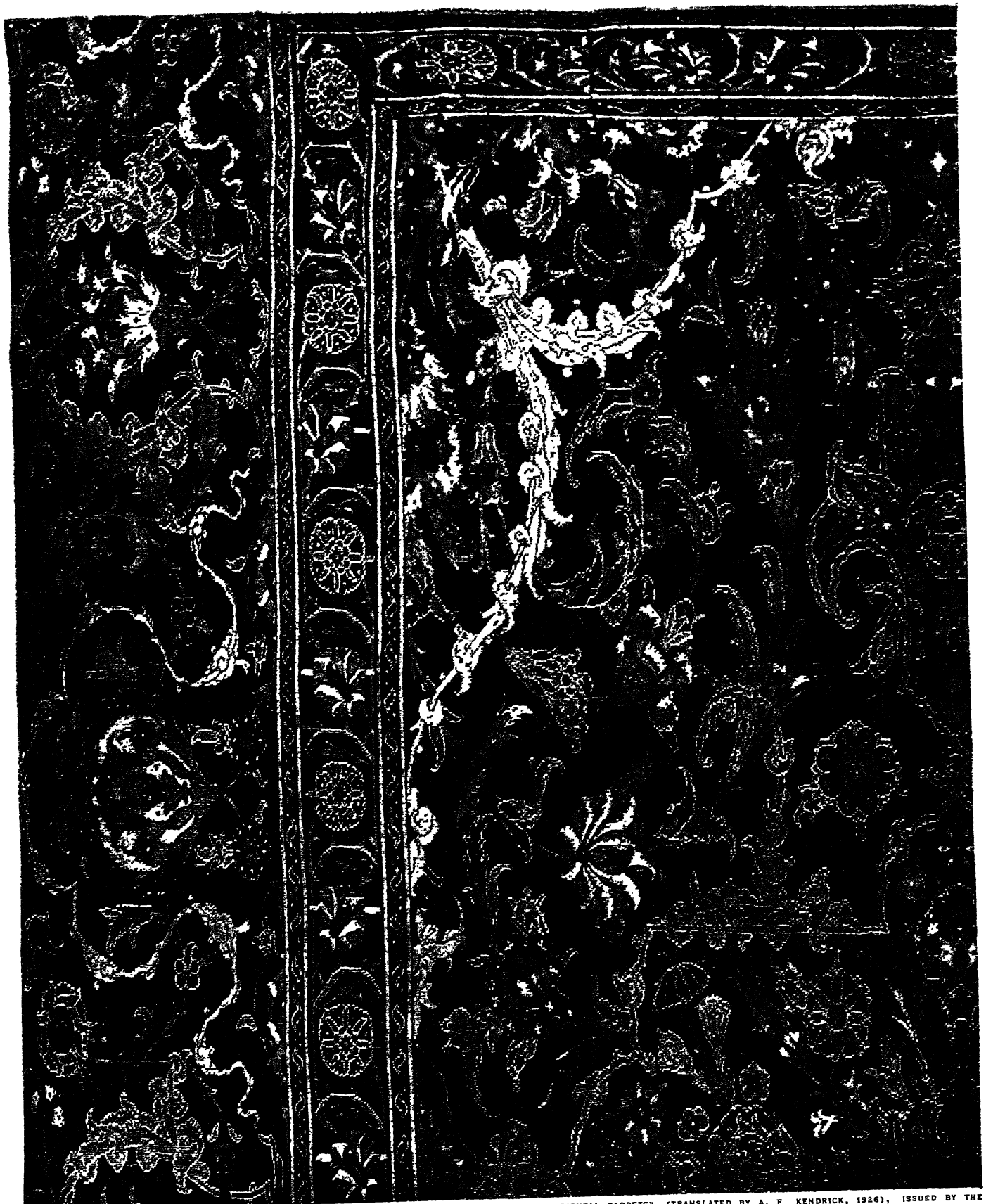


2

BY COURTESY OF (1) THE DUKE OF BUCCLEUCH, (2) SARRE AND TRENKWALD, FROM "OLD ORIENTAL CARPETS," ISSUED BY OESTERREICHISCHES MUSEUM FÜR KUNST UND INDUSTRIE, (ANTON SCHROLL AND CO., VIENNA, AND KARL W HIERSEMANN, LEIPZIG)

ENGLISH AND TURKISH CARPETS, 16TH CENTURY

1. English carpet, 1584, belonging to the Duke of Buccleuch. The pattern follows closely the Turkish carpets of the period
2. Asia Minor carpet (so-called Ushak carpet), *c.* 1600. 15 ft. 9 in. x 8 ft. The pattern shows red panels and flattened hexagons, with serrated borders, and floral forms and arabesques. The colours used are red, light blue, dark blue, yellow, black (brown in places), white and rose



BY COURTESY OF A. SCHROLL AND COMPANY FROM FRIEDRICH SARRE AND HERMANN TRENKWALD, "OLD ORIENTAL CARPETS" (TRANSLATED BY A. F KENDRICK, 1926), ISSUED BY THE AUSTRIAN MUSEUM FOR ART AND INDUSTRY

TURKISH CARPET, 16TH CENTURY

Fragment of Turkish carpet, court manufactory, 16th century. Dimensions of whole, about 18 ft. x 10 ft. The warp is of yellow silk, the weft of dyed red silk, the knotting of sheep's wool and cotton, in seven colours. The pattern, of cartouches and conventionalized flowers and leaves, gives the effect of movement, with half-panels forming the corner filling

TECHNIQUE

Pile Carpets.—A pile carpet is a woven fabric with extra threads attached to form the pile. A set of threads—the *warp*—is stretched between two beams or rollers, which with a supporting framework constitute the *loom*. The warp being supposed vertical, which is usually the case, a row of knots is tied on the warp-threads in a horizontal line, and then one or more other threads—the *weft*—are interlaced with the warp, each weft-thread passing alternately under and over consecutive warp-threads. Lines of knots alternate with lines of weft until the work is finished. The warp and weft are visible at the back of the carpet but not at the front, and the pattern is formed by the knots, which are of coloured yarn, individually at the choice of the weaver. Two kinds of knots only are used in oriental carpets—the Persian or Sehna—and the Turkish or Ghiordes (*see* figs. 1 and 2). A third kind, tied on one warp-thread instead of on two, is found in most Spanish carpets but rarely elsewhere (*see* fig. 3). After each line of knots is tied and the weft-threads are inserted, the work is consolidated by beating down with a heavy comb and the ends of the pile are rough-trimmed with shears. When the knotting is all finished the pile is with great care cut to an even surface. Should the required carpet be longer than the loom, then at intervals the finished part is rolled round the lower beam and more of the warp is unwound from the upper. The treatment of the sides or selvedge, where the weft doubles back on itself, and of the top and bottom, where the ends of the warp often form a fringe, is capable of more variation in detail than can now be described. A simple and easily constructed loom, with fixed beams instead of rollers (*see* fig. 4), exhibits most of the features of larger looms and is suitable for the use of those who wish to try practical carpet-knotting or weaving.

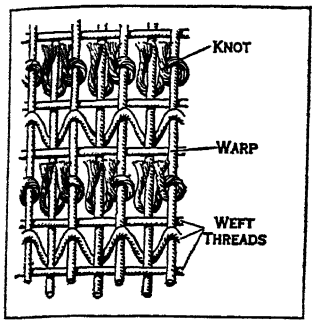


FIG. 1.—PERSIAN OR SEHNA KNOT, ONE OF THE TWO TYPES OF KNOTS USED IN ORIENTAL CARPETS

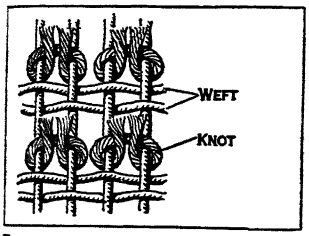


FIG. 2.—TURKISH OR GHIORDES KNOT, THE OTHER TYPE OF KNOT USED IN ORIENTAL CARPETS

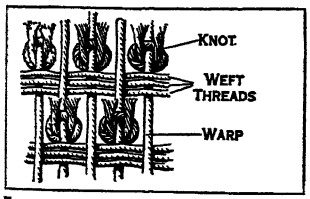


FIG. 3.—SPANISH OR SINGLE-WARP KNOT

Smooth-Faced Carpets.—The majority of these are made by the tapestry method, which is only a modified form of plain-cloth weaving. Each weft-thread is carried under and over consecutive warp-threads in the usual way, but the yarn for the weft is bulky and is inserted so loosely that when it is beaten down it completely hides the warp. By choosing a weft sufficiently strong and heavy, a very durable fabric may be obtained. The pattern is formed by varying the colour of the weft, and only carrying each colour as far as it is needed. It will be seen that a change of colour necessitates a discontinuity in the weft (*see* fig. 5); and where lines of the pattern lie parallel to the warp a slit will occur in the fabric. Either lines in this direction must be avoided by the designer—a condition that has much influence upon the patterns of *kilims*, as tapestry-woven rugs are called—or the slits must be sewn up afterwards. The back of a *kilim* is almost exactly like the front, though usually rather less tidy. To rugs woven by a modified form of the tapestry method the name *soumak* is applied. In these the weft is carried forward over four of the warp-threads and then backwards behind two (*see* fig. 6). This gives a kind of herring-bone texture at the front and a series of ribs at the back of the fabric. Because a weft looped round the warp-threads as described has much less than the usual binding effect, it is found necessary to insert in the ordinary way other weft-threads that remain hidden among the coloured threads forming the pattern.

Texture.—The technical feature which above all others indicates the amount of time and trouble spent by the weaver and therefore serves as the first criterion of technical merit, is the fineness of texture. This depends upon the closeness of the warp-threads and the size of the yarns used for weft and pile, and is measured by the number of knots in a specified area. Some idea of the wide variation possible in this respect is given by the fact that carpets are found with as few as 15 and as many as 1,000 knots to the square inch. Textures with from 40 to 80 may be considered of medium fineness.

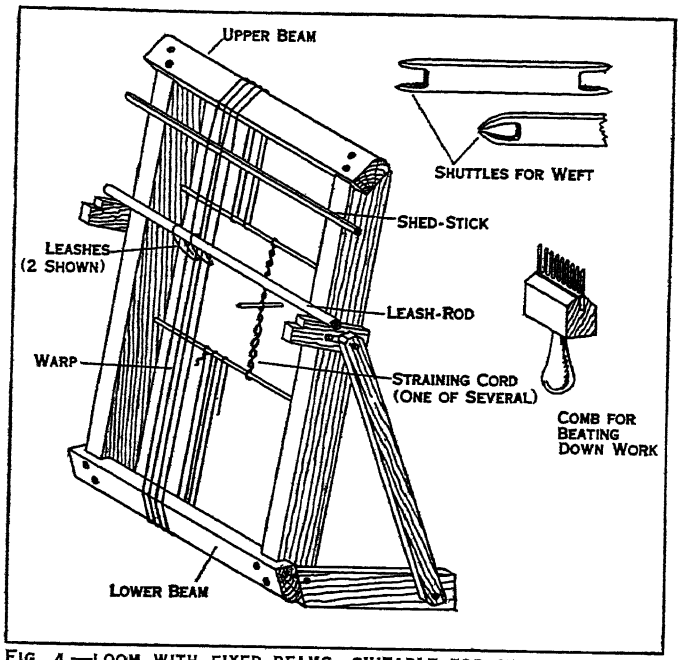


FIG. 4.—LOOM WITH FIXED BEAMS; SUITABLE FOR SMALL WORK AND ILLUSTRATES CHIEF PARTS OF LARGER LOOMS

Other technical points, not necessarily in themselves signs of merit, have to be taken into account in problems of classification and identification. The chief of these are:—the species of knot; the material (wool, cotton, silk, etc.) and nature of the yarns constituting warp, weft and pile; the colour of the warp, and whether it is arranged on one or two levels; the colour of the weft, and the number of times it passes after each row of knots; the length of the pile; the way in which the sides and ends are finished. These points, duly observed, will throw as much light upon the carpet as do the design and colour.

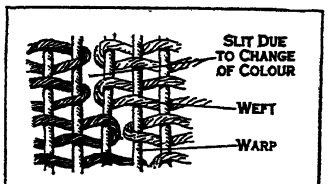


FIG. 5.—TAPESTRY WEAVING

Design.—In order to give a pleasing effect at distances from which the detail cannot be clearly seen, there is generally a definite scheme of composition upon which the masses of the pattern are based. In the first place there is almost invariably, running along every edge, a border, which may be divided into two or more parallel bands. Within the border is the field, either of fairly level tone (still neglecting the lesser detail) or containing various arrangements of shaped panels differing in tone from the rest. There is no definite limit to the number of such arrangements but a few are so common as to deserve mention.

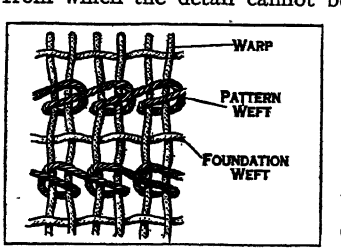


FIG. 6.—SOUMAK WEAVING, A MODIFIED FORM OF THE TAPESTRY METHOD

Very often there is a prominent central panel or medallion, which is sometimes associated with four quarter-panels, one in each corner of the field: or there may be a number of panels, perhaps of two different shapes, arranged on a symmetrical plan. Again, a succession of similar panels is often found set on the long axis of the carpet: or the whole field may be divided up into well-marked rectangular or lozenge-shaped compartments. Lastly may be mentioned the arched form cut off from the ends of the field, or from one end only as in most prayer-rugs.

Motives with symbolic meaning are undoubtedly often seen in carpet design, but it is very questionable (in spite of much that is alleged) whether in most cases the designer or weaver has adopted them with full consciousness of their significance. In this connection it must be remembered that the vast majority of oriental carpets have been copied with only slight modifications from others previously made.

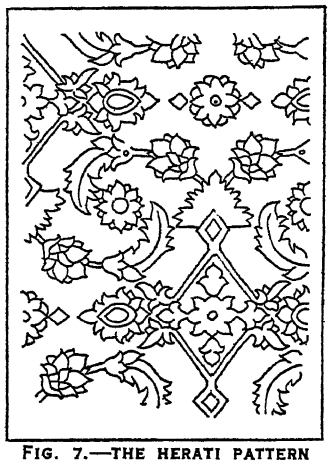


FIG. 7.—THE HERATI PATTERN

Little need be said about the ornament in detail. Flowers such as the rose, jasmin, hyacinth, or trees as the cypress or willow can often be identified but many of the floral forms are too indefinite for recognition. The inflorescence of the date palm —such an important object to the oriental—is rendered in many characteristic ways to which the term *palmette* is frequently applied. The well-known comma-shaped device common in the later Persian carpets may also be derived from the date-palm. It is most often called the *cone-device,* but many other names and origins are ascribed to it. The *cloud-band,* borrowed from Chinese art, is a ribbon or snake-like conventionalization of a cloud. Perhaps it is the origin of the S-form found in many of the more geometrical carpets. *Latch-hooks* are the angular appendages set round the edge of a panel to soften a too rigid contour. Apart from isolated motives there are several well-known all-over patterns, of which the *herati* and the *mina khani* are the most common (*see* figs. 7 and 8). With regard to border patterns it will soon be noticed that there are many almost standardized types, some of which are peculiar to particular groups of rugs. The basic idea is mostly either that of a wavy stem bearing flowers and leaves or else a succession of similar devices, floral or geometrical, set in a row.

Colouring.—A comparatively small number of dyestuffs, well proved by experience, are used. The tones are usually darker than appears at first sight to the eye, as may be readily proved by matching them, especially the lighter ones, against tinted paper. This association of great richness of colour with great depth of tone is undoubtedly due in great part to the effect of the pile surface, and in consequence it is not possible to get on paper a reproduction of a carpet that will give more than an indication of the beauty of the original.



FIG. 8.—THE MINA KHANI PATTERN

Dyes.—There is little mystery about the actual dyestuffs used. Indigo and madder yield a range of most satisfactory and permanent blues and reds; kermes or some other form of cochineal will supplement the latter; and several good though less permanent yellow dyes are available. The secondary colours can be obtained by double dipping; and the more neutral colours—brown, white, black—are often supplied by undyed wool, but in any case present no technical difficulty.

Size and Shape.—Rugs—a term understood to include all carpets for use on the floor—are mostly rectangular, though occasionally pieces are seen made to fit into irregular spaces. The rectangle may vary from a square to a strip at least six times as long as it is wide. A very usual ratio is about three to two.

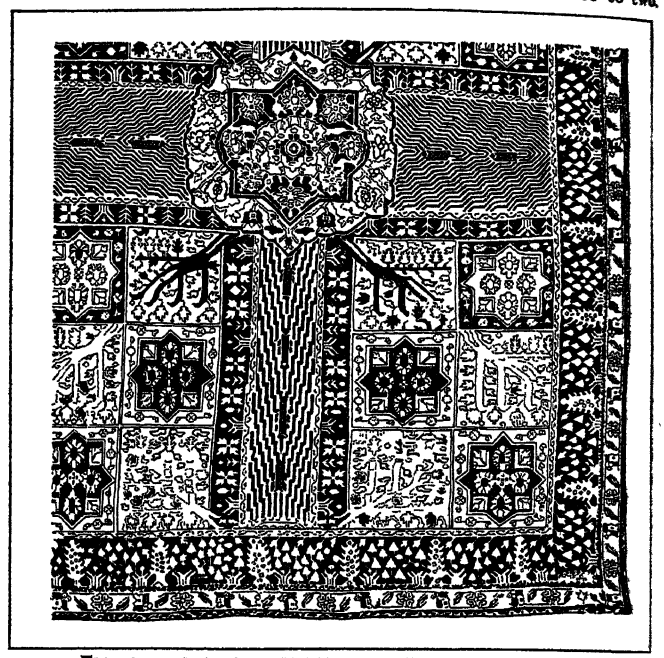


FIG. 9.—GARDEN PATTERN, RARE TYPE OF PERSIAN RUG

The strips, called runners or *kanara,* made in pairs to go along the sides of a Persian room, are very useful in corridors. A very common size for small rugs is about 6½ by 4½ ft., while large ones may reach 25 ft. in length or occasionally more. The large rugs are mostly now made with an eye to the western market, and there is a general tendency for the smaller rugs to be of better quality of design, workmanship and material.

CLASSIFICATION

The natural tendency of workers in a district to follow a fixed system of technique even though wide variations are available, and the conservatism which causes them to copy traditional patterns with only slight modifications, allow the origin and approximate date of most oriental carpets to be determined with fair certainty. Difficulties of attribution, of course, do frequently arise, especially in the case of the earlier carpets, but it is still often possible to form groups of like carpets even when their exact origin is not known. With regard to dating, much difference of opinion exists and there is a tendency for the assigned antiquity to err in excess. Positive evidence on the point is the exception. A close study, however, of the development of designs shows that their secular changes proceed along definite lines that are mostly in the direction of simplification and debasement. Also it is seen that new motives are occasionally introduced. Upon these observations a scheme of chronological sequence may be founded, and if certain carpets in the series can be definitely fixed in time either by the internal evidence of dated inscriptions, or because they are seen reproduced in pictures or mentioned in historical documents, then the whole scheme of dating may be

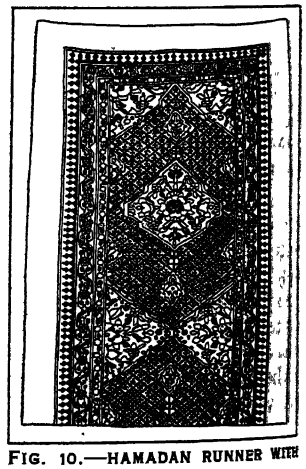
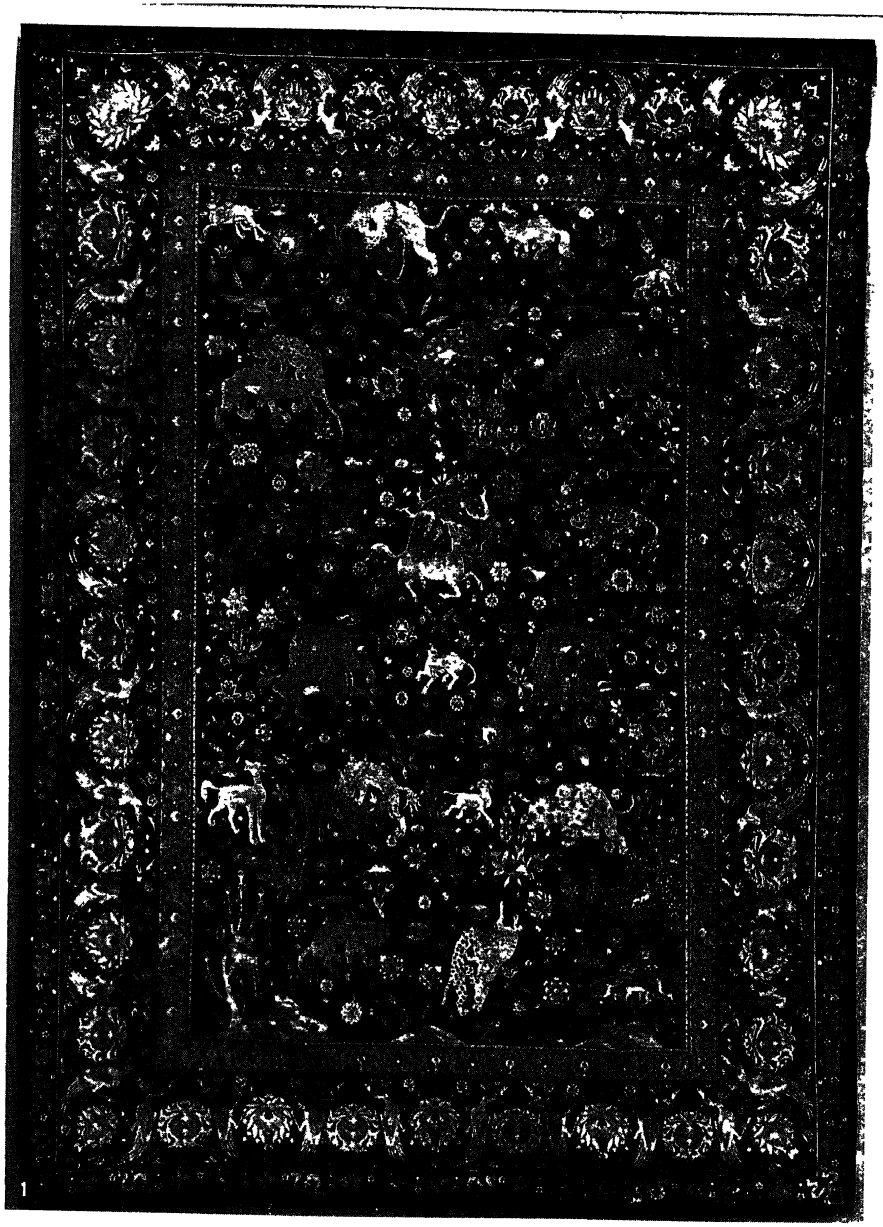


FIG. 10.—HAMADAN RUNNER WITH HEXAGONAL PANELS





BY COURTESY OF THE METROPOLITAN MUSEUM OF ART, NEW YORK

PERSIAN AND TURKISH RUGS, 16TH CENTURY

1. Silk rug, Central Persia, showing a hunting scene; late 16th century. The colour of the inner field is a deep rose-red. The central border is blue-green. The patterns are in yellow, blue, green and tan

2. Turkish rug, court manufactory, late 16th century The patterns are based on floral forms. The foundation colour is red, with green, blue and yellow prevailing in the design

RUGS AND CARPETS



BY COURTESY OF JEKYLL'S, LTD , AND KENT-COSTIKYAN, INC.

LOCALITIES OF "CLASSIC" ANTIQUE RUGS

A. Silk and silk and wool animal rugs, hunting scenes

B. Wool rugs with floral patterns, Persian (Isafahan)

C. Silk and metal, so called "Polish rugs" coming from central Persia

D. So-called "Armenian rugs," woollen rug of floral and geometric design, southern Caucasus and northern Persia

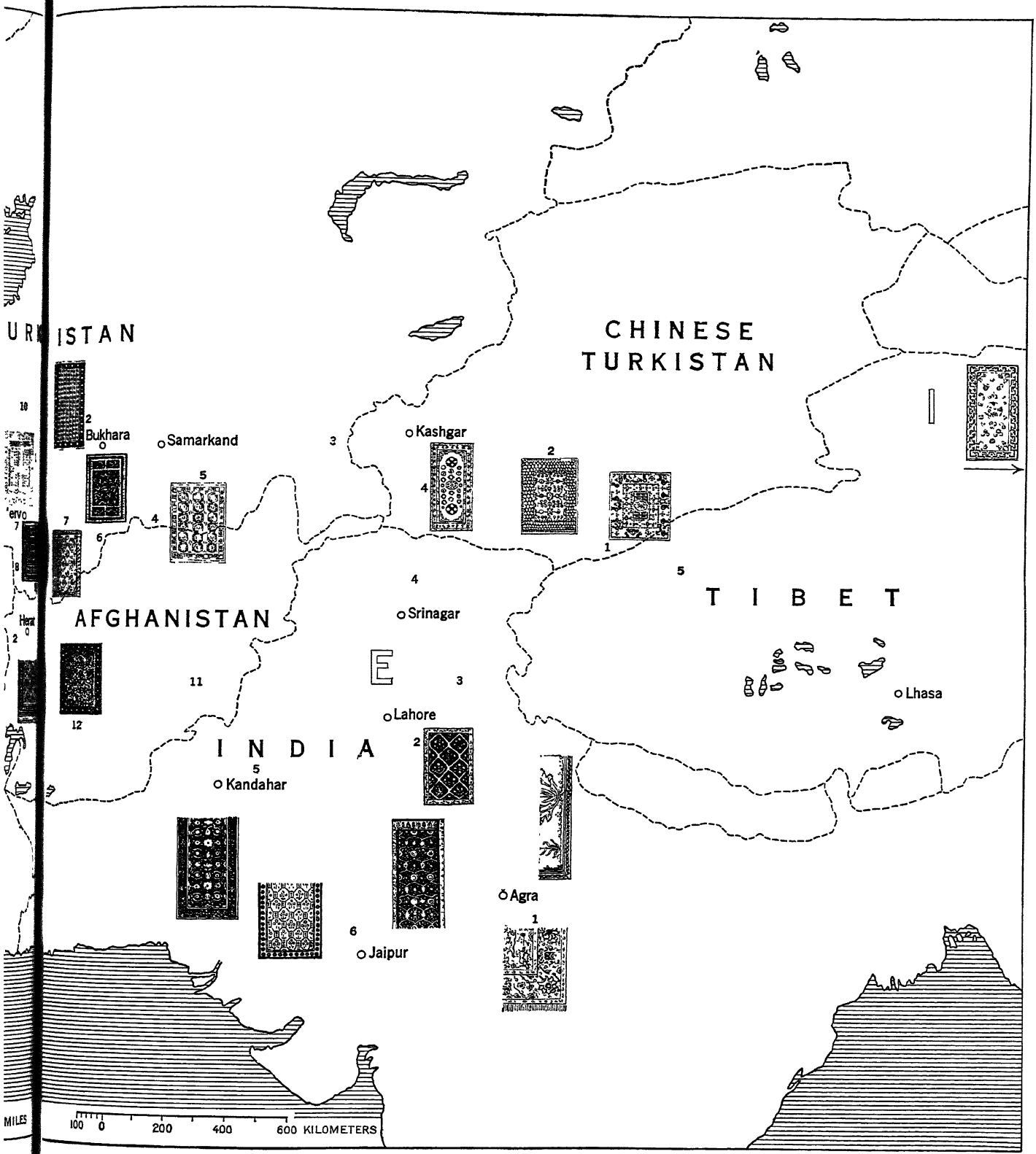
E. Wool and cotton—Indo-Persian (Indo-Isfahan, double warp) north Central India

G. Wool carpets, floral and geometric, Damascus

H. Wool, geometric and conventionalized floral pattern, western Asia Minor and Anatolia

I. Wool, silk and metal, floral and geometric, Chinese

J. Wool, floral design, Ushak



10. Héreké. 11. Kir-Sher. 12. Mujur. 13. Sivas. 14. Yuruk. 15. Tuzla. 16. Kaisariya. 17. Anatolian. 18. Ak-Hissar. 19. Sparta. 20. Damascus carpet made in Constantinople

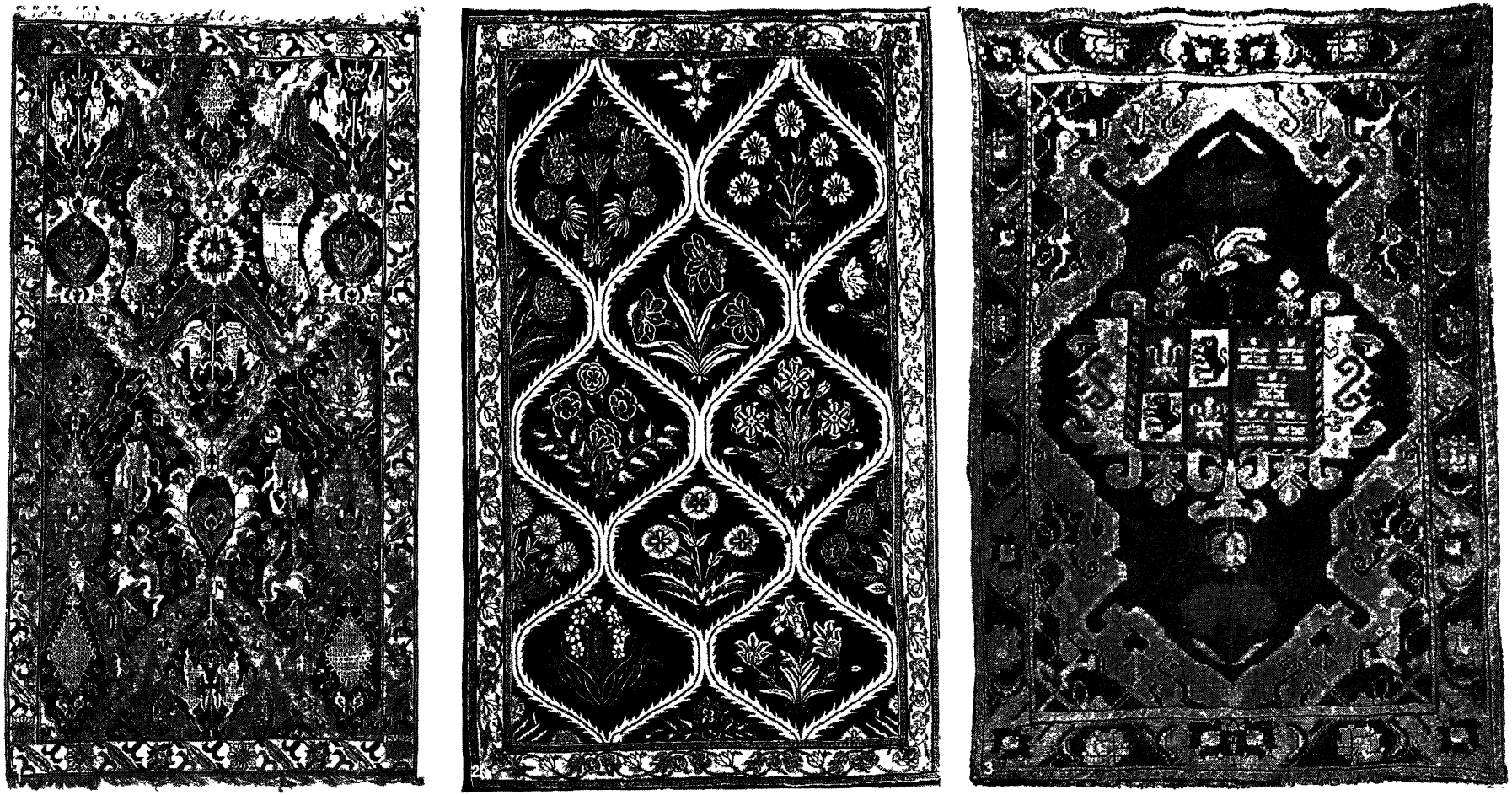
CAUCASIAN CARPETS: 1. Daghestan. 2. Shirvan. 3. Kabistan. 4. Kuba. 5. Derbent. 6. Soumak (pileless). 7. Shemakha. 8. Leshgian. 9. Chichi (Tchechen). 10. Cherkess. 11. Kazak. 12. Baku. 13. Ghenga. 14. Karabagh

PERSIAN CARPETS: 1. Isfahan. 2. Herat. 3. Khurasan (a) Kain (b) Birjand. 4. Meshed. 5. Kerman. 6. Yezd. 7. Shiraz. 8. Niriz. 9. Ferghana. 10. Hamadan. 11. Sarouk. 12. Kashan. 13. Joshagan. 14. Saraband. 15. Burejird. 16. Sultanabad. 17. Muskabad. 18. Sehna. 19. Bijar. 20. Kermanshah. 21. Western Kurdistan. 22. Persian Kurdistan. 23. Karaja. 24. Tabriz. 25. Bakshais. 26. Gorevan. 27. Serapi. 28. Sauj Bulakh. 29. Herez. 30. Kara Dagh. 31. Mosul. 32. Kultuk. 33. Mlaneh

TURCOMAN CARPETS: 1. Tekke. 2. Bukhara. 3. Yomud. 4. Ersari. 5. Afghan. 6. Beshir. 7. Salor. 8. Saryks. 9. Pinde'. 10. Khiva. 11. Adraskand. 12. Baluchi

CHINESE TURKISTAN CARPETS, Middle Asian (Mongolian): 1. Khotan. 2. Yarkand. 3. Samarkand. 4. Kashgar. 5. Tibetan

INDIAN CARPETS: 1. Agra. 2. Lahore. 3. Amritsar. 4. Srinagar. 5. Kandahar. 6. Jaipur (Palace rugs found there)



BY COURTESY OF (1, 2) THE DIRECTOR OF THE VICTORIA AND ALBERT MUSEUM, (3) THE SPANISH ART GALLERY, LONDON

THREE CARPETS

1. South Caucasian, north-western Persian, or Armenian Dragon carpet, 17th century. 11 ft. x 6 ft. 4 in. This type, called Kuba carpets, has a pattern based on the Persian Diamond diaper, with diamond-shaped compartments in the field, and conventionalized representations of the dragon and other Chinese creatures, such as the phoenix and the unicorn. The colours are brown, white, blue, yellow, red and purple

2. Indian carpet, late 16th or early 17th century. 4 ft. 8 in. x 2 ft. 11 in. This shows a type of pattern exclusive in Indian carpets with the field divided into quatrefoils or ogee compartments, each containing naturalistic flowers or floral patterns. The colours are: crimson foundation, with the design in yellow; the floral forms are in red, white, rose, blue, green, yellow and purple

3. Spanish carpet, with purely Spanish ornament, showing a shield of arms in the field, with honeycomb pattern introducing plant forms. This is a woollen pile carpet

considered to be established. The name commonly applied to a type is usually that of the town or district where it is made, though sometimes that of the tribe that makes it, or of the place where it is marketed.

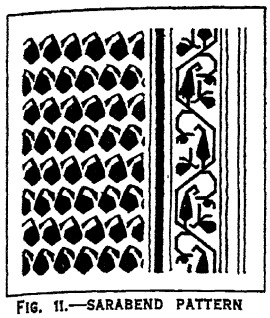


FIG. 11.—SARABEND PATTERN

Persia.—In the 16th and 17th centuries the Sehna knot is always used—at least in those carpets that have come down to us: the warp and weft are of silk or cotton and the pile mostly of wool. The texture is fine and there are usually three lines of weft after the knots. The patterns are based on floral motives and the treatment is often highly naturalistic: cloud-bands and other Chinese details are frequently introduced. The colours are rich but quiet and there are usually from ten to twenty different tints, of which crimson is most commonly used for the ground though blue is also seen. The term "Ispahan" is used in the trade to describe these early carpets, but it is not known certainly where the various groups were made, and the following classification is based chiefly upon the patterns.

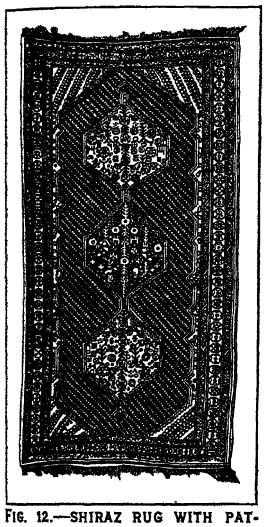


FIG. 12.—SHIRAZ RUG WITH PATTERN OF HEXAGONAL PANELS

Garden.—In this well marked but very rare type there is a map-like representation of a garden, with paths, flower-beds, trees and water-channels (*see* fig. 9).

Floral.—One type of floral carpet has a mass of trees and flowers forming almost a thicket, growing upwards from one end. More often however the ornament is arranged in a more ordered manner on a basis of scrolling stems curving about the field. The scheme may be associated with variously shaped panels as in the very famous "Ardabil" carpet in the Victoria and Albert Museum (*see* Plate VI.). In the rather later examples the floral forms—mostly palmettes—become larger and fewer and give the effect of a number of definite masses, sometimes almost touching, arranged more or less evenly throughout the field.

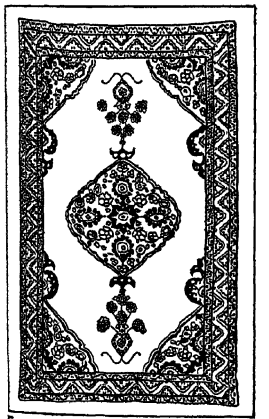


FIG. 13.—MESHED PATTERN FROM EAST PERSIA

Large Medallion.—These are floral carpets with a central lobed medallion, almost as wide as the field, having an appendage stretching towards each end of the carpet. To this device the name "pole-medallion" is often given. Carpets that are of this type probably come from north-west Persia.

Animal or Hunting.—An artificial division that includes floral carpets introducing hunting scenes or animals. Probably most of them come from south-east Persia.

Vase.—These are simply floral carpets with vases of flowers occurring in the pattern. The third type of floral carpet is very commonly so treated (*see* Plate IX.). It has been suggested that they were made in the neighbourhood of Joshaghan.

Diamond Diaper.—In these the field is divided up by long serrated leaves into diamond-shaped compartments, which are often filled with a group of four large palmettes, and sometimes contain vases.

Polonaise.—These are carpets with a silk pile often enriched with gold and silver thread inserted by the tapestry method. They appear to date from the 17th century but their place of origin is still uncertain. An abandoned theory is that they were made by Persian settlers in Poland. It is possible that they were all made in Persia and were mostly intended as gifts to European courts, but their patterns certainly differ from contemporary Persian carpets and an Indian or Turkish origin is not out of the question.

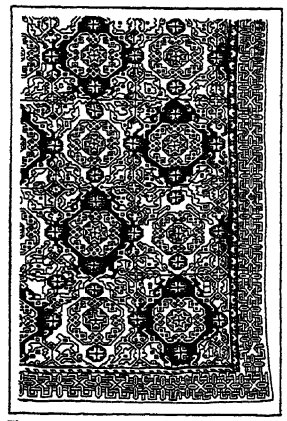


FIG. 14.—"HOLBEIN" TYPE, GROUND MOSTLY A CHEQUER OF TWO COLOURS DISGUISING THE TRUE NATURE OF THE PATTERN

Indo-Persian.—These are of the second and third floral types, but with a more set and angular arrangement of the basic stems, and with a much brighter colour scheme. The ground is crimson and among the other colours, brilliant greens and yellows predominate. It is thought that they may have come from the neighbourhood of Herat.

Tapestry.—A very few examples are known of carpets with the usual Persian patterns, woven by the tapestry method.

During the 17th and 18th centuries the patterns become more formal in character without undergoing any essential change: the more naturalistic forms tend to drop out and designs of the third floral and the diamond diaper type become more frequent. Silk is rarely used for the warp, but wool begins to be noticed though no doubt it had been used much earlier in carpets that have not been preserved. Towards the end of this period there begin to emerge certain groups of carpets that can be ascribed to definite districts, and these types mostly persist throughout the 19th century, when their numbers are augmented by the efforts of the manufacturer catering for the western market. The carpets of a locality rarely differ much in technique, and are mostly restricted to a few types of pattern, some of which are highly characteristic. There is a general tendency for carpets made towards the north-west of Persia to have a woollen warp, the Ghiordes knot and a rather coarse texture; and those from the south-east to have a cotton warp, the Sehna knot and a fine texture.

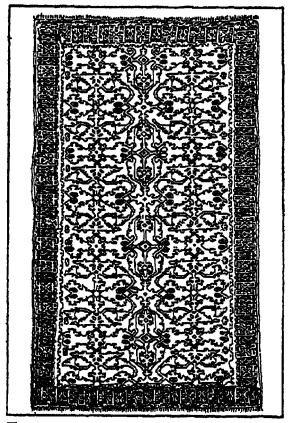


FIG. 15.—"YELLOW ARABESQUE" TYPE, YELLOW ON RED GROUND

Kurdistan.—Very thick and close pile: Ghiordes knot and woollen warp: mostly two lines of red woollen weft. The Mina Khani is a favourite pattern. Similar rugs not easily distinguishable from a description are called *Kara Dagh, Bijar,* and *Mosul.*

Hamadan.—Usually a cotton warp; the Ghiordes knot; and one line of weft after the knots. There is a wide outer band of plain camel hair which is very characteristic. Many are runners and have two or more large hexagonal panels along the field (*see* fig. 10). The colours are soft and harmonious.

Tabriz.—A type produced during the 19th century by an organized system chiefly for the western market. They are finely woven and well and accurately made but they lack the interest of the spontaneous product. The colours are light and delicate: the graceful pattern is evolved from traditional detail

by the modern designer. They have a cotton warp and the Sehna knot. Both large and small rugs are made; many with a silk pile.

Herez.—Mostly large carpets, coarser in texture and bolder in pattern than the Tabriz, but otherwise answering much the same description. To kindred products the names *Gorevan, Kermanshah* and *Serapi* are applied.

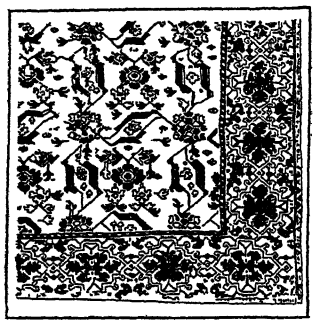


FIG. 16.—"BIRD" PATTERN, DIAPER PATTERN OF DEVICES ON A WHITE GROUND

Feraghan.—A type much prized in the East. The best, usually small, are finely woven with a short pile. They have the Ghiordes knot, a cotton pile, and two lines of weft. The colouring is soft, and evenly toned patterns like the *herati* are common. Sometimes they have a well-marked diamond-shaped panel on a light ground. Many large and coarse rugs dating from the middle of the 19th century are found in English houses.

Sarabend.—Like the Feraghan in technique, but they nearly always have the cone pattern in the field, and a wavy stem with dependent cones in the border. Many are runners (*see* fig. 11).

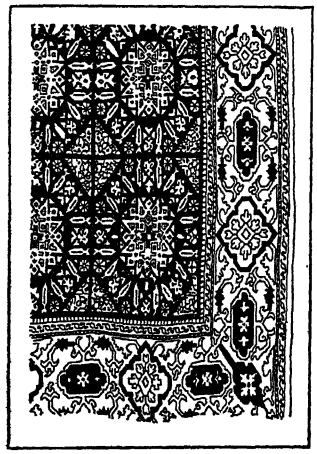


FIG. 17.—"GEOMETRICAL" TYPE

Sehna.—Very fine texture and short harsh pile: the Sehna knot; a cotton warp; and one line of weft. They are always small and have often the cone pattern or the *herati*. The field may have one or more concentric diamond-shaped panels but the sub-pattern runs through all with perhaps a change of colouring. The most expensive Persian rugs of their date.

Joshaghan.—Richly coloured rugs with the Ghiordes knot and a silky, lustrous pile. The warp and weft are either of cotton or wool, and there may be two or three lines of weft. The patterns are similar to those of the old Persian floral rugs.

Muskabad.—Large carpets produced in a commercial way near Sultanabad. They are the Persian equivalent of the large Turkey dining-room carpet, but are superior to it. Cotton warp; Sehna knot; and mostly two lines of blue weft. A long and rather silky pile. The colours are mellow and the pattern is mostly a large and graceful floral one. Varieties are called *Sultanabad, Ziegler, Mahal* and *Savalan.*

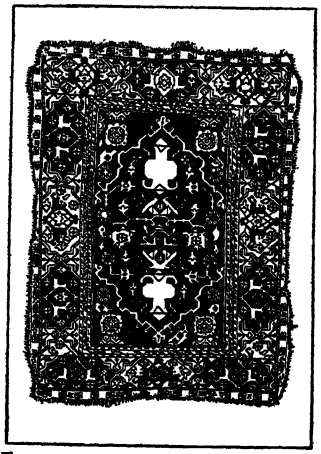


FIG. 18.—"TRANSYLVANIA" CARPET SHOWING CHARACTERISTIC SHAPE

Kashan.—The best modern Persian carpet. Very finely woven with graceful floral patterns, rather like the Tabriz, but with deeper colouring. The majority are unfortunately chemically washed. Cotton warp; Sehna knot; and mostly two lines of blue weft. Very thick in substance and most durable. Many are made with a silk pile. The *Sarouk* is very similar but is not so fine and has mostly a white weft.

Shiraz.—An easily recognized type. Woollen warp and two lines of red woollen weft: either kind of knot. The wool is very soft and silky and takes the dyes better than any other, and as a consequence the colouring is very rich and bright. The sides are mostly overcast with red and blue, and the ends often have extra embroidered bands. Tassels are often found along the sides. A common pattern is a large hexagonal panel (*see* fig. 12), and the cone diaper is also popular. Small devices and birds as found in Caucasian carpets are very frequent. The border mostly has very angularly-drawn floral forms. A great many saddle-bags are made. Kindred rugs are called *Mecca, Niris* and *Afshah.*

Khurasan.—Loosely woven rugs, often large, with a cotton warp, blue weft and the Sehna knot. There is generally a purple tone to the colouring. The *herati* is a common pattern and curious double cone-devices are almost peculiar to them. One kind is called *Herat.*

Meshed.—A sub-group of Khurasan rugs, with closer texture and lighter colours. A pole-medallion on a light field is common (*see* fig. 13).

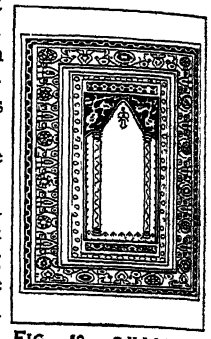


FIG. 19.—GHIORDES PRAYER-RUG OF FINE TEXTURE AND SHORT PILE

Kirman.—Cotton warp; two or three lines of blue weft; and the Sehna knot. Finely and closely woven and of medium thickness. They have very naturalistic floral patterns and soft but rich colouring together with several light tints. Some modern ones introduce figure and pictorial subjects that are rarely pleasing.

Kilims.—Tapestry-woven rugs are not largely made in Persia but the few are of very fine texture and have the same kind of patterns as the Sehna rugs.

India.—Carpet weaving is not a spontaneous art in India and it is possible that only few were made there before the Emperor Akbar introduced Persian workmen about the end of the 16th century. Most of the carpets then made followed Persian models in design and technique so closely that it is often difficult or impossible to distinguish between them. Generally however it will be found that the design is more stiffly arranged and the drawing less sympathetic and that there is a difference in the colour-scheme. The crimson, often in two shades, is more vivid; ochrous yellows and white are common and a peculiar plum colour is used. Two types of pattern however seem to be found exclusively in Indian carpets. The field of the first is divided up into quatrefoils or ogee compartments, each containing a naturalistic plant or other floral forms (*see* Plate X.). The second has detached sprigs of flowers arranged in various ways. Both types have very rich colouring and a deep crimson ground. Most of these carpets appear to have been made at Lahore for the palace of Amber at Jaipur.

The later Indian carpets are mostly very inferior, largely on account of the difficulty of obtaining good wool. Many still have the designs of Persia and of other countries but purely Indian patterns are also common. From time to time better carpets have been made in the factories and during the 19th century the government established a fairly successful manufacture in the gaols, but it is rarely that in both design and quality they rival the better products of Persia. The best come from Agra and Warangal, the latter producing some good silk rugs. Carpets from Masulipatam, Mirzapore and Tanjore are very cheap and very substantial but the wool is so harsh and the colours so dull and grey that they are quite unattractive. Cotton rugs are made in Multan, and tapestry-woven ones, called *daris,* in many places. During the 20th century carpets of good quality, with any desired pattern, are being made in Kashmir.

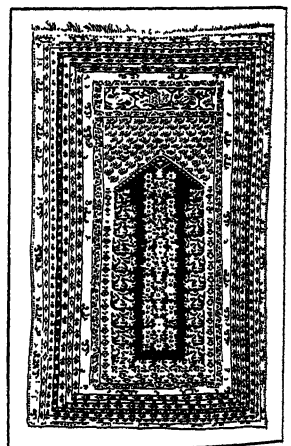
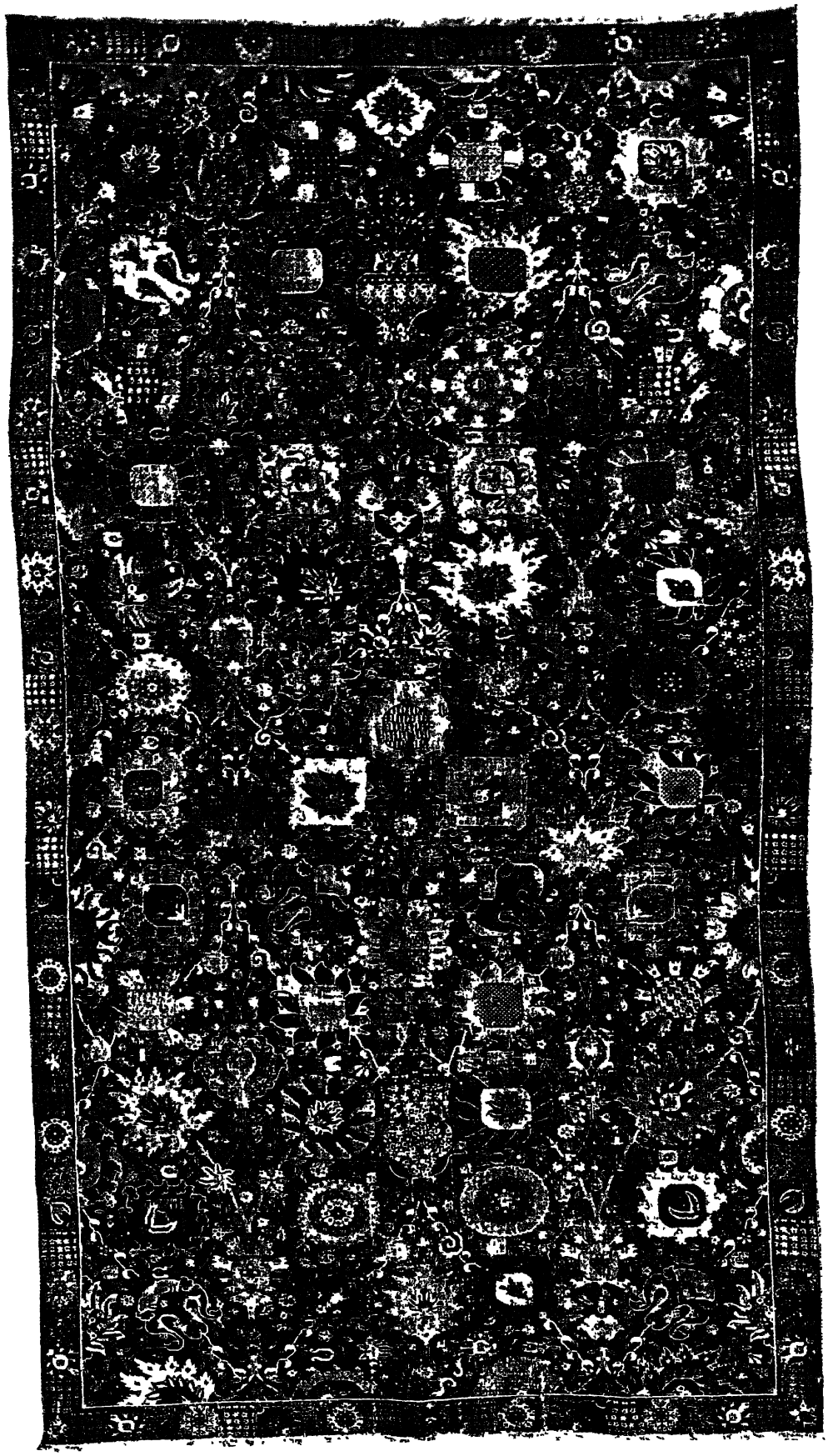


FIG. 20.—KULAH PRAYER RUG

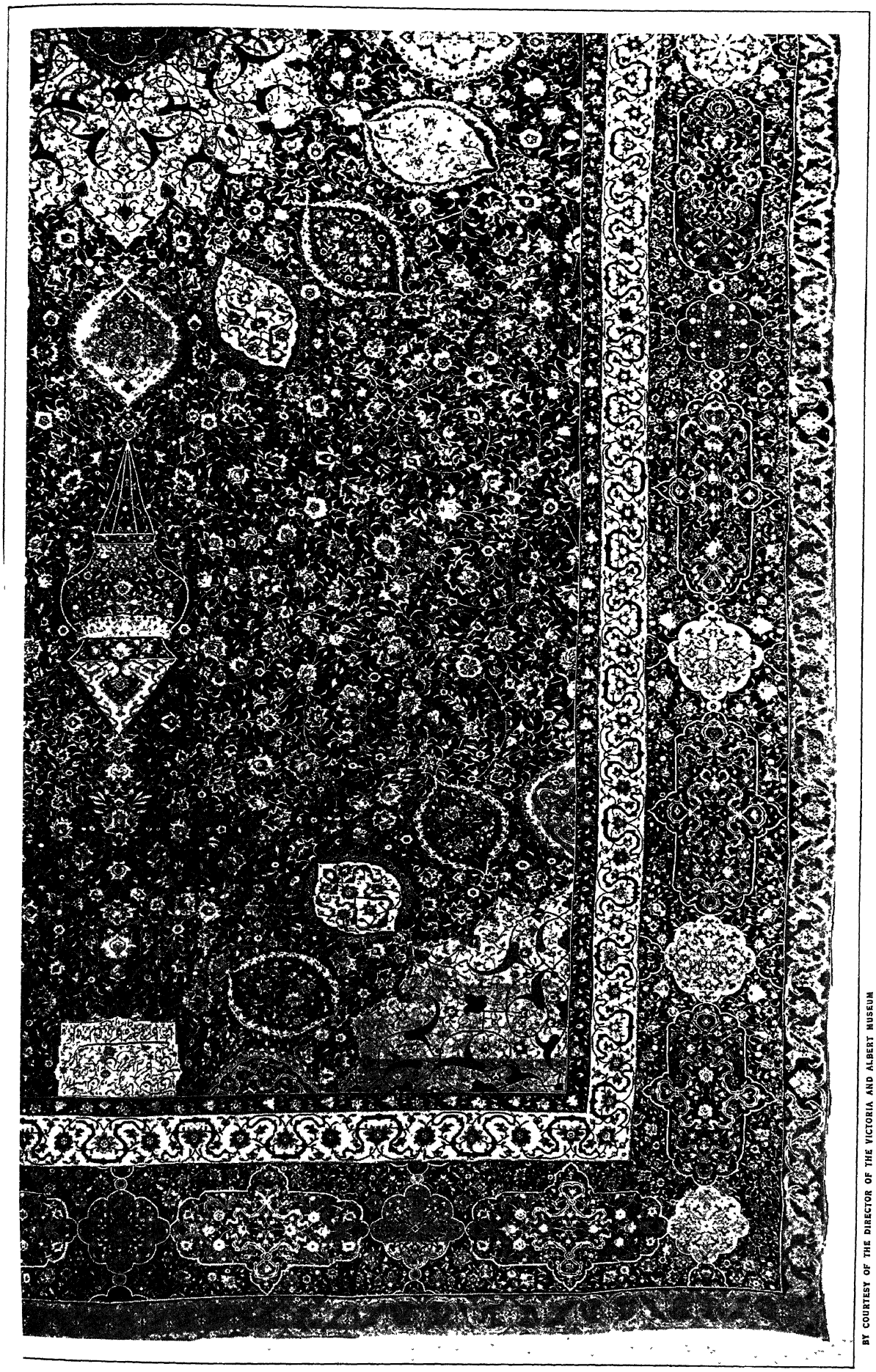
Turkey.—The Turkish carpets of the 16th and 17th centuries are made entirely of wool and have the Ghiordes knot and two lines of weft, mostly red, after the knots. The texture is of



BY COURTESY OF MR. AND MRS. WILSON-FILMER

PERSIAN VASE CARPET, EARLY 17TH CENTURY

Vase carpet, so-called because of the vases of flowers in the pattern, 17 ft. 9 in. x 7 ft. 9 in. Knotted in woollen pile on a cotton warp



BY COURTESY OF THE DIRECTOR OF THE VICTORIA AND ALBERT MUSEUM

PERSIAN CARPET, 16TH CENTURY

Famous carpet from The Mosque at Ardabil, Persia, A.D. 1540, 34 ft. 6 in. x 17 ft. 5 in. Knotted in woollen pile on a silk warp. The floral ornament, on a basis of scrolling stems curving about the field, is here associated with a central medallion and variously shaped panels. The ground is deep indigo and the other prevalent colours are yellow, red, white and black

RUGS AND CARPETS

BY COURTESY OF THE DIRECTOR OF THE VICTORIA AND ALBERT MUSEUM

ORIENTAL CARPETS, 18TH AND 19TH CENTURIES

1. Chinese carpet, late 18th century, 11ft. 8in. x 8ft. 4in. Knotted in woollen pile on a cotton warp. The colour of the inner field is white, with the pattern in blue. The outer border is a deep blue, with the design in white and yellow

2. Tekke-Turcoman carpet, 19th century, 9ft. 7in. x 7ft. 2in. Knotted in woollen pile on a woollen warp. The carpets of the Tekke tribe, sometimes erroneously called Bokhara, are often very finely woven; the principal colour is a deep crimson

medium fineness. Only about six to eight tints are used and these are mostly bright primary colours. The reds, which predominate, do not incline towards crimson. The patterns are never naturalistic but yet are based on floral forms, and very little purely geometrical ornament is introduced apart from that obviously derived from Saracenic art. One group—the Court Factory—differs from the above description in several particulars.

Holbein.—So called because they are often represented in the pictures of that painter. They have a pattern of Arabesque octagonal forms arranged regularly in rows and columns, with diamond-shaped figures between them (*see* fig. 14). The ground is mostly a chequer of two colours which rather disguises the true nature of the pattern. This design is very interesting as being essentially the same as that of the Turcoman rugs of about three centuries later.

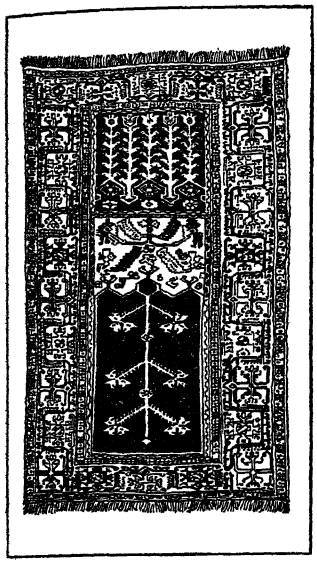


FIG. 21.—LADIK PRAYER RUG

Lobed Panels.—These have a number of angular lobed panels on a field covered with a small floral diaper.

Yellow Arabesques—These have a repeating pattern of yellow arabesques on a red ground (*see* fig. 15), and usually a border with a debased Cufic inscription.

Ushak.—A very important kind of large rugs having an almost circular medallion in the centre and the halves of circular lobed medallions against the sides. (*See* Plate IV.) The pattern seems closely connected with the *Large Medallion* Persian type. They are the direct ancestors of the well known red and blue "*Turkey*" carpet of the 19th century.

Prayer-Rugs.—The earliest known prayer-rugs have a plain red field with a very simple arch-form at one end and mostly a hanging lamp. The border often has a row of modified cloud-bands alternating with rosettes. Most of them have been preserved in Italian churches.

Bird.—Apparently akin to the last group, these have a diaper pattern of devices somewhat bird-like in shape, on a white ground (*see* fig. 16).

Court Factory.—This group, believed to have been made under direct Court patronage near Constantinople, differs in several respects from other Turkish rugs, and has much affinity with the Persian. The Sehna knot is used and the texture is fine. The warp is of fine yellow wool and the weft is often of red or green silk. The chief colours, always bright, are crimson, yellow, yellow-green, and light blue. The patterns closely resemble those of the so-called "Damascus" faience.

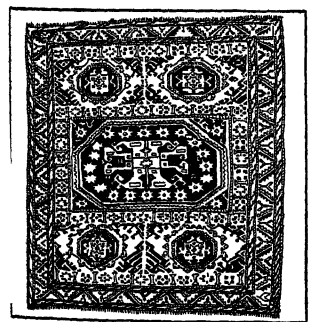


FIG. 22.—BERGAMA SQUARE RUG

Geometric.—These are coarser, but have several points of resemblance to the last group, the colours being similar and identical. They have arabesque geometrical patterns of octagons, stars and interlacing lines (*see* fig. 17). Dr. Sarre claims that they were made in Egypt.

Later Turkish Carpets.—Apart from the Ushak rugs, which persist to the 20th century, the above types almost disappear during the 17th century, and are succeeded by others which mostly have the form of prayer-rugs. During the 19th century the large Turkey carpet becomes merely an article of commerce and the smaller rugs deteriorate sadly in quality while keeping the design almost unchanged. Great numbers of kilims have been made. The larger ones, woven in two strips, have simple geometrical patterns, while the smaller follow in a simplified form the patterns of the pile carpets.

Transylvanian.—So called because many were found in that country. Those of the 17th and early 18th centuries have bright red and yellow colouring and mostly a hexagonal panel in the middle, and a succession of such panels in the border. During the 18th century the colour-scheme becomes more sombre and includes chiefly red, blue and a characteristic dingy purple. These later rugs are almost square in shape (*see* fig. 18).

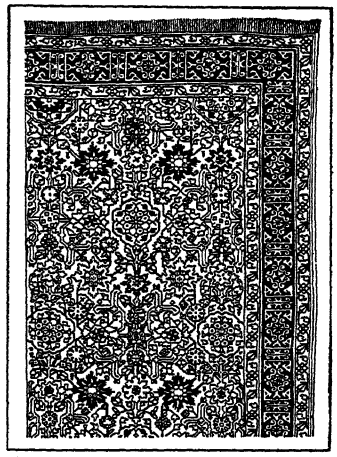


FIG. 23.—CAUCASIAN CARPET WITH CUFIC BORDER

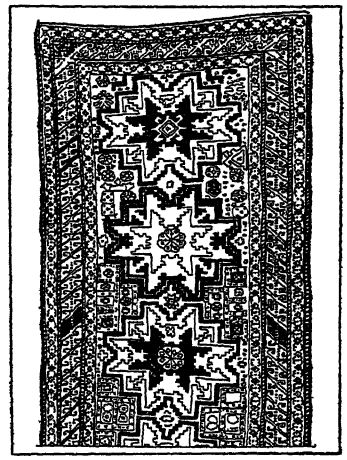


FIG. 24.—SHIRVAN RUG, FINE TEXTURE AND SHORT PILE

Ghiordes.—Mostly prayer-rugs, though in the 19th century fairly large rugs of similar design were made. They are fine in texture and have a very short pile. The pattern is a delicate mosaic of small detail. The arch is steeply pointed and often supported by two columns and the niche is mostly plain. There are several narrow border-stripes (*see* fig. 19). The main colours are red, blue and white.

Kulah.—Prayer-rugs of medium texture and blue and yellow colouring, the reds having faded. The arch is a flat-pointed one (*see* fig. 20), and there are often tree-forms in the niche. There are numerous narrow border-stripes with a pattern of small spots.

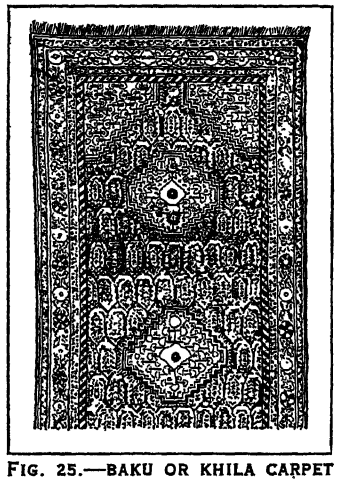


FIG. 25.—BAKU OR KHILA CARPET FROM GILAN

Ladik.—Prayer-rugs with red preponderating and some blue and yellow. One of the border-stripes is wide. A characteristic feature is the row of upright lilies either above or below the prayer niche (*see* fig. 21).

Mujur.—Loosely woven rugs with bright colours including much green.

Melas.—Prayer-rugs with brick red and yellow colouring. The pointed arch opens out at the top into a diamond shape.

Makri.—Brightly tinted rugs with two arches side by side often with different colouring.

Bergama.—Largish square rugs of loose pile. The pattern mostly consists of a number of rectangular panels (*see* fig. 22). The colouring is dark, and that, as well as the detail, resembles that of some Turcoman rugs.

The Caucasus.—The Caucasian weaver is clearly inspired by the carpets of both Persia and Turkey, but in the matter of technique and colouring his debt is chiefly to the latter. Warp and weft are both of wool; the Ghiordes knot is always used and the texture is of medium fineness. The colours are few and bright, but more white is introduced than in the Turkish rugs and there is no predominance of red. Many Persian and Turkish patterns are adopted with a much more angular treatment, and purely geometrical ornament is not disdained. A common basis for the design is the rectilinear panel fringed with latch-hooks;

and the ground is often filled with small detached devices, such as octagons, stars and animals capriciously inserted wherever there is a blank space. The drawing, apart from tone and colour, has rarely much beauty. Few of the earlier carpets—called *Kuba* in the trade—have been preserved.

Dragon.—This 17th century type, once ascribed to Armenia, has a very quaint pattern apparently based on the Persian

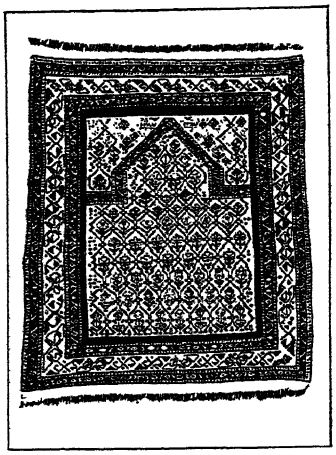


FIG. 26.—DAGHESTAN PRAYER RUG, DIAGONAL LINE PATTERN

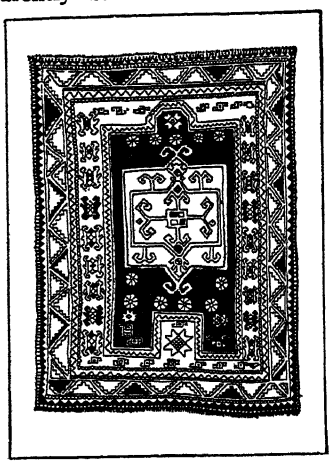


FIG. 27.—KAZAK PRAYER RUG, COARSE WITH LONG PILE

Diamond diaper; and introducing scarcely recognizable representations of the dragon and other Chinese mythological creatures. (*See* Plate X.)

Cufic Border.—A very formal arrangement of the third Persian floral type, mostly with a Cufic border (*see* fig. 23). They are found in the 18th century and onwards.

Shirvan.—An important group made by the sedentary population. It has a rather fine texture and a short pile. The chief colours are red, blue and white. Of many kinds of patterns that with repeated panels is a favourite (*see* fig. 24).

Baku or *Khila.*—Large, long rugs made like the *Shirvan,* having large cone-devices and birds (*see* fig. 25). Their soft, faded colours are supposed to go specially well with antique objects.

Daghestan.—Thicker than the *Shirvan,* with a rich yellowish tinge in the colouring, and a tendency to diagonal lines in the patterns (*see* fig. 26). The prayer rugs are often dated.

Kazak.—A very important group made by the nomadic people (*see* figs. 27 and 28). They are rather coarse and have a long pile and two to four lines of red weft. The sides are overcast in different colours. Panelled fields are common and an interesting pattern is one of large radiating devices probably derived from the *Dragon* carpets. The colours are mellow with a good deal of brick-red.

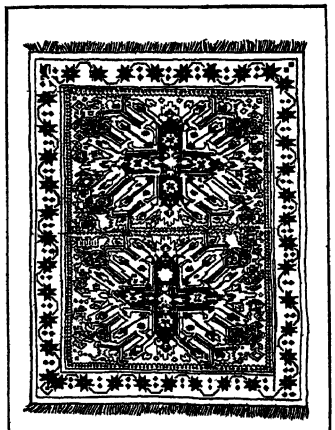


FIG. 28.—KAZAK CARPET WITH RADIATING DEVICES

Karabagh.—Woven like the *Shirvans.* The design often includes diamond-shaped panels and very angular cone-devices (*see* fig. 29); floral patterns influenced by Western art are not infrequent. Magenta and light blue are freely used.

Kilims.—Large numbers of tapestry-woven rugs are made, mostly with geometrical patterns.

Soumaks.—These, made by the Soumak method, are mostly large rugs with a pattern of three octagons in the field.

Central Asia.—As the carpets of Western Turkestan are made by nomadic Turcoman tribes living in tents and constantly moving about, it is not to be expected that very old ones can still exist. Probably in fact few go back more than a hundred years, though it is almost certain that similar rugs have been made for centuries. Turcoman rugs are easily identified, for they all, excepting the *Beluchis,* have a dark red colouring and peculiar designs. Most of the older pieces are not in reality rugs at all though those intended for hanging in tent doorways have that appearance. The majority are bags, used for storage in the tents or on the pack animals. Those called camel-bags measure about five by three feet, and the tent or wall-bags three by one or more. Saddle-bags consist of two squares of about two feet, joined together. There are also long bands about a foot wide and perhaps sixty yards long, which are for wrapping round the large tents. The small squarish rugs and larger ones of about ten by seven feet seem to be later in date and were perhaps made chiefly for sale. The Turcoman carpets (wrongly called Bukhara) have woollen warp, weft and pile, two lines of weft and nearly always the Sehna knot. They are surprisingly well woven for nomads with none but the most primitive appliances. After the predominant red, the chief colours are blue, white and a natural black that tones to a very pleasant brown. The characteristic design is the octagon—or so-called elephant's foot—arranged in rows and columns, often with diamond-shaped figures in between. The doorway hangings—called *Khatchlis* (*see* fig. 30)—have cross shaped panelling and the smaller pieces often have a rectangular diaper. Woven end-webs and tassels are freely used as embellishments. The best classification is on a tribal basis.

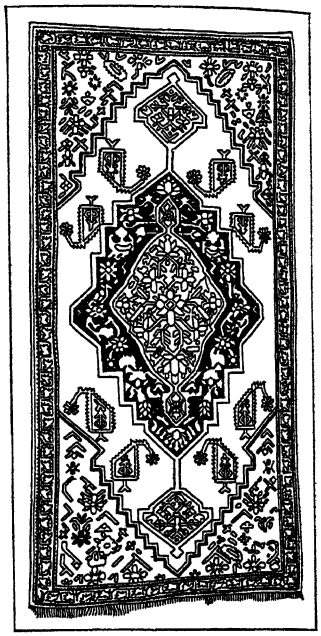


FIG. 29.—KARABAGH CARPET, BLUE AND MAGENTA

Tekke.—These are often very finely woven, sometimes with 400 knots to the square inch. The principal colour is a deep crimson (fig. 31) often modified by time so that it is best seen at the back. (*See* Plate VII.)

Yomud.—Of medium fineness, mostly with the Ghiordes knot. The chief colour is a purple red, and there is a good deal of white, especially in the border. In the pattern diamonds often displace the usual octagon (*see* fig. 32). The long tent-bands, which have the pattern in pile on a woven ground, belong to this group.

Saryk.—Like the *Tekkes* but with an almost black-purple or very deep crimson colouring, together with some very prominent white. Not very common.

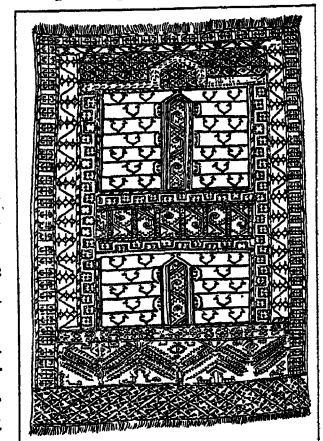


FIG. 30.—PORTIERE CARPET OR KHATCHLIS

Ersari.—These are rarely large pieces. The chief colour is a brown-red; dark green and a little bright yellow are characteristic. The patterns are very varied, with a tendency to zig-zags, diagonal lines and spotted effects (*see* fig. 33).

Afghan.—Mostly large rugs with long pile and a pattern of large octagons almost touching in columns (*see* fig. 34), and akin to the *Ersaris.*

Bokhara.—A rare type apparently made in Bukhara, with rich colouring including a lot of yellow, and patterns apparently based on the Persian. Most are prayer-rugs with a characteristic pointed



BY COURTESY OF A. SCHROLL AND COMPANY FROM FRIEDRICH SARRE AND HERMAN TRENKWALD, "OLD ORIENTAL CARPETS" (TRANS. BY A. F KENDRICK, 1926), ISSUED BY THE AUSTRIAN MUSEUM FOR ART AND INDUSTRY, VIENNA

CAUCASIAN CARPET, 17TH CENTURY

So-called Armenian carpet, Caucasus region, end of 17th century. About 11 ft. 6 in. x 6 ft. 6 in. The ten colours are strong in tone; the ground colours, deep-blue, white and red. The warp and weft of white cotton, the knotting is of sheep's wool, with the pile slightly to the right. The pattern of large stems and cartouches includes floral motives angularly conventionalized. The border, narrow in relation to the field, shows leaf-motives and blossoms

arch (*see* fig. 35).

Beluchi.—These differ from the other Turcomans in that they have a black weft, and dark purple and red colouring, sometimes with natural camel-colour and very staring white. The patterns are almost geometrical but the prayer-rugs often have tree-forms (*see* fig. 36). It is one of the cheapest rugs, but too many of the later ones are chemically washed.

Chinese Turkestan.—The earliest rugs of Chinese Turkestan date from the 17th century and mostly have a silk pile and some

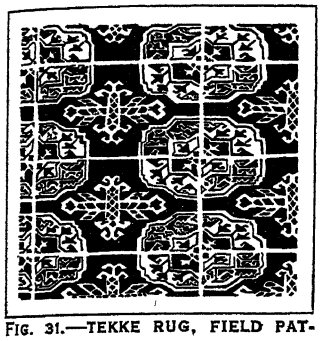


FIG. 31.—TEKKE RUG, FIELD PATTERN

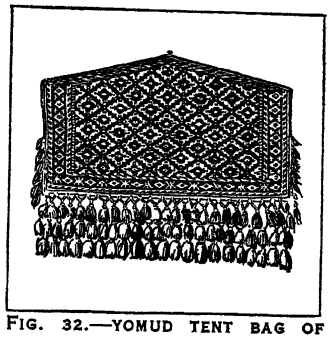


FIG. 32.—YOMUD TENT BAG OF MEDIUM FINENESS

gold and silver thread. The patterns are formal floral ones, based on the Persian but with unmistakable Chinese treatment of the detail. The later carpets are loosely woven with the Sehna knot, wool, or more rarely silk pile, and a cotton warp. The 18th century examples have rich but dark colouring, which during the 19th century gets gradually more vivid until at last it becomes excessively crude. There are two important types of design.

Medallion.—These usually have three medallions suggesting in shape a square with well-rounded corners (*see* fig. 37). One border almost invariably has a conventional Chinese pattern of foam-crested waves. This pattern is mostly called Samarkand in the trade.

Five Blossom.—These have a floral diaper with characteristic groups of five blossoms (*see* fig. 38). The colouring is often richly red and orange with a little clear blue. They are often called *Khotan* or *Kashgar*.

China.—The rugs of China proper are easily recognized by their characteristic Chinese ornament. They are of coarse texture and are woven with the Sehna knot on a cotton warp: the pile is thick with a very smooth surface. A peculiar feature is the clipping of the pile so as to form a furrow at the contours of the pattern. The prevailing colour is yellow, sometimes intentional but often resulting from the fading of shades of red and

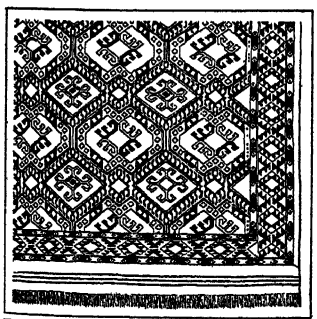


FIG. 33.—ERSARI PATTERN, CHIEFLY A BROWN RED

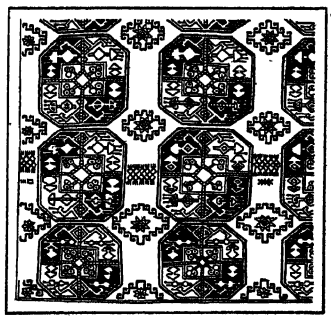


FIG. 34.—AFGHAN RUG, FIELD PATTERN

orange. Blue and white are also freely used (*see* Plate VII.) but there is little true red, brown or green. The patterns are very varied. Some carpets have repeating scrolling plant-forms. Others have, scattered about, flowers, medallions of frets and the countless symbols that are so familiar in Chinese art. Frets of the Greek type are very common in the border. Pillar carpets are peculiar to China. They are designed (*see* fig. 39) so that when wrapped round a pillar the edges will fit together and give a continuous pattern, which mostly is a coiling dragon. Many small mats, seat-covers and the like are found. The dating of Chinese rugs is an almost impossible task, as patterns have varied very little with time, and internal evidence is almost non-existent. During the 20th century numbers of large carpets have been made for export. They usually have a scattered pattern on a light ground and are soundly woven but not very artistic.

Morocco.—Large carpets, twice as long as wide, are made here. They are loosely woven with very bright but mostly faded

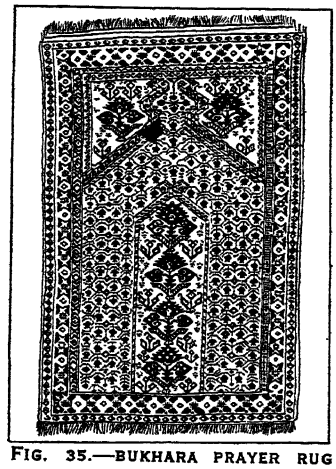


FIG. 35.—BUKHARA PRAYER RUG OF RARE TYPE

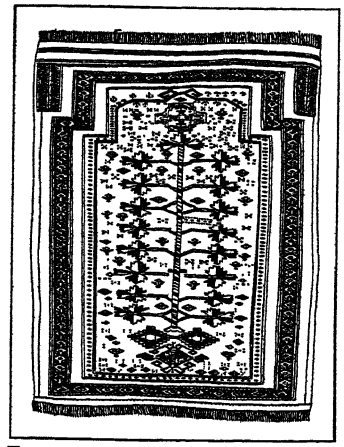


FIG 36.—BELUCHI PRAYER RUG WITH BLACK WEFT

colours. The field is often cut up into rectangular panels filled with ornament taken directly from Turkish carpets.

Spain.—Carpets seem to have been made in Spain as early as the 14th century, no doubt soon after their importation from the East. They are made entirely of wool, with some unusual technical features. The knot is tied, or rather twisted, on one warp-thread instead of on two, and the weft passes several times after each row of knots. The colours are bright and few in number, little being used but yellow, blue, red and green. The designs fall into two groups, being based either upon oriental models, such as the geometrical Turkish one or upon purely Spanish ornament (*see* Plate X.). The latter frequently introduces heraldry. One early type of long rug has shields of arms on a field with a honeycomb pattern introducing plant-forms and birds. A common design is a succession of foliated wreaths; another is a diaper of ogee compartments containing the floral device known as the "artichoke." Few knotted pile carpets seem to have been made after the 17th century, but small rugs woven in narrow breadths with a looped pile are common until at least the end of the 18th century.

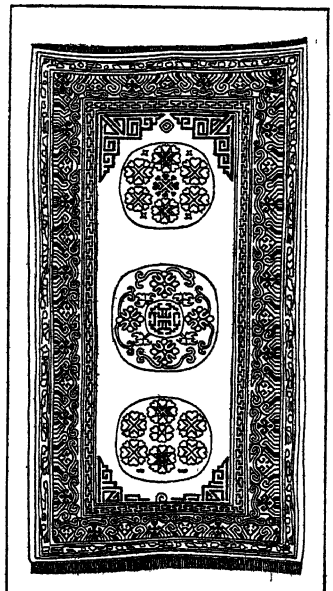


FIG. 37.—CHINESE TURKESTAN CARPET WITH THREE MEDALLIONS

England.—The art of making hand-woven carpets in England soon followed their importation from Turkey, though actual specimens of the 16th and 17th centuries are so rare that only about a dozen complete rugs are known. They have a hempen warp and weft and a woollen pile of medium fineness, tied with the Ghiordes knot. The ground is usually green and there are so many shades of the other colours that the whole number of tints is greater than in oriental carpets. The designs may be divided into two groups. In the first are found typical English patterns resembling contemporary embroidery, and often introducing heraldic devices and, fortunately, dates. The earliest known carpet of this type belongs to the Earl of Verulam and is dated 1570.

The second group has patterns following closely, except in colour, the Turkish carpets of the time. On two out of four of this type belonging to the Duke of Buccleuch, the dates, 1584 and 1585, appear. (*See* Plate IV.) Large numbers of pieces of carpet-knotting —called at the time "Turkey-work"—were made for covering chairs and stools. As the demand for carpets increased in the 18th century small factories were started at Paddington, Fulham, Moorfields, Exeter and Axminster, and the home production was stimulated by premiums offered by the Society of Arts in 1756. The designers continued to adopt the decoration of the time or to copy eastern carpets. The famous Axminster factory worked on well into the 19th century and then became merged into the Wilton factory, which is still in operation. With the advent of machinery the industry dwindled and almost disappeared until, about 1880, the craft was revived by William Morris. Quite late in the century a successful factory was opened in Donegal and during the 20th century many small rugs have been knotted by handicraft societies, though their products can scarcely compete commercially with the machine or with the oriental rug. (C. E. TA.)

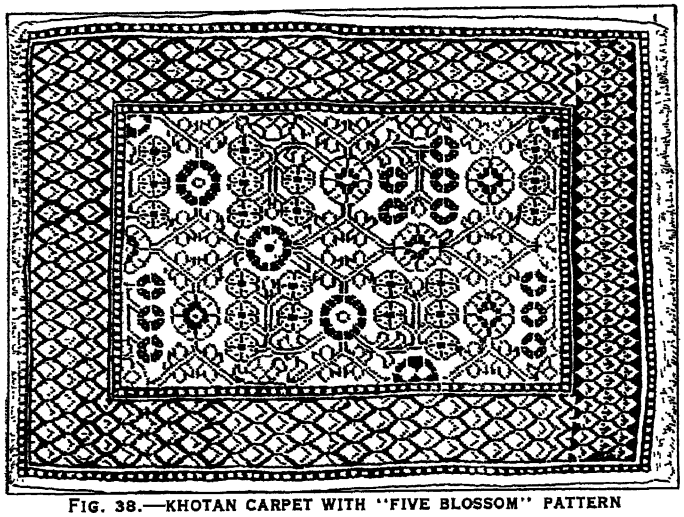


FIG. 38.—KHOTAN CARPET WITH "FIVE BLOSSOM" PATTERN

THE UNITED STATES

The first carpet factory in the United States was established in 1791 by W. P. Sprague at Philadelphia. From that time the development of carpet-weaving machinery has progressed rapidly, especially in the line of broadlooms. One of Sprague's earliest Axminster carpet designs represented the arms and achievements of the United States. This attracted the attention of Alexander Hamilton, who recommended the imposition of a small duty on imported carpeting, thus initiating the policy of a protective tariff. While in the early days of carpet manufacturing in the United States, looms were imported from Great Britain and the Continent, it was not long before looms were invented and constructed in the different carpet mills which had come into existence in several cities in the United States. The Jacquard pattern device was put into use in the United States shortly after its introduction in Europe. At Medway, Mass., in 1825, a small ingrain carpet mill, owned by Henry S. Burdett and managed by Alexander Wright, was started with hand looms brought from Scotland. In 1839 Erastus B. Bigelow began experimental work at Lowell, Mass., which resulted in the perfection of the first power loom ever made for weaving carpets. This wove an ingrain type, and was followed by Mr. Bigelow's development of the Brussels power loom in 1848. John Johnson of Halifax, England, undertook tapestry and velvet weaving (*q.v.*) in Newark, N.J., producing the pattern by printing the dyestuff on the individual strands of yarn. In 1876, after several years of research, Halcyon Skinner invented the moquette or spool Axminster at West Farms, N.Y. James Dunlap, in Philadelphia, developed a method of printing tapestry and velvet carpeting in the finished fabric. Imitation Smyrna rugs were made in considerable quantity by many factories during the latter part of the 19th century, the process being of the chenille Axminster type, but double faced. The three quarter width or 27 in. was the limit of weave in the several types for long periods after invention, but in the closing years of the 19th century a movement to widen the looms began in America. The ingrain carpet and Smyrna rugs gradually lost favour, while the tapestry, velvet, Axminster, Wilton and chenille rapidly grew in demand as the processes were perfected and the looms widened. Rugs were first formed by sewing carpet strips together. Later the corners of a border pattern strip were mitred to form the framed design effect. Slowly the necessary changes were made to allow weaving the border patterns in the straight strips and avoid the mitred corners. (*See* CARPET MANUFACTURE.) To eliminate the seam through the centre of rugs and in the medallion designs, popular at the time, required a wider strip and loom to weave it. Looms nine feet in width followed this trend in tapestry, velvet and Axminster in the early years of the present century and Wilton broadlooms followed after many years of experimental work and became popular about 1926. All these weaves are commonly woven up to 15 ft. in width and even wider looms were being developed in 1928. The chenille weave, developed in Great Britain in 1839, was not introduced into the United States until 1909 and was not produced in quantity until 1916. It has had a steady growth since because it is the only woven floor covering that can be woven to special order up to 30 ft. in width, any reasonable length, any shape, design or colour arrangement and an inch or better in thickness. Seamed rugs are no longer in demand. (X.)

France.—There are early records of carpet weavers in France, but nothing is known of their work until the foundation of the famous Savonnerie factory near Paris in 1626. There many large carpets were made, mostly with flaxen warp and weft and a woollen pile tied with the Ghiordes knot. The designs accord with contemporary French decoration and few if any were based on oriental carpets. In 1825 the factory was closed and the manufacture transferred to the Gobelins tapestry factory. During the 18th century and afterwards many tapestry-woven carpets were made at Aubusson and in other tapestry factories.

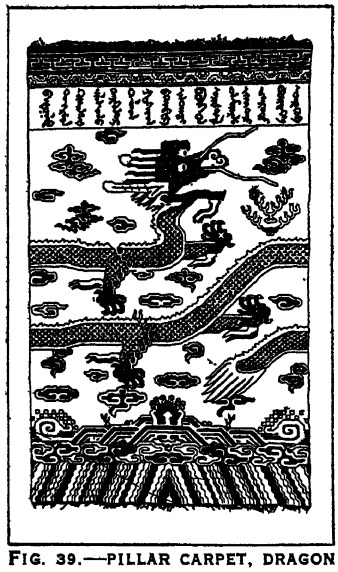


FIG. 39.—PILLAR CARPET, DRAGON DESIGN

Other Countries.—A few carpets are still in existence that were made in Poland in the 17th century, with floral patterns in light colouring. Loosely woven rugs have been much made by the peasants of Finland. They often have human figures and dates and seem mostly to have formed part of the bridal dowries. Kilims are made in the Balkan States and in Southern Russia; they resemble the Turkish pieces but have, especially the Russian, more naturalistic floral patterns. Those from Rumania generally include birds in the design.

PRACTICAL CONSIDERATIONS

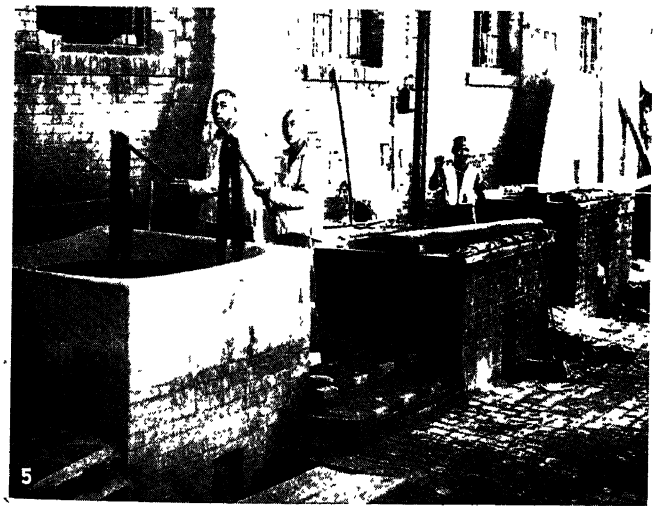
It is perhaps more important that a carpet for use should be soundly made than beautiful, and certainly better that it should be beautiful than that it should accord with any particular scheme of decoration. Oriental carpets, on account of their depth of tone, rarely go badly with other objects. Accordingly when buying, the first thing to ascertain is that the foundation threads are sound and strong and that the pile is not unduly worn away. If a rug is held up to the light, holes and thin places are often revealed that were quite unnoticed when it lay on the floor. Holes that have been properly repaired are of little consequence. It should be noticed whether it is of good shape and whether it lies flat on the floor. Few rugs have the sides perfectly parallel but an excessive distortion is unsightly. A rug that is not flat tends to wear badly

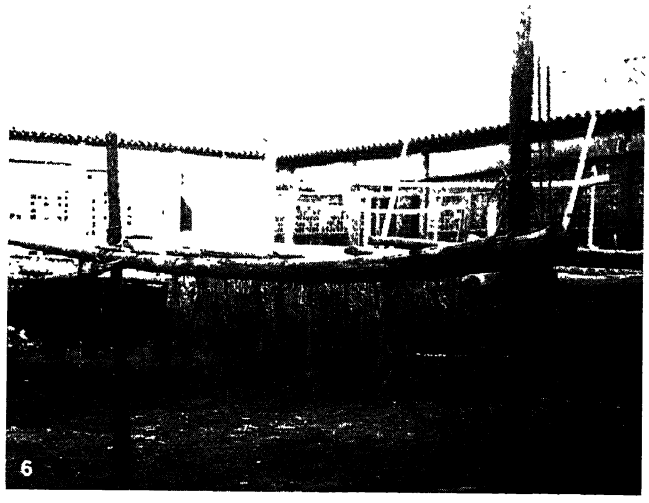










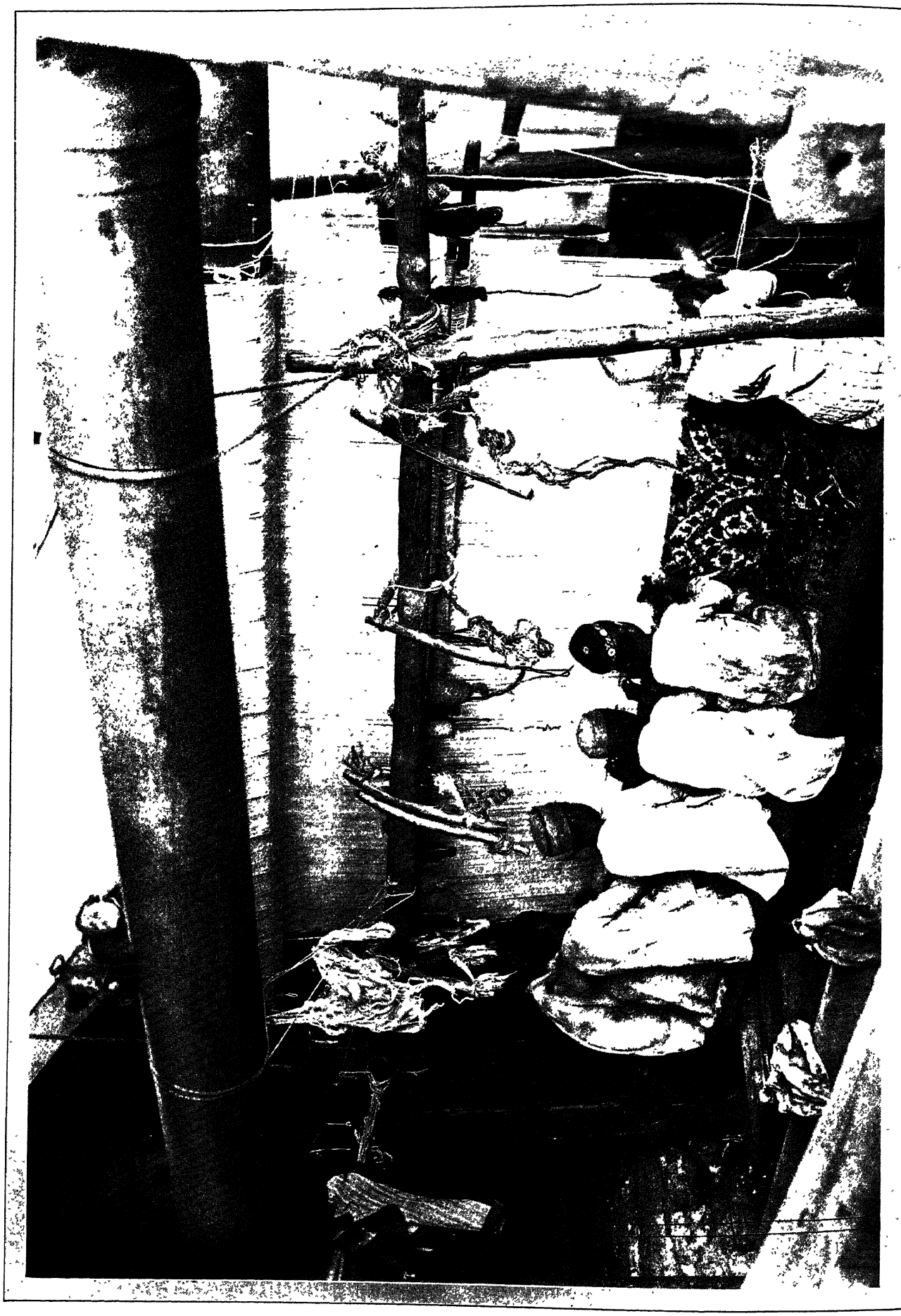


BY COURTESY OF (1-4) W. AND J. SLOANE, (5, 6) THE KENT-COSTIKYAN TRADING CO., INC.

PREPARATION OF WOOL FOR CARPETS IN INDIA AND CHINA

1. Old process of clipping wool from the sheep with shears, still practised in India. This scene is in Amritsar, India
2. Carding wool with a bow string, showing how an ancient weapon of war is used for a peaceful purpose, Amritsar
3. The *charkha* or spinning-wheel still used to-day by millions of Indian home workers. The spinning-wheel has become a symbol of the principle of the encouragement of home industry preached by Gandhi
4. Dyers dyeing wool for carpets, Amritsar
5. Dye-vats of a large carpet plant, Tientsin, China
6. Drying the dyed wools in large drying-space, Tientsin

RUGS AND CARPETS



BY COURTESY OF THE CANADIAN PACIFIC STEAMSHIPS

CARPET-WEAVING

Indian workers at a loom in one of the factories for the manufacture of hand-made carpets at Jaipur, Rajputana, in northern India. Between the two rollers which, with the supporting framework, constitute the loom, are stretched the vertical warp threads. The coloured wools (or silks) are knotted in horizontal rows on the warp threads, the knots being put to form the pile of the carpet. The weft threads are passed alternately under and over the warp threads, lines of weft alternating with lines of knots. Carpets are found with as few as 15 and as many as 1 000 knots

in the baggy places, but certain good rugs, such as the *Shiraz*, are rarely quite free from this defect. A guarantee should be asked that the rug has not been chemically treated, as is too often done with the object of effecting a supposed improvement in colour. Such treatment usually results in a hopeless deterioration of the yarns. Undesirable, though less destructive, is the process of hot-rolling, which gives to inferior wool a silky gloss that is only transitory.

The Care of Carpets.—Carpets will give remarkably long service if treated with proper consideration. Their two great enemies, apart from the inevitable destructive effect of wear, are moth and damp. The former is best kept at bay by frequent moving or handling and by regular exposure to light and air. If rugs must be stored, then inspection at intervals is essential. A carpet in use is rarely in danger. There seems to be a great future for certain chemical applications that render the wool uneatable by moth, but the method is not yet fully established (1929). Damp will in time rot the threads and destroy the fabric, but it can be avoided by obvious means. If any mechanical injury is suffered, such as a cut or burn, the damage should be dealt with as soon as possible by a competent repairer, for such lesions get worse very quickly. In ordinary use, quite apart from accident, the ends and sides often tend to wear and fray out, in which case the parts should be re-overcast—a very simple operation if done in time. Places in the middle locally worn or damaged can have new knots inserted and even large holes can be restored so as to be almost as good as new, though such work is rather expensive. In carpets of lesser value, instead of new knotting, patches cut from a suitable rug can often be inserted at less cost, and sometimes a serviceable small rug can be made from a larger worn one by cutting away the bad parts.

From time to time but not more often than necessary carpets should be cleaned and the improvement in their appearance is often astonishing. If there is any doubt as to the stability of the dyes of the carpet, it should be entrusted to one of the many firms who specialize in this kind of work. In many cases, however, surface washing with a limited supply of hot water and carpet soap applied with a stiff brush may be done at home, though drying the fabric afterwards is often a difficulty, as a clean and airy place must be available for some days at least. In ordinary use carpets are properly kept free from dust by brushing, or by means of a vacuum cleaner, but in all cases where a brush is employed it is *most important* that it is not used against the lie of the pile. (*See* also TEXTILES and EMBROIDERIES; TAPESTRIES; INTERIOR DECORATION.)

BIBLIOGRAPHY.—Kendrick and Tattersall, *Hand-Woven Carpets, Oriental and European* (1922, bibl.); H. Clark, *Bokhara, Turkoman and Afghan Rugs* (1922); Ricard, *Corpus des tapis marocains, Illustrated* (1923–); Kendrick and Tattersall, *Fine Carpets in the Victoria and Albert Museum* (1924; 20 coloured plates with descriptions); Sirelius, *The Hand-woven rugs of Finland* (1925); Sarre and Trenkwald, *Old Oriental Carpets* (1926–29, Austrian Museum of Art and Industry, Illustrations and descriptions of many fine carpets; Tattersall, *Notes on Carpet knotting and Weaving* (Victoria & Albert Museum, 1927). (C. E. TA.)

RUHLA, a town of Germany, in the republic of Thuringia. Pop. (1925) 8,275. It stretches along the valley of the Erb 8 m. S. of Eisenach, and attracts a number of visitors owing to its surroundings and its mineral springs. Its staple industry is the making of wooden and meerschaum pipes; it also manufactures electrical apparatus, amber ware, watches and toys.

RUHNKEN, DAVID (1723–1798), one of the most illustrious scholars of the Netherlands, was of German origin, having been born in Pomerania in 1723. His parents had him educated for the church, but after two years at the University of Wittenberg he determined to live the life of a scholar. At Wittenberg Ruhnken lived in close intimacy with the two most distinguished professors, Ritter and Berger. To them he owed a thorough grounding in ancient history and Roman antiquities and literature; and from them he learned a pure and vivid Latin style. But neither at Wittenberg nor at any German university was Greek seriously studied, so Ruhnken went to Leyden, where, stimulated by the influence of Bentley, the great scholar Tiberius Hemsterhuis had founded the only real school of Greek learning which had existed on the Continent since the days of Joseph Scaliger and Isaac Casaubon. At Leyden he became a close friend of Hemsterhuis, and when Hemsterhuis died in 1766 Ruhnken and his fellow-pupil Valckenaer carried on the tradition. With the exception of a fruitful year (1755) spent in the libraries of Paris, he spent the rest of his life at Leyden where he died in 1798.

Ruhnken's principal works are editions of (1) Timaeus's *Lexicon of Platonic Words*, (2) Thalelaeus and other Greek commentators on Roman law, (3) Rutilius Lupus and other grammarians, (4) Velleius Paterculus, (5) the works of Muretus. He also occupied himself much with the history of Greek literature, particularly the oratorical literature, with the Homeric hymns, the scholia on Plato and the Greek and Roman grammarians and rhetoricians. A discovery famous in its time was that in the text of the work of Apsines on rhetoric a large piece of a work by Longinus was embedded.

See Wyttenbach, *Vita Ruhnkenii* (Leyden, 1799).

RUHR, a river of Germany, 142 m. long, an important right-bank tributary of the lower Rhine. It rises on the side of the Winterberg in the Sauerland, at about 2,000 ft. above the sea. It flows north and then west in a deep, well-wooded valley past the town of Arnsberg. Shortly after reaching Neheim it bends south-west, and courses through the important mining district of the Ruhr coalfield around Hagen. Hence in a tortuous course it passes Witten, Steele, Kettwig and Mülheim, and joins the Rhine at Ruhrort. The river is navigable from Witten downwards, by the aid of eleven locks. Its chief affluents are the Mähne (right) and Lenne (left).

French Occupation.—Though the occupation of the left bank of the Rhine arranged for in the Treaty of Versailles included the bridge-head at Cologne, and thus practically touched the Ruhr district, the French were not satisfied from a military point of view, as the "Westphalian basin" was the hub of the German iron and steel industry. In March 1921 the French extended the occupation to Duisburg, Ruhrort and Düsseldorf, containing 5,000 sq.km. and 877,000 inhabitants, as a sanction for Germany's refusing the Paris reparation proposals; another 37,700 sq.km. with 3,191,000 inhabitants were occupied during 1923–24, when they controlled almost the entire Ruhr district.

Before the World War most of the Lorraine iron and steel works were owned by or closely affiliated with concerns in the Ruhr. The low grade iron ore of Lorraine, apart from the quantities used on the spot went to the blast furnaces of the Ruhr. Of 21,100,000 tons mined, 3,100,000 tons went to the Ruhr. On the other hand the coke of the Ruhr was needed for the smelting of Lorraine ores, whilst the finished iron and steel goods of Lorraine found their market in south-western Germany.

The re-annexation of Alsace–Lorraine and the retirement of Luxembourg from the German customs union reduced Germany's home supply of iron ore to about 20% of its former size. At the same time France became the greatest iron ore producing country of Europe; moreover she controlled the well equipped iron and steel mills in Lorraine, expropriating the German iron and steel-masters. She also temporarily annexed the Saar mines, partly in the hope of getting coke for her iron industries. As the Saar coal did not coke well, special clauses were inserted in the Treaty of Peace, guaranteeing to France (and to the other Allies) a regular supply of the Ruhr coal and coke at statutory prices.

Political pressure apart, however, the German coalmasters held the winning hand. Compensation from the German government enabled them to erect new iron and steel works on the Ruhr, which could easily be run with high-grade Swedish or Spanish ore or with the enormous quantities of scrap available after the war. The low grade Lorraine ore, on the other hand, had either to be smelted locally or sent to the Ruhr. Smelting in Lorraine depended on the regular supply of Ruhr coke. And the export of finished products depended mainly on German markets which were open to France without duty for five years only (within the limits of Alsace–Lorraine's pre-war sales to Germany). Thus those who controlled the Ruhr coal really controlled the Lorraine iron and steel industry.

As early as the Conference of Spa (1920) when Germany had

fallen short on coal deliveries, the Allies presented her with an ultimatum, which threatened the occupation of the Ruhr in case of non-acceptance. Though this extension of the area of occupation was an arbitrary act, the German Government gave way. From this moment the French began to use this threat of an extension of the occupation as a weapon in the struggle about reparation. When the German Government refused the proposals of the Paris Conference (Jan. 29, 1921) they occupied Düsseldorf, Ruhrort and Duisburg, and continued the occupation after Germany had accepted the London ultimatum of May 5, 1921.

On Dec. 26, 1922, the Reparation Commission under French pressure announced that Germany had fallen short on the delivery of 20,000 cu.m. of boards and of 130,000 telegraph poles, the total averaging but a few million marks; a few days later a similar shortcoming in coal-deliveries variously estimated at 11 to 15·6%, was declared. Against the vote of the British delegates the Reparation Commission came to the conclusion that Germany's shortcomings had been "intentional" (*manquement volontaire*), constituting a case under Annex II § 18, which permitted the Allied and Associated Powers to take "such other measures as the respective Governments may determine to be necessary in the circumstances." The French and Belgian Governments decided to send a commission of engineers into the Ruhr, to control the activities of the Coal Syndicate and the carrying out of the deliveries as, in their opinion the coal mine owners were trying to sabotage the Treaty. This technical mission, in which Italy was to participate, but not Great Britain, was accompanied by a military force, though military occupation was not intended.

When the French and Belgian troops entered the Ruhr on Jan. 11, 1923, the Coal Syndicate had transferred their seat and their papers to Hamburg. The German Government issued a protest (Jan. 12, 1923); all reparation payments especially the delivery of coke and coal to France and Belgium ceased. Civil servants and railway officials were forbidden to obey orders from the occupying powers. The French tried to get hold of the proceeds of taxes and of government property. They controlled the distribution of coal and insisted on cutting timber. They expelled the German officials, railway servants and leading citizens and heavily fined or imprisoned recalcitrants. They erected a customs frontier, dividing the occupied district from the rest of Germany, thus controlling and stopping exports and imports into unoccupied Germany. The aim of the German resistance was to prevent the French from getting coal and coke, whilst the French tried to cut the connection with unoccupied Germany and to paralyse the district's economic life.

The struggle for the Ruhr completely destroyed German finance and with it German currency. Passive resistance in the long run meant the withdrawal of all workers, starting with the railway men, from such productive and distributive processes as might help the army of occupation. This involved the maintenance of all persons out of work at the public expense. The Ruhr occupation was the deciding factor in the collapse of the mark.

Germany's various proposals for a settlement were not accepted by the French, nor were the various suggestions of the British. At last the new German Government, presided over by Stresemann, gave up passive resistance on Sept. 26. The French Government continued to refuse negotiations and strongly supported the separatist movement all over the left bank of the Rhine.

In Nov., 1923, the industrial concerns in the occupied districts negotiated an agreement with the *Mission Interalliée de Contrôle des Usines et des Mines* (called Micum) with the object of freeing the huge iron and coal stocks which had accumulated, as the French Government would not negotiate with the German Government. It demanded the payments of the German coal tax and the coal on the dumps, whilst the new output could be sold by the works against payment of a duty; the delivery of reparation coal and coke was to be resumed on a percentage basis of the total output. Iron and steel might be sold by the works against payments. The German Government (by letters of Nov. 1 and 21) acknowledged their obligation to refund the cost of payments of delivery to the industries concerned. They did so later on by paying the iron and coal firms 700,000,000 marks.

These provisional arrangements paved the way for peace, after British and American pressure had induced the French government to agree to the appointment of the Dawes committee by the Reparation Commission. The total payments realized from the Ruhr were 490,000,000 gold marks in cash and the value of 491,900,000 gold marks in goods, leaving a total balance—after deduction of 184,000,000 marks expenses—of 798,000,000 gold marks—or not a third of the minimum payment expected under the London ultimatum.

The new French Government was willing to accept the Dawes plan, to free the prisoners and to leave the Ruhr. The plan was formally signed on Aug. 30. Within the next two months administration, railways and government property were handed back to Germany. The evacuation of the Ruhr ended on July 31, 1925 when the French troops left Essen and Mülheim. On Aug. 25 the old occupied areas of Düsseldorf, Duisburg and Ruhrort were given back.

After political pressure ceased, the mere compulsory economic co-operation of the Treaty of Versailles came to an end. But the German industrialists had realized that France had held the winning cards in the political game, whilst the French Government began to understand the limits of military pressure in the economic field. The result was the Franco-German commercial treaty, and the Franco-German (international) iron-and-steel pact. The former secured French iron and steel goods a limited sale in German territory, to be effected through the German Steel Syndicate, whilst the ore and coal supplies were left to more or less private agreements. The latter combined French and German and Belgian steel works in an international syndicate, giving each country a fixed percentage of the total output.

The economic unity which the Treaty of Peace had destroyed, was thus being restored by extremely complicated measures, after a six years' struggle between governments and industrial groups, which cost much money and bloodshed. After Germany's entry into the League of Nations and the Locarno treaties the plan of using the Ruhr as an additional security became obsolete.

BIBLIOGRAPHY.—*Survey of international affairs*, 1925 Supplement (London, 1928); C. Bergmann, *Der Wag der Reparationen* (Frankfurt-am-Main, 1926); *see* also German official publications. (M. Bo.)

RUHRORT, since 1905 a part of Duisburg, in the Prussian Rhine province, situated at the junction of the Ruhr and the Rhine, in the midst of a productive coal district, 15 m. N. of Düsseldorf and 12 m. E. of Crefeld by rail. Ruhrort is first mentioned in 1379, and obtained civic rights in 1551. Having been in the possession of the counts of La Marck, it passed into that of Brandenburg in 1614. Ruhrort has the largest river harbour in the world, and it is the principal shipping port for the coal of the Westphalian coalfield, which is dispatched in the fleet of steam-tugs and barges belonging to the port. The coal is sent principally to south Germany and the Netherlands. Grain and timber are also exported and iron ore is imported. In 1924 the port was entered and cleared by 18,000,000 tons. The industries of the town include large iron and steel works, shipbuilding yards and tanneries.

RUIZ, JUAN (*c.* 1283–*c.* 1350), Spanish poet, became arch-priest of Hita. It may be inferred from his writings that he was not an exemplary priest, and one of the manuscript copies of his poems states that he was imprisoned by order of Gil Albornoz, archbishop of Toledo. It is not known whether he was sentenced for his irregularities of conduct, or on account of his satirical reflections on his ecclesiastical superiors. What seems established is that he finished his *Libro de buen amor* in 1343, while in gaol, and that he was no longer arch-priest of Hita in Jan. 1351; it is assumed that he died shortly before the latter date.

Ruiz is by far the most eminent poet of mediaeval Spain. His natural gifts were supplemented by his varied culture; he clearly had a considerable knowledge of colloquial (and perhaps of literary) Arabic; his classical reading was apparently not extensive, but he knew by heart the *Disticha* of Dionysius Cato, and admits his indebtedness to Ovid and to the *De Amore* ascribed to Pamphilus; his references to Blanchefleur, to Tristan and to Yseult, indicate an acquaintance with French literature, and he utilizes

the *fabliaux* with remarkable deftness; lastly, he adapts fables and apologues from Aesop, from Pedro Alfonso's *Disciplina clericalis*, and from mediaeval bestiaries. All these heterogeneous materials are fused in the substance of his versified autobiography, into which he intercalates devout songs, parodies of epic or forensic formulae, and lyrical digressions on every aspect of life. Ruiz, in fact, offers a complete picture of picaresque society in Spain during the early 14th century. From his Don Furón is derived the hungry gentleman in *Lazarillo de Tormes*, in Don Melón and Doña Endrina he anticipates Calisto and Melibea in the *Celestina*, and Celestina herself is developed from Ruiz' Trotaconventos. Moreover, Ruiz was justly proud of his metrical innovations. The *Libro de buen amor* is mainly written in the *cuaderna via* modelled on the French alexandrine, but he imparts to the measure a variety and rapidity previously unknown in Spanish.

See J. Puyol y Alonso, *El Arcipreste de Hita* (1906). (J. F.-K.)

RUIZ ZORRILLA, MANUEL (1834–1895), Spanish politician, born at Burgo de Osma. Deputy in 1856, he soon attracted notice among the most advanced Progressists and Democrats. After the military movement in Madrid of June 22, 1866, he had to flee to France, returning only at the revolution of 1868. In 1869 he became minister of grace and justice under Serrano: elected president of the House of Deputies in 1870, he seconded Prim in offering the throne to Amadeus of Savoy. In 1871 he formed a cabinet, and continued to be the king's chief councillor until his abdication (Feb. 1873), when Ruiz Zorrilla advocated a republic. On the restoration of Alphonso XII. (1875), he went to France, where for nearly 18 years he was the soul of the republican conspiracies. He was eventually allowed to return to Spain and died at Burgos on June 13, 1895.

RUKWA (sometimes also Rikwa and Hikwa), a shallow lake in Tanganyika Territory, lying 2,650 ft. above the sea in a north-west continuation of the rift-valley which contains Lake Nyasa. The sides of the valley here run in steep parallel walls 30 to 40 m. apart, from south-east to north-west, leaving between them a level plain extending from about 7½° to 8½° S. This whole area was once covered by the lake, but this has shrunk so that the permanent water occupies only a space of 30 m. by 12, immediately under the east escarpment. In the rains it extends some 40 m. farther N., and the north of the plain is likewise then covered with water to a depth of about 4 ft. The rest of the plain is a bare expanse intensely heated by the sun in the dry season, and forming a tract of foul mud near the lake shores. The lake has two large feeders, the one from the west the Saisi, or Momba, rises in 8° 50′ S., 31° 30′ E., and traverses a winding valley cut out of the high plateau between lakes Nyasa and Tanganyika. The other chief feeder, the Songwe, rises in 9° 8′ S., 33° 30′ E. on the same plateau as the Saisi and flows north-west. The Songwe is joined by the Rupa. The maximum depth of the lake is about 10½ ft. Its water is very brackish and of a milky colour from the mud stirred up by the wind. It contains many fish.

RULED SURFACE: *see* SURFACE; MATHEMATICAL MODELS.

RULE OF ST. BENEDICT: *see* BENEDICT OF NURSIA, SAINT.

RULE OF THE ROAD. This in Great Britain and Ireland is a matter of common law, otherwise custom, the origin of which is too remote for other than conjecture. The only statutory enactments dealing with the ordering of road traffic are the terms of the Highways Act of 1835, and those of the Motor Car Order of 1904. In the former it is laid down that all vehicle drivers must keep to the left side of the road when encountering other traffic. In the latter it is specifically ordered that drivers of motor vehicles, when meeting other traffic, must keep to the left, or near side of the road; and when passing any traffic proceeding in the same direction must keep to the off, or right side of it. Those seeking for a reason for the original choice have surmised that the left side was adopted because of the need on the part of drivers to have their whip hands free, which would not be the case on the narrow tracks and roads then existing if the right side had been selected. A more fanciful explanation was the wisdom, in turbulent times, of horsemen keeping that side of the road which would admit of the sword arm being free in case of attack. But, while plausible, both leave unexplained why most other nations reversed the order, their traffic flowing along the right side of the road. On the Continent of Europe the right is the correct side for wheeled traffic in every country except Austria, Hungary, Portugal, Sweden, Czechoslovakia and Yugoslavia. In America the right is the correct order of the road for wheeled traffic.

Motors.—These differences, in view of the enormous increase of international road travel, due to the development of the motor vehicle, are becoming irksome and at times dangerous, and there is a growing desire to adopt a single universal rule. But the great disturbance and confusion inevitable in such radical change in the daily life of a nation makes the necessary surrender of its customs as disagreeable for one group as the other, and so, although discussions and proposals arise periodically, there seems to be little possibility of any agreement of the kind. Any change from the existing order would involve not only a corresponding reversal of traffic procedure, but the structural alteration of every motor vehicle in use. Experience has shown that where the left side of the road is the rule the driver must be seated on the right side of his vehicle in order that he may be the better able to keep his off-side front wheel clear of the traffic he is meeting; and, of course, the contrary holds when the right is the correct side.

Horses.—From the point of view of horse traffic the question of the adoption of a universal rule of the road in the various countries, though for obvious reasons this would appear desirable, is not so affected by considerations of safety as in the case of motor vehicles, since accidents due to forgetfulness on the part of drivers accustomed to pass on the opposite side are more easily avoided when travelling at the pace of a horse, and when they occur are likely to be less serious. It may be noted that although it is considered essential in motor vehicles that the driving seat should be on the side nearest to approaching traffic, it appears never to have been thought necessary so to construct horse carriages in countries where the rule of the road is the right; such countries are therefore at a disadvantage in this respect.

In civilian life it has always been customary for a horseman when riding one horse and leading another to ride with the led horse on his right or off side, the object being to allow full freedom to the left or bridle hand. Since it is desirable that the led horse should be on the side away from passing traffic, this obliges the rider to cross the road when a vehicle approaches and to pass it on the wrong side, a dangerous practice at any time, but more so now than formerly, owing to the naturally greater ignorance of present-day road travellers as to the ways of horses; moreover, the horseman, as he is contravening the rule of the road, has no redress in the case of accident. At night, especially, the practice of leading on the right is a very real danger, as it is then impossible to pass approaching vehicles on the off side, and the led horse, if frightened, may shy into the middle of the road and be struck by a passing vehicle before the driver is aware of any obstruction or has time to avoid it. In the army it has for some years been recognized that the ridden horse can be as well controlled by the right as by the left hand, and horses are now led on the near or left side, thus necessitating no change from the normal method of passing approaching traffic. (E. CAM., G. W.)

American Practice.—The United States has departed from the common law inherited from England as to the basic rule of the road. The rule in the United States as in the greater part of Continental Europe and elsewhere, is to pass approaching traffic on the right hand side of the roadway, whether operating a motor vehicle or driving, riding or leading a horse or other animal. Canada has abandoned the left hand in favour of the right hand rule. Neither rule appears to have any outstanding physical advantage over the other, but where either has become firmly established many structural and equipment details and practices are based upon it. While for more than a decade right hand drive prevailed, virtually all American motor vehicles are now built with the driver's seat on the left side, thus enabling the driver to watch his clearance with approaching vehicles. Highway signs and automatic traffic signals are placed to be seen from the right hand side of the road. The American rule of the road is

also consistent with the practice on the street railways and nearly all the steam railroads.

The tremendous growth of motor transport in the United States has impelled the States and municipalities to lay down numerous rules specifically setting forth the application of the basic right hand rule in various situations. For example, a vehicle meeting another must give the other vehicle half the road. A vehicle may not overtake and pass another on sharp curves or hill crests and not unless there is space ahead of the overtaken vehicle to permit the overtaker to regain safely his own side of the road. The operator of the overtaken vehicle must on signal give the overtaker ample opportunity and must not increase his speed until the other vehicle has passed him completely. It has been assumed that the overtaken vehicle will normally be near the right hand edge of the roadway, but with the development of wide streets with several definite lanes of traffic in each direction, there has been a growing tendency of operators to keep toward the centre. A rule has therefore been developed requiring slow moving vehicles to keep as far to the right as possible.

One of the most essential and also most difficult rules of the road to define and enforce equitably is the right of way rule at intersections. The fundamental rule is that the vehicle which would first reach the common point has the right of way. Supplementary to this rule is a provision of wide prevalence requiring the vehicle on the left to yield to one on the right approaching the common point at approximately the same time. A further qualifying provision in some jurisdictions is that giving right of way to the vehicle which first entered the intersection. Other widely accepted provisions are those giving emergency vehicles the right of way over other vehicles regardless of relative position at an intersection; and the through street stop rule, which requires all vehicles to come to a full stop before entering certain thoroughfares designated for high-speed through traffic, and placing upon the cross traffic the same added burden of responsibility that is upon any vehicle starting from a position of rest.

Recognizing the danger, particularly at night, of pedestrians on highways without separate footpaths being run down by motor vehicles coming from the rear, it is regarded as generally safer for them to walk on the left side. A few States have passed laws requiring this. Such laws, however, would compel the pedestrian to walk where it is at times manifestly unsafe, as on the inside of a sharp curve, and virtually deny him right of way on any other part of the roadway. A vehicle turning to the right is generally required to keep close to the right curb or edge of the roadway, while, according to the prevailing rule, a vehicle turning to the left must do so from the traffic lane next to the centre line of the roadway. The most modern and approved speed restrictions embody a general prohibition against driving too fast for the conditions, together with *prima facie* limits, for the guidance of operators and enforcement officers, beyond which the apprehended operator must prove that he was driving safely. The *prima facie* limits are ordinarily graded from business districts to rural areas. (A. B. B.)

RULE OF THE ROAD AT SEA. The principal nations have subscribed to the following regulations for preventing collisions at sea, and rules as to signals of distress.

Every steam vessel which is under sail and not under steam is to be considered a sailing vessel, and every vessel under steam, whether under sail or not, is to be considered a steam vessel. The word "steam vessel" shall include any vessel propelled by machinery. A vessel is "under way" within the meaning of these rules, when she is not at anchor, or made fast to the shore or aground.

Lights.—The word "visible" when applied to lights shall mean visible on a dark night with a clear atmosphere. The rules concerning lights shall be complied with in all weathers from sunset to sunrise, and during such time no other lights which may be mistaken for the prescribed lights shall be exhibited.

Lights for Steam Vessels.—A steam vessel when under way shall carry: (*a*) On or in front of the foremast, a bright white light, so constructed as to show an unbroken light over an arc of the horizon of 20 points of the compass, so as to throw the light ten points on each side of the vessel, viz., from right ahead to two points abaft the beam on either side, and to be visible at a distance of at least five miles. (*b*) On the starboard side a green light to show an unbroken light over an arc of the horizon of ten points of the compass, so as to throw the light from right ahead to two points abaft the beam on the starboard side, and to be visible at a distance of at least two miles. (*c*) On the port side a similar red light. (*d*) The green and red side-lights shall be fitted with inboard screens projecting at least 3 ft. forward from the light, so as to prevent these lights from being seen across the bow.

(*e*) A steam vessel under way may carry an additional white light similar in construction to the light mentioned in subdivision (*a*). These two lights shall be so placed in line with the keel that one shall be at least 15 ft. higher than the other, and in such a position with reference to each other that the lower light shall be forward of the upper one. The vertical distance between these lights shall be less than the horizontal distance.

Towing Lights.—A steam vessel when towing another vessel shall, in addition to her side-lights, carry two bright white lights in a vertical line one over the other, not less than 6 ft. apart, and when towing more than one vessel shall carry an additional bright white light 6 ft. above or below such lights, if the length of the tow, measuring from the stern of the towing vessel to the stern of the last vessel towed, exceeds 600 feet.

Not Under Control.—A vessel which from any accident is not under command shall carry: if a steam vessel, in lieu of the white steaming light, two red lights, in a vertical line one over the other, not less than 6 ft. apart, and of such a character as to be visible all round the horizon at a distance of at least 2 m.; and shall by day carry in a vertical line one over the other not less than 6 ft. apart, where they can best be seen, two black balls or shapes each 2 ft. in diameter.

Telegraph Laying.—A vessel employed in laying or in picking up a telegraph cable shall carry in lieu of the white steaming light, three lights in a vertical line one over the other not less than 6 ft. apart. The highest and lowest of these lights shall be red, and the middle light shall be white, and they shall be of such a character as to be visible all round the horizon, at a distance of at least 2 miles. By day she shall carry in a vertical line one over the other, not less than 6 ft. apart, where they can best be seen, three shapes not less than 2 ft. in diameter, of which the highest and lowest should be globular in shape and red in colour, and the middle one diamond in shape and white.

The vessels referred to in the two former classifications when not making way through the water, shall not carry side-lights, but when making way shall carry them.

Lights for Sailing Vessels.—A sailing vessel under way, and any vessel being towed, shall carry the same lights as those prescribed for a steam vessel under way, with the exception of the white (steaming) lights which they shall never carry. Whenever, as in the case of small vessels under way during bad weather, the green and red side-lights cannot be fixed, these lights shall be kept at hand lighted and ready for use; and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side, nor, if practicable, more than two points abaft the beam on their respective sides.

Lights for Small Vessels and Boats.—Steam vessels of less than 40, and vessels under oars or sails of less than 20, tons gross tonnage, and rowing boats, when under way, shall not be obliged to carry the lights mentioned under sub-sections (*a*), (*b*) and (*c*), but if they do not carry them they shall be provided with the following lights:—

1. Steam vessels of less than 40 tons shall carry: (*a*) In the fore part or on or in front of the funnel, a bright white light constructed and fixed as prescribed for a steaming light, and to be visible at a distance of at least two miles. (*b*) Green and red side-lights to be visible for at least one m., or a combined lantern showing a green light and a red light from right ahead to two

points abaft the beam on their respective sides.

2. Vessels under oars or sails, of less than 20 tons, shall have ready a lantern with a green glass on one side and a red glass on the other.

3. Rowing boats, whether under oars or sail, shall have ready a lantern showing a white light, which shall be exhibited in sufficient time to prevent collision.

Lights for Pilot Vessels.—Pilot vessels, when engaged on pilotage duty, shall carry a white light at the masthead, visible all round the horizon, and shall also exhibit a flare-up light at short intervals, which shall never exceed fifteen minutes. On the near approach of or to other vessels they shall have their side-lights lighted and shall flash or show them at short intervals, to indicate the direction in which they are heading. A steam pilot-vessel carrying specially licensed pilots shall, in addition to the lights required for all pilot boats, carry at a distance of eight ft. below her white mast head light a red light visible all round for at least two m., and also the coloured side-lights required to be carried by vessels when under way. When at anchor she shall carry, in addition to the lights required for all pilot boats, the red light above mentioned, but not the coloured side-lights.

Lights for Fishing Vessels.—Fishing vessels and fishing-boats shall carry or show:

(*a*) Open boats, by which it is to be understood boats not protected from the entry of sea water by means of a continuous deck, when engaged in any fishing at night, shall carry one all-round white light. (*b*) Vessels and boats, except open boats when fishing with drift-nets, shall carry two white lights where they can best be seen. Such lights shall be placed so that the lower of these shall be in the direction of the nets, and both shall show all round the horizon for not less than three miles. (*c*) When line-fishing, vessels and boats, except open boats, shall carry the same lights as vessels fishing with drift-nets. When shooting lines, or fishing with towing lines, they shall carry the lights prescribed for a steam or sailing vessel under way respectively. (*d*) Vessels engaged in trawling, if steam vessels, shall carry in the same position as the white steaming light a tricoloured lantern to show a white light from right ahead to two points on each bow, and a green light and a red light from two points on each bow to two points abaft the beam on the starboard and port sides respectively; and below the tricoloured lantern a white light in a lantern to show a clear uniform and unbroken light all round the horizon.

If sailing vessels, shall carry a white light in a lantern, to show a clear uniform and unbroken light all round the horizon, and shall also, on the approach of or to other vessels, show a white flare-up light or torch in sufficient time to prevent collision.

(*e*) Oyster dredgers and other vessels fishing with dredge-nets shall carry and show the same lights as trawlers. (*f*) Fishing vessels and fishing-boats may at any time use a flare-up light in addition to the lights already prescribed. (*g*) Every fishing vessel and every fishing-boat under 150 ft., when at anchor, shall exhibit a white light visible all round the horizon for at least one mile.

Every fishing vessel of 150 ft. or upwards, when at anchor, shall exhibit a white light visible all round the horizon for at least one mile, and shall exhibit a second light as hereinafter prescribed for vessels of such length. Should any such vessel, whether under 150 ft., or of 150 ft. in length or upwards, be attached to a net or other fishing gear, she shall on the approach of other vessels show an additional white below the anchor light in the direction of the net or gear. (*h*) If a vessel or boat when fishing becomes stationary in consequence of her gear getting fast to a rock or other obstruction, she shall in daytime haul down the day-signal required by subdivision (*k*); at night show the light or lights prescribed for a vessel at anchor; and during fog, mist, falling snow, or heavy rain-storms make the signal prescribed for a vessel at anchor. (*i*) In fog, mist, falling snow, or heavy rain-storms, drift-net vessels attached to their nets, and vessels when trawling, dredging, or fishing with any kind of drag-net, and vessels line-fishing with their lines out, shall, if of 20 tons gross tonnage or upwards, respectively, at intervals of not more than one minute make a blast; if steam vessels, with the whistle or siren, and if sailing vessels, with the fog-horn; each blast to be followed by ringing the bell. (*j*) Fishing vessels and boats of less than 20 tons gross tonnage shall not be obliged to give these signals; but if they do not, they shall make some other efficient sound signal at intervals of not more than one minute. (*k*) All vessels or boats fishing with nets or lines or trawls, when under way, shall in daytime indicate their occupation to an approaching vessel by displaying a basket or other efficient signal where it can best be seen. If vessels or boats at anchor have their gear out, they shall, on the approach of other vessels, show the same signal on the side on which those vessels can pass.

Vessel Being Overtaken.—A vessel which is being overtaken by another shall show from her stern to such last-mentioned vessel a white light or a flare-up light. If a lantern is used for this purpose, it shall be so screened that it shall throw an unbroken light for 6 points from right aft on each side of the vessel, so as to be visible for at least 1 mile. Such light shall be carried as nearly as practicable on the same level as the side-lights.

Lights for a Vessel at Anchor.—A vessel under 150 ft. when at anchor, shall carry forward, at a height not exceeding 20 ft. above the hull, a white light to show a clear, uniform and unbroken light visible all round for at least 1 mile. A vessel of 150 ft. or upwards, when at anchor, shall carry a similar light at a height of not less than 20, and not exceeding 40, ft. above the hull, and at such a height that it shall be not less than 15 ft. lower than the forward light, another such light. A vessel aground in or near a fairway shall carry the above light or lights and the two red lights prescribed for a vessel not under control. Every vessel may, if necessary in order to attract attention, in addition to the lights which she is by these rules required to carry, show a flare-up light or use any detonating signal that cannot be mistaken for a distress signal.

Special Lights.—Nothing in these rules shall interfere with the operation of any special rules made by the government of any nation with respect to additional station and signal lights for two or more ships of war or for vessels sailing under convoy, or with the exhibition of recognition signals adopted by shipowners, which have been authorized by their respective governments and duly registered and published.

A Steam Vessel Under Sail Only.—A steam vessel proceeding under sail only, but having her funnel up, shall carry in daytime, forward, where it can best be seen, one black ball or shape 2 ft. in diameter.

Fog-Signals.—Fog-signals shall be given:—

1. By steam vessels, on the whistle or siren. 2. By sailing vessels and vessels towed, on the fog-horn. A "prolonged blast" shall mean a blast of from four to six seconds.

A steam vessel shall be provided with an efficient whistle or siren, and with an efficient fog-horn, to be sounded by mechanical means, and also with an efficient bell. A sailing vessel of 20 tons gross tonnage or upwards shall be provided with a similar fog-horn and bell. In fog, mist, falling snow, or heavy rain-storms, whether by day or night, the following signals shall be used:—

(*a*) A steam vessel having way upon her, shall sound, at intervals of not more than two minutes, a prolonged blast. (*b*) A steam vessel under way, but stopped and having no way upon her, shall sound, at intervals of not more than two minutes, two prolonged blasts, with an interval of about one second between them. (*c*) A sailing vessel under way shall sound, at intervals of not more than one minute, when on the starboard tack one blast, when on the port tack two blasts in succession, and when with the wind abaft the beam three blasts in succession. (*d*) A vessel, when at anchor, shall, at intervals of not more than one minute, ring the bell rapidly for about five seconds. (*e*) A vessel, when towing a vessel employed in laying or in picking up a telegraph cable, and a vessel under way, which is unable to get out of the way of an approaching vessel through being not under command, or unable to manoeuvre as required by these rules shall, at intervals of not more than two minutes, sound three blasts in succession, viz.: one prolonged blast followed by two short blasts. A vessel towed may give this signal and she shall not give any other.

Sailing vessels and boats of less than 20 tons gross tonnage shall not be obliged to give these signals, but if they do not, they shall

make some other efficient sound-signal at intervals of not more than one minute.

Speed of Ships in Fog.—Every vessel shall, in fog, mist, falling snow, or heavy rain-storms, go at a moderate speed. A steam vessel hearing, apparently forward of her beam, the fog-signal of a vessel the position of which is not ascertained, shall, so far as the circumstances of the case admit, stop her engines, and then navigate with caution until danger of collision is over.

Steering and Sailing Rules to Avoid Collision.—Risk of collision can, when circumstances permit, be ascertained by carefully watching the compass bearing of an approaching vessel. If the bearing does not appreciably change, such risk should be deemed to exist.

Sailing Vessels.—When two sailing vessels are approaching one another so as to involve risk of collision, one of them shall keep out of the way of the other, as follows:—

(*a*) A vessel which is running free shall keep out of the way of a vessel which is close-hauled. (*b*) A vessel which is close-hauled on the port tack shall keep out of the way of a vessel which is close-hauled on the starboard tack. (*c*) When both are running free, with the wind on different sides, the vessel which has the wind on the port side shall keep out of the way of the other. (*d*) When both are running free, with the wind on the same side, the vessel which is to windward shall keep out of the way of the vessel which is to leeward. (*e*) A vessel which has the wind aft shall keep out of the way of the other vessel.

Steam Vessels.—When two steam vessels are meeting end on, or nearly end on, so as to involve risk of collision, each shall alter her course to starboard, so that each may pass on the port side of the other. The only cases to which this rule applies are those where by day, each vessel sees the masts of the other in a line, or nearly in a line, with her own; and, by night, to cases in which each vessel is in such a position as to see both the side-lights of the other. When two steam vessels are crossing, so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way of the other.

Steam and Sailing Vessels.—When a steam vessel and a sailing vessel are proceeding in such directions as to involve risk of collision, the steam vessel shall keep out of the way of the sailing vessel.

General.—Where, by these rules, one of two vessels is to keep out of the way, the other shall keep her course and speed; but when, in consequence of thick weather or other causes, such vessel finds herself so close that collision cannot be avoided by the action of the giving-way vessel alone, she also shall take such action as will best aid to avert collision. Every vessel whose duty it is to keep out of the way of another vessel shall, if the circumstances of the case admit, avoid crossing ahead of the other.

Vessels Overtaking.—Notwithstanding anything contained in these rules, every vessel, overtaking any other, shall keep out of the way of the overtaken vessel. Every vessel coming up with another vessel from any direction more than two points abaft her beam, shall be deemed to be an overtaking vessel; and no subsequent alteration of the bearing between the two vessels shall make the overtaking vessel a crossing vessel within the meaning of these rules, or relieve her of the duty of keeping clear of the overtaken vessel until she is finally past and clear.

As by day the overtaking vessel cannot always know with certainty whether she is forward or abaft this direction from the other vessel, she should, if in doubt, assume that she is an overtaking vessel and keep out of the way.

Narrow Channels.—In narrow channels every steam vessel shall, when it is safe and practicable, keep to that side of the fair-way or mid-channel which lies on the starboard side of such vessel. Sailing vessels under way shall keep out of the way of sailing vessels or boats fishing with nets, or lines, or trawls.

Navigational Dangers.—In obeying and construing these rules, due regard shall be had to all dangers of navigation and collision, and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger.

Sound-signals for Vessels in Sight of One Another.—A "short blast" means a blast of about one second's duration.

When vessels are in sight of one another, a steam vessel under way, in taking any course authorized or required by these rules, shall indicate that course by the following signals on her whistle or siren:—

One short blast to mean, "I am directing my course to starboard." Two short blasts, "I am directing my course to port." Three short blasts "My engines are going full speed astern."

Proper Precautions.—Nothing in these rules shall exonerate any vessel, or the owner, or master or crew, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper look-out, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

Rules for Harbours and Inland Navigation.—Nothing in these rules shall interfere with the operation of a special rule, duly made by local authority, relative to the navigation of any harbour, river, or inland waters.

Distress Signals.—When a vessel is in distress and requires assistance from other vessels or from the shore, the following shall be the signals to be used or displayed by her, either together or separately:—

1. A gun or other explosive signal fired at intervals of about a minute; 2. The international code signal of distress indicated by NC.; 3. The distant signal, consisting of a square flag, having either above or below it a ball or anything resembling a ball; 4. A continuous sounding with any fog-signal apparatus. At night —1. A gun or other explosive signal fired at intervals of about a minute. 2. Flames on the vessel (as from a burning tar-barrel, oil-barrel, etc.); 3. Rockets or shells, throwing stars of any colour or description, fired one at a time, at short intervals; 4. A continuous sounding with any fog-signal apparatus. (E. A.)

RULHIÈRE (or RULHIÈRES), CLAUDE CARLOMAN DE (1735–1791), French poet and historian, was born at Bondy, near Paris, on June 12, 1735. He served Marshal Richelieu in the Hanoverian campaign of 1757, and during his government at Bordeaux in 1758. At St. Petersburg (Leningrad) where he was sent as secretary of legation, he witnessed the revolution which seated Catherine II. on the throne. In 1773 Rulhière became secretary to the future Louis XVIII.; in 1787 he was admitted to the Academy. He lived chiefly at Paris, where he held an appointment in the Foreign Office. He died at Bondy on Jan. 30, 1791. He befriended J. J. Rousseau in his old age.

Rulhière's historical works include *Histoire de l'anarchie de Pologne* (4 vols., 1807), edit. P. C. F. Danon; and *Éclaircissements historiques sur les causes de la révocation de l'édit de Nantes* (2 vols., 1788).

RULLUS, PUBLIUS SERVILIUS, a Roman tribune of the people in 64 B.C., well known as the proposer of one of the most far-reaching agrarian laws brought forward in Roman history. This law provided for the establishment of a commission of ten, empowered to purchase land in Italy for distribution amongst the poorer citizens and for the foundation of colonies. The commission was to be invested with praetorian powers, and Pompey, then in the East, was excluded by a provision that personal attendance was necessary to election. In fact, the commission as a whole was intended to act as a counterpoise to his power. There were provisions for the purchase of further land by the sale of recently conquered territory and the use of the revenues from Pompey's provinces. The places to which colonies were to be sent were not specified, so that the commissioners would be able to sell wherever they pleased, and it was left to them to decide what was public or private property. Cicero delivered four speeches against the bill, of which three are extant. It was not greeted with enthusiasm and was dropped before the voting. The whole affair was obviously a political move, probably engineered by Caesar, his object being to make the democratic leaders the rulers of the state. Although Caesar could hardly have expected the bill to pass, the aristocratic party would be saddled with the odium of rejecting a popular measure, and the people themselves would be more ready to welcome a proposal by Caesar himself, an expectation fulfilled by the passing of the *lex Julia* in 59, whereby Caesar at least partly succeeded where Rullus had failed.

See the orations of *Cicero De lege agraria,* with the introduction in

G. Long's edition, and the same author's *Decline of the Roman Republic*, iii., p. 241; Mommsen, *Hist. of Rome*, bk. v., ch. 5; art. AGRARIAN LAWS.

RUM or **ROUM,** an indefinite term in use among Mohammedans at different dates for Europeans generally and for the Byzantine empire in particular; at one time for the Seljuk empire in Asia Minor, and now for Greeks inhabiting Ottoman territory (Arab. *ar-Rūm*). When the Arabs met the Byzantine Greeks, these called themselves Ῥωμαῖοι, or Romans; so the Arabs called them "the Rūm" as a race-name (already in Qur. xxx. 1), their territory "the land of the Rūm," and the Mediterranean "the Sea of the Rūm." Later, inasmuch as Muslim contact with the Byzantine Greeks was in Asia Minor, the term Rūm became fixed there geographically and remained even after the conquest by the Seljuk Turks, so that their territory was called the land of the Seljuks of Rūm.

RUM, a potable alcoholic liquor obtained by distillation from fermented products of the sugar cane. The origin of the term is obscure.

Production.—Rum is chiefly produced in the West Indies and, on account of geographical origin and method of preparation, may be divided into two main classes "Jamaica" and "Demerara."

Jamaica rum is produced by fermentation of a wash consisting, in addition to water, of scum, molasses and "dunder." Liquor expressed from the sugar cane is steam-heated, the scum, containing much of the foreign matter present in the liquor, thus being driven to the top and facilitating the withdrawal of the clear sugar solution. The scum is transferred to the still house whilst the sugar liquor is either evaporated down in order to crystallize out the sugar or is first subjected to a further process of clarifying. Sugar crystals are removed from the concentrated sugar solution by centrifugals or purgers, the uncrystallized molasses being added to the scum in the still house. The "dunder" is a viscous mass remaining at the bottom of the still at the end of the distillation and is taken out and added to the wash for the next operation. In order to render the latter sour and promote fermentation the fibrous part of the crushed cane, known as "megass," is also added.

Fermentation occupies from six to twelve days, in some cases longer, and when it is complete the spirituous mass obtained is pumped into a pot still—the only kind used in the island. There are three types of rum produced in Jamaica. That for export to the United Kingdom forms the bulk of the production and is of the best quality. An inferior type for sale in the island is produced by more rapid fermentation and lacks the full flavour and aroma of that intended for the British market. The third type is the "flavoured" or "German" rum chiefly exported to the continent of Europe, where it is used for blending and flavouring purposes.

Demerara rum is prepared by the fermentation of molasses diluted with water to a density of about 1060, the solution being first rendered slightly acid with sulphuric acid. Pot stills and patent stills of various types are used for the distillation. The resultant spirit, which has a low ester content and light flavour, most nearly resembles that produced in Jamaica for local consumption.

Fictitious rum is prepared with spirit derived from potato and beet molasses, the rum flavour being imparted by the addition of artificial essence of rum chemically prepared, or of the "flavoured" Jamaican rum previously referred to. The one time extensive importation of this artificial preparation into Britain resulted in official action to differentiate between rum from Jamaica and other sugar cane producing countries and "imitation" rum, a term which must be applied to all spirit intended for sale as rum but which has not been produced in a country where the sugar cane is cultivated. In recent years, however, the importation has almost completely ceased, being only 143 proof gallons in 1926–27 against 44,000 proof gallons in 1900.

Composition.—Considerable variation is observed in the strength of rum as imported, the range being from 20 under proof to about 50 over proof, whilst the average is approximately 35 over proof or 77% by volume of absolute alcohol. The proportion of secondary ingredients also varies.

Consumption.—The quantity of rum consumed during recent years has steadily decreased, the importation into Britain since the war years 1914–1919—when abnormal quantities were imported—being as follows:

Year ended March 31	Quantities retained for consumption	Year ended March 31	Quantities retained for consumption
	Proof gallons		Proof gallons
1920* . . .	3,673,258	1924 . . .	1,324,111
1921* . . .	2,742,955	1925 . . .	1,147,852
1922* . . .	1,803,151	1926 . . .	1,095,114
1923 . . .	1,328,487	1927 . . .	852,728

*Figures for United Kingdom; those for later years relate to Great Britain and Northern Ireland only.

These figures include a small quantity of "imitation" rum.

(F. G. H. T.)

RUMANIA or RÔMANIA, a kingdom of south-east Europe to the north of the Balkan peninsula. Its present area since the World War within the boundaries established by the Peace Treaties covers a total of 294,967 square kilometres, an area roughly equivalent to that of England, Wales and Scotland. The population within the present boundaries is 17,153,932 (1926).

The southern boundary starts near Balchik on the Black Sea, runs north-west to the Danube near Turtukaia and then follows the north bank of the Danube as far as Bazias above Gradiste in Serbia. South of this line are Bulgaria and Yugoslavia. From Gazias the frontier runs roughly north-north-west with Yugoslavia across the flat plainland of the Banat to Cenadul on the Maros river. Thence it runs north-east in front of Arad, Oradea Mare and Satmar. (From Cenadul the frontier is against Hungary.) It now turns eastward at the summit of the northern Carpathians. For this stretch it is the frontier to Czechoslovakia. It now runs north-east for a similar stretch as the frontier of Poland until it reaches a point north-east of Cernauti (Czernowitz) and east of this it bends round, turning south-east to the Black Sea. The last part is the frontier of Bessarabia against Russia, following the line of the river Dniester from Zalescio near Czernowitz to Akkerman (Cetatea Alba). Rumania is thus roughly circular in shape consisting of two halves, that on the west mountainous and that on the east largely alluvial plains. It has frontiers against six countries.

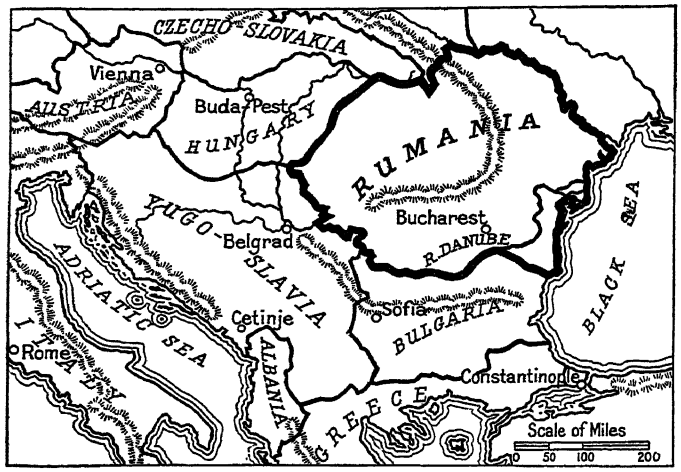
Physical Features.—Old Rumania of the time before the World War has been increased by the addition of the Dobrudja, Bessarabia, Bukovina, the Banat and Transylvania. Of these additions Bessarabia adds a further inter-fluvial region between the Dniester and the Pruth to that which, in Old Rumania lay between the Pruth and the Sereth. The Dobrudja merely extends southwards, almost to the Balkan ridge, the plain-lands of Walachia and the Danube mouth. Thus lands of a type already characteristic of Rumania have now been added to the old nucleus. Transylvania on the other hand represents an entirely new area, to the control and cultivation of which the Rumanians have not yet become accustomed. It is a homogeneous region, largely fertile plateau, with the curve of the Carpathians for its boundary on the north, east and south and the Hungarian plain on the west. These two main divisions constitute the most important feature of the country. South and east of the Carpathians conditions of climate, custom and flora have an Oriental flavour and face the east. The other side of the great Carpathian barrier, the west, is the predominant influence, although on both sides the people are, by a great majority, Rumanian in race.

The province of Bessarabia is cut up by numerous ravines and river valleys all tributary of the Pruth and Sereth. In the northern half it is hilly, rising to 1,000 ft. and timbered with beech, oak, mountain-ash and some birch. To the south it is open country until it finally reaches the lagoons and marshes of the Danube at Galatz, Ismail and Kilia.

The Bukovina, a comparatively small province, is similar in character to Bessarabia, being fertile and productive. It is, however, heavily wooded, no less than 43% of its area being covered. It is hilly, containing as it does the foothills of the northern Carpathians.

The Dobrudja, confined between the Danube and the Black sea, is almost entirely steppe land. It is of extreme fertility and consists of alluvial soil. But it is almost devoid of springs and wells, so that much of it is desolate. It is substantially of the same character as the lower part of Bessarabia and Moldavia, all alike being derivative from the Danube river and largely dependent on it.

The remaining area south and east of the Carpathians comprises Moldavia between the Sereth and the mountains and the



MAP SHOWING POSITION OF RUMANIA WITH REGARD TO OTHER STATES. THE TERRITORY OF RUMANIA WAS MORE THAN DOUBLED AS A RESULT OF THE SECOND BALKAN WAR AND THE WORLD WAR

great westward extension of the Danubian plains to the Iron Gates where the Balkan and Carpathian ridges meet and close in the lowlands.

This great southern plain of Rumania is monotonous in its features. It slopes gently upwards from the Danube to the Carpathians and is intersected by a succession of rivers which, like the Dambovita, the Oltu and the Teleorman, rise on the southern and south-eastern slopes of the mountains and flow without much deviation into the Danube. Passage from east to west is thus much hindered and interrupted.

The Carpathians.—The Carpathians themselves form a remarkable Alpine intrusion into what is, in part, a Pontic or semi-Mediterranean setting. The mountains rise from the southern plains without much preliminary undulation. They achieve a maximum height of 2,400 metres in the peaks above Braşov (near Sinaia) at or near Piatra Craiului. The most formidable ridge lies between the passes at Braşov and Sibiu. All Alpine conditions are found here and Alpine flora and fauna contrast vividly with those of the wholly different regions to the south and east. Snow lies on the peaks far into the summer while at Sinaia and similar resorts snow covers the ground for almost half the year. North of the ridge the Transylvanian plateau extends in broken and hilly country of great fertility to the northern borders. The main and more abrupt face of the mountains is everywhere on the south and east. It serves as a most formidable barrier to invasion from the Black sea and Balkan regions and is far more easy to defend from the side of the plateau. Starting from the passage round the Carpathians at the Iron Gates the only passes across the southern part of the ridge are the Szurduk pass between Deva and Turgu Jiu, the Rothenturm pass between Sibiu (Hermannstadt) and Valcea, the Predeal pass between Braşov and Ploeşti and the Oituz pass at the south-eastern extremity of the range. All admit of the passage of railroads and all except the last-named have rail-traffic now passing through them. From Oituz to the Polish frontier the range consists more of isolated masses and there is no continuous ridge of great height. It is crossed at several places, notably by the railway from Ciuc Sereda to Focsani and further north again by the railway at Campulung.

Rivers.—The Transylvanian plateau itself is traversed by rivers that rise in the northern half of the range and flow westwards to the Theiss (Tisa). One river only, the Oltu, flows from Transylvania to Walachia. It has cut the Sibiu-Valcea pass. The principal rivers of Transylvania are: the Maros, which rises in the mountains forming the eastern wall of Transylvania, and taking first a northern course flows through the country from east to west; its principal affluents are the Görgeny, the Great and Little Kokel or Nagy and Kis Küküllö, the Strell (Sztrigi) and the Cserna on the left, and on the right the Ampoly and the Aranyos, which is rich in auriferous sediments. The Maros (Mureş) is the largest and longest river of Transylvania. It forms the northern boundary of the Banat province, which is traversed also by some minor streams. This province forms the plain-land end of the gradually sloping plateau of Transylvania so that a traveller going from the Carpathian passes to the Theiss would on the whole be steadily descending. It is structurally part of the main Hungarian plain but historically and ethnically is a unity. It is rich, well-watered and fertile, and in its southern corner, where it extends to the Danube, richly endowed with coal and other minerals. Central Transylvania produces gold in small quantities, but is mainly agricultural farmland. Fruit and vines, maize, wheat and rye are largely grown. Crops of hemp, flax and tobacco are also gathered though not in large quantities. Bears, wolves, foxes and boars are found in the abundant forests of the uplands. The goldmines are situated, as in antiquity, in the isolated mass of hills in the region of Kluj, in particular at Verespatak and in the mountains of Hunedoara, near Deva. In 1900 the value of gold so obtained was £300,000. The gold is often found in combination with tellurium. Saline springs are common and salt is worked at Maros-Ujvar, Des-Akna-Kolozs, Torda and Vizakna. Of the 337,996 tons of salt obtained by the state monopoly in 1925 the bulk comes from these sources.

The Danube is a controlling feature in the life of the country. It first meets the Rumanian frontier at the Iron Gates and thence flows with a swift and deep stream to Kalafat. Here, taking a sharp turn eastwards it flows through open country with cliff banks on the Bulgarian side, and lagoons and marshes on the Rumanian. It gradually gains in width and volume but decreases in speed. It so runs without change, always with low hills on the south bank until Turnu Magurele and Giurgiu are reached. Islands are common throughout the later reaches. After Giurgiu the direction is north-east by east and the river opens out by Silistra into a maze of islands, shoals and sandbanks. At Giurgiu and Silistra are the two most important ferries. From Calarasi onwards the river has great width. It is bridged at Cernavoda by a bridge some 12 km. in length and this is the average width of the river for many miles. Near Braila and Galatz it widens still more and after its final sharp turn to the east at Galatz the Delta proper begins. The principal channel cuts through the centre of the Delta from Tulcea and enters the sea at Sulina. It is kept clear largely by dredging. There is no bridge over the Danube between Novisad in Yugoslavia and the sea except at Cernavoda.

Geology.—The axis of the Transylvanian Alps consists of sericite schists and other similar rocks; and these are followed on the south by Jurassic, Cretaceous and Early Tertiary beds. The Jurassic and Cretaceous beds are ordinary marine sediments, but from the Cenomanian to the Oligocene the deposits are of the peculiar facies known in the Alps and Carpathians as Flysch. Farther north, the Flysch forms practically the whole of the Rumanian flank of the Carpathians. Along the foot of the Carpathians lies a broad trough of Miocene salt-bearing beds, and in this trough the strata are sometimes horizontal and sometimes strongly folded. Outside the band of Miocene beds the Sarmatian, Pontian and Levantine series, often concealed by Quaternary deposits, cover the great part of the Danube plain. Even the Pontian beds are sometimes folded. In the Dobrudja crystalline rocks, presumably of ancient date, rise through the Tertiary and recent deposits to form the hills which lie between the Danube and the Black sea.

Climate.—The Moldavian-Walachian region, together with Bukovina and Bessarabia, endure the scorching summers of the Russian steppe-land and the extreme frosts and blizzards of the Pontic zone in winter. Transylvania and the Banat endure the

less violent variations of Central Europe. The Danube plains often experience a temperature of 20° below zero (Fahrenheit) and in summer 100° to 110° is common. Autumn is the mildest season; spring lasts only for a few weeks. At Bucharest the mean temperature for summer is 72° for autumn 65° and for winter 27°. For many weeks and even months the plainlands endure the north-east wind from Russia called the *Crivets*. In summer a hot south or S.W. wind sweeps up from the Mediterranean, but without freshness. The Danube has been ice-bound for periods as long as three months. The rainfall, which is heaviest in summer, particularly in the Transylvanian plateau averages 15–20 in.

Fauna.—In its fauna, Walachia has far more affinity to the lands lying south of the Danube than to Transylvania, although several species of *Claudilia*, once regarded as exclusively Transylvanian, are found south of the Carpathians. Moldavia and the Baragan Steppe resemble the Russian prairies in their variety of molluscs and the lower kinds of mammals. Over 40 species of freshwater mussels (*Unionidae*) have been observed in the Rumanian rivers. The lakes of the Dobruja likewise abound in molluscs; parent forms, in many cases, of species which reappear, greatly modified, in the Black sea. Insect life is somewhat less remarkable; but besides a distinctive genus of Orthoptera (*Jaquetia Hospodar*), there are several kinds of weevils (Curculionidae) said to be peculiar to Rumania. Birds are very numerous, including no fewer than 4 varieties of crows, 5 of warblers, 7 of woodpeckers, 8 of buntings, 4 of falcons, and 5 of eagles; while among the hosts of waterfowl which people the marshes of the Danube are 9 varieties of ducks, and 4 of rails. Roe-deer, foxes and wolves find shelter in the forests, where bears are not uncommon; and chamois frequent the loftiest and most inaccessible peaks.

ANTIQUITIES AND EARLY SETTLEMENT

Rumania is rich in antiquities of all periods from the Neolithic to the Roman but no scientific archaeological work can be said to have been done before 1900 when Prof. Tocilescu published the results of his surveys of Roman Dacia. Excavation by Rumanians did not begin before 1914.

The Neolithic period is hard to distinguish from the Chalcolithic but in general it is abundantly clear that Rumania in the first half of the third millennium B.C. formed part of a homogeneous region in which Bulgaria, Thrace, Thessaly and the Ukraine as far north as Kiev were included. This culture is distinguished by a remarkable painted pottery of high artistic quality in design and shape. The people of this area and period have, for convenience been called the people of the "Black Earth Region" because the soil is rich and alluvial and because those living upon it at this period were largely agriculturalists.

The most important sites in Rumania hitherto examined are Cucuteni near Jassy where abundant remains have been found of two periods of this culture, Erösd in Transylvania and Braşov (Kronstadt), and some sites (excavated by Germans during the World War) near Cernavoda on the Danube. The culture so revealed is one of the most remarkable that developed in Europe in the early prehistoric period. It is thought by some to have oriental affinities with regions so far afield as Turkistan and Honan in China, where remarkably similar pottery is found. In any case the "Black Earth Culture" came to an abrupt end about 2000 B.C. and was replaced by a culture coming from the north-east, equipped with weapons of war. The Bronze Age that ensued develops rapidly and concentrates mainly in the western half of Transylvania and the Hungarian plains. It is of great artistic merit and some of the finest products of the European Bronze Age in gold and bronze come from Transylvania. Inhabited sites are numerous but not large and the gold of Transylvania seems certainly to have been worked on a large scale. There was a nobility and a subordinate or serf population and the accoutrement of the nobility and their gold ornaments and plate form an outstanding feature of the civilisation they represented. The *floruit* of this Bronze Age seems to have been about the fifteenth century B.C. and the Hungarian plain seems to have been the breeding-place for movements that extended far and wide. Bronze swords of Danubian type from these regions are found during the fourteenth and thirteenth centuries penetrating, perhaps more as signs of invasion than as elements of trade, as far afield as Mycenae, Egypt, Cyprus and Crete. The makers of the swords seem to have been the peoples who were gradually pressing down southwards into the Mediterranean and who subsequently were responsible for northernisation of the Minoan world. Their gold may have reached the wealthy cities of the Mycenaean mainland. Certainly they were in close touch with Troy and Anatolia.

The Second Millennium.—Towards the close of the second millennium before Christ the Bronze Age culture of Rumania was modified by external influences and at the dawn of the Mediterranean Iron Age, Italy played a preponderant part in the commerce of the Carpatho-Danubian regions. Villanovan culture from North Italy sent its wares (particularly its fine bronze work), far and wide into Transylvania and western influences predominated. Rumania proper is almost out of touch with the Hallstatt Iron Age and does not cease to be a Bronze Age until the eighth century when devastating invasions from Scythia entered from the north east. Scythian graves are found in three large areas—in North Hungary, in South Transylvania and in Walachia. They are never rich and they indicate the intrusion of large bodies of well-armed warriors who for a time controlled the country. They were, however, soon absorbed by the native population. But the wealth and prosperity of Rumania was checked, and never really recovered until Roman times.

Hellenic penetration was marked but never very effective and the Daco-Getic peoples of Rumania were never Hellenized as were the Balkan Thracians. But of the Greek period there are many archaeological evidences. The important Milesian settlement of Histria near the Danube mouth on a lagoon island facing the modern village of Karanasuf has been well excavated. Over a hundred and fifty inscriptions illustrate the life over many centuries of this remote Hellenic town. The wealth of the inhabitants, as is evident from two large and important inscriptions of the Roman period, had at all times come from the fishing in the Delta, over which the Histrians had immemorial rights.

Kallatis, an old Dorian settlement on the site of the modern Mangalia in the Dobruja, has been partly excavated. Inscriptions there indicate that the population was strongly Dorian and that the city, with others along that coast was largely subject to the Thraco-Scythian kings of the interior. Kallatis was evidently one of the great corn-exporting emporia of the Black sea. Constanţa has been identified as the ancient Tomi, the place of exile of Ovid. Remains of the city walls have been discovered across the promontory upon which the residential part of the town is built. A small museum which contained all local antiquities was looted by Bulgarian soldiers during 1917 and the contents dispersed. Greek objects of commerce have been found as far inland as the headwaters of the Pruth and the Argeşul. Wine from Thasos and the Aegean was a much valued commodity in these regions.

In Roman remains the country is extremely rich. The great wall of Trajan can be traced without difficulty between Constanţa and the Danube near Cernavoda. Extensive remains of Axiopolis at its western end can be seen on the Danube, and excavations have been carried out there. The most impressive of all the Roman monuments is the Tropaeum Trajani at Adamklissi. It stands in a wild and desolate region in the rolling steppeland between the Danube and Constanţa with much of its sculptured decoration still lying round the massive concrete core which survives. The Roman town of Ulmetum midway between Harsova on the Danube and the coast has also been explored and excavated. Along the Danube the traces of Trajan's campaigns are numerous. The inscription recording his construction of the road along the south bank near the Iron Gates is still visible in the cliff face near the island of Ada Kalesi. Some of the piles of the bridge he built across the Danube still survive.

In Transylvania inscriptions are found as far north as the Polish border and elements of the various defences and vallums

built at different periods can be made out. Near Cluj at the village of Verespatak considerable traces of Roman mining for gold are to be seen and a century ago a series of important inscribed wax tablets was found here, bearing record to the manner and method by which the mines were worked. Of the Dacians who opposed the Romans there is much evidence but the archaeological discoveries are not of the first importance. The site of Sarmigetusa has been identified in the mountains a little south of Deva in Hunedoara. It is a powerfully fortified hill-city and was the metropolis of the Dacians.

Post-Roman remains of the time before the Rumanians came under the influence of Byzantium are rare and little or nothing is known about the country at this time. But the great gold treasure of Petroasa, which was transported to Moscow during the war and has never been returned, is certainly of Hunnish or semi-oriental origin. It consists of two superb chalices of pure gold, inset with large garnets and with handles shaped like panthers, a large necklet of the same fabric, several large gold ewers elaborately chased and some superb torques.

Byzantine remains are not of importance until the fourteenth century when the Byzantine church and monastery of Curtea de Argeş was built. The frescoes here rank as the finest and oldest Byzantine works of art in the country.

A special architectural style grew up after this, particularly in Moldavia, based upon the Byzantine, but of a very marked character and of great beauty. It flourished mostly in the sixteenth century and the early 17th. The church of the "Three Saints" at Jassy, founded in 1639 is one of the finest examples. The style of architecture so evolved is purely Rumanian and owes little or nothing to Greek or Slavonic tradition in matters of decoration, though the structure is in essence Byzantine. Byzantine traditions in painting dominated the artists of the churches and monasteries down to the eighteenth century.

THE PEOPLES OF RUMANIA

Whereas the population of Rumania in 1914 was 7,600,000 it has, by the new provinces been increased two and a half times. The distribution of the population is as follows: within the area of the old boundaries there were (1926) 7,897,311 inhabitants. Transylvania and the Banat contain 5,487,966, Bessarabia 2,956,934 and Bukovina 811,721. Transylvania has the lowest density of population (57 to the sq.km.), while Bukovina is the most thickly populated (77 to the sq.km.). Bucharest still remains the largest city, even of the new area, with a population of 850,000 (1925) and there is no other city of the size. The next largest is Kişinau (Kishinev) in Bessarabia with 150,000. Cluj comes next with 105,000 and there are no other towns whose populations reach more than five figures.

Of the total population according to the latest ethnological statistics (1920) 11,805,000 or about 70% of the population are of pure Rumanian blood and origin. Of the remainder 1,568,000 Magyars inhabit Transylvania and parts of the Banat; 792,000 Germans live in and round the old Saxon and Alsatian towns of the Carpathian slopes and the Banat; 900,000 Jews live scattered throughout the country, but with a majority in Transylvania and Bukovina; 170,000 Turks, 290,000 Bulgars and some 30,000 Tatars and gypsies live in Moldavia, Walachia and the Dobruja. Some 37,000 Poles are found in Bukovina and neighbouring parts. Of the remainder there are 792,000 Ukrainian Russians in Bessarabia and nearly 400,000 other Slavs in the northern departments.

The Rumanians are equally distributed throughout and are one of the most industrious elements. For the most part they are engaged in the agriculture and stock-breeding activities of the country. Recent research has done much to prove beyond doubt that they are partly the descendants of the Roman merchants and veterans who settled in Dacia, even as far north as the present Polish border, before and after the campaign of Trajan and partly of the native Dacians. Archaeological and historical evidence agree to show that there was a long and thorough period of penetration of the Carpathians by Roman commerce and after the Roman withdrawal the various established Roman elements remained in the country. The very word *batran* in Rumanian, meaning "old" is derived from the Latin *veteranus* and the word *biserica* (= church) indicates the western origin of Christianity in these parts (*biserica=basilica*) and so the western connections with Italy and Roman culture. The Rumanian physical type, in many cases, seems more definitely Latin than the Italian and the language is in many respects closer to Latin than is Italian. Slavonic elements are clear in some of the prevalent types but it is by no means the preponderating influence.

The 1,500,000 Magyars are found for the most part in the towns of Transylvania. By training, education and tradition they associate themselves more happily with the German elements than with the Rumanian and they take only a small part in the agricultural development of the land. They are industrious and honest but are politically unreliable since they are encouraged by their fellow-Magyars in Hungary to oppose in every way the rule under which they live. A branch of the Magyars known as Czeklers are descendants from the original Hungarians who entered Europe in the ninth century and who stopped and settled in Rumania. These can hardly be considered as expatriated: they number 500,000 in the Banat.

Germans have settled in Rumania from time to time for various reasons. The earliest were knights and their companies, perhaps Crusaders, in the 12th century, who were persuaded by the Hungarians to settle in towns that commanded the main passes of the Carpathians and so prevent inroads of Barbarians into Europe. Gradually they developed their settlements and in 1224 their position and independence were recognized. Alsatians and Saxons together with some groups from the Rhineland were settled in these early times. They still live an exclusive and separate life, largely with their own institutions and local government. They are mainly of the Lutheran persuasion. It is remarkable to see in their churches the one hint of the Orient, which they were brought there to combat, in the shape of fine Turkish carpets of the 16th century, survivals of the period when the Turks overran the Transylvanian plateau but left the German settlements still independent. The Germans in the various German regions of Transylvania are fine types and entirely unmixed with Rumanian or Magyar blood. They wear German costumes and live in a way indistinguishable from that of modern Germans. They form a very useful element in the state and, if rather an isolated enclave in a foreign land, yet are loyal subjects of whatever régime may control them. The Germans of the Banat are of a different type and are comparatively late arrivals. They colonised the waste plains of this fertile region in the eighteenth century (*see* BANAT) and are mostly Rhinelanders and Alsatians. Their activities are almost entirely agricultural and their wealth and industry is considerable.

The Jews live mainly in the towns and have until quite recently been so restricted in their civil and legal rights that they can hardly be said to have held the status of citizens. Nevertheless they are, as always, of the greatest financial value to the country and have much of the business in their hands. Their position, if not yet quite free, is still better than it was before the war. In origin the majority are Polish and Galician, though there are some few Spanish Jews of the same kind as those at Salonika.

The Turks are the survivors from the days of Turkish domination, settled mainly in the sixteenth century. They live in the remoter districts along the Danube, particularly on the Dobruja coast and near Silistria. They are old-fashioned and recall the Turkey of a century ago; they bear little resemblance to their brethren of the new Turkish Republic. The gypsies and Bulgars are the least satisfactory element in the country. The former contribute the attractive music of the traditional Tsigane and are at least picturesque, but the latter are a difficult element. Both are found mainly in the Moldavian and Dobruja provinces. Bulgar villages are common throughout the Dobruja, intermingled with Tatar settlements and Rumanian hamlets. But the Bulgars here are of a savage type, perhaps descendants from the original Cumans (*q.v.*), of the Middle Ages, and they are neither so clean nor so industrious as the Rumanian peasants.

The Russians in Bessarabia naturally form a difficult element but they do not number much more than a quarter of the total population of the district. Nevertheless they form an important minority, situated as they are on the borders of a powerful state. They are, however, industrious and quiet and have not given rise to so many difficulties as the Hungarians.

Religion.—The State Church of Rumania, which is governed by a Holy Synod, professes the Orthodox Oriental creed. Its independence was formally recognized by the oecumenical patriarch of Constantinople, in 1885. The Rumanian Church had claimed its independence from very ancient times, but under the Turkish suzerainty and Phanariote hospodars Greeks were generally elected as bishops, and the influence of the Greek patriarch at Constantinople came to be more and more felt. In 1864 it declared itself independent of all foreign prelates. In 1872 a law was passed by which the bishops were elected by the senate, the chamber of deputies, and the synod sitting as an assembly (the only other occasion on which provision is made for such an assembly is in the event of the throne becoming vacant without any apparent heir). It was subsequently decided to consecrate the holy oil in Rumania instead of procuring it from Russia or Constantinople; but the Greek patriarch protested. Secret negotiations were entered into which came to a successful issue. The patriarch feared on the one hand that the growing influence of the Russian Church would give a colour of Slavism to the whole church, and that a Russian might eventually be appointed oecumenical patriarch at Constantinople, while the Rumanians hoped by means of the independence of their church to deprive the Russians of all excuse for interfering in their internal affairs under the pretext of religion. The Rumanians, although obtaining complete independence, agreed to recognize the patriarch at Constantinople as the chief dignitary of the Orthodox Church.

The metropolitan archbishop of Bucharest, officially styled metropolitan primate of Rumania, presides over the Holy Synod; the other members being the metropolitan of Jassy (primate of Moldavia), the six bishops of Râmnicu Vâlcea, Roman, Hushi, Buzeu, Curtea de Argeș and the lower Danube (Galatz); together with eight bishops *in partibus*, their coadjutors. Metropolitans and bishops are elected by the senate and deputies, sitting together. In Hungary there are a uniate metropolitan and three bishops belonging to the Rumanian church. The secular clergy marry before ordination; and only regular clergy (*kalugari*) are eligible for high preferment. Many convents have been closed and utilized for secular purposes. The older convents are usually built in places difficult of access and are strongly fortified; for in troublous times they served as refuges for the peasants or rallying-places for demoralized troops. The sequestration of the monastic estates, which in 1864 covered nearly one-third of Rumania, was due to flagrant abuses. Many estates were held by alien foundations, such as the convents of Mount Athos and Jerusalem; while the revenues of many more were spent abroad by the patriarch of Constantinople. Religious liberty is accorded to all churches, Jews, Muslims, Roman Catholics, Protestants, Armenians and Lipovans having their own places of worship. The addition of the new provinces has added mainly to the number of the Roman Catholics, who were few in number in old Rumania. Nearly 300,000 come from Transylvania and the Banat alone. But the Orthodox and Uniate churches control 29·6% of the inhabitants of Transylvania, according to a religious census of 1910. Bessarabia has but added to the numbers of the Orthodox Church. The Saxons of the Banat and of Transylvania are mainly Lutherans of the Augsburg Confession, but some are Roman Catholics. The Magyars are almost wholly Roman Catholics.

Constitution.—In 1862 Alexander Cuza, an able Rumanian prince visited the Sultan at Constantinople and persuaded the Turks to recognize provisionally as one land the various principalities which then made up Rumania. A provisional government was soon after constituted and on May 10, 1866, Prince Charles of Hohenzollern-Sigmaringen was elected prince of Rumania by a constituent body chosen by universal suffrage. A constitution was at the same time drawn up. The country was not, however, wholly independent until 1877 when on May 10 the two chambers proclaimed autonomy. Rumanian troops then helped the Russians at Plevna against the Turks and so definitely associated themselves with the powers who were then combating the Turkish Empire. On May 10, 1881, Charles of Hohenzollern was crowned King of Rumania.

Charles had no heir and the succession was accepted by his brother Leopold whose younger son Ferdinand became king in 1888. By the constitution no woman may ascend the throne and, in default of a male heir, the representatives can choose a king among the royal families of western Europe. The constitution was revised in 1879 and in 1884 and finally, with fundamental changes on March 29, 1923.

The Constitution of 1923 radically altered all previously made constitutions and may be considered as virtually new. The most fundamental changes were the establishment of Universal Suffrage and Agrarian Reform. This new constitution consists of 138 separate articles and is based in general upon European models. It differs from the British Constitution principally in the numerous and considerable rights accorded to the monarch. The administrative sections are based largely upon French models. For administrative purposes the land is divided into districts (*Judete*) and these into cantons (*Plași*) and the last into communes; new and old provinces alike have these divisions and no others. Every citizen has to belong to a commune and each commune has a decentralised local government. There is a Senate and a Chamber of Deputies and a newly created third body called the Legislative Council, which formulates and prepares for the two Houses all legislative and non-financial administrative measures. The Senate is partly elected on a democratic basis by direct vote in some cases: 76 senators are nominated by the 76 Districts, Chambers of Commerce nominate others and Universities have one each. Another group of Senators hold their seats *ex officio* by virtue of high office. Such are the Crown Prince, the Metropolitan, the recognised bishops and certain other ecclesiastics of high position and the President of the Academy. Their tenure of office ceases with their office. A third group of Senators is composed of ex-Presidents of Council, ex-Presidents of legislative assemblies, generals and ex-Presidents of the Court of Appeal.

The King has considerable political power and by his veto can forbid certain legislation. He must be of the Orthodox persuasion, and attains majority at the age of 18. The legislature consists of District Tribunals, Higher Tribunals, Courts of Appeal, Courts of Assize and finally of the ultimate Court of Cassation. Electoral rights depend on Rumanian birth, domicile in Rumania and upon the citizen being of the age of 25, and being literate. The general political parties are as follows: A Peasant Party founded in 1918 by Jon Mihalache is of great influence and power. A Socialist Party founded in 1910 exists among the townspeople, but it is not numerically strong and has been severely repressed. There is a Liberal Party led by Bratianu and a Conservative by Marghiloman, a National Party by Julius Maniu and Vaida Voivod. A so-called Popular Party is led by General Averescu.

The most fundamental political change since 1914 was the Agrarian Reform of December 16, 1918. It was a reform made urgent by the war and demanded by the returned soldiers. Subsequent decrees between 1918 and 1921 completed the measure. The result has been a steady increase in the output of cereals, and a very satisfactory solution of social and agricultural discontent. It was undoubtedly the wisest and most fundamental reform ever made in the country.

Commerce.—Salt and tobacco are State monopolies. The former produced a revenue of nearly 3,250,000 lei in 1925, while the latter in the same year from 14,919 tons produced the enormous income of over 3,404,000,000 lei. The tobacco is all of local growth, mainly from the Danube plains, and its quality is of the very lowest. Compared with the usual Balkan tobaccos it is a very poor leaf very badly cured. The most important industry is that of oil and petrol productions. The main oil wells lie at the foot of the Carpathians in old Rumania near Ploești at the entrance to the Predeal pass. The oil-bearing strata

extend north-eastwards towards Focsani and westwards towards Craiova. The production is rigidly controlled by the Rumanian Government although foreign companies have great interests. The principal Rumanian companies are the Steaua Romana which in 1924 produced 270,274 tons and the Astra Romana which in the same year produced 455,640 tons. The only other large producer is the Creditul Minier which in 1924 produced 220,230 tons; 37 other companies work the fields ranging in production from the small figure of 480 tons to 180,000. The total production for 1924 was 1,860,471 tons, being worth in lei (then at about 1,000 to the pound sterling) 4,584,000,000 lei.

The coal mining area in Rumania is limited to the region of Anina in the Banat but it is productive of coal of very high quality. Anina itself produces some 300,000 tons annually. Coal from the Szekul valley is similar to Welsh coal and contains 66·76% of solid carbon. The deepest and best seams are at Kölnik, Klokodics and Nermeth. The coal-fields of Szekul, Domany and Vaskö are connected with important steelworks. Unworked beds are said to exist in the Hunyad, south of Deva. Lignite is produced in large quantities in the Hunyad and in the region between Varciarova and Bacau but the most important deposits lie in Old Rumania in Moldavia. The total lignite production in 1922 was 900,000 tons. Anthracite is found in the Gori district at Schela and in Moldavia and Walachia but the total tonnage in 1922 did not exceed 201,000 tons. A natural deposit only recently exploited on a large scale is natural gas. In 1918 the region, in Transylvania of Sarmasel, Sarmgud, Zaul-de-Campie, Sarosul-Ungure, Basna and Copsa Mica covering 114 sq.km. was exploited. In general 140 million cubic metres of gas can be produced from a sq.km.; it consists of almost pure "marsh" or "methane" gas with 8,716 calories to the cubic metre. It is one of the most valuable deposits of natural gas in the world. A not inconsiderable steel industry exists in the Banat, largely connected with the Banat coal-mines, with an annual output of 200,000 tons of ore. There has, however, been a decline since 1914.

The fisheries of the Danube region are a considerable commercial asset. After the Volga fisheries those of the lower Danube are the most extensive and the richest in Europe. (The sea fisheries on the other hand, on the Rumanian coast are negligible.) The annual product of the Danube delta alone is nearly 9,000,000 kilogrammes. Elsewhere the lagoons and shallows near Giurgiu and Oltenitsa at Calarasi, Cernavoda and Harsova and near Ostrov are the most productive. Carp are the most numerous, having since 1920 amounted to nearly 3,000,000 kilogrammes in weight annually. About 150,000 kilogrammes of sturgeon are caught annually. There is considerable scope for enlargement and improvement in the fishing industry.

In wheat, rye and other grain, Rumania is one of the richest countries of south-east Europe. Old Rumania together with Bessarabia grows about three times the quantity grown in Transylvania. The total production is only slightly below that of Germany and is about a fifth that of Canada. The corn grown is of a high quality and it is harvested largely by mechanical means, with which Rumanian farms are well-provided. The export trade in corn has decreased considerably since 1914, though in 1911 it represented 70% of the value of the total exports. Since then petrol has largely replaced it in the exports of the country. The principal customers for Rumanian wheat are Belgium, Holland, Germany and Great Britain.

Of other exports there are none of great importance except wood, of which 2,500,000 tons were exported in 1924, and live stock of which some 70,000 tons were exported in the same year.

Communications.—The river Danube forms a magnificent highway for Rumanian trade passing from west to east. It also allows for the passage of imports from the Black sea into Europe. Navigation from Orsova at the Iron Gates to the Delta is easy and safe in both directions and after Calafat the current is so slight that transit from east to west is as rapid as traffic in the reverse direction. A total of some 7,000,000 tons of shipping passed in each direction along the river in 1923. Nearly a million tons of corn alone was transported during this period by this shipping. Maritime trade from Constanţa and the Danube ports is considerable reaching 4,000,000 tons in 1923.

Passenger shipping amounts in all to 21,031 tons for the connections between the Black sea ports and the outside world, the fleet consisting of 14 ships.

The railways are almost entirely State-managed and largely State-owned. In all 7,305 kilometres of line are State-owned and 3,099 privately owned but controlled and managed by the State. In 1925 there existed 2,000 locomotives and 54,000 wagons of which 4,200 were for passenger use. The tracks are almost everywhere single with the exception of the lines between Ploeşti and Buzau, Bucharest and Campina and Arad-Curtici. The line used for the Orient Express enters the country at Curtici and runs by Alba Julia to Braşov and over the Carpathians by the Predeal Pass. The Black sea traffic is borne mainly by the Bucharest-Cernavoda-Constanţa line, across the Danube at the great Cernavoda bridge. There is no line parallel with the Danube but the river traffic is tapped at Orsova whence a line runs north to Timişoara at Calafat, and thence a line runs north-east to Craiova, Slatina, Piteşti and Bucharest. Smaller lines from the river join the last-named line from Corabia, Turnu Magurele and Zimnicea. Another line links Bucharest with its port Giurgiu. At Braila, Galatz and Reni, lines radiate inland and so link the corn-growing areas with the Danube ports.

Warsaw is reached via Cernauti and Russia via Tighina or Cetatea Alba (Akkerman) on the Bessarabian frontier.

New lines are contemplated between Braşov and Nehoias in order to discharge Transylvanian products to the Danube; between Bumbeşti and Livazeni in the Hunedoara region in order to extend the coal industry; between Ilva Mica and Dorna Vatra in order to facilitate the transport of wood from Bukovina to the south.

BIBLIOGRAPHY.—N. Jorga, *History of Rumania* (1925); V. Parvan: *Tara Noastra* (Bucharest 1923); C. G. Rommenhoeller, *La Grande Roumanie* (The Hague 1926); V. Parvan, *Dacia* (1928); *La Roumanie Économique* (Bucharest 1926). (S. CA.)

DEFENCE

Historical.—The history of the present Rumanian army dates from the accession of Prince Charles to the throne, and to the culmination in 1891 of the drastic reforms which he instituted. The Rumanian army subsequently participated in several of the Balkan wars and finally, on the side of the allies, in the last two and a half years of the World War. From the effect of initial disasters Rumania was saved, with a large gain in territory, by the defeat of the central powers.

Recruitment and Service.—Universal service is in force for all Rumanians, without distinction of race, language, or religion, for 29 years between the ages of 21 and 50. Certain exemptions are allowed for reasons of family, education or physical disabilities. The first two years of service are spent in the Regular army, 18 years in the reserve, and 9 years in the militia. Officers are recruited from the secondary schools, supplemented by a few army non-commissioned officers who can pass into the military schools, where the preparatory classes for all arms last for 2 years. The compulsory system is supplemented by youths volunteering between the ages of 18 and 21 for three years service.

Strength and Organization.—The budget effectives in 1927 numbered 153,145. In this total were included 13,436 officers and 3,376 civilian officials in army employment. There is also a corps of 2 brigades of frontier guards raised by the ministry of war but controlled by the finance minister, and a *gendarmerie* corps of 4 brigades under the minister of the interior but responsible to the war ministry in areas containing no troops. The organization of the army is in 7 army corps each of 3 infantry divisions and corps troops, 1 corps (2 divisions) of light infantry and 3 cavalry divisions. Each infantry division contains 3 infantry regiments, a regiment of field artillery and one of howitzers. Light divisions have these light infantry "groups," with 3 groups of mountain artillery and a regiment of mountain howitzers. Each cavalry division contains 4 regiments of Red and one of Black Hussars, and a group of horse artillery. Infantry regiments contain 2 or 3 battalions. Battalions contain 3

companies and a machine-gun company. Cavalry regiments contain 2 or 3 groups, each of 2 squadrons, and a machine-gun squadron. Field artillery regiments each contain 3 groups of 2 or 3 batteries and a specialist battery.

Higher Command.—The head of the army is the King. He can depute the command to a general officer in time of war. There is a supreme council responsible for organizing national defence, and a war office under a minister of war, with the usual departments including a general staff under a chief with his own secretariat and departments. There are seven army corps areas, each under its own commander, and, under them, divisional command areas. There are also inspectors general to supervise preparation for war in groups of 2 or 3 army corps. The various formations and units are distributed territorially in the 7 army corps areas. For recruiting, each of these is divided into districts of which there are 72 in all.

Military Education, etc.—There are 2 training schools for both regular and reserve officers, and 2 for reserve officers, 2 schools for infantry non-commissioned officers, a special infantry school, training centres for infantry and for light infantry, military colleges; an army cavalry school and special cavalry school; a training school for regular and reserve artillery officers, one for artillery officers and non-commissioned officers, a special artillery school and an artillery training centre. Also an army engineer school, technical engineer school, and field engineering school. There is a staff college under the chief of the general staff.

There is a tank regiment of one battalion of 2 companies, an artificers company and a depot company. Automatic rifles are in use in some of the infantry and cavalry units. An elaborate system of fortification, designed to form the keystone of national defence, was designed by the Belgian expert General Brialmont in 1882 and constructed at a cost exceeding £4,000,000. Since the World War, less reliance is placed in forts, and more in mobile field troops.

Army Air Force.—This contains aeroplane and balloon units, schools, anti-aircraft artillery, and various arsenals and depots. There are 3 groups of scouting planes, each group containing 4–5 scouting flights, besides a depot flight, a flight of specialists, a photography and meteorology section, machine-gun section, details and workshops. There is one "fighting squadron" containing one group of 2 flights of bombing planes and 2 groups of 3 or 4 flights of fighters, together with specialist flight, workshops and details; a naval flying group; a balloon group of 6 balloon companies, workshops and factory. There is a training centre for flying, and aviation schools for courses in flying, gunnery, bombing and mechanics work; also arsenals, depots and 6 aerodromes under a service flying group. About 15 flights of machines are maintained at the various training centres and schools.

See also League of Nations *Armaments Year-book* (Geneva, 1928).

(G. G. A.)

ECONOMIC AND FINANCIAL CONDITIONS

Area and Population.—Under the terms of the Peace Treaties arising from the World War Rumania's area and population were more than doubled. Nearly 83% of the people are engaged in agriculture, forestry and kindred rural pursuits. The total area of the country and the population are distributed as follows:—

	Sq.km.	Population
Moldavia	38,058	2,233,556
Muntenia	52,505	3,485,859
Oltenia	24,078	1,484,706
Dobrudja	23,262	693,190
Bessarabia	44,422	2,956,934
Bukovina	10,442	811,721
Banat	18,628	1,008,456
Crishana	17,086	1,142,469
Maramuresh	8,592	463,968
Transylvania	57,819	2,873,073
	294,892	17,153,932

while the following table shows the distribution of the population by trades, other than agriculturists; and includes workmen as well as clerical staffs:—

Oil	32,323
Mining	60,175
Metallurgical	44,748
Saw-mills	50,235
Chemicals	8,791
Food products	34,672
Textile	30,406
Leather tanneries	9,324
Glass workers	4,174
Building materials (cement works, etc.)	15,192
Paper and printing	9,689
Total, in above and other occupations	302,082

Agriculture.—The 24,238,076 hectares of Rumanian agricultural and forest land are distributed as follows:—

	Hectares	Per cent of total
Arable land	12,276,807	41·63
Meadowland and pastures	4,156,155	14·09
Forests	7,248,987	24·58
Orchards, and vineyards	556,127	1·89

Before the War, Rumania was still a country of large estates and one of the principal wheat exporting countries of Europe. After the emancipation of the peasants in 1864, they were granted from time to time allotments from Crown Lands but such grants were never sufficient to satisfy the general land hunger. Distribution was equally unsatisfactory in the case of Bessarabia under the Russian and Transylvania under the Austro-Hungarian Empire, but the Bukovinan peasants had been more fortunate in obtaining possession of a considerable share of the land. It was found expedient in 1920 to pass an Expropriation Law for Bessarabia, which was rapidly followed by similar laws for the Old Kingdom (1921) and for Transylvania and the Bukovina (also 1921), whereby provision was made for the total expropriation of absentee landlords, foreigners, mortmain estates and for partial expropriation of large landed properties. For purposes of comparison with the present Agrarian Reform Laws, it may be useful to reproduce a statistic compiled by Monsieur Ionescu-Sisești as to the distribution of arable land in the Old Kingdom in 1905:—

Size of holdings	Area in hectares	Percentage of total	Number of land-owners
Under 10 hectares	3,153,645	40·29	920,939
10 to 100 hectares	862,800	11·02	38,723
100 hectares and over	3,810,351	48·69	5,385
	7,826,796	100·00	965,047

To give effect to the post-war Agrarian Reform Laws official statistics show that a total of 16,500 estates (6,055,863 hectares) have been broken up, while litigation is in progress for the expropriation of a further 140,744 hectares. Not all of the land expropriated however has been handed over to the peasants as will be seen from the following:—

Progress of Expropriation to December, 1927

	Old Kingdom	Transylvania	Bessarabia	Bukovina
Hectares expropriated	2,776,401	1,711,575	1,491,920	75,967
Number of persons entitled to land	1,033,628	490,528	357,016	77,911
Number granted land	630,113	310,583	357,016	71,266
Hectares allotted to latter	1,916,350	451,653	1,025,174	27,797
State, communal, and district reserves	739,123	1,259,922	393,875	33,135
Peasants still without land	403,515	179,945	..	6,645
Balance for distribution	120,928	..	73,871	15,035

The thousands of peasants who took over the land in the first years of the agrarian reform were unskilled in management, inadequately organised on the co-operative side and lacked both the

machinery and capital required for successful farming. Although it may be assumed that with the passage of time the peasant is now better able to exploit his land and has acquired wider experience, nevertheless the shortage of money, the impossibility of cheap loans, and the heavy fall in the world price of cereals are all conditions which have combined to retard progress. Added to these unfavourable economic factors, the bad harvests of 1927 prevented any progress towards the pre-war cereal production of the territories under review, as will be seen from the following table:—

(In Thousands of Metric Tons)

	1925	1926	1927	Pre-War Averages (estimate for present territory)
Wheat	2,850	3,018	2,633	4,574
Rye	203	285	237	524
Oats	740	1,159	868	1,159
Barley	1,019	1,685	1,262	1,457
Maize	4,159	6,083	3,533	5,912

According to Rumanian economists, the division of the land will ultimately lead to increased total production, but not necessarily attaining the pre-war production of wheat.

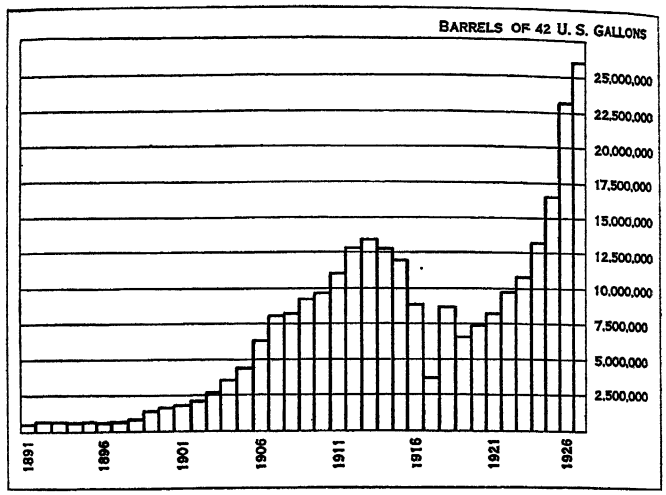
A reliable index to Rumania's prosperity agriculturally is the number of animals maintained. In taking the following table into consideration territorial changes must also be considered:—

	1911	1920	1927
Cattle	2,667,000	4,730,000	4,991,670
Sheep	5,269,000	8,690,000	13,581,869
Pigs	1,021,000	2,514,000	3,167,722
Horses	843,000	1,485,000	1,877,285

Rural Co-operation.—As a result of the post-war agrarian legislation the functions of the co-operatives underwent change. The whole organisation had been destroyed by the Central Powers and it was found necessary to commence *de novo*. The Central Credit Bank has a capital of 12,000,000 lei of which two-thirds were found by the State. The nominal capital was increased in 1923. The rural societies provide the peasants with seeds, machinery, etc.: and in many cases make arrangements for the collection and export of produce. There were at the end of 1926 over 4,600 societies with a total of 915,388 members. Even with the limited assistance which these societies are enabled to extend to the peasant farmer, there is no doubt that they are doing good work and, were it not for them, the peasant would be unable even to raise sufficient from the land he possesses to keep himself and his dependents. As it is, with the scarcity of money, high rates of interest and the complete lack of long-term credits for the purchase of implements, seeds, etc.: the peasant is able to do justice neither to himself nor to his land. Especially is this the case in Bessarabia where, as a result of an extremely bad harvest in 1927, wheat and maize had actually to be imported into the province for alimentation and seed reserves.

Mining.—Rumania's chief mineral wealth before the War lay in her rich petroleum deposits. In 1913 Rumania produced 1,885,000 tons of petroleum, standing fourth in the list of petrol-producing countries. In the autumn of 1916 an Allied Mission, operating in concert with the Rumanian Government, put the fields out of action to prevent them falling into enemy hands. Production fell to 517,000 tons, but although by 1926 it was restored to 3,244,415, or nearly twice the pre-war figure for the Old Kingdom, Rumania's production to-day is only two per cent of the world output. During the last two years the Rumanian oil industry has been struggling with a combination of economic evils, two of the chief being high export taxation and weakening world prices due to Californian over-production. It was found possible however at the beginning of 1926 to reduce considerably the taxes on certain grades of oil, benefiting the industry to a certain degree, while the formation of an oil cartel for the control of internal prices also eased the situation to some extent in this direction also.

A measure which affected the industry greatly was the Mining Law of 1923 which nationalised the sub-soil, restricted the holdings of foreign Companies and thus countered foreign exploitation at the expense of national enterprise. New oil-bearing lands could only be obtained in concession with Government consent. Under the Rumanian Company Law of the same period, sixty per cent of all invested capital must be Rumanian, while two-thirds



GRAPH SHOWING PRODUCTION OF CRUDE PETROLEUM IN RUMANIA, 1891–1927. THE AMOUNT PRODUCED, 1857–1927 (273,968,000 BARRELS), WAS 1·7% OF WORLD PRODUCTION DURING THAT PERIOD. FIGURES FOR 1927 ARE PRELIMINARY

of the Board of Directors must be natives. Rumanians must also be employed in all industrial concerns, cause having to be shown for the importation of foreign technical and clerical assistance. The majority of the foreign Companies conformed to the provisions of the new Laws and, in the oil industry at least, it has been found that the new system was practicable. Those Companies not conforming were subject to obstruction, being ineligible for grants of State oil lands. The Maniu Government which took office in the autumn of 1928 expressed their intention of revising the Bratianu policy in regard to the mining rights.

The other principal mineral riches are coal, natural gas and salt, while there are, in a lesser degree, deposits of asphalt, amber, gold and silver, pyrites, copper, lead, antimony, mercury, manganese, chrome, bauxite and iron.

The coal supply was formerly insufficient for home requirements and supplies, chiefly from Poland, were imported. However, coal output is increasing and since 1925 Rumanian coal has been protected by a high tariff imposed on foreign coals.

According to official statistics, the annual coal output for the years 1924 to 1926 was as follows:—

	1924	1925	1926
	Metric tons		
Lignite	2,479,083	2,615,278	2,731,362
Stone coal and anthracite	313,722	313,572	322,191
Total	2,792,805	2,928,850	3,053,553

With the annexation of Transylvania, Rumania acquired the coal, iron, gold, silver, lead and copper mines of the province. The whole of the ore is handled in the three metallurgical works in the province which are State-owned. The development of the mines is delayed owing to the lack of coking coal.

Trade.—Rumania's principal exports are cereals, petroleum products and timber. Quantities for the years 1922 to 1926 show a gradual improvement, except in the case of timber exports for the latter year, which are less than those for 1923:—

(In Thousands of Metric Tons)

	1922	1923	1924	1925	1926
Cereals	1,278	1,775	1,422	851	1,791
Petroleum products	436	416	436	700	1,502
Timber	1,793	2,225	2,541	2,507	2,216

Other exports are hides, wool, vegetable oils, manufactured wood articles, fruits and, in a lesser degree, eggs. Principal imports are manufactured goods (chiefly textiles), colonial produce and chemicals. Following the Government's change of policy in 1925 in regard to export taxes, when a reduction in the taxes on cereals was effected, and as a result of the continued fall in the world prices of cereals, a further reduction in export taxes was put into effect in 1927.

Taking only imports for domestic consumption and exports of home produce, Rumania before the war showed a large and favourable balance of trade, due almost wholly to wheat exports. In the years immediately following the war however the balance was an adverse one, but the tide turned in 1922 and the monthly averages after that date are indicative of progressive recovery, with the exception of the 1927 slump only, the reasons for which have already been mentioned.

MONTHLY AVERAGES OF IMPORTS AND EXPORTS
(*In Thousands of Lei*)

	Imports	Exports
1922	1,027,114	1,169,941
1923	1,626,336	2,050,872
1924	2,182,704	2,318,633
1925	2,501,511	2,383,928
1926	3,095,517	3,185,239

Finance.—The fundamental factor in foreign exchange in Rumania is the grain harvest and the facilities for moving it, for the lei which Rumanian merchants can devote to the purchase of foreign goods are the profits on cereal exports. There was much headway to make up, owing to the devastating effect of the German occupation and the temporary chaos in agriculture which followed the expropriation of large estates. The financial position was made more difficult by the expenses incurred by the invasion of Hungary in 1919 and by the large expenditure on armaments due to Rumania's political situation, and especially to the uncertainty existing as to Rumanian sovereignty over Bessarabia. During the occupation the Germans issued some two and a half milliards of lei; they also secured large sums of Rumanian gold by the sale to the peasants of goods, especially sugar, of which there was a scarcity. Although, under the Peace Treaties, Germany was to repay her various depredations, and it was eventually agreed between the two Governments that deliveries of locomotives and other goods should be made on account of Reparations, no agreement has yet been reached in regard to the repayment by Germany of the Banca Generală note issues above referred to; Rumania, by way of retaliation, refusing to pay either amortisation or coupons of German-held Rumanian bonds in consequence.

On taking over the new territories Rumania also had to take over eight and a half million Austrian kronen and two milliards of Russian roubles. Further, at the time of the German invasion, the bullion of the National Bank with much private property in jewels, treasure and objects of art, was sent to Moscow for safety. This property, valued at 315,000,000 gold lei, ultimately fell into the hands of the revolutionary régime set up soon after, and is now considered to be irrecoverable. The decline in value of the leu was rapid between 1918 and 1922, during which period the amount of notes in circulation increased from two and a half milliards to 15 milliards and is today just over 21 milliards. The decline in the value of the leu, normally equivalent to the franc, is shown in the following table:—

Mean Rate to the £ Sterling

1919 .	79	1922 . .	673·16	1925 . .	1,008·25
1920 .	203·41	1923 . .	948·75	1926 . .	1,068·50
1921 .	329	1924 . .	896·75	1927 . .	814·75

The excessive depreciation of the leu which characterised 1926, and which was the immediate result of the excessive influx of foreign goods to forestall the new and heavily protective Customs Tariff shortly afterwards introduced by the Government, was maintained until late in the year when the extent of the exportable surplus of an exceptionally good harvest became known. At one period of the year the leu had dropped to 1,500 to the £. In addition to the excellent crop the oil production also proved to be more than usually large and almost doubled the highest pre-war output. Thus, despite a fall in world prices of both cereals and petroleum products, a favourable trade balance of more than four milliards of lei proved more than sufficient to permit the recovery of the leu and afforded besides a striking proof of Rumania's recuperative powers. The tendency of the leu to appreciate continued throughout 1927 in spite of indifferent crop yields. On Feb. 11, 1929, a loan of $101,000,000 at 7% was negotiated in Paris and other cities which made it possible for the government to pass a bill stabilizing the leu at 813.6 to the £. The main preoccupations of the Government were now directed towards the complete reconstruction of the State Railways without which neither true stability of currency nor maintained economic prosperity can be hoped for. There seems little reason to doubt that the Maniu Government will be able to proceed to ensure Rumania's future prosperity.

The policy of deflation adopted in 1922, which followed Rumania's first balanced budget has been continued, though trade has been seriously hampered thereby. The shortage of money and high rates of interest on loans have also continued and despite of an edict of the National Bank in 1927 to the effect that banks persisting in charging more than 18% on short loans would be penalised by the reduction and, in the event of continued transgression by the complete withdrawal, of discount facilities, interest is still high and likely to continue so until the effects of stabilisation supported by a foreign loan are sufficiently pronounced as to ease the money stringency. The arrangement whereby the State undertook to repay to the National Bank loans to the extent of 11 milliards of lei has proceeded satisfactorily and the State debt to the Bank has now been reduced to less than ten milliards and will continue to be thus amortised at the rate of some three-quarters of a milliard lei annually. All budgets have been balanced and the effectiveness of the measures adopted will clearly be seen from the following table:—

(*In Millions of Lei*)

	Revenue		Expenditure	Surplus
	Estimated	Real		
1924 . .	24,000	27,744	21,404	6,340
1925 . .	31,750	34,038	29,440	4,598
1926 . .	28,250	31,224	28,499	2,725
1927 . .	34,640	36,008	33,137	2,871

The Budget Estimates for 1928 were also balanced at 38,350 millions of lei or 3,710 millions more than the preceding Budget. The budget for 1929, passed in December, 1928, balanced at 38,300 millions of lei. It must also be borne in mind that laws were passed in 1926 and 1927 by which the State Railways, Post Office and the State Pensions Office became autonomous bodies with separate budgets not included in the figures given for the years in question. The same holds good for succeeding years. Were the budgets of the autonomous departments also included in the General State Budget, the latter would be found to have become much inflated, being for the years 1926 and 1927 41,881 and 53,612 millions of lei respectively. Of the 1929 budget, 15,593 million lei was allotted to the Ministry of Finance, 7,930 million lei to the Ministry of War, 4,848 million lei to the Ministry of Education, and 1,916 million lei to the Ministry of the Interior. In spite of the fact that budgets have been balanced in the face of acute financial depression, it must nevertheless be remembered that these results have only been accomplished at the cost of:—

1. Impoverishment of the Army, Air Force, Navy and Civil Services.
2. Serious deterioration of the railway system.
3. Suffering in all but the highest classes through the arbitrary maintenance of the cost of living at a figure far above the intrinsic value of the heavily depreciated currency.

Communications.—A large part of Rumanian trade is carried on the Danube, although as far as concerns river traffic and petit cabotage Rumanian services are inadequate while foreign services are generally obstructed. The main communications of Rumania converge on Braila and Galatz, and two-thirds of Rumanian imports are received from the industrial countries of Europe through these river ports. Galatz is the principal port for the export of timber, Braila for cereals, vegetables and petroleum products, etc. Constanța is the only Rumanian port open all the year round and is, for this reason, of paramount interest to the oil industry, for the carriage of whose products to the port a second pipe-line is contemplated to augment the present somewhat inadequate service. Constanța is also a port of call for Near East and Levant steamers and provides a connection for quick trans-Continental transit for travellers from the East. The incorporation of the new provinces, whose communications were naturally directed chiefly to serve the States to which they formerly belonged, have made new railway communications essential to the development of Rumanian trade and industry. A new line from Oradea-Mare to Arad obviates a detour through Hungarian territory.

The new lines for which credits were voted in 1923—viz., Brașov-Nehoiași; Ilva-Mica-Vatra Dornei; Bumbesci-Livezeni; Hamangia-Tulcea—are still (1929) under construction. The first of these provides a direct route from Brașov to Constanța; the second will give a direct connection between Transylvania and the Bukovina; the third will traverse the Vulcan Pass and permit the easy transport of coal from the Petroshani field to Craiova. Other work in hand includes the transformation of the Bessarabian railways to normal gauge and effective linking up of the Province with the Danube ports. Little progress is being made however in this direction owing to lack of credits for the reconstruction work entailed. Before the war the outlet for Bessarabian produce was Odessa and a necessary condition for Bessarabian prosperity under the changed sovereignty is the provision of an easy outlet from the Danubian ports. Until the Bessarabian lines are re-orientated towards Rumania and from Russia, and are augmented by other lines binding the province closer to itself and with the other new provinces as well as with the Old Kingdom, no change in the present unsatisfactory economic position of this territory can be hoped for.

BIBLIOGRAPHY.—*Bulletin Statistique de la Roumanie* (Bucharest, annual); Mitita Constantinescu, *L'Évolution de la Propriété Rurale . . . en Roumanie* (Bucharest, 1925); *Reports on Rumania* (Department of Overseas Trade, London, annual); *Les Forces Economiques de la Roumanie* (Cultura Națională, Bucharest); *General State Budget*, 1928 (Ministry of Finance, Bucharest). (N. L. F.)

HISTORY

For the history of the countries constituting the modern Rumania, until the end of Roman rule in them, *see* DACIA. From the 6th to the 12th century, wave after wave of barbarian conquerors, Goths, Huns, Bulgars, Slavs and others, passed over the country, and, according to one school of historians, almost obliterated its original Daco-Roman population; the modern Vlachs, on this theory, representing a later body of immigrants from Transdanubian territory. According to others, the ancient inhabitants were, at worst, only submerged for a time, and their direct descendants are the Rumans of to-day. Each of these conflicting views is supported by some evidence; and the whole controversy, too large and too obscure for discussion here, is considered under the heading VLACHS.

Towards the close of the 13th century, when the authentic political history of the Vlachs in Rumania begins, Walachia (known to the chronicles as Muntenia) and Moldavia were occupied by a mixed population, composed partly of Vlachs, but mainly of Slavs and Tatars, with an admixture of Petchenegs and Cumans. The two principalities of Walachia and Moldavia which now emerge developed, however, separately and each has its separate annals. About the year 1774 it first becomes possible to record the progress of these Danubian principalities in a single narrative, owing to the uniform system of administration adopted by the Turkish authorities, and the rapid contemporary growth of a national consciousness among the Vlachs. In 1859, the two principalities were finally united under the name of Rumania. The following article is therefore arranged under the four headings: *Walachia, Moldavia,* the *Danubian Principalities* and *Rumania.*

WALACHIA

Foundation of the Principality.—Tradition, as embodied in a native chronicle of the 16th century, entitled the *History of the Ruman Land since the arrival of the Rumans* (*Istoria tierei Românéscĭ de cândŭ au descălicata Românii*), gives a precise account, which has probably at least a background of historical truth, of the founding of the Walachian state by Radu Negru, or Rudolf the Black (otherwise known as Negru Voda, the Black Prince), voivode of the Rumans of Fagaraș in Transylvania, who in 1290 descended with a numerous people into the Transalpine plain and established his capital first at Campulung and then at Curtea de Argeș. Radu (who died in 1310) was a vassal of the king of Hungary; but his successor, who is presumed to be his son, John Bassaraba, or Bassarab the Great (1310–38) defeated his suzerain king Charles I. of Hungary in 1330, and made Walachia completely independent. His son Alexander Bassarab (1338–60) maintained and consolidated this position; but Vladislav (1360–74), although again defeating the Hungarians (1369) accepted Hungarian suzerainty in return for investiture with the banat of Severin and the duchy of Omlaș.

Mircea the Great (1386–1418) allied himself with King Ladislaus of Poland and extended his power over the Dobrudja. After the defeat of Serbia at Kosovo (1389), where a Walachian contingent had assisted the Serbs, Mircea was forced to pay tribute to the Sultan, whom, however, he defeated in 1394. Allying himself with Hungary (1395), he failed to support his ally at the battle of Nikopolis (1396) and was deposed by his son Vlad, who accepted Polish suzerainty. Mircea returned, re-established, and for a time increased, his power by exploiting the internecine quarrels between the sons of the Sultan Bayezid. In 1411, however, Mohammed II. made Walachia tributary to the Turks, while leaving intact its dynasty, territorial integrity and Christian religion.

Relations with Hungary and Turkey.—The succeeding period is one of intestine strife and shifting foreign policy. The only notable figure among the voivodes of Walachia was that of Vlad V. "the impaler" (1455–62 and 1476–7), a creature of the Sultan's. The stories of the cruelty of this savage (himself the son of Vlad III., "the devil") surpass belief. Vlad's ferocity frightened even the Turks, whom he defied for some years before they deposed him in favour of Radu the Fair (1462–75). Most of the voivodes of Walachia were, however, only able to maintain a very precarious independence by "fawning alternately on the Turks, the Tatars, the Poles and the Hungarians." The elections to the throne, though often controlled by the Divan, were still nominally in the hands of the factious native boyars, and the princes followed each other in rapid succession, often meeting violent ends. The state of the country was still primitive, the people largely pastoral, the cottages built of clay and wattle. Only the capital, Tîrgoviștea, was a considerable town of stone.

A temporary improvement took place under Neagu Bassarab (1512–21), who founded the cathedrals of Curtea de Argeș (*q.v.*) and Tîrgoviștea and many monasteries, and adorned Mount Athos with his pious works. He transferred the direct allegiance of the Walachian Church from the patriarchate of Ochrida in Macedonia to that of Constantinople. On his death, however, the Turkish commander, Mahmud Bey, seized and imprisoned his young son and successor, and nominated Turkish governors in the towns and villages of Walachia. The Walachians resisted desperately, elected Radu, a kinsman of Neagu, voivode, defeated Mahmud Bey with Hungarian help, at Grumatz in 1522, and secured recognition of Radu in 1524; but the battle of Mohács in 1526 decided the long preponderance of Turkish control. The unfortunate province served as a transit route for Turkish expeditions against Hungary and Transylvania, and was exhausted by continual requisitions. The voivode Alexander, who succeeded in 1591, and like his predecessors had bought his post of the Divan, carried the oppression still further by introducing a janissary guard and farming out his

possessions to his Turkish supporters, and again it seemed as if Walachia must succumb to the direct government of the Ottoman.

Michael the Brave, 1593–1601.—In the depth of the national distress the choice of the people fell on Michael the son of Petruşko, ban of Craiova, who had fled to Transylvania to escape Alexander's machinations. Supported at Constantinople by Sigismund Báthory (*q.v.*) prince of Transylvania (1581–98 and 1601–02), and the English ambassador, Edward Barton, and aided by a loan of 200,000 florins, Michael succeeded in procuring from the Divan the deposition of his enemy and his own nomination. Michael's genius secured Walachia for a time a place in universal history. By previous concert with the Moldavian voivode Aaron, the Turkish guards and settlers in the two Principalities were massacred at a given signal (Nov. 13, 1594). Having secured the help of Báthory by accepting his suzerainty, Michael next invaded Turkish territory, and took Rustchuk, Silistra and other places on the right bank of the Danube. A simultaneous invasion of Walachia by a large Turkish and Tatar host was successfully defeated at the battle of Mantin (1595). The Sultan now sent Sinan Pasha, "the Renegade," to invade Walachia with 100,000 men. Michael withdrew to the mountains before this overwhelming force, but, being joined by Báthory with a Transylvanian contingent, resumed the offensive, stormed Bucharest, and, pursuing the main body of Sinan's forces to the Danube, overtook the rearguard and cut it to pieces. In 1597, the Sultan, weary of a disastrous contest, reinvested Michael for life and granted the succession to his son.

Conquest of Transylvania.—On the abdication of Sigismund Báthory in Transylvania, Michael, in league with the imperial forces, and in connivance with the Saxon burghers, attacked and defeated his successor Andreas Báthory near Sibiu (Hermannstadt), seized the government, and secured his proclamation as prince of Transylvania (1600). The emperor appointed him viceroy, and the diet ratified his position. The partiality that he showed for the Ruman and Szekler parts of the population, however, alienated the Transylvanian Saxons, who preferred the direct government of the emperor. The imperial commissioner, General Basta, lent his support to the disaffected party, and Michael was driven out of Transylvania by a successful revolt, while a Polish army invaded Walachia from the Moldavian side. Michael appealed to the emperor, who was won over by his singular address, supplied him with funds, and sent him to Transylvania as imperial governor. In conjunction with Basta he defeated the superior Transylvanian forces at Goroslau, expelling Sigismund Báthory, who had again aspired to the crown. But at the moment of his returning prosperity Basta, who had quarrelled with him about the supreme command of the imperial forces, procured his murder (Aug. 10, 1601). Not only had Michael rolled back for a time the tide of Turkish conquest, but for the first time in modern history, and the only time before 1918, he united what once had been Trajan's Dacia, in its widest extent, and with it the whole Ruman race north of the Danube, under a single sceptre.

Matthias Bassaraba and Constantine Brancovan.—Sigismund now resumed the government of Transylvania, while Serban, of the Bassaraba dynasty, was, by the emperor's wishes, appointed voivode of Walachia. On his deposition by the Porte in 1611 there followed a succession of princes who, though for the most part of Ruman origin, bought their appointment at Stamboul. The most notable of them was Matthias Bassaraba (1633–54) who maintained his position and reorganized his principality despite incessant attacks from his rival Basil the Wolf, of Moldavia. Matthias's illegitimate son and successor Constantine Serban (1654–58) was the last Bassarab to rule in Walachia. On his death the Turks, who in 1698 moved the seat of government to Bucharest, at a safer distance from the Transylvanian frontier, were able to exercise a greater influence over the various notable families which aspired to rule. The immediate successors of the Bassarabs were, however, able men. Sherban Cantacuzino (1679–88) who was forced to assist the Turks at the siege of Vienna (1688) opened up secret communications with the emperor, who granted him a diploma creating him count of the empire and recognizing his descent from the imperial house of Cantacuzino. Sherban meanwhile collected his forces for an open breach with the Porte. His prudence, however, perpetually postponed the occasion, and Walachia enjoyed peace to his death in 1688. This peaceful state of the country gave the voivode leisure to promote its internal culture, and in the year of his death he had the satisfaction of seeing the first part of a Walachian Bible issue from the first printing-press of the country, established at Bucharest.

Immediately on Serban's death the boyars elected his sister's son Constantine Brancovan (1688–1714) who ruled the province skilfully until, fearing the increasing strength and prosperity of his vassal, the Sultan deposed him. He was finally beheaded at Constantinople in May 1714. A scion of the rival Cantacuzinian family was then elected and after exhausting the principality for the benefit of the Divan, was deposed and executed in 1716.

The Phanariot Regime.—From this period onwards the Porte introduced a new system with regard to its Walachian vassals. The line of national princes ceased. The office of voivode, or hospodar, was sold to the highest bidder at Stamboul, to be farmed out from a purely mercenary point of view. The princes who now succeeded one another in rapid succession were mostly Greeks from the Phanar quarter of Constantinople, and were generally men of culture and intelligence, and Constantine Mavrocordato introduced an extremely liberal agrarian reform, even decreeing the abolition of serfdom in 1747—an enactment which was not, however, carried out. But the rule of the Phanariots and their Greek satellites could not but be productive of grinding oppression, and numbers of the peasantry emigrated. In 1745 the number of tax-paying families, which a few years before had amounted to 147,000, had sunk to 70,000. The hospodar Scarlat Ghica (1758–61), removed the Turkish settlers from Walachia, but the Turks maintained their grip on the country by holding on the Walachian bank of the Danube the fortresses of Giurgiu, Turnu Severin and Orsova, with the surrounding districts.

The tide of Ottoman dominion, however, was ebbing fast. In 1769 the Russian General Romanzov occupied the principality, the bishops and clergy took an oath of fidelity to the empress Catherine, and a deputation of boyars followed. Catherine set about reorganizing the principalities on Russian lines, and at Focşani she demanded (1772) that the Sultan recognize the independence of Walachia and Moldavia under a European guarantee. The failure of these negotiations was followed by the Treaty of Kutchuk Kainarji (1774); but before considering this it is convenient to review the early history of Moldavia.

MOLDAVIA

Early History.—According to the Moldavian chroniclers of the 16th, 17th and 18th centuries, Dragoş the son of Bogdan, the founder of the Moldavian principality, emigrated with his followers from the Hungarian district of Marmaroş in the northern Carpathians. The dates assigned to this event vary from 1299 to 1342; but in any case it appears that the Vlachs of Moldavia were first reinforced and organized, after the collapse of the Cumans, by immigrants from Hungary in the early 14th century. About 1349 Bogdan Voda (1349–65) expelled the remnants of Cumans and Tatars and founded an independent principality. In 1372 by an agreement between Louis of Hungary and the emperor Charles IV., the voivodate of Moldavia was recognized as a dependency of the Crown of St. Stephen. The voivode Peter Musat (1375–91), however, recognized the suzerainty of the king of Poland, whose sister he married; and his successors, the chief of whom was Alexander the Good (1401–35) usually acknowledged Polish suzerainty.

The internal situation created by the Turkish advance was skilfully utilized by Stephen the Great (1457–1504) who, in agreement with Poland and the Sultan, evicted Vlad from the throne of Walachia and extended his own power southward at the expense of the Turks, whose armies he repelled in 1475 (battle of Rahova), 1476 and 1484. He defeated a Polish invading force in 1487, and soon after, with Turkish help, himself invaded Poland and annexed temporarily the province of Pokutia. Stephen's realm was a considerable one, extending both north and east far beyond the present Moldavia, while his international relations included Venice

and Poland. His son Bogdan III. "the one-eyed" (1504–17), however, at feud with Poland over Pokutia and unsupported by the shaken power of Hungary, was forced to agree to pay the Sultan an annual tribute (1513) in return for guarantees preserving the national religion and constitution. The terms were further regulated by a firman of 1529, Moldavia paying a tribute and supplying a contingent to the Turkish forces. Peter Rareș (1527–38 and 1541–46), the last really independent prince of Moldavia, attempted an ambitious foreign policy. Allying himself with the Turks he made war on both the imperial forces in Transylvania, and on Poland. He then allied himself with the emperor against Poland and the sultan, but was defeated and deposed in 1538. Returning in 1541 he again allied himself with the emperor against the sultan; but on his death his successors were no longer able to resist the growing Turkish power.

Moldavia Tributary to the Turks.—The tribute was gradually increased, and the sultan strengthened his hold on Moldavia by occupying successively a series of fortresses. A curious interlude in the increasing oppression was provided by the adventurer Jacob Basilicus Heraclides, an adventurer of Greek origin who succeeded in obtaining imperial support, seizing Moldavia from the voivode Alexander Lapușeanu, and purchasing Turkish confirmation of his title (1561). Basilicus, who was a cultivated man, attempted to introduce an educational system in Moldavia and to reform its morals; but his heavy taxation and foreign advisers led to a revolt, and he was assassinated (1563). Under the restored Lapușeanu and Bogdan IV. (1568–72) Moldavia relapsed into its earlier barbarism. Bogdan's successor, John the Terrible (1572–74) provoked by the Porte's demand for increased tribute, rose against the oppressor, but was defeated and slain (1574), and the country was left more than ever at the mercy of the Ottoman. Voivodes were now created and deposed in rapid succession by the Divan, but the victories of Michael the Brave in Walachia infused a more independent spirit into the Moldavians. The Moldavian dominion was now disputed by the Transylvanians and Poles, but in 1600 Michael succeeded in annexing it to his "Great Dacian" realm. On his murder the Poles again asserted their supremacy, but in 1618 the Porte once more recovered its dominion. Basil the Wolf (1634–53) led a temporary national reaction; but he exhausted his country in attempts to secure the throne of Walachia; and after his death the Porte instituted a Phanariot régime similar in all respects to that set up in Walachia, which endured until the beginning of the 18th century. In addition, Moldavia was repeatedly devastated in the wars between Poland and Turkey, and in various Tatar invasions. An attempt by the voivode Demetrius Cantemir to exchange the Turkish rule for Russian suzerainty (1711) proved unsuccessful. In the 18th century, however, despite extortion and oppression, a certain improvement occurred. The export trade of Moldavia at this period, principally in timber, salt, wine and foodstuffs, was considerable. Some of the Phanariot hospodars, who were generally drawn from the families of Mavrocordato, Ghica, Callimachi, Ypsilanti and Murusi, were men of culture. Gregory Ghica (1774–7) in particular made praiseworthy efforts to raise the standard of education, and encouraged the settlement of German Protestant colonists.

THE DANUBIAN PROVINCES, 1774–1859

The situation in both Moldavia and Walachia was altered by the peace of Kutchuk Kainarji (1774) which ended the Russo-Turkish war. Russia restored the principalities which she had occupied, to the sultan (Moldavia, however, being reduced by the Bukovina, which Austria profited by the situation to annex). Several stipulations were made in favour of the Walachians and Moldavians. The tribute was reduced; the agents of Walachia and Moldavia at Constantinople were to enjoy the rights of national representatives and the Russian minister at the Porte should on occasion watch over the interests of the principalities. The stipulations of this treaty formed the basis of future liberties in both principalities; but for the time all reforms were postponed.

The treaty was hardly concluded when it was violated by the Porte, which seemed intent on restoring the old system of government in its entirety, but in 1783 the Russian representative extracted from the sultan a more precise definition of the liberties of the principalities and tribute due. By the peace of Jassy (1792) the Dniester was recognized as the Russian frontier and the privileges of the principalities confirmed. In defiance of treaties, however, the Porte continued to change the hospodars almost yearly. In 1802 Russia resolved to assert her treaty rights in favour of the oppressed inhabitants of the principalities, and obtained a decree from the Porte, by which every prince was to hold office for at least seven years, unless the Russian minister was satisfied that there were sufficient grounds for his deposition, while the Turkish troops in the principalities were paid off, the boyars entrusted with a measure of local self-government, and the Russian envoy at Constantinople charged with the task of watching over the Walachian and Moldavian liberties. The principalities thus came under a veiled but effective Russian protectorate.

The revolt of the Serbs in 1804 was secretly encouraged by the Walachian voivode Ypsilanti. In the subsequent Russo-Turkish wars, Russia occupied both principalities (1806–12), greatly to their detriment, as the exactions of the Russian army almost reduced the country to a desert. Russia aspired to incorporate the principalities in her own empire, but under the Peace of Bucharest (1812), the principalities were restored to the sultan under the former conditions, with the exception of Bessarabia, which was ceded to the tsar. The Prut thus became the Russian boundary.

In 1821 Alexander Ypsilanti, an aide de camp of the tsar, entered Moldavia at the head of the Hetaerists, or Greek revolutionaries, and persuaded the hospodar Michael Sutzu to help him invade Ottoman territory. The Greeks had, however, misjudged popular feeling; a national movement in Walachia, led by Todor Vladimirescu (*q.v.*) turned, not against the Turks, but against the Phanariotes. Turkish troops, which invaded the country to crush Ypsilanti, were only finally withdrawn in 1824. The Rumanians, however, took advantage of the situation to secure a number of national reforms, including the promulgation of laws in Rumanian and the appointment of native princes, the first of whom were John Sturdza in Moldavia and Gregory Ghica in Walachia (1822–28).

Peace of Adrianople, 1829.—By the convention of Akkerman between the Russians and Turks in 1826 the privileges of the principalities were once more confirmed, and they were again ratified in 1829, under Russian guarantee, by the peace of Adrianople, which left the principalities tributary to the sultan, but placed them wholly under Russian protection. An "Organic Law," drawn up by assemblies of bishops and boyars at Jassy and Bucharest, regulated the internal constitution. This very reactionary law, which maintained and fraudulently extended the feudal pretensions of the boyars to the detriment of the peasants, was ratified by the Porte in 1834, Russia then withdrawing her troops. The new hospodars, however, Alexander Ghica (1834–42) and George Bibescu (1842–48) in Walachia and Michael Sturdza (1834–49) in Moldavia, were little more than creatures of Russia. In 1848, although the liberal and intelligent Sturdza was able to quell the popular agitation, which was partly national and partly social, Bibescu was forced to grant a constitution in Bucharest, and fled the country. The Turks, instigated by Russia, crossed the Danube and a joint Russo-Turkish dictatorship restored the Organic Law. Barbŭ Stirbeiŭ was appointed prince of Walachia, Gregory Ghica of Moldavia (Balta-Liman Convention, 1849).

Crimean War and Treaty of Paris.—During the Crimean War the principalities were occupied by Russia and Austria successively, and although they suffered severely, the Austrian occupation brought them material benefits, and the exile into which many politicians were driven brought them into contact with a higher civilization.

By the Treaty of Paris (1856) the principalities with their existing privileges were placed under the collective guarantee of the contracting Powers, while remaining under the suzerainty of the Porte. A strip of southern Bessarabia was restored to Moldavia, withdrawing the Russian frontier from the Danube mouths. The existing laws and statutes of both principalities were revised by a European commission, sitting at Bucharest, assisted by a national council convoked by the Porte in each of the two provinces.

Union of the Principalities.—The commission arrived in March 1857, and the assemblies were convoked in September. They voted unanimously for territorial autonomy, union of the principalities under the name of Rumania, a foreign hereditary prince, neutrality of Rumanian territory, and a single representative legislative Assembly. The Convention of Paris (Aug. 19, 1858) accepted these decisions with modifications. Each principality was to continue to be governed by its own prince, and to maintain its separate legislative assembly. A central commission, sitting at Focşani, was to prepare laws of common interest for submission to the two assemblies. Thereupon the two assemblies, meeting at Bucharest and Jassy respectively, elected a single prince in the person of Alexander Cuza (*q.v.*). The *de facto* union of Rumania was thus accomplished.

RUMANIA

A new conference met in Paris to discuss the situation, and in 1861 the election of Prince Cuza was ratified by the Powers and the Porte. The two assemblies and the central commission were replaced in Jan. 1862 by a single ministry and single assembly at Bucharest. In May 1864 the Assembly was replaced by two chambers (of senators and deputies). The franchise was now extended to all citizens, a cumulative voting power being reserved, however, for property, and the peasantry were emancipated from forced labour. Prince Cuza's agrarian and educational reforms were well-meant and drastic; but he attempted to force them through by too despotic measures. He alienated the good will of the nobles by abolishing forced labour; of the clergy by confiscating monastic estates; of the masses by introducing a tobacco monopoly and by the imperfect success of the agrarian reform. On Feb. 11/23, 1866, he was compelled to abdicate, and although the Powers in Paris voted in favour of a native ruler, the principalities, on a referendum, elected, almost unanimously, Prince Charles, the second son of prince Charles Antony of Hohenzollern-Sigmaringen (*see* Charles I. King of Rumania).

Prince Charles I.—The new Prince reached Bucharest on May 10/22, 1866, and took the oath to the Constitution. In October he proceeded to Constantinople, where the Sultan invested him formally, admitted the principle of hereditary succession in the family, and the right of maintaining an army of 30,000 men.

Foreign and Domestic Politics, 1866–75.—The internal domestic situation was at first very stormy, ten governments holding office in five years. They managed, however, to pass a new constitution (July 11, 1866) providing for an upper and a lower house and allowing the Prince an absolute and unconditional veto on all legislation. An attempt was made to reorganize the army and construct railways. Less fortunate was a decree, ostensibly aimed at vagabond foreigners, but resulting in the expulsion and imprisonment of many Jews, which aroused much indignation abroad, especially in France and Great Britain. On the outbreak of the Franco-Prussian War (1870, *q.v.*) feeling ran high between the nation, which was strongly pro-French in sympathies, and the German prince. There was a revolutionary outbreak at Ploeşti and the mob, after storming the barracks, proclaimed Charles deposed. The regular troops restored order, but the prince seriously thought of abdicating. A few days later a German railway contractor named Strausberg failed to honour the coupons of the railway bonds due on Jan. 1, 1871, most of which were held by influential people in Germany. The responsibility for payment fell on the Rumanian government, which the Prussian government threatened to coerce into payment. Bitter indignation prevailed in Rumania against all things German, culminating in an attack on the German colony in Bucharest (March 22, 1871). The council of Regency having refused the prince's offer to place the government in their hands, a conservative government was formed under Lascar Catargiu to restore order. The chamber was dissolved, and at the new elections in May Catargiu received a large majority. The anti-German feeling subsided, and the railway crisis was ended in Jan. 1872 by a law under which Rumania undertook to pay the railway coupons. Catargiu's ministry held office for four years, at the end of which time the leading Liberals promoted a conspiracy for the arrest and expulsion of the prince and the formation of a provisional government. The situation was saved by the fall of the Ministry and after two interim cabinets, I. C. Bratianu took office at the head of a Liberal Ministry (1876).

The Russo-Turkish War, 1877–78.—Domestic problems were temporarily eclipsed by the re-opening of the Eastern Question (*q.v*) in 1877. Russia had shown symptoms of anger against Rumania for not having taken up a decided attitude in the approaching struggle, and the Russian ambassador Ignatiev had some months previously threatened that his government would seize Rumania as a pledge as soon as the Turks occupied Serbia and Montenegro. Prince Charles decided to send a mission, composed of Bratianu and Colonel Slaniceanu (the Minister of War), to the Imperial headquarters at Livadia, where they were well received by the emperor and were successful in not committing Rumania to active measures.

In November both Russia and Turkey sent secret envoys to Bucharest to bid for Rumanian support. Prince Charles and Bratianu temporized with both, and attempted to extract concessions from Turkey; but when the Porte, in issuing Midhat Pasha's reform plan, disregarded Rumania's hopes and national vanity, she signed a secret convention with Russia (April 16, 1877) allowing free passage to the Russian armies—the details to be regulated in a special convention—while the tsar promised to maintain her political rights and respect her integrity. On April 23, Russia declared war against Turkey, and the grand duke Nicholas issued a proclamation to the Rumanian nation, announcing his intention of entering their territory in the hope of finding the same welcome as in former wars. The Rumanian Government made a platonic protest against the crossing of the frontier, but actually acquiesced in and materially assisted the Russian advance. The Rumanian chambers were assembled on April 26, and the convention with Russia was sanctioned; while on May 11 the chambers passed a resolution that a state of war existed with Turkey. (For a detailed account of the subsequent campaign, *see* Russo-Turkish Wars, and Plevna.) The fall of Plevna left the Russian army free to march on Constantinople, and on Jan. 31, 1878, the preliminaries of peace were signed at Adrianople. They stipulated that Rumania should be independent and receive an increase of territory.

Treaty of Berlin.—Peace between Russia and Turkey was signed at San Stefano on March 13. On Jan. 29 the Rumanian agent at St. Petersburg was officially informed of the intention of the Russian Government to regain possession of the Rumanian portion of Bessarabia, *i.e.*, that portion which was ceded to Moldavia by Russia after the Crimean War, in return for the northern Dobruja (*see* Bessarabia). This exchange Rumania, while deeply resentful, was unable to prevent. The Treaty of Berlin in 1878 (*see* Berlin, Congress and Treaty of) recognized the independence of Rumania conditional on the restoration to Russia of Bessarabia (Art. 45) and a guarantee of absolute freedom of worship without loss of political rights to all persons in Rumania (Art. 44). Art. 46 transferred to Rumania the northern Dobruja (*q.v.*) with the adjacent islands.

Article 44 of the treaty caused tremendous agitation throughout the country, and almost provoked a revolution. Article 7 of the constitution of 1866 laid down that "only Christians can become citizens of Rumania"—in other words, all Jews were excluded from the rights of citizenship; and as no foreigner could own land in Rumania outside the towns, no Jew could become a country proprietor. Public opinion in Rumania rendered it almost impossible for any government to carry out the wishes of the Berlin tribunal. To do so involved a change in the constitution, which could only be effected by a specially elected constituent assembly. This body met on June 3, and sat through the entire summer. The irritation of the powers at the unexpected delay was so great that Great Britain proposed a collective Note on the subject, to be executed by the Austrian Cabinet; while Prince Bismarck threatened, if the Berlin proposition were not carried out, to refer to the suzerain power at Constantinople. At last, however, on Oct. 18, Article 7 was repealed, and it thus became possible for Rumanian Jews to become naturalized and to hold land; but this was hedged about by so many difficulties that,

although the compromise was accepted by the powers, in actual fact few Rumanian Jews were naturalized during 1880 to 1884.

Independence of Rumania.—The independence of Rumania was recognized by Italy in Dec. 1879, and by Great Britain, France and Germany on Feb. 20, 1880. Following the assassination of the tsar Alexander II. (March 13, 1881) the Rumanian Liberal Government was accused of republican and anti-dynastic tendencies. To refute this charge, the ministry proposed the elevation of the principality into a kingdom. The proclamation and coronation took place on May 10–22, 1881. All the great Powers granted immediate recognition.

Internal Policy, 1878–1907.—During this eventful period, the liberal government had held office continually. In March 1883 the Government, largely at Bratianu's initiative, introduced various important changes into the constitution. Three electoral colleges were formed instead of four, a considerable addition made to the numbers of the senate and chamber; and trial by jury introduced for press offences. These measures estranged the second leader of the Liberal party, C. A. Rosetti, who had unsuccessfully advocated reforms of a far more sweeping character; and Bratianu was now left in sole control of the Liberal party. The chambers having fulfilled their special mandate, were dissolved in Sept. 1884 and a new parliament assembled in November, the Government, as usual, obtaining a large majority in both houses.

Since 1876 Bratianu had exercised an almost dictatorial power, and anything like a powerful parliamentary opposition had ceased to exist. But he had been too long in power; the numerous State departments were exclusively filled with his nominees; and some pecuniary scandals, in which the Minister of War and other high officials were implicated, helped to augment his fast-growing unpopularity. New parties were formed in opposition, and the National Liberal and Liberal Conservative parties combined to attack him. The first of these maintained that the Government should be essentially Rumanian, and, while maintaining friendly relations with foreign Powers, should allow no interference in internal affairs. The Liberal Conservatives held very similar views, but desired a guaranteed neutrality for Rumania. The Junimists, or Young Conservatives, advocated in home affairs the amelioration of the position of the peasantry and artisan classes, whose progress they considered had been overlooked, while in foreign policy they strongly supported intimate and friendly relations with Austria-Hungary. On April 4, 1888, following the new elections of February, in which all the opposition leaders had been elected, Bratianu retired. In Oct. 1888, when a new Chamber was elected, only five of the party retained their seats. The most prominent statesman in the new Conservative-Junimist administration was P. Carp, who in the spring of 1889 succeeded in passing a bill which authorized the distribution of the state lands among the peasantry. Despite this admirable measure, he was unable to retain office, and three changes of ministry followed. The Conservative-Junimist parliament nevertheless restored tranquillity to the country. Meanwhile the gold standard had been introduced (1889), and the financial situation was regarded as satisfactory. In Dec. 1891 a stable cabinet was at last formed by Lascar Catargiu, whose Ministry passed several useful measures. The State credit was improved by the conversion of the public debt; the sale of the State lands to the peasantry was actively continued; important judicial reforms were carried out; a mining law was passed to attract foreign capital; and a State maritime service of passenger and cargo steamers was formed.

Meanwhile the Liberal opposition was being reorganized. On the death of I. C. Bratianu, in 1891, and of his brother Dimitrie in June 1892, the veteran statesman Dimitrie Sturdza was recognized as the head of the Liberals, and in 1894 started a very violent agitation in favour of the Rumanians in Hungary. Another popular Opposition cry was "Rumania for the Rumanians," directed against the right granted to foreigners under the new mining law to lease lands for long periods for the working of petroleum. In 1895, although the government carried the mining bill, the Liberal Party was able by a policy of abstention to bring about the fall of the government. A new liberal government was formed by D. Sturdza.

The very excess of their victory, however, proved a source of weakness to the Liberals, whose party broke up into factions named after their respective leaders, Sturdzists, Aurelianists and Flavists. Sturdza himself was obliged to retire, as public opinion was incensed by his harsh treatment of the head of the Orthodox Church, the metropolitan Gennadius, who, after a quarrel over the management of some wealthy charity funds, had been found guilty by the Holy Synod of certain canonical offences, and deposed. Aurelian, in co-operation with the conservative leaders, calmed public opinion by a successful compromise, but then refused to retire from the office which he had taken over on Dec. 3, 1896. After a sharp struggle, Sturdza regained office and held it from April 1897 to April 1899, when he was forced to retire by a popular outcry against his excessive subservience to the Hungarian Government.

The Conservatives, under G. G. Cantacuzino, returned to power, but were at once faced by a very severe financial crisis, due to past overborrowing and extravagant expenditure, as a result of which the treasury found itself without resources to meet a payment of bonds for £2,500,000, which had fallen due in Berlin. The Government managed to extricate itself from its immediate difficulties in the autumn of 1899, by raising a loan in Berlin, on very stringent terms. The Conservatives were united in wishing to meet the financial crisis by a moderate reduction of expenditure and a large increase of taxation, while the Liberal Opposition advocated the permanent reduction of the annual expenditure of £800,000, which would necessitate the raising of £200,000 only by fresh taxation. The Conservative programme was naturally unpopular; Carp and the Junimists were unwilling to co-operate with the government, and, on Feb. 26, 1901, Sturdza again became premier. His administration lasted until Dec. 31, 1904, and averted the impending bankruptcy of Rumania by a policy of strict retrenchment. On Jan. 4, 1905 the Conservatives returned to power, and in May succeeded in floating a conversion loan.

Agrarian Rising, 1907.—The chief cause of the agrarian insurrection of March 1907 was the unsatisfactory distribution of the land after the emancipation of the peasants in 1864. Although framed to benefit them the 1864 law did not allow them really to free themselves from the large proprietors and forced them to borrow from Jewish moneylenders. An additional cause was the harsh treatment of the peasants on the state and communal lands leased to Jewish middlemen. At first an attack on the Jews alone, the rising soon became a *jacquerie* directed against all the large landowners. Numerous towns and villages were sacked and partly burned, and 140,000 soldiers were employed to suppress the revolt. On March 24 the Cantacuzino Ministry resigned and was succeeded by a Liberal government under Sturdza, who completed the restoration of order by strong military measures and afterwards initiated remedial legislation. General elections in June confirmed the Liberal majority, and Sturdza and his successor in the leadership, Bratianu, remained in office till the end of 1911, when they gave way to a Conservative Cabinet under J. J. Carp. Violently attacked by the Liberals and new party of Conservative Democrats, under Take Jonescu, the Carp government was reconstructed in April 1912 with Maiorescu as Premier and Take Jonescu as the most important figure in the Ministry.

Foreign Affairs, 1878–1912.—Meanwhile the foreign political situation had, since the accession of Prince Charles, been comparatively uneventful. Of Rumania's three neighbours, she was bound to Bulgaria by a traditional friendship, but of this the cession of the Dobruja boded the end. It was not, however, easy for Rumania to adopt a cordial attitude towards either Russia or Austria-Hungary, for different reasons. Against Russia, Rumania was bitterly incensed in 1878. Friction continued over the delimitation of the Dobruja frontier until 1884, and after that date the loss of Bessarabia was still regretted. While the population, trained in traditional respect for Russia—a respect due largely to the influence of the Orthodox Church—was less enduring in its resentment, Ion Bratianu, who smarted under the personal humiliation which he had received at the Congress of Berlin, was the more ready to fall in with Prince Charles' pronounced and natural preference for the Central Powers. This received its

official seal when Charles secretly adhered to the Triple Alliance in 1883 (*see* EUROPE). The people at large had many reasons to dislike Austria-Hungary. Ill-feeling began with the conclusion of the Commercial Treaty of 1875, in which Rumania believed herself unfairly treated, and was intensified on the question of the Danube Commission, on which Austria-Hungary insisted on her right to place a delegate, although the sphere of activity of the Commission, which extended from Galatz to Orsova, did not touch Austrian soil (*see* DANUBE). Another constantly recurring dispute (which also caused a diplomatic rupture with Greece, lasting from 1905 to 1911) was that concerning the status of the Vlach (*q.v.*) communities in Macedonia, over which Rumania claimed the rights of a protector. Relations with the Dual Monarchy really became difficult after Bratianu's death, when the Liberals under Sturdza opened up a campaign in favour of the Rumanians of Transylvania (*q.v.*), whose awakening national consciousness was bringing them into increasing conflict with the policy of Magyarization pursued by the Hungarian government. The national cause was adopted by the Francophile Liberal Party, while the Conservatives still held to the policy of friendship with Germany; but though during the annexation crisis of 1908 Rumania still held to an attitude consistent with her secret treaty obligations, the increasing tension between Austria-Hungary and Serbia, with the resultant attempts by Austria to entice Bulgaria into her orbit, made this attitude ever more difficult. Should complications arise in the Balkans, forcing Austria to define her attitude towards Bulgaria, it seemed likely that the thread between Austria and Rumania might snap for ever.

First Balkan War, 1912.—This situation arose in Oct. 1912, when the Balkan League went to war with Turkey. Rumania's sympathies were at first uncertain; indeed, the secret Serbo-Bulgar military convention of March 13, 1912 had provided against a possible attack from Rumania. At first the Rumanian Government expressed itself disinterested in the course of the war; but the rapid success of the Bulgarians caused Rumania to intimate to Bulgaria that she would, in the event of a partition of European Turkey and in the interests of the balance of power in the Balkans, require a frontier rectification in the Dobruja. Danev, then president of the Bulgarian house of deputies, appealed to Austria, and then proceeded himself to Bucharest in Nov. 1912, where he offered to renounce for ever Bulgaria's claims to Dobruja and to modify the existing frontier in Rumania's favour. No agreement could be reached either in Bucharest or in London, although Austria-Hungary made determined efforts to reconcile and secure the friendship of both countries. The case was finally submitted for arbitration to the Conference of St. Petersburg (May 17), which assigned Silistra to Rumania. (H. TR.; X.)

Second Balkan War, 1913.—This arrangement failed to satisfy the country, and on the outbreak of the Second Balkan War, the Rumanian army, 500,000 strong and commanded by the crown prince crossed the frontier (July 10, 1913), occupying Southern Dobruja as far as Kavarna, and advancing upon Sofia. Negotiations were immediately begun at Bucharest, where an Armistice was signed on July 31, 1913, between Rumania, Serbia, Greece and Bulgaria. The Treaty of Bucharest was concluded on Aug. 10; Rumania obtained the territory which she had already occupied in the Dobruja.

Her position was now more uncertain than ever. Although the king had again renewed the secret Triple Alliance in 1914, and Austria made great efforts to win Rumania's friendship, the resentment felt by the younger generation at Magyar oppression of the Rumanians in Transylvania, and at Austria's diplomatic support of Bulgaria, increased steadily, particularly when Austria-Hungary made a diplomatic intervention in favour of Bulgaria at Bucharest in the hope of having the treaty modified. Rumania became therefore more and more convinced of the necessity of a national policy in the interests of the entire Rumanian nation, whether in the kingdom or under Austro-Hungarian or Russian rule. She hoped that Russia would enable her to realize her ambitions; but the visit of the Rumanian heir to the throne to St. Petersburg (March 27, 1914) and of the tsar to Constanța (June 14, 1914) did not bring about a definite change of policy.

Rumania During the World War.—When the World War broke out, I. Bratianu, head of the Liberal party, was in office and endeavouring to introduce a number of reforms—foremost among them being an agrarian law based on the expropriation of the large landowners, and an electoral law establishing universal suffrage except for illiterates. At first it was decided to maintain armed neutrality, but after the battle of the Marne, Take Jonescu passed from the first idea of "loyal neutrality" to that of intervention on the side of the Allies. In this he was especially supported by Filipescu, who, with other Conservatives joined hands with Take Jonescu against Marghiloman's group, which still favoured the Central Powers. Meanwhile, Austria-Hungary and Germany concluded conventions by which Rumania was exploited to feed the population of the Central Powers. There were popular demonstrations against this policy, and Filipescu vehemently demanded rupture with Austria-Hungary. One great obstacle to this was removed by the death of King Charles on Oct. 10, 1914.

The Bratianu Government continued to negotiate with the Central Powers, but in 1916 the Western Powers overcame Russia's objections, and Great Britain, France, Russia and Italy signed a treaty on Aug. 17, 1916, by which they guaranteed Rumania the Banat, Transylvania, the Hungarian plain as far as the Tisza, and the Bukovina as far as the Prut, in return for an immediate declaration of war. Rumania declared war on Austria-Hungary Aug. 27, 1916. (*See* also EUROPE: *History*.)

The Rumanian troops at once crossed the passes into Transylvania, but were expelled by mid-November. Bucharest was occupied by the armies of the Central Powers on Dec. 6, 1916. The army retired into Moldavia to reorganize there, sheltered by the Russian troops; the King, his Ministers and Parliament, had already retired to Jassy. A counter offensive had begun in July 1917, when the Russian collapse left Mackensen free to throw all his forces against the Rumanian army, which was rendered incapable of further resistance after the prolonged and glorious struggle of Mărășești in Aug. 1917. The Russian army disintegrated into pillaging bands; hostilities were suspended; and eventually an armistice followed (Dec. 6, 1917).

Agrarian and Electoral Reforms.—Parliament met at Jassy in Dec. 1916, determined to prosecute the war to a finish, and Bratianu formed a coalition with Take Jonescu and his section of the Conservative party. In April 1917 the agrarian question once more became urgent, largely owing to the effect on the public mind of the social revolution in Russia. In May direct and universal suffrage was introduced, raising the number of voters from 180,000 to over 1,200,000. Influenced by the Crown, the Conservatives in May 1917 at last accepted the radical policy of expropriation, to be applied to an area fixed at 2,000,000 hectares. A law was passed by a large majority on July 14, which left the original proprietors with a maximum of 500 hectares per estate (absentees being completely expropriated), and assigned them a compensation in State bonds, the amount not to exceed twenty times the value of the annual return from the property. A scheme for the communal holding of village associations of the land thus obtained was rejected in favour of traditional individual tenure.

The Union of Bessarabia.—On the break-up of the Russian empire, a "National Moldavian Committee" formed itself out of the Rumanian elements in Bessarabia (May 1917); in August the Ukrainian National Rada recognized Bessarabia as a separate unit. In Oct. a Supreme Council (Sfat Țarii) for Bessarabia was set up, the various nationalities being represented on it proportionately. On Dec. 17 this body proclaimed an independent Moldavian Republic, and invited Rumania to send troops into the country for its defence. Russia protested, and a state of war existed between Russia and Rumania from Jan. 28, 1918 till March 9, when an agreement was reached that the Rumanian troops should withdraw. On April 8, the Sfat Țarii voted for political union with Rumania; Bessarabia to retain a large degree of autonomy. The Central Powers sanctioned this arrangement by the Treaty of Bucharest to compensate Rumania for her other losses. No Russian Government, however, admitted the validity of these arrangements, as the Rumanian troops had not

been withdrawn as agreed, and the Ukrainian representatives of the Sfat had abstained from voting.

The Treaty of Bucharest.—Bratianu having resigned on Feb. 9, 1918, General Averescu was charged with the peace negotiations at Buftea, near Bucharest. The Dobruja was ceded as far as the Danube, Bulgaria taking over the southern half which she had lost in 1913, while the Quadruple Alliance administered the northern half conjointly. Rumania was to have a trade route to the Black Sea via Constanţa. The frontier of Hungary was advanced in the Carpathians. The Central Powers secured such terms on the Danube, in the Rumanian oilfields and over the railways, as would have placed Rumania in a state of economic slavery to them for many years. Averescu's Cabinet hesitated to sign and resigned on March 12, in favour of the Germanophile Marghiloman Ministry, which signed the treaty at Bucharest on May 7, 1918.

Marghiloman's Ministry struggled against almost unsurmountable difficulties throughout the succeeding months. In the occupied territory everyone was snatching greedily at the remnants of national prosperity; the Central Powers forced the Banque Generale to issue no less than 2,500,000,000 lei in paper money, and disorganized the finance of the kingdom; while economic ruin was ensured by the exportation of sheep and cattle, the cutting down of forests and the dismantling of factories. The population meanwhile was starving, reduced to famine rations, and the *moral* of its working-class was being perverted by revolutionary propaganda.

Peace: the Formation of Greater Rumania.—On Nov. 8, 1918, when the defeat of the Central Powers was assured, the King called to power General Coandă, who repealed all laws introduced by the Marghiloman Ministry and decreed universal, obligatory and secret suffrage for all male voters over 21. The King re-entered Bucharest (Nov. 30) after the German troops had evacuated Rumania under the terms of the Armistice. Bratianu again became Minister on Dec. 14.

The new Liberal Government had the difficult task of reuniting provinces which had been under the domination of different alien States. Bessarabia was already incorporated in the ancient kingdom, having abandoned the idea of autonomy. Her council voted for unconditional incorporation on Dec. 9, 1918. The incorporation of Transylvania (*q.v.*) followed in virtue of a resolution passed by a Rumanian assembly at Alba Iulia on Dec. 1, and that of Bukovina (*q.v.*) on Nov. 28. The Government had also to carry on difficult diplomatic negotiations for the recognition by the Allies of the new frontiers. Those fixed by the Agreement of Aug. 1916 were drawn back in places to give the Hungarians a part of the hinterland of Oradea Mare, and the Yugoslavs the western half of the Banat. A line of demarcation was fixed in Hungary, and Rumanian troops occupied the country up to this line, pending final settlement by treaty. In March 1919 a further "neutral zone" was established and Rumania was given the right of occupying it. Bela Kun's Government which now came into power in Hungary, started a campaign, as a result of which the Rumanians advanced to the Tisza (Theiss), where they were stopped by the Allies on May 9. On July 22 Kun started a new offensive; but the Rumanian army defeated his troops, crossed the Tisza—despite the interdiction of the Allies—and occupied Budapest on Aug. 4. Here they remained in the face of numerous protests until Nov. 14. The Treaties of St. Germain and Trianon recognized as Rumanian the predominantly Rumanian territories of the old Dual Monarchy.

Vaida Voivod and Averescu Governments.—The Bratianu Government resigned on Sept. 13, 1919, as a protest against Art. 60 of the Treaty of Trianon (Minorities Clause). New elections held on Oct. 3 gave a large majority for the Peasant party and the Nationalist Democrats, which coalesced as a *bloc parlementaire,* and on Dec. 9, 1919, formed a democratic Government of advanced tendencies. The President was the Transylvanian Alexander Vaida Voivod, who at once visited Paris and London and obtained the formal recognition of a Rumanian Bessarabia. During his absence, however, the landowners agitated against proposed expropriation, and the court and society felt alarmed at the Bolshevik propaganda. The Cabinet was forced to resign and General Averescu became Premier (March 19, 1920) with the support of the "League of the People" which he had founded in April 1917, an organization which included many Conservatives and some new men. He also concluded a pact with Take Jonescu's Conservative Democrats. Elections were held early in June. Averescu's party won by a large majority even in Transylvania. Take Jonescu became Minister for Foreign Affairs in his Government (June 21, 1920).

The chief object of the Averescu Government was what it called "the re-establishment of order." In fact the Bolshevist danger continued on the Dniester, where a real revolutionary movement had been attempted at Hotin under the previous Government; the Soviet Russians had friends, not only in Bessarabia, but also in the old Kingdom, and the odious crime in the Senate[1] had shown to what lengths their fanatical ardour could go. It was thought necessary therefore to continue the regime of press censorship, and to proceed against the communist leaders in May 1921. A law on workmen's unions, first of all received with noisy protests in working class circles, soon succeeded in securing agreement to accept State mediation between masters and men, and after that, thanks to a change of attitude on the part of the men, the number and importance of strikes diminished. But, except for one school for apprentices, nothing was done for the instruction or education of the urban classes.

Agrarian and Fiscal Reforms.—At the same time the popularity of General Averescu among the rural population forced him to carry through his agrarian reforms. The bill was only introduced in the spring of 1921, by the Minister of Agriculture, Garoflid, a big landowner, who belonged to the "progressive" party of the Germanophiles. After impassioned controversy, decisions on the whole favourable to the peasantry were finally secured, while the compensation to be paid by the new owner was increased by a payment to be raised from a special tax on new fortunes. Later on regulations drawn up by the Liberal Minister of Agriculture were to change in many respects the enactments of the Garoflid law. A drastic fiscal reform, which, while introducing many happy innovations, in some respects went beyond what could be carried out in the country, was introduced by N. Titulescu after March 1921.

Foreign Policy.—Take Jonescu gave Rumanian foreign policy a definite direction. Marriages were concluded between the Crown Prince and Princess Helen of Greece, March 10, 1921, the Princess Elizabeth and the Crown Prince of Greece, Feb. 27, 1921, and Princess Marie and King Alexander of Yugoslavia, June 6, 1922.

Rumania and Poland were equally threatened by Russia, who had never recognized Rumania's right to Bessarabia, and seemed little satisfied with Poland's right to retain her White Russian and Ukrainian territories. The Rumanian-Polish Treaty (March 3, 1921) provided for mutual assistance in the event of an unprovoked attack upon either party on their eastern frontier; for common diplomatic action towards their eastern neighbours, and for a military convention. Rumania took cognizance of Poland's agreement with France, Poland of Rumania's agreements with other States for the maintenance of the Treaties of Trianon and Neuilly, the last-named clause referring to Rumania's relations with the Little Entente. Although Take Jonescu failed to secure from Prague and Belgrade his wish of a wider defensive alliance to include Greece and Poland, for mutual guarantee against any aggressor, including Russia or Bulgaria, Rumania concluded a Convention with Prague for mutual protection against an attack from Hungary (April 23, 1921) and with Belgrade against an unprovoked attack from Hungary or Bulgaria (June 7, 1921), thus entering the system of the Little Entente. Her Eastern policy was regulated by agreement with Poland (*see* POLAND; CZECHOSLOVAKIA; and LITTLE ENTENTE). Relations with Russia remained, meanwhile, extremely strained, especially as Italy and Japan still hesitated to ratify the Bessarabian treaty. During 1924

[1]On Dec. 9, 1920 an infernal machine exploded in the Senate killing the bishop Radu and mortally wounding D. Grecianu (the Minister of Justice) and another senator.

Russia kept up continuous agitation and threat of war; for three days in 1924 there was even a communist republic at Tatarbunar in South Bessarabia. A conference with the Soviet representatives held in Vienna (March 27 to April 2, 1924) led to no result, although an understanding was reached at Cetatea Albă to prevent incursions of Bolshevik bands.

The Bratianu Government.—Meanwhile, in 1921, the Liberals recommenced an agitation for power. After the opening of Parliament in Nov. 1921, the king formally demanded a détente. General Averescu resigned, and after various combinations had been rejected, the king, wishing to maintain unity of direction, appointed J. J. Bratianu to office on Jan. 19, 1922. Bratianu, whose Liberals now comprised the bulk of the wealthy circles of Old Rumania, the Conservative Party as such having been swept out of existence owing to its Germanophile war policy, proposed at once to consolidate his party and to take exceptional measures, amounting to a dictatorship, to "save the country." He carried through forced elections. The Peoples Party, the Popular Transylvanians, the Peasant Party and the Nationalist Democrats, who had opposed him, declared the Parliament illegal and all legislation passed by it null and void in their eyes, and abstained from voting. A party administration took office almost at once. The brother of the president of the council, Vintila Bratianu, was entrusted with the task of re-establishing order in the finances, which were endangered by the quantity of Treasury bonds and unfunded loans.

The Coronation and the Constitution.—The coronation of the king and queen, which had already been prepared for by the preceding Government, was carried through with ceremony by Bratianu. On Oct. 15, 1922, Ferdinand I. and Queen Mary assumed the crowns of United Rumania at Alba Iulia, the Transylvanians of the Opposition absenting themselves from the ceremony. The new law of the Constitution, debated by the Nationalist Democrats only, and with reservations, was adopted March 28, 1923. It was a reproduction of that of 1866, with the addition of the election of deputies by universal suffrage, with a vague right of representation of electoral minorities, and adding to the Senate the old dignitaries and members of Parliament and representatives of the Chambers of Commerce and Agriculture. The subsoil and forests were nationalized. The admission of Jews to citizen rights was incorporated in the constitution, but open competition with the newcomers provoked violent trouble in the universities, which was exploited by certain politicians. In agrarian affairs, in labour questions, in military matters, and above all in foreign affairs, there were no innovations. In the financial sphere the position was long maintained of isolation towards foreign capital, which was excluded wherever possible, and only admitted under irritating restrictions for the exploitation of the oil-fields. The attempt to commercialize properties and State enterprises did not succeed.

The opposition, systematically divided, long remained sterile; but in March 1925 the Transylvanians united with the new "Nationalist-Popular" group under the name of the National Party, and came to an understanding with the Peasant Party. The new coalition produced a programme based on concessions to the peasants and national minorities, the abolition of arbitrary government and a revised financial policy. Violent attacks on the Government were launched in May and June, but suspended when it was thought that the Government would soon retire. The People's Party negotiated with the Liberals in the hope of forming the next government with their support. Nevertheless J. J. Bratianu wished to carry his reforms through to the end. The law for the unification of the Church had already been passed, introducing the Transylvanian system of elective councils for each parish, each diocese and for the religious life of the country in general. In the autumn he put forward an Education Bill which was attacked, not only by the national minorities, but even by the Rumanian opposition parties as infringing on the liberty of private, religious and national education by imposing on it too strict state control.

The Crown Prince Charles.—At the end of Dec. 1925 the heir to the throne, the Crown Prince Charles left Rumania abruptly. At Venice he renounced all his rights, including that of bringing up his little son Prince Michael, and repeated his intention of disassociating himself from his country. Meanwhile, a Crown council had met at Sinaia. The king insisted that the party leaders recognize the situation created by the Prince's action. After some hesitation, the National Peasant opposition abstaining from voting, the chamber and senate, in view of the precarious state of the king's health, appointed (Jan. 11, 1926) a provisional council of regency, consisting of the Patriarch Miron Cristea, the president of the Supreme Court of Appeal, Buzdugan, and Prince Nicholas, the king's second son.

The Parliamentary Situation.—When the chambers reassembled, Bratianu forced through an electoral law of the Fascist type. Any party which received 40% of the total votes cast, the other votes being divided among several political bodies, was rewarded with half the number of seats, without counting what it got on the scrutiny (March 1926). The local elections in February, despite the Government's methods, showed the growth of feeling in favour of the Nationalist and Peasant Coalition, which had been joined by Averescu's party. Accordingly, after much hesitation, the king in March asked Averescu to form a cabinet, which also included four seceding members from the Transylvanian faction.

Averescu Government, 1926–27.—Elections, held in May, gave General Averescu's party four-fifths of the seats in the chamber, a result largely due to great pressure exercised at the polls. The Liberals returned only 16 deputies; yet it was clear that the Government existed largely only on Liberal sufferance. In foreign policy, Averescu followed the course marked out by his predecessors, at the same time showing his own sympathies by initiating a marked leaning towards Italy. The defensive treaties with Yugoslavia and Czechoslovakia were renewed in June, and on June 10 a treaty of alliance and non-aggression was signed with France, with a supplementary protocol and arbitration convention. France undertook to respect the existing frontier in Bessarabia. With Italy, an agreement for the funding of the Rumanian war debt to Italy was reached on June 15, when arrangements were also made for supply of Italian capital to the Rumanian oil-fields. In August Averescu visited Italy, and on Sept. 16 Rumania signed with Italy a treaty of friendship and arbitration. These measures were severely criticized by the Opposition, principally on the ground that they failed to achieve the much-desired ratification by Italy of the Bessarabian treaty. Meanwhile, this policy, which was simultaneous with Italy's activity in Albania, somewhat decreased the cordiality between Rumania and Yugoslavia within the Little Entente, although co-operation continued through a renewed crisis with Bulgaria, occasioned by a recrudescence of *comitadji* (*q.v.*) activity. In this crisis Rumania played to some extent the part of mediator. In financial and economic policy, Averescu's Government took a line directly opposite to its predecessors', increasing the fiduciary circulation, encouraging the admission of foreign capital and initiating negotiations for a much-needed foreign loan. Some members of the Cabinet were also said to favour stabilization of the lei, rather than Bratianu's policy of deflation.

Averescu's policy won a signal success, admitted even by the Opposition, when Italy agreed to recognize the Bessarabian Treaty (March 14, 1927). Yet his increasing independence alarmed the Liberals, particularly in view of the very precarious state of the king's health. The Nationalist and Peasant parties had definitely coalesced on Sept. 16, 1926, forming a bloc which commanded the sympathies of a large proportion of the population. The Nationalist wing of this group had opened up communications with the exiled Prince Charles, who appeared to be repenting his renunciation of the throne. On Feb. 1, 1927, the National Peasants Party publicly urged that the renunciation be repealed. This was, however, strongly opposed by Averescu. It was clear that the situation would become very critical on the king's death.

Before this event occurred, however, Averescu, having failed to reach an agreement with the National Peasants, resigned (June 4). Stirbey, a friend of the king's, took over a temporary Coalition Government, with the declared object of holding "legal and open elections." Internal party difficulties proved, however, too great,

and on June 21 Stirbey gave way to J. Bratianu, who, by traditional methods adapted to the new electoral law, secured 70% of the votes in the country. The National Peasants, despite universal popularity, polled only 20% of the votes, and Averescu's party, whose fall from power was succeeded by scandalous revelations of ministerial corruption and wholesale venality, secured not a single mandate.

Death of King Ferdinand; New Liberal Government.—On July 29 King Ferdinand died at Pelişor, universally regretted. The Liberals were, however, now firmly in the saddle, and the expected outbreak of internal disorder and pro-Charles agitation did not occur. The Government at first adopted a very firm attitude, fortified by the increased confidence with which Rumania was again regarded by France and her colleagues in the Little Entente. When, however, Manoilescu, Under-Secretary for Finance in the late Averescu Government, was arrested on Oct. 23 on his return from Paris, and was found to be bearing messages from Prince Charles to all political leaders in the country, suggesting his return, public feeling ran so high in Rumania in favour of the accused that the Government dared not convict him at the courtmartial which was held on him.

Relations between Government and opposition had become excessively strained, but when J. Bratianu, who had long been the very soul of the Liberal Party, died suddenly (Nov. 24), the Government tried to come to terms with the National Peasants by an offer of nearly 50% of the portfolios. The offer was rejected, on the ground that the Government had usurped power by oppressive and illegal means. The Liberals, unexpectedly, weathered the storm, and Vintila Bratianu became head of the party and of a new Ministry.

Meanwhile, relations with Hungary had become increasingly strained owing to the prolonged dispute (dating from 1923) over the expropriation, under the Agrarian Reform, of the Hungarian optant landowners in Transylvania, which was again fruitlessly discussed before the Council of the League in September and December. On Dec. 8, Hungary, and also the Jewish community, were presented with a fresh grievance by an outbreak of hooliganism by Rumanian students at Oradea Mare and Cluj. The opposition redoubled their agitation, and the Rumanian opposition and the Hungarian nation thus found themselves aligned, although not in any real sense united, in their hostility to the Rumanian Liberal Government.

A crisis was expected to occur after the meeting of the National Peasant Party at Alba Iulia on May 6, 1928. This party had now rallied round it almost the whole Opposition, which united in demanding real representative government, a measure of devolution and local autonomy, and economic reform. The occasion was seized by the ex-Crown Prince Charles, who, after involving himself in an escapade which betokened a profound ignorance of the situation, attempted to issue to the Alba Iulia meeting a proclamation demanding his own return, attacking the Liberals and putting forward a programme which combined some of the demands of the Opposition with a guarded but unmistakable reference to an arrangement with Hungary, on whose support he seemed to be counting. The manifesto, however, fell flat; and the Congress of the Opposition remained merely an imposing though somewhat melodramatic demonstration, in the face of which the government coolly and firmly maintained its attitude.

Negotiations for a foreign loan, which all parties agreed to be a prime necessity, were carried on through the summer. They hung fire, and on Nov. 3 the Liberal cabinet, after a vain attempt at reconstruction on coalition lines, resigned in consequence of a disagreement with the council of regency. M. Maniu, leader of the National Tsaranists, or National Peasant Party, formed a cabinet which carried through elections on Dec. 12. The Government secured 349 seats in the Chamber, the Liberals 13, the Jorga-Averescu group 5, the Independent Peasants 5, and the minority groups 15. The new Government began well, abolishing censorship and martial law, mitigating the police régime, and promising concessions to the minorities, and other much-needed and long sought for reforms. (N. L. F.)

BIBLIOGRAPHY.—(a) Older sources: Up to the 14th century, only Hungarian, Russian and Byzantine authorities are available; the *Chronicle of Hurul* is a forgery. Later documents are contained in the *Annalele* of the Rumanian Academy (1880 etc.); E. de Hurmuzaki, *Documente privitore relative la istoria Românilor*, 30 vols. (1876 etc.), bibl. by N. Jorga, vol. x.; Kovachich, *Scriptores Rerum Hungaricorum Minores* (Budapest, 1798); N. Jorga, *Acte şi Fragmente* (1895–96). Principal early works, J. L. Carra, *Histoire de Moldavie et de Valachie, avec une dissertation sur l'état de ces deux Provinces* (Jassy, 1777); de Launette, *Memoire de l'état ancien et actuel de la Moldavie* (1787; 1902); G. Urechia, *Chronique de Moldavie*, 16th century, ed. E. Picot, French trans. (1878); M. Costin, *Opere Complete*, 17th century, ed. V. A. Urechia (1886). (b) Periods, *Phanariot:* P. Eliade, *Les Origines* (1898); *19th century*, D. A. Sturdza, *Charles Ier, Roi de Roumaine*, 2 vols. (1899–1904), *Acte şi documente relative la istoria renascereĭ Românĭĭ* (1900 etc.). *Latest period:* F. Damé, *Histoire de la Roumanie Contemporaine* (1900); C. Kiriţescu, *Istoria razboiluĭ* (1924); N. Jorga, *Regele Ferdinand* (1924), *Regina Maria* (1924); S. Jonescu, *Rapport sur l'activité du gouvernement libéral* (1925). (c) Complete histories: A. D. Xenopol, *Istoria Românilor*, 6 vols. (Jassy, 1888–93, 1926). A monumental work but somewhat biased. Abridged French trans. *Histoire des Roumains*, 2 vols. (1896); A. Sturdza, *La Terre et la race Roumaines* (1904); N. Jorga, *Histoire des Roumains et de leur civilisation* (1920), good bibl., Eng. trans., J. McCabe, *A History of Roumania* (1925); N. Jorga, "Roumania" in *Nations of the Day*, ed. Y. Buchan (1924); D. Mitrany, "Roumania" in *The Balkans* (1915).

RUMANIAN LANGUAGE AND LITERATURE.

Latin was introduced into the farther end of eastern Europe at the time when Trajan's legions occupied Dacia (A.D. 101–107). The natural riches of this region attracted settlers from all points of the Roman empire. In A.D. 274 Aurelian determined to withdraw all the Roman legions and likewise part of the civilian population menaced with disaster by the constant incursions of the Goths, and from the 3rd to the 6th century Rumanian evolved normally maintaining touch with Western Europe through Illyria and especially Dalmatia. In the course of the 6th century, however, it was cut off from the Latin world by the invasions of the Slavs and Bulgarians, whilst the bulk of the Romanic population was compelled to seek shelter in places less exposed to barbarian attack. Dalmatia was the worst sufferer: Salona, the most important city in that province, was occupied and partly destroyed, its inhabitants fleeing to the coast and islands of the Adriatic. Slav influence bore heavily on the conquered, who received from their victors a liturgy and an alphabet (the Cyrillic alphabet which the Rumanians retained till the latter part of the 19th century when they adopted the Roman alphabet). The constitution of the Rumanian language was also profoundly affected. It is from the Slav invasion that Rumanian starts upon its peculiar course of evolution and begins to acquire those characteristics distinguishing it from all other Romance languages. The centre of formation of Rumanian, which till the 7th century had been north of the Danube, followed the drift of the population and was transferred south of the river. But, as a result of slow migrations of which the history is barely known and which lasted from the 9th to the 12th century, we find in the 13th century two groups of Rumanians, one, the more important, north of the Danube, the other, much less considerable, south. From the 13th century onwards the northern group again becomes the main centre of language formation. To these two groups must be added a third in certain parts of Istria whither Rumanian was brought by successive migrations of settlers north of the Danube between the 10th and 14th centuries.

At the present time Rumanian is divided into four dialects: (i.) Daco-Rumanian, spoken by some 12,000,000 persons in Wallachia, Moldavia, Bessarabia, Transylvania, the Bánat of Temesvár, Bukovina and in some places on the right bank of the Danube, the Dobruja in particular; (ii.) Macedo-Rumanian, spoken by about 600,000 Armînì in portions of Macedonia, Albania, Thessaly, Epirus; (iii.) Meglenitic, spoken north-west of Salonica; (iv.) Istro-Rumanian, spoken by about 3,000 persons at the beginning of the 20th century (number rapidly diminishing) in the villages of Sousniévitsa, Lettay, Gradigné, Grobrique, Brdo, Noselo and Jéane. Speakers of this dialect have entirely disappeared at Squitatsa and in the Arsa valley. They are known as Tširibiri by the Italians and Slavs; their language is called vlaški or tširibirski.

The vocabulary of Rumanian is a mirror of the history of the

Rumanian people. Its basis is a development of Vulgar Latin; to this have been added in the course of centuries elements from the languages of the various populations with which the Rumanians have successively lived on friendly or hostile terms: Albanians, Byzantines, Bulgarians, Serbs, Hungarians, Poles, Turks. The most important added ingredient is Slavonic. It has ousted many words of Latin origin relating to the most ordinary manifestations of life, human activities and social conditions: relationship, parts of the body, animals, plants, metals, implements, etc. The affirmation itself *da* is borrowed from the Slavonic.

Slavonic has altered the sounds of a few words, introduced novel reflexive forms, and in composition and derivation played a very important rôle. The Latin negative prefix *in* has, for instance, been replaced by the Slavonic *ne, e.g., nebătuť, necertat, neegal.* The Latin prefix *dis-,* expressing separation, has given place to Slavonic *razŭ, e.g., răsbi,* instead of Latin *dis-solvere, risipi* instead of Latin *dispergere.* Slavonic has also introduced a few suffixes such as *-că* (old Bulgarian *ŭka*) *e.g., săteancă* (country-girl); *-nic* (old Bulgarian *ĭniku*) *e.g., falnic* (proud, presumptuous). The element next in importance is Magyar, present, however, in Daco-Rumanian only, to which it has given not only words but also some suffixes: *-aş, -iş, -uş, -şag, -şug.*

Among the characteristic features of Rumanian are the following:

1. Lat. *au* has been preserved as a diphthong (as in Sardo-Sicilian, in part of Provençal and the Grisons dialect) *e.g.,* L. *aurum,* Rum. *aur;* L. *audere,* Rum. *auzi.*

2. Lat. open *e* has become *ie* even when in closed syllable (as in Spanish and Friulian) *e.g.,* L. *perdit,* Rum. *pierde.*

3. Lat. *a,* open *e,* and *o* followed by *n* have become respectively *î, e.g.,* L. *canto,* Rum. *cînt;* L. *bene,* Rum. *bine;* and *u,* L. *carbonem,* Rum. *cărbune.*

4. Lat. tonic *e, o,* preceding a syllable with open vowel became first respectively: *ea, oa, e.g.,* L. *directa,* Rum. *dreaptă,* L. *porta,* Rum. *poartă;* this *ea* has been reduced in Daco-Rumanian at times to *a,* at times to *e, e.g.,* L. *legem,* Rum. *lege* (formerly *leage*). L. *mensa,* Rum. *masă* (formerly *measă*) but has been maintained in Macedo-Rumanian: *oa* has generally remained without alteration in Daco-Rumanian as in *voastră* but has been confused with close *o* in Istro-Rumanian.

5. Lat. intervocalic *l* has passed to *r* (as in some Italian dialects, in Ladin, in Franco-Provençal and in Vaudois), *e.g.,* L. *filum,* Rum. *fir;* L. *mola,* Rum. *moară;* L. *gula,* Rum. *gură.*

6. Lat. *qua* and *gua* have respectively become *pă* and *bă, e.g.,* L. *aqua,* Rum. *apă;* L. *equa,* Rum. *iapă;* L. *lingua,* Rum. *limbă* (compare Logudorese *abba* and *limba*). This modification which is normal inside the word appears at times in the initial syllable, *e.g.,* L. *quattuor,* Rum. *patru.*

7. Lat. *Kt, Ks,* have respectively become *pt, ps, e.g.,* L. *lactem,* Rum. *lapte;* L. *coxa,* Rum. *coapsă.*

8. Lat. *Sk, e, i,* has become *sht, e.g.,* L. *piscem,* Rum. *peşte.*

9. Lat. intervocalic *b, v, ll* (in group vowel +*lla*) have disappeared, *e.g.,* L. *caballum,* Rum. *cal;* L. *lavare,* Rum. *la;* L. *stella,* Rum. *stea.*

10. In the Istro-Rumanian dialects and, till the 17th century in Transylvanian (as in parts of Franco-Provençal) Lat. intervocalic *n* has been changed into *r, e.g.,* L. *lana,* I.-R., Tr., *lare;* L. *manum,* I.-R., Tr., *marę;* L. *virum,* I.-R., Tr. *virę.*

11. There still exists a system of declensions of substantives and adjectives with five cases: N., V., Acc., Gen., Dative.

12. The definite article is put after the substantive, *e.g., lup, lupul, lupului, lupilor.*

13. The formation of the numerals from 11–90 proceeds upon the Slav system. (*a*) From 11–19 *spre* (L. *super*) is inserted between 1, 2, 3, 4, 5, 6, 7, 8, 9 and *zece,* 10, *e.g.,* 11, *unsprezece;* 12, *doisprezece* (masc.) *douăsprezece* (fem.); 13, *treisprezece.* *b*) From 20–90 *zeci* (10) is added to 2, 3, 4, etc., *e.g.,* 20, *douăzeci;* 30 *treizeci.* The ordinals are formed by adding to the corresponding cardinals the ending *-lea* (masc.) and *-a* (fem.) *e.g., al doilea,* the second (masc.), *a doua,* the second (fem.), *al unsprezecilea;* the eleventh (masc.), *a unsprezecea,* the eleventh (fem.). *întâiul* (from L. *antaneum*) or *cel dîntâiu* (masc.); *întâia* or *cea dintâiu* (fem.) means the first.

14. All infinitives have shed the final posttonic syllable of Vulg. Lat. *e.g., a aduna, a tăcea, a începe, a fugi.* These infinitives are those of the four conjugations existing in Rumanian.

15. The future present is formed by the infinitive of the verb to be conjugated, preceded or followed by the present indicative of *a voi.* In colloquial Rumanian it is often expressed by the present indicative of *a avea,* followed by the conjunction *să* and the verb in the present subjunctive; or the present indicative of *a avea* may be replaced by *o* which is invariable. The following examples give the four different ways of expressing this tense: *voi ruga, ruga-voi, am să rog, o să rog* (I shall pray).

16. The passive is expressed by a special construction of the subject with the reflexive form: *e.g., Mânăstirea s'a zidit de Ştefan cel Mare* (The monastery has been built by Stephen the Great). Another construction, more modern, is similar to the one to be found in other Romance languages: *e.g., Sunt bătut* (I am beaten).

17. Preposition *pre* or *pe* (Lat. *per*) is used before names of persons and before pronouns in the accusative. Compare the use of *a* (Lat. *ad*) in Portuguese, Spanish, dialects of Southern Italy and Engadine, *e.g., Am vĕzut pe prinţul* (I have seen the prince); *Iacă un moşneag pe care ţi-l recomand* (There is an old man I recommend you).

BIBLIOGRAPHY.—*Dicţionarul Limbii Române, Academia Română* (in course of publication since 1907). O. Densusianu, *Histoire de la langue roumaine* T. I. 1901; T. II. 1914 (bibl.); A. Rosetti, "Chronique roumaine," in *Revue de linguistique romane* T.I. and *sqq.*; Tagliavini, *Grammatica della lingua rumena* (1923). (L. B.)

LITERATURE

Various Influences.—The intellectual development of Rumania has never until modern times been affected by Latin culture, but it has been most profoundly influenced successively by Slavonic, Greek and Byzantine, and Western, notably French and Italian, literature. Rumanian literary history may be divided into three periods: the Slavonic, from the beginnings in the middle of the 16th century down to 1710; the Greek, from 1710 to 1830; and the modern, from 1830 to the present. The change from Slavonic to Rumanian was very gradual. Slavonic had been the language of the church from the early middle ages, and was therefore hallowed in the eyes of the people and the clergy. Through the political connection with Bulgaria and Serbia it had also been the language of the chancelleries and the court. The beginnings of Rumanian literature proper consist of translations, as literal as possible, from Slavonic, prompted by the activities and aspirations of the Calvinistic reformers in Transylvania.

The second period is marked by a complete waning of Slavonic influence, through the literary activity of the Phanariote rulers. The Slavonic kingdoms to the south had ceased to exist, politically and culturally, whilst the Greeks brought with them the old literature from Byzantium and drove out the last remnants of Slavonic. They treated Rumanian as an uncouth and barbarian language, and imposed their own Greek upon the church. This Greek period corresponds to that of the Renaissance in the West; but when the rule of the Phanariotes was shaken off, the cultural link was broken too, and under Western influences began the romantic movement which has dominated Rumanian literature since 1830. Much of the Rumanian literature of the first two periods has been preserved only in mss.; few of these have been investigated, and a still smaller number have been compared with their original.

First Period: c. 1550–1710.—Rumanian literature begins, like all modern European literature, with translations from the Bible. The oldest of these are direct translations from Slavonic texts, following the original word for word, even in its grammatical construction. The first impetus towards the printing of the Rumanian translations came from the princes and judges in Transylvania. It was under their orders and often at their expense that the first Slavonic printing-presses were established in places like Kronstadt (Braşov) Oraştia, Sasz-Shebesh and Alba Julia, where Slavonic and Rumanian books appeared. The foremost printer and translator was a certain Diakonus Koresi, of Greek origin, who had emigrated to Walachia and thence to Transylvania. He

was assisted in his work by the "popes" (parish priests) of those places where he worked. The very first book published in Rumanian is the Gospels printed in Kronstadt between 1560 and 1561. An absolutely identical Slavonic text of the Gospels appeared in the same year, or one year earlier, which no doubt was the original for the Rumanian translation. Following up the list of publications of the books of the Bible in chronological order, we find Diakonus Koresi immediately afterwards printing a Rumanian translation of the Acts of the Apostles; in 1577 he printed at Sasz-Shebesh a Psalter in both Slavonic and Rumanian; the Rumanian follows the Slavonic verse for verse.

The first complete Rumanian translation of the New Testament appeared at Alba Julia, in Transylvania, in 1648. Its chief author was a certain Hieromonach Sylvestre, a Walachian who had undertaken the work at the command of Prince Gabriel Bethlen of Transylvania and while it was based on the Slavonic version, it was collated with the Hungarian Calvinistic translation and the Greek original. The first edition of the complete Bible was published (1688) by order of Prince Ioan Sherban Cantacuzino, by Radu Greceanu, assisted by his brother Serban and by Bishop Metrofan of Buzeu. This may be considered as the supreme literary monument in Walachia in the 17th century. At least 100 years had to pass before a new edition of the whole Bible was undertaken. The first rhymed Psalter in Rumanian was published by Dositheiu in 1673.

The ancient collections of homilies in Rumania are due to the same proselytizing movement. Almost the first book printed by Koresi (at the expense of the magistrate of Kronstadt, Foro Miklaus, *c.* 1570), seems to have been a translation from some Calvinistic compilation of homilies, one for every Sunday in the year. A Slavonic original sent by the metropolitan Serafim of Walachia served as the basis for a second collection of homilies known as *Evangelie învățătoare* (1580). The first collection of homilies, known as *Cazanii*, appeared in Dlŭgopole, *i.e.*, Câmpulung, in Walachia, in 1642. It was compiled by a certain Melchisedec and contained 13 homilies.

The Rumanian language was not yet introduced into the church. The burial service seems to have been the first to be translated from the Slavonic. Two *Evhologia* appeared during the second half of the 17th century, one by the bishop Dositheiu (Jassy, 1679–80) and the other by Ioan of Vinti (Belgrad, 1689). This *Molităvnic* (prayer-book) has been the basis of all subsequent editions of the Rumanian prayer-book. The liturgy proper was also translated by Bishop Dositheiu in 1679, but a translation from the Greek, by Jeremia Kakavela (Jassy, 1697), was the one adopted in the churches. In 1694 Alexander Dascalul translated, and the bishops Mitrofan of Buseu and Kesarie of Râmnicu Vâlcea printed (among other church books) the 12 volumes of the *Mineu* in Slavonic with Rumanian rubrics, and short lives of the saints, as well as the *Triod* and the *Anthologion*.

In addition to the activity of the Reformers in Transylvania, there was also a Roman Catholic propaganda in Rumania; the Orthodox Church found it necessary to convoke a synod in Jassy in 1642 under the presidency of Peter of Mogila, and a formulary of the Orthodox creed was drawn up. An answer to the Lutheran Catechism of Heidelberg (translated into Rumanian and printed at Fogaras in 1648) was also prepared by Bishop Varlaam. R. Greceanu translated the formulary from Greek into Rumanian under the title *Pravoslavnică mărturisire* (Bucharest, 1692). Of a more decided polemical character is the *Lumina* of Maxim of Peloponnesus, translated from the Greek (Bucharest, 1699).

Of far greater interest is the literature of maxims, and lives of saints, real or apocryphal, intended to teach by example. Such are the maxims in the *Floarea darurilor*, translated from the Greek (Sneagov, 1700), and going back to the Italian *Fiore de virtù;* the *Mântuirea păcătosilor*, or "Salvation of sinners," translated from the Greek by a certain Cozma in 1682, which is a storehouse of mediaeval *exempla;* and above all the *Mirror of Kings*, ascribed to Prince Neagoe Bassaraba, written originally in Slavonic (or Greek, if the prince be really the author), and translated *c.* 1650.

The first law-books were also compiled during this period. The Slavonic *Nomokanon*, which rests on Greek legislation and embodies the canonical and civil law, had previously been used in Rumania. In 1640 there appeared in Govora the first canonical law-book, which was at the same time the first Rumanian book printed in Walachia. This *Pravilă* (code) was probably the work of the historian Moxa or Moxalie. In 1646 appeared the *Pravilă aleasă*, or "Selected Code," compiled by Evstratie the logothete and published with the authority of the then reigning Prince Vasile Lupul (Basil the Wolf), hence known as the Code of Vasile. In 1652 there appeared in Bucharest a complete code of laws, adapted from the Greek and Slavonic under the direction of the prince of Walachia, Matthias Bassaraba. The *Indreptarea legii*, in which *Pravilă* of Vasile was incorporated without acknowledgment, remained the recognized code almost down to 1866. It embraces the canonical as well as the civil law. The chief authors were Uriil Năsturel and Daniil M. Panoneanul.

The earliest historical works are short annals, written originally in Slavonic by monks in the monasteries of Moldavia and Walachia. In 1620 Moxa translated from the Slavonic a short history of the world down to 1498. Two other universal histories were translated from Greek and Slavonic chronographs. One by Pavel Danovici contains the history of the world told in the style of the Byzantine chroniclers; it includes the legend of Troy, the history of Pope Sylvester and the description of the various church councils; and it concludes at the year 1636. The second is the *Hrongraf* of Dorotheus of Monembasia, translated by a certain Ion Buburezău. Both are still in ms. The Old Slavonic annals were later on translated and new notes were added, each subsequent writer annexing the work of his predecessor, and prefixing his name to the entire compilation. The most important author whose writings rank as classical is Miron Costin, who either took up the thread where it was left by Simion and Ureche and wrote the history of Moldavia from 1594–1662, or continued the history from where (probably) Evstratie had left it (*c.* 1630–62). Nicolae Costin (d. 1715), son of Miron, completed the history at both ends. He starts from the creation and endeavours to fill up the lacuna from 1662 to his own time, 1714.

In Walachia the beginnings are the work of an anonymous author, whose chronicle, continued by a certain Constantin Capitanul, describes the history of Walachia from Radu Negru (*i.e.*, Rudolph the Black), *c.* 1290–1688. An addition to this chronicle from the time of the Roman Conquest to Attila is ascribed to Tudosie Vestemianul, twice metropolitan of Walachia (1669–73, 1677–1703). The chronicle of Capitanul was further continued by Radu Greceanu to 1707, and finally by Radu Popescu to 1720. A comprehensive history of both principalities was written by an anonymous author, probably the Spatar Milescu, who finished his eventful life as ambassador of Russia to China (still in ms.), and the *Hronicul Moldo-Vlahilor* of Prince Demetrius Cantemir (*see* CANTEMIR) is more an apology for the Roman origin of the Rumanians than a true history. Cantemir wrote the original in Latin and translated it into Rumanian in 1710. His style shows an immense superiority to that of the previous historians. Of poetry there is scarcely a trace except some rhymed Psalters and a few rhymed dedications to patrons.

Second Period: 1710–1830.—The Phanariote period has been described as one of total decay; political degradation was thought to be reflected in spiritual life. The facts do not warrant this opinion. The few students of Rumanian literature disregarded the vast ms. material accumulated during the Phanariote régime, and out of ignorance and political bias condemned the whole period as sterile. Another influence was far more potent than the conduct of the Greek princes, though some of the latter were benefactors of the people. In Transylvania one section of the Rumanian population had accepted the spiritual rule of the pope; they now became Greek Catholic, instead of Greek Orthodox. Rome strove to educate the priesthood above Orthodox standards, and developed a vigorous proselytizing activity. The substitution of the Latin alphabet for the Cyrillic, and the movement emphasizing the Roman origin of the Rumanian people, were among the means employed by the Roman Church to win over the Rumanians of Transylvania from the fold of Orthodoxy. Thus a great change was wrought towards the end of the 18th century and

in the first half of the 19th century in the whole spiritual life of the Rumanian race. It suited the promoters of the Latin movement to pretend that they started a new era. But this movement imposed a handicap upon Rumanian literature from which authors have begun to free themselves only recently.

By the end of the 17th century Rumanian had become the authorized language of the church, and the Rumanian translation of the Gospel, printed in 1693, had become the authorized version. Most of the liturgical books adopted in this period are still used. Such are the *Ceasoslov,* revised by Bishop Kliment of Râmnicu Vâlcea (1745), the *Evhologion* (1764), the *Kataviasar* (1753). The 12 folio volumes of the Mineiu, by Bishops Kesarie and Filaret of Râmnicu Vâlcea (1776–80), and the monumental Lives of the Saints, also in 12 folio volumes, translated from the Russian and published (1809–12) under the auspices of the Metropolitan Veniamin of Moldavia, compare in beauty, richness and lucidity of language with the Bible of 1688. The most important works of the Fathers were also translated from the original Greek into Rumanian in this period.

In Transylvania, with the conversion to Greek-Catholicism of Bishop Athanasius in 1701, the Greek Orthodox had to place themselves down to 1850 under the protection of the Serbian metropolitan of Karlovatz. No writer of any consequence arose among them. The "United" fared better, and many a gifted young Rumanian was sent to Rome and helped from Vienna to obtain a serious education and occasionally also temporal promotion. With a view probably to counteract the literary activity in Rumania, the bishops P. P. Aaron and Ioan Bobb were indefatigable in the translation of Latin writers. First and foremost a new translation of the whole Bible was undertaken by Samuel Klain. It appeared at Blazh (1793–95). It falls short of the older version of 1688; it was modernized in its language, and no doubt a careful examination would reveal differences in the translation of those passages in which the Catholic tradition differs from the Eastern. Bobb translated Thomas à Kempis's *Imitatio Christi* (Blazh, 1812) and wrote a *Theologhie morală* (1801).

After 1727 Rumanian was recognized as the language of the law-courts, and through the annexation of Bukovina by Austria (1774) and of Bessarabia by Russia (1812), codes for the civil and political administration of those provinces were drawn up in Rumanian. Such legal codes reflect the German or Russian original. They were, however, of importance as they served as models (to some extent) for the new legislative code compiled in Moldavia under Prince Calimach; this was originally published in Greek (1816), and afterwards translated into Rumanian with the assistance of G. Asaki (Jassy, 1833). The Walachian civil laws and local usages were collected and arranged under the direction of Prince Ypsilanti (1780) in Greek and Rumanian; and under Prince Caragea another code was published (1817), which remained in force until 1832.

The last and probably the best writer of Rumanian history in the Phanariote period is Neculcea. He wrote a history of Moldavia to his own time, but for the period before 1684 his work is more or less an abstract from older writers. The original part covers the period 1684–1743, and is to some extent an autobiography of a very adventurous life. Neculcea adds to his chronicle a collection of historical legends, many of them still found in the ballads of Moldavia. In Walachia there was not a single historian of importance in the first half of the 18th century. In the second we have the chronicle of Dionisie Eclesiarh (1764–1815), a simple-minded and uncritical writer who describes contemporary events. The ancestor of a great family of poets and writers, I. Vacarescu described the history of the Ottoman empire from the beginning to 1791, interpolating doggerel verses.

Whilst a political and national revival was taking place in Moldavia and Walachia, towards the beginning of the 19th century, the Latin movement went on in Transylvania. There ethical and religious tendencies got the upper hand. Three historians had been partly educated in Rome under the protection of Prince Borgia and the influence of the Jesuit Minotto and the College of the Propaganda; they were Samuel Klain, Petru Maior and George Sincai. To Klain's initiative can be traced most of the work of the three. Unfortunately his writings, with a few exceptions, are still in ms. He is the author of the first history of the Rumanians in Dacia written according to Western standards. The tendency is to trace the modern Rumanians directly from the ancient Romans, and to prove their continuity in these countries from the time of Trajan to this day. Political and religious aims were combined in this new theory. A conflict was raging between the Hungarians and Rumanians, and history was required to furnish proofs of the greater antiquity of the Rumanians in Transylvania.

Imaginative Literature.—These books had no immediate influence in Walachia and Moldavia, where fiction and the drama had developed under the influence, first, of Greek and then to an increasing extent of French, Italian and German models. It was towards the end of the 18th century that Rumanian literature began to emancipate itself, very slowly of course, and to start on a career of its own in poetry and *belles lettres.* Curiously enough, the first novel to be translated was the "Ethiopic History" of Bishop Heliodorus. The *Odyssey* and *Iliad* were then translated into prose, and the *Arabian Nights,* after undergoing an extraordinary change in Italian and modern Greek, appear in Rumanian literature at the middle of the 18th century under the name of *Halima.* The young men of Walachia had come into contact with Western literature. Most of the writings of Florian, Marmontel, Le Sage, Montesquieu and others were rapidly translated into Rumanian.

Nowhere has the theatre played a more important rôle in the history of civilization than in Walachia and Moldavia. It formed the rallying-ground for the new generation which chafed under the tyranny of a Greek court. A certain Aristia, of Greek origin, but soon acclimatized to his surroundings as teacher at the high school in Bucharest, was the first to adapt foreign dramas for the Rumanian stage. These were first performed in Greek and afterwards translated into Rumanian. The plays produced on the Rumanian stage included most of the dramas of Molière, some of Corneille, Kotzebue and Metastasio, whose *Achille in Schiro* was the first drama translated into Rumanian (by Iordache Slătineau, printed at Sibiu in 1797). Schiller was also translated, and a few plays of Shakespeare (*Hamlet,* etc.) from a French version.

The lyrical and epic poetry of the time follows somewhat the same lines, but with certain notable differences. Transylvania, which awoke to a new life towards the end of the 18th century, produced some of the most popular poets. Among them were Vasile Aaron (1770–1822) and Ion Barak (1779–1848). Aaron wrote the *Passion,* in 10,000 verses (1802; often reprinted); the lyrical romances of *Piram şi Tisbe* (1808) and *Sofronim şi Hăriti* (1821); and the humorous *Leonat şi Dorofata,* a satire on bad women and on drunken husbands, now a chapbook. Barak wrote *Răsipirea Ierusalimului* (1821), "The Destruction of Jerusalem," almost as long as Aaron's *Passion;* and he versified a Magyar folktale, *Arghir şi Elena,* which has also become a chapbook, and has been interpreted as a political poem with a hidden meaning. He also translated the *Arabian Nights* from the German. In Walachia a certain Ion Budai Deleanu, a man of great learning, author of a hitherto unpublished Rumanian dictionary of great value, wrote *Tiganiada* (1812) a satirical epos in which gipsies play the chief part.

The love-songs of the time are primitive imitations of the Neo-Greek lyric dithyrambs and rhapsodies, which through the teaching of the princes of Walachia were considered the fountain head of poetical inspiration. But a closer acquaintance with the West led to greater independence in poetical composition. In the three generations of the Vacarescu one can follow this process of rapid evolution. Ianache Vacarescu, author of the first native Rumanian grammar on independent lines, was also the first who tried his hand at poetry, following Greek examples. He then studied Italian, French and German poetry, and made translations from Voltaire and Goethe. His son Alecu (b. 1795) followed his example. Both were overshadowed by the grandson Ioan (b. 1818). The collected poems of I. Vacarescu were published in 1848; but among them were some of the poems of Ianache and Alecu, which were confused with his own work.

In Moldavia a similar development took place, translations leading up to independent production. The most prominent figure is that of the scholar and linguist Constantin Konaki (1777–1849).

Third Period: from 1830.—The agitation for the transliteration of the alphabet, the elimination of all non-Latin words, and the ostracism of the old literature, completely crippled all literary activity, first in Transylvania and then in Rumania. The Latin movement was first brought into Walachia by the Transylvanian George Lazar who became a teacher at St. Sava's school in Bucharest and spread the doctrines of the Latin movement. Of his pupils there was one whose influence became decisive: Ion Eliade (Heliade), afterwards also known as I. E. Radulescu (1802–72), a man of immense activity, great initiative and still greater imagination. He it was who ushered in the new epoch, and for almost 40 years presided at almost every literary undertaking. There are two periods in his life, the latter the exact opposite and negation of the former. Up to 1848 he was closely connected with politics, the theatre and education. He founded the first political and literary review, and had a genius for discovering talent. About this time he turned to philology and fell under the spell of the Transylvanian school, the views of which he embraced with an ever-growing and toward the end fanatical zeal. He translated dramas and novels from French and Italian, and the number of his publications is legion.

All the prominent Rumanians of this period were politicians, striving to emancipate the country from the Turkish yoke, and later to effect the union of Moldavia and Walachia. These political aspirations form the keynote of the poetry and historical novels of Bolintineanu (1826–73). He was discovered by Radulescu, spent nine years in exile, returned in 1857 to Walachia and rose to high administrative posts. His main strength lay in his historical ballads, a *genre* which he introduced. Grigorie Alexandrescu (1812–85), another pupil of Eliade, is noted chiefly for his satirical rhymed fables. In Teodor Serbănescu (b. 1839) we find the reflex of Bolintineanu of the earlier period, in the beauty and simplicity of his lyrics.

Like Serbănescu, Vasile Alecsandri (1821–90) (*q.v.*) was a Moldavian. In 1855 he published, under the influence of Percy's *Reliques,* his collection of folk poems, *Ballades et chants populaires de la Roumanie.* This, together with the old chronicles, edited by Mihail Kogâlniceanu (1845), constituted a living monument of the vernacular. Their importance as an inspiration and stimulus to the new writers was fully appreciated by Titu Maiorescu, who became the leading critical spirit in Rumanian letters.

Under Maiorescu's influence a group of national writers gathered round the newly founded periodical *Convorbiri Literare.* Among them were I. Creangă, who in his "Recollections of Childhood" and other tales embodied the spirit of the Moldavian peasantry; I. L. Caragiale, who, beside a realistic drama and two volumes of excellent short stories, showed in his comedies *Scrisoarea din Urmă* (The Lost Letter) and *Noaptea Furtunoasă* (Stormy Night) the grotesque effects of a hasty introduction of Western manners into a semi-oriental society; and above all the poet Michail Eminescu (*q.v.*). He has been called the Rumanian Leopardi, on account of his all-pervading sadness. But there is another side to Eminescu—his broad conception of the Rumanian race. It was this that impressed writers of the later generations such as Prof. Torga, who in his *Istoria Literaturii Romîne in secolul al XVIII. lea, 1688–1821,* etc. (1901) arrived at a clearer understanding of what a national literature may be. His own periodical *Sămănătorul,* and the reviews *Convorbiri Literare,* edited by Prof. Mehedintzi, *Luceafărul* and *Viața Românească,* are the chief exponents of modern Rumanian letters.

Among Eminescu's followers the most important is A. Vlahutza (b. 1859). G. Coşbuc is the poet of the Rumanian peasant. He is a Transylvanian, and so is Octavian Goga, another poet of rich gifts, who however has in latter years turned to politics and is one of the best leader writers.

Rumanian prose suffered in consequence of the philological confusion brought about by Eliade and his assistants, mostly Transylvanians who came to Rumania proper after 1848. N. Bălcescu edited the ancient Walachian chronicles and wrote an admirable history of the reign of Michael the Brave. His friend and literary executor A. Odobescu was a consummate scholar of ancient and mediaeval antiquities, an unsurpassed satirist, and creator of the Rumanian historical novel (*Mihnea Voda,* 1858, and *Doamna Kiajna,* 1860). The first Rumanian novel to describe contemporary manners is the *Ciocoii vechi şi noi* (1863) of Nicolae Filimon (1819–65).

Ioan Ghica, a contemporary of the revolutionaries of 1848, gathered his recollections into two volumes, *Amintiri* (1890) and *Scrisori către V. Alecsandri* (1887), which beside their historical value have become a model of Rumanian prose. Among writers of fiction mention is also due to Ion Slavici (b. 1848), whose short stories describe the life of the Transylvanian peasantry; Barbu Stefănescu de la Vrancea (b. 1858), whose stories are characterized by a wealth of imagery and richness of language; Ion Popovici-Bănătseanu, and Marcu Beza, whose volume of short stories *Pe Drumuri* (1914) and novel *O Viața* (1921) represent the life of the romantic Vlach population scattered throughout the mountains of Macedonia, Epirus and Thessaly. I. Al. Bratescu-Voinesti's two volumes of short stories, *In Lumea Dreptății* (In the World of Justice, 1908) and *In Tuneric şi Lumină* (Darkness and Light) were awarded, in 1925, the great prize of the Rumanian Academy. Duiliu Zamfirescu's trilogy *Din Viata Comăneştilor* is a kind of Rumanian Forsyte Saga, while Liviu Rebreanu's novel *Ion* (1921) deals with the peasant's love of the land. Michael Sadonuvea is a prolific writer of vivid and graphic short stories depicting the life of the Rumanian country-side.

Most popular among Rumanian dramatists is Ioan Caragiale (b. 1852) who has brought on the stage living types of the lower and middle classes, and has skilfully portrayed the effect of modern veneer on old customs. Barbu de la Vrancea's trilogy, *Apus de Soare, Luceafărul, Viforul* (Sunset, The Evening Star, The Storm), is inspired by Rumanian history and folklore; Victor Eftimiu's fairy play *Insiră-te, mărgărite!* (String, Ye Pearls!) is founded on a folk tale; so is Adrian Maniu's rhymed drama *Meşterul* (The Master Builder, 1922).

Among the critics and essayists Dobrogeanu Gherea (b. 1853) stands out with his *studii critice* (1890 *seq.*). But in the domain of prose writing Rumania, like all the other nations of south-eastern Europe, lags behind.

The World War does not seem to have either altered or much inspired literary production. An attempt to depict the general spirit during the German invasion of Rumania was made in a novel, called after the national colours, *Roşu, Galben şi Albastru* (1925) ("Red, Yellow and Blue") by I. Minulescu, known as a disciple of the French symbolists. From the same school proceeded likewise a younger poet, Ion Pillat, who in his *Satul meu* (1925) ("My Village") manifests a definite return to the Rumanian tradition.

Popular Literature.—There existed in Rumania another set of literary monuments at least as old as any of the books hitherto enumerated, but which appealed to a wider circle. Rumanian folk-literature contains both popular written books and oral songs, ballads, etc. It is advisable to group the material in three sections: (1) the romantic and secular literature; (2) the religious literature;—both of these being written—and (3) the modern collections of ballads, songs, tales, etc.

To the first belong the oldest books, such as the *History of Alexander the Great,* which was known in Rumania in the 17th century. It rests mostly upon a Sloveno-Greek text and is of the utmost interest for the study of this cycle of legends. The first printed copy appeared in 1794, and it has been reprinted in innumerable editions. Next comes the legend of Constantine, of his town and his exploits—a remarkable collection of purely Byzantine legends. In addition to these there is the history of St. Sylvester and the conversion of Constantine, etc., all still in ms. *The History of Barlaam and Ioasaf* (*see* BARLAAM AND JOSAPHAT) may also be mentioned here. The *History of Arkir and Anadam,* printed by Anton Pann from older mss., is the now famous Old Testament apocryphon of Akyrios the Wise, mentioned in Tobit and found in many languages. In Rumanian it rests on an older

Greek-Slavonic text, and owes its great popularity to the wise and witty proverbs it contains. "Esop," whose wonderful biography (by Planudes) agrees in many points with Arkir, has also become one of the Rumanian popular books. The history of *Bertoldo,* which, though of Italian origin, reached Rumania through a Greek translation, belongs to the same cycle of rustic wisdom and cunning. These books are of course anonymous, most of them being translations and adaptations. One man, however, stands out prominently in this section of romantic and secular folk-literature. This was Anton Pann, who was born in 1797 at Slivden, of Bulgarian parentage, and died at Bucharest in 1854. Carried away by the Russians in his early youth, he settled in Rumania, and in about 20 years he published no fewer than 50 books, all of them still popular. Besides his edition of the Rumanian Church service-books with musical notation, he published a series of tales, proverbs and songs either from older texts or from oral information; and he made the first collection of popular songs, *Spitalul amorului,* "The Hospital of Love" (1850–53), with tunes either composed by himself or obtained from the gipsy musicians who alone performed them. Of his numerous writings two or three are of the greatest interest to folklore. His *Povestea vorbii* (first ed. 1 vol., 1847; 2nd ed. 3 vols., 1851–53) is a large collection of proverbs ingeniously connected with one another and leading up to or starting from a popular tale exemplifying the proverb. The *Fabule şi istorioare* (2 vols., 1839–41) is a collection of short popular stories in rhyme; *Sezătoarea la tară* (1852–53) is a description of the Rumanian *Spinnstube,* for which the peasants gather in one of their houses on a winter's night, the girls and women spinning and working, the young men telling tales, proverbs, riddles, singing songs, etc.

Far larger than the secular is the religious popular literature; it comprises many apocryphal tales from the Old and the New Testaments, and not a few of the heretical tales circulated by the various sects of Asia Minor and Thracia, which percolated into Rumania through the medium of Slavonic. A brief enumeration of the chief tales must suffice. Only a few of them have hitherto been published. They exist in numerous mss. which testify to their great popularity; in the popular songs one finds many traces of their influence upon the people's imagination. They include the *History of Adam and Eve,* the *Legend of the Cross, The Apocalypse of Abraham,* the *History of the Sibyl,* the *Legends of Solomon;* numerous New Testament apocryphal tales, starting with legends of St. John the Baptist. A number of astrological calendars and *prognostica* are among the best known and most widely circulated popular books, and the lives of St. Alexius, Xenophon, etc., have become chapbooks.

The whole of this popular literature belongs to what may be called the cycle of the Balkan nations, in every one of which exact parallels are to be found. Not that there was any direct, deliberate borrowing by one nation from the other, but all of them seem to have been subject for a long time to identical psychological influences and to have developed on similar lines. One of the first to collect these treasures of Rumanian poetry was V. Alecsandri, who, however, retained only their poetical beauty and did not reproduce them with that strict accuracy which modern study of folklore demands. A. M. Marienescu collected those of Transylvania (1859); S. F. Marian, those of the Bukovina (1873); T. T. Burada, those of the Dobrudja (1880); but the most complete collection is that of G. Dem. Teodorescu, *Poesii populare române* (Bucharest, 1885). The collection of fairy tales started later than that of the ballads. The first collection is the German translation of tales heard by the brothers Schott (1845). The most important collections, now deservedly considered as classical from every point of view, are the successive publications of P. Ispirescu.

It would be giving an incomplete picture of the contribution of Rumanian subjects to literature if one passed over the works of Rumanians which have appeared simultaneously in foreign countries and in Rumania: Charles Adolphe Cantacuzene (*Sourires Glacés*), the Princesse Marthe Bibesco (*The Eight Paradises, Catherine-Paris, A Royal Victim*), Princesse Elizabeth Bibesco (*I Have only Myself to Blame*).

BIBLIOGRAPHY.—M. Gaster, *Chrestomathie roumaine* (2 vols., Leipzig, 1891), *Literatura populară română* (Bucharest, 1883), "Geschichte der rumänischen Litteratur," in Gröber, *Grundriss der romanischen Philologie,* ii. pp. 264–428; L. Şăineanu, *Autorii români moderni* (Bucharest, 1891); Winifred Gordon, *Rumania* (1918); M. Beza, *Papers on the Rumanian People and Literature* (1920). Several of the stories cited above are contained in *Isvar* by Princess Bibesco. (M. BE.; A. BI.)

RUMELIA or **ROUMELIA,** a name used by the Turks to denote their possessions in the Balkans (Turkish *Rumili,* the land of the Romans, *i.e.,* Byzantines), particularly the ancient provinces, including Constantinople and Salonika, of Thrace and Macedonia; later particularized to denote the province composed of central Albania and western Macedonia. Eastern Rumelia (the present southern Bulgaria) became, by the Berlin Treaty of 1878, an autonomous province within the Turkish empire, but proclaimed its unity with Bulgaria on Sept. 18, 1885. (*See* BULGARIA).

RUMFORD, BENJAMIN THOMPSON, COUNT (1753–1814), British-American scientist, philanthropist and administrator, was born at Woburn (Mass.), on March 26, 1753. The Thompson family to which he belonged settled in New England about the middle of the previous century and were moderately wealthy farmers. At the age of 14 Benjamin was sufficiently advanced "in algebra, geometry, astronomy, and even the higher mathematics," to calculate a solar eclipse within four seconds of accuracy. In 1766 he was apprenticed to a storekeeper at Salem, in New England, and there occupied himself in chemical and mechanical experiments, and in engraving. At the outbreak of the American War when he was between 17 and 18 years of age he went to Boston, where he became assistant in another store. At 19 he married the widow of Col. Benjamin Rolfe, a woman possessed of considerable property, and his senior by 14 years.

This marriage was the foundation of his success. Soon after it he became acquainted with Governor Wentworth of New Hampshire, who conferred on him the majority of a local regiment of militia. As he was distrusted by friends of the American cause, it was considered prudent that he should seek an early opportunity to leave the country. On the evacuation of Boston by the royal troops, therefore, in 1776, Governor Wentworth sent him with despatches to England. On his arrival in London Lord George Germain, secretary of state, appointed him to a clerkship in his office. Within a few months he was advanced to the post of secretary of the province of Georgia, and in about four years under-secretary of state. He continued his scientific pursuits, however, and in 1779 was elected a fellow of the Royal Society. The explosive force of gunpowder, the construction of firearms, and a system of signalling at sea were subjects which particularly interested him. On the resignation of Lord North's administration, of which Lord George Germain was a member, he left the civil service, and was nominated to a cavalry command in the revolted provinces of America. But the War of Independence was practically at an end, and in 1783 he quitted active service, with the rank and half-pay of a lieutenant-colonel. He now decided to join the Austrian army, to campaign against the Turks. At Strassburg he was introduced to prince Maximilian, afterwards elector of Bavaria, and was by him invited to enter the civil and military service of that State. Having obtained leave of the British Government to accept the prince's offer, he received the honour of knighthood from George III., and remained at Munich 11 years as minister of war, minister of police, and grand chamberlain to the elector. During his stay in Bavaria he contributed a number of papers to the *Philosophical Transactions.* He reorganized the Bavarian army; he improved the condition of the industrial classes and he did much to suppress mendicity. In one day he had 2,600 beggars and depredators in Munich and its suburbs alone arrested and transferred to an industrial establishment which he prepared for them. In this institution they were housed and fed, and they not only supported themselves, but earned a surplus for the electoral revenues. The principle on which he acted is stated by him in the following words: "To make vicious and abandoned people happy, it has generally been supposed necessary first to make them virtuous. But why not reverse this

order? Why not make them happy, and then virtuous?"

In 1791 he was created a count of the Holy Roman Empire, and chose his title of Rumford from the name of the American township to which his wife's family belonged. In 1795 he visited England, where he lost all his private papers, including the materials for an autobiography. In London he applied himself to the discovery of methods for curing smoky chimneys and to improvements in fireplace construction. But he was quickly recalled to Bavaria, Munich being threatened at once by an Austrian and a French army. The elector fled, and it was entirely owing to Rumford that a hostile occupation of the city was prevented. It was now proposed that he should be Bavarian ambassador in London; but the fact that he was a British subject presented an insurmountable obstacle. He returned to England, however, as a private citizen.

In 1798 he presented to the Royal Society his "Enquiry concerning the Source of Heat which is excited by Friction," in which he combated the current view that heat was a material substance, and regarded it as a mode of motion. In 1799, he, with Sir Joseph Banks, projected the establishment of the Royal Institution. It received its charter from George III. in 1800, and Rumford selected Sir Humphry Davy as scientific lecturer there. He lived in London until 1804, when he went to Paris, marrying (his first wife having died in 1792) the wealthy widow of Lavoisier, the celebrated chemist. He separated from her eventually and took up his residence at Auteuil. He died there suddenly on August 21, 1814, in the 62nd year of his age.

Rumford was the founder and the first recipient of the Rumford medal of the Royal Society. He was also the founder of the Rumford medal of the American Academy of Arts and Sciences, and of the Rumford professorship in Harvard university. His complete works with a memoir by G. E. Ellis were published by the American Academy of Arts and Sciences in 1870–75.

RUMFORD FALLS, a manufacturing village of Oxford county, Maine, U.S.A., on the Androscoggin river, 60 m. N. of Portland; served by the Maine Central railroad. Pop. (1920) 7,016 (39% foreign-born white); 8,726 in 1930 by Federal census. Rumford Falls has the largest water-power east of Niagara; a hydro-electric station with an installed capacity (1928) of 42,000 h.p.; and large paper and paper-bag mills. The village was founded in 1893 as an industrial community.

RŪMĪ (1207–1273). Mohammed b. Mohammed b. Husain albalkhī, better known as Maulānā Jalāl-uddīn Rūmī (or simply Jalāl-uddīn), the greatest Sūfic poet of Persia, was born on Sept. 30, 1207 (604 A.H. 6th of Rabī' I.) at Balkh, in Khorāsān. His father was invited to Iconium (or Rum), and from this place Jalāl-uddīn took his pen-name.

Jalāl-uddīn founded the order of the Maulawī (Mevlevī) dervishes, famous for their piety as well as for their garb of mourning, their music and their mystic dance (samā), which is the outward representation of the circling movement of the spheres, and the inward symbol of the circling movement of the soul caused by the vibrations of a Sūfī's fervent love to God. Most of Rūmī's matchless odes were composed in honour of the Maulawī dervishes, and even his *opus magnum,* the *Mathnawī* (*Mesnevi*), or, as it is usually called, *The Spiritual Mathnawī* (*mathnawī-i-ma'nawī*), in six books with 30,000 to 40,000 double-rhymed verses, can be traced to the same source. The idea of this immense collection of ethical and moral precepts was first suggested to the poet by his favourite disciple Hasan, better known as Husām-uddīn, who in 1258 became Jalāl-uddīn's chief assistant. Jalāl-uddīn dictated to him, with a short interruption, the whole work during the remaining years of his life. Soon after its completion Jalāl-uddīn died, on Dec. 17, 1273.

Jalāl-uddīn's life is fully described in Shams-uddīn Ahmed Aflākī's *Manākib-ul 'ārifīn* (written between A.D. 1318 and 1353), the most important portions of which have been translated by J. W. Redhouse in the preface to his English metrical version of *The Mesnevī, Book the First* (London, 1881); there is also an abridged translation of the *Mathnawī,* with introduction on Sufism, by E. H. Whinfield (2nd ed., 1898). Complete editions have been printed in Bombay, Lucknow, Tabriz, Constantinople and in Bulaq (with a Turkish translation, 1268 A.H.), at the end of which a seventh daftar is added, the genuineness of which is refuted by a remark of Jalāl-uddīn himself in one of the Bodleian copies of the poem, Ouseley, 294 (f. 328*a seq.*). A revised edition was made by 'Abd-ullatīf between 1024 and 1032 A.H., and the same author's commentary on the *Mathnawī, Latā'if-ulma'nawī,* and his glossary, *Latā'if-allughāt,* have been lithographed in Cawnpore (1876) and Lucknow (1877) respectively, the latter under the title *Farhang-i-mathnawī.* For the other numerous commentaries and for further biographical and literary particulars of Jalāl-uddīn, *see* Rieu's *Cat. of the Persian MSS. of the Brit. Mus.,* vol. ii. p. 584 *seq.;* A. Sprenger's *Oudh* Cat., p. 489; Sir Gore Ouseley, *Notices of Persian Poets,* p. 112 *seq.;* H. Ethé, in *Morgenländische Studien* (Leipzig, 1870), p. 95 *seq.,* and in Geiger and Kuhn's *Grundriss der iranischen Philologie* (Stuttgart, 1896–1904), vol. ii. pp. 287–292. Selections from Jalāl-uddīn's diwan (often styled *Dīwān-i-Shams-i-Tabrīz*) are translated in German verse by V. von Rosenzweig (Vienna, 1838); into English by R. A. Nicholson (2nd ed., 1898) and W. Hastie (1903).

RUMINANTIA, a term employed by Cuvier to include all the artiodactyle ruminating ungulate mammals classed under the groups Pecora, Tylopoda, and Tragulina. (*See* ARTIODACTYLA, PECORA, TYLOPODA.)

RUMMY or **RUM** is a card game which is said to have originated in Texas. It is played on the same lines as Coon-Can (*q.v.*), the object being to form in one's hand sequences of three cards or more of the same suit, or to collect three or more of a kind such as three knaves, or four sevens. The game is played by three, four or five players. Two full packs, properly shuffled, are used. Seven cards are dealt, one at a time, to each player, and the top card of the stock is turned face upwards on the table. The player on the left of the dealer must either take up the exposed card into his hand, or take the top unexposed one from the stock. He then discards a card from his hand and places it, face upwards, on the top of, or in the place of, the exposed card, so that there is never more than one card exposed. The next player follows the same routine, and so it goes on round until someone calls "Rummy." Rummy is called when the counting cards, that is the cards in the caller's hand which do not form a sequence or three of a kind, count up to seven or less, court cards counting ten and an ace counting one. The figure seven seems rather high, but that is how it is played in England. Suppose that the seven cards dealt to a player are three knaves, the king of clubs, the seven and eight of spades, and the four of hearts. If he is lucky enough to pick up either the six or the nine of spades, he discards the king of clubs and he is left with a sequence in spades, three knaves, and the four of hearts, so he says "Rummy" at once.

Directly a player rummies that deal is finished, and all the hands are exposed and added up. A score has to be kept, and each player is debited with the amount of the counting cards in his hand, reckoned by pips. Court cards count ten each, aces one, and other cards their face value. Say that a player has in his hand two queens, three nines, and two fours, he would be debited with 28—ten each for the queens, and eight for the two fours; the three nines are free. When a player's score amounts to 100 he is out, but he has the right to buy himself in again at one point more than the next highest score.

Before commencing, each player contributes to the pool two counters, or units; the units may be given any value. When a player buys himself in he has to contribute three more units to the pool. Suppose a player goes over the 100, and the other three scores are 57, 76, and 82, he can buy himself in again at 83 by subscribing an additional three units to the pool. Besides this each player pays on every hand one unit for every completed ten; if his counting cards amount to 26 he pays two units, if they tot up to 41 he has to hand over four units, and so on. The players are reduced by elimination until there is only one left, and he takes the pool. (X.)

The United States.—In the United States it is played differently from the British game. It is most often played by two. Except in "double rum," only one pack is used; another pack is out of play, at the left of the second dealer to mark that fact. Ten cards are dealt in "double rum," seven cards are dealt to each of two players in rum, or six cards in case more than two play. On the opening play, beginning with the player at the dealer's left, each player in turn may accept the exposed card or decline it; if

all decline the exposed card, the eldest hand must accept it or draw from stock. No player can buy himself in again; the game terminates when one player scores 100 points, and a new game starts with all players in it.

Three or more of a kind or a sequence of at least three cards may be played as made or may be retained in the hand. Any player may add a fourth card to an exposed three of a kind or he may add a single card at a time to an open end of an exposed sequence. After the claim of "rum" or "down" has been made the remaining players may board all threes or fours of a kind held; also each player may board completed sequences or add cards to sequences exposed. The player left with the smallest count in his hand collects from each other player the net difference in score left in the hand. Unless game is made before the stock becomes exhausted a collection and redeal is made of all cards exposed on the table; the new stock is boarded and its top card is exposed.

Variations that may be played are: (1) A player able to board all his cards, in cards of a kind, in sequences, or by adding to boarded plays, scores 50 points bonus; if another player can also claim a "slam," the latter scores the 50 points, also 10 points from the former slam claimant; (2) the joker may be introduced and played as its holder wishes, either as a stop at one end of a sequence or as the fourth card of an exposed three of a kind; (3) a mistaken claim of ability to make any play adds 10 points to every other player's score. (E. V. S.)

RUNCIMAN, WALTER (1870–), British statesman, was born at South Shields Nov. 19, 1870, the son of Sir Walter Runciman (b. 1847) 1st Bart., a Newcastle shipowner. He was educated at Trinity College, Cambridge, and afterwards joined his father in his shipping business, being from 1896 to 1905 managing director of the Moor Line of cargo steamers. In 1898 he unsuccessfully contested Gravesend in the Liberal interest, but was elected for Oldham in 1899, although he only held the seat for a year. In 1902 he stood successfully for Dewsbury, and retained this seat until 1918. In 1905 he entered Campbell-Bannerman's Government as parliamentary secretary to the Local Government Board. He became financial secretary to the Treasury in 1907, president of the board of education in 1908, and was president of the board of agriculture from 1911 to 1914. From 1912–4 he was also commissioner of woods and forests, and from 1914–6 president of the board of trade. On the formation of Lloyd George's ministry in 1916 he retired from the Government. In 1920 he unsuccessfully contested North Edinburgh and in 1924 was returned for Swansea West. He was an active member of the Radical group formed within the Liberal party, and was thus opposed to the leadership of Lloyd George. (*See* LIBERAL PARTY.) Runciman was a director of the Westminster Bank, and owner of a group of periodicals, in addition to his shipping interests. In 1926–27 he was president of the Chamber of Shipping of the United Kingdom. He wrote *Liberalism as I see it* (1927).

RUNCORN, market town, urban district, river-port, Northwich parliamentary division, Cheshire, England, on the south of the estuary of the Mersey, 16 m. above Liverpool. Pop. (1931) 18,158. It is on the L.M.S. railway, and the Bridgewater canal (1773), which here descends into the Mersey by a flight of locks. Runcorn, being on the Manchester ship canal, is a subport of Manchester, and has extensive wharfage and warehouse accommodation. The chief exports are coal, salt and pitch; but there is also a large traffic in potters' materials. It is connected with Widnes by a railway and a transporter bridge. The town possesses shipbuilding yards, iron foundries, rope works, tanneries, soap and alkali and chemical works. As the Mersey is here fordable at low water, Runcorn was in early times of considerable importance. On a rock which formerly jutted into the Mersey Aethelfleda erected a castle in 916. The ferry is noticed in a charter in the 12th century.

RUNDALE, the name of a form of occupation of land, somewhat resembling the English "common field" system. The land is divided into discontinuous plots, and cultivated and occupied by a number of tenants to whom it is leased jointly. The system was common in Ireland, especially in the western counties. In Scotland, where the system also existed, it was termed "run-rig."

RUNEBERG, JOHAN LUDVIG (1804–1877), national poet of Finland, son of a sea-captain, was born at Jakobstad, on Feb. 5, 1804. He was educated at the University of Åbo and after its removal to Helsingfors, Runeberg became, in 1830, amanuensis to the council of the university. In 1831 his verse romance of Finnish life, *Grafven i Perrho* (The Grave in Perrho), received the small gold medal of the Swedish Academy, and the poet married Fredrika Charlotta Tengström, daughter of the archbishop of Finland. In the same year he was appointed university lecturer on Roman literature. In 1837 Runeberg accepted the chair of Latin at Borgå college, of which he was rector in 1847–50, and lived at Borgå for the rest of his life.

His two idylls, *Elgskyttarne* (The Elk-Hunters) and *Hanna* had won for him a place second only to Tegnér among the poets of Sweden. Later works are *Nadeschda* (1841); *Julqvällen* (1841); *Fänrik Ståls Sägner* (2 series, 1848 and 1860), patriotic poems on the war of independence of 1808; and *Kungarne pa Salamis* (1863), a tragedy. In 1844 he published the noble cycle of unrhymed verse romances derived from old Scandinavian legend and entitled *King Fjalar*. Runeberg died at Borgå on May 6, 1877. His writings were collected by C. R. Nyblom in six volumes in 1870, and his posthumous writings in three volumes (1878–79).

The poems of Runeberg show the influence of the Greeks and of Goethe upon his mind; but he possesses a great originality. It is hardly possible to over-estimate the value of his patriotic poems as a link between the Swedish and Finnish nations. He has remained one of the most popular poets writing in Swedish, although his whole life was spent in Finland.

An account of his life and works by C. R. Nyblom is prefixed to the *Samlade Skrifter* of 1870. For a minute criticism of Runeberg's principal poems, with translations, see Gosse's *Studies in the Literature of Northern Europe* (1879). A selection of his lyrical pieces was published in an English translation by Messrs. Magnusson & Palmer in 1878. There are also monographs on Runeberg by Dietrichson and Rancken (Stockholm, 1864), by Cygnäus (Helsingfors, 1873), by Ljunggren (Lund, 1882–83), Peschier (Stuttgart, 1881), and by W. Soderhjelm (Stockholm, 1904). A further edition of his *Samlade Skrifter* appeared in 1907.

RUNES, the oldest form of Germanic writing. This form of writing was in use in the Scandinavian North in the 3rd century, and in remote districts of Sweden almost down to our own times.



FIG. 1.—THE EARLIER RUNE-STAVES

During the first centuries of their vogue runes consisted of 24 letters: the so-called older or all-Germanic runic staves (fig. 1).



FROM L. F. A. WIMMER, "DIE RUNENSCHRIFT," (WEIDMANN)

FIG. 2.—THE VADSTENA BRAKTEA

Their peculiar forms appear first in inscriptions found all over Europe from Rumania and western Russia to the east of France and Friesland, but in greatest number in England and Scandinavia. Runes, which at first sight seem to betray derivation from the southern European alphabets, the Greek and the Latin, differ from these radically in their arrangement, as we may see from some inscriptions which use the runic staves in their entirety, the most important being the Kylver Stone in Gothland (5th century), the Vadstena *braktea* from Östergötland, Sweden (fig. 2), the Charnay clasp from eastern France and the Thames sword from southern England. Moreover every rune had its special name which we know through the oral traditions recorded in Anglo-Saxon manuscripts. The 24 runes were divided up into three groups of eight each, each group coming later to be called in Scandinavian an *ætt*, a word which probably meant "number of eight." The runic staves, at least at a later

period, were called *futhark*, after their initial letters.

As regards sound values, it may be mentioned that *th* was pronounced approximately as in the English *thing; d* like *th* in the English *this; g* had a sound corresponding to a fricative *d; b* in the same way, therefore corresponding to *b* in the Spanish *Habana;* ŋg like *ng* in *England* and *R,* finally, almost like *s* in the English *is.*

The oldest extant decipherable runic writings as to the origin of which we can speak with any certainty hail from discoveries in the bogland in south-western Denmark, Vi-mose in Fyn, and Torsbjaerg in Slesvig. Most archaeologists date the first-mentioned from the middle of the 3rd century, the second from the 4th. The inscriptions are few in number and brief. Those which can be deciphered contain one or two names of men. These earliest finds of runes in Denmark were supplemented by a whole series of others from the 4th, 5th and 6th centuries—inscriptions on single objects, arms, ornaments, and more especially gold *brakteas.* Archaeological research establishes the fact that south-western Denmark was really the cradle of the knowledge of runes, whence the use of runes spread to Norway and Sweden. It has been ascertained, moreover, that from Slesvig it made its way in the 5th century along the southern coast of the North Sea to England and the Continent.

If then Slesvig and Fyn are the original home of the runes in northern and western Europe, our next question is: did the runes originate in Denmark or were they imported from elsewhere? It has been established that a number of runes which are contemporaneous with the oldest of those found in the Danish bogland have been discovered along a line of country passing through Pomerania, Brandenburg, Volhynia and Rumania. Moreover these discoveries include archaic objects the primary forms of which do not hail from western Europe but are found in south-eastern Europe, on the northern coast of the Black Sea and along the lower Danube. From this fact the Swedish archaeologist, B. Salin, drew the conclusion a quarter of a century ago that the runes came to Scandinavia from south-eastern Europe. The eastern European runes are certainly Gothic in part, and it is certain that runes were known and used among the Goths in the first half of the 4th century, because Ulfilas, the Apostle of the Goths, constructed his Gothic writing on the basis of runes. It may be added that in the 3rd and 4th centuries there is no trace of the existence of runes in the western Teutonic world, *i.e.,* south-west of the line Slesvig, Berlin, Bukarest.

This signifies that the runes originated with the Goths in south-eastern Europe, in a milieu, therefore, in immediate touch with Greek and Latin culture. Greek was the prevailing language along the lower Danube; Latin was the language of the Roman forces and colonists. Archaeological and historical discoveries indicate, therefore, that the runes had their source in one or other of the classical alphabets—or in both.

It remains to consider what the runes themselves have to tell about their origin. The Dane, L. Wimmer, has made it clear paleographically that they are derived from classical writing. It has been demonstrated by him that the runes have the same signs for the vowels *a, e, o,* as the Greek and Latin alphabets, but these letters in the Latin are the result of a Greek modification of the Semitic guttural signs. Wimmer has demonstrated, too, once for all, that at least the runes for *f, h,* and *r,* derive from the Latin alphabet. As quite a number of runes like *a, i, b, t, m* and *n,* may be traced typographically to the Greek and Latin alphabets, and as it undoubtedly would be natural to seek the source of the runes in a single alphabet, Wimmer seeks to trace all the runes back to Latin. In so seeking, however, he has been forced into assumptions and deductions which must be regarded as improbable and irrational. In February 1928, the Norwegian, C. J. S. Marstrander, in a very weighty treatise, seeks to show that the runes derive from a late Northern Etruscan alphabet, most of the letters of which were made up out of the Latin but which in regard to sounds, not to be found in the Latin, preserved a number of Northern Etruscan letters. This alphabet was in use at the beginning of our era in the region of the eastern Alps among Celtic tribes and it was through intercourse with these that the Teutons, probably the Marcomanni who lived in Bohemia, created the runes. Certain runes are more easily and naturally explained in the light of Marstrander's paper than in that of any other interpretation that has been put forward, but on the other hand new difficulties present themselves in regard to other runes. Archaeological and chronological facts seem also hard to reconcile with Marstrander's hypothesis. He has promised us a more exhaustive treatise on certain questions bearing upon the

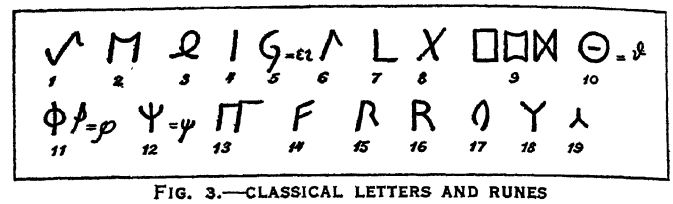


FIG. 3.—CLASSICAL LETTERS AND RUNES

problem. Until this is available, or at all events until Marstrander's hypothesis can be examined thoroughly, the theory regarding the origin of the runes put forward in 1904 by von Friesen along the following lines may be accepted.

We have just noted that certain runes may safely be said to derive from Latin letters. On the other hand the runes possess certain characteristic features which are in agreement with the Greek alphabet. These are: (a) the phonetic signs in both alphabetical systems number 24, which in view of the use of the runes for magical purposes has acquired its special significance. The Latin alphabet consisted originally of 21 letters, afterwards, when *y* and *z* were adopted from the Greek, of 23; (b) the use in the runes of a special sign for ŋg points directly to the Greek indication of ŋg by γγ; (c) every rune has its special name, an arrangement which seems to be inspired by the peculiar Greek names inherited from the Semitic alphabet, *alpha, beta, gamma,* etc. The Latin letters, on the contrary, were called in classic times as they are now *a, be, ce, de,* etc.

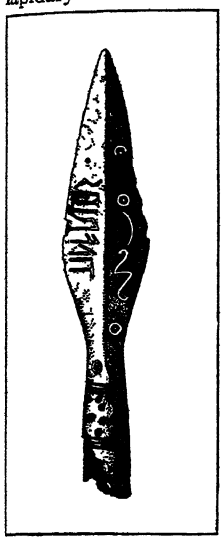
In addition we come upon a question of phonetic nature. Like the early Germanic, the Gothic language was specially notable for its wealth in spirant sounds such as *th* in the English *thing* and *this, ch* in the German *auch, g* in the German *tage, b* in the Spanish *Habana.* Hardly any sounds of this kind are to be met with in the later Latin of Imperial Rome except *f* and *s,* while Greek at this period possessed in addition both *th* and *ch.*

A comparison between the runes and the ordinary cursive form of the Greek alphabet gives us a number of concordances which can scarcely be attributed to chance. The Greek cursive alphabet has two forms of *e* (fig. 3, 1 and 2), the runes also have two forms: a Greek form of *o* (fig. 3, 3), which accords with the runic *o.* In the Greek is found a consonant *i*-sound which is written as fig. 3, 4 or fig. 3, 5, which latter form accords with the runic *j.* Also in the formation of other consonants we find the runic letters in remarkable accord with the Greek: the runic *l* accords with the Greek, fig. 3, 6 (compare the Latin fig. 3, 7); the runic *g,* with the sound value *ch* and *g* (ʒ), accords with the Greek (fig. 3, 8) *ch;* the runic (fig. 3, 9) *th* in the English *this* with the Greek (fig. 3, 10). In other cases we find in the runes forms which are identical with the Greek but with different sound values: the runic form for *th* in the English *thing* accords with the Greek, fig. 3, 11 (f); the runic form for *R* or *z* (in the English *is*) accords with the Greek (fig. 3, 12). Finally the runic form for ŋg clearly derives from the Greek (fig. 3, 13) except for the symmetrical stylization usual in the formation of the runes.

These numerous resemblances between the runes and the Greek letters can scarcely be the result of chance. The concordance between the runes and the Greek cursive writing is particularly striking and, significantly, the runes which have their source in the Latin also in many cases derive clearly from the cursive form: the runic *f* is stylized Latin cursive (fig. 3, 14), and the runic *r* is always open in its middle part like the Latin cursive (fig. 3, 15), while the Latin uncial and lapidary *r* (fig. 3, 16) is closed. The runic for *u* also seems to come from the Latin cursive *o* (fig. 3, 17).

The close relationship between the runes and the classic cursive handwriting—the ordinary handwriting used in everyday life and also by less cultured people—indicates that the art of writing

did not come to the Goths by the way of scholarship. Some individual Goths—mercenaries, for instance—from the north-western coast of the Black Sea, in the course of visits to the Roman provinces, learnt Greek and Latin and the Greek and Latin forms of writing used in state edicts and in private life. They acquired in addition an imperfect acquaintance with the lapidary and uncial style which was the basis for the ordinary cursive handwriting, wherefore some forms of the better style occasionally appear. Such a Goth or several such Goths working together, undertook to write out the Gothic language on the basis of the knowledge of Latin and Greek writing thus acquired. The result of these efforts is the runic stave.



FROM L. F. A. WIMMER, "DIE RUNENSCHRIFT" (WEIDMANN)

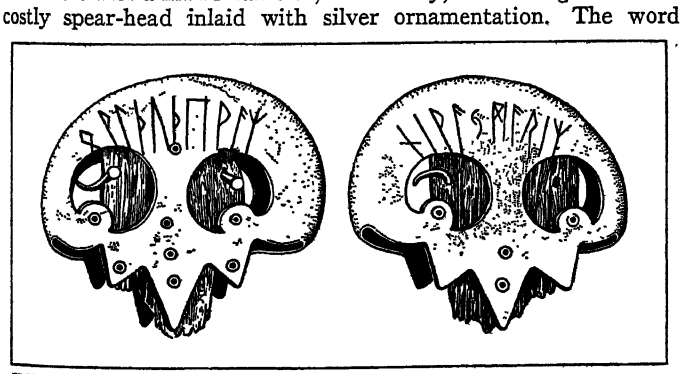
FIG. 4.—THE KOVEL SPEAR-HEAD

Like the letters of the classic alphabet, runes soon came to be used for purposes of magic, a use which continued for a long time. But that the chief purpose of the runes was to give the spoken language a fixed form is demonstrated at an early date by the fact that Ulfilas built up his Gothic letters upon runes, which even before his time had solved the difficult problem of representing the Gothic phonetic system by the use of classic letters.

Removed from the sphere of classical culture, the runic writing soon came to be used chiefly for inscriptions: it was carved or cut on wood, metal or stone. In the process the individual letters began to undergo a certain kind of symmetrical stylization or conventionalization which gave them a substantially different appearance from that of their classic prototypes, and, probably, in connection with this the runes came to be put in an order entirely different from that of the classic alphabets.

From the region of the Black Sea the knowledge of runes soon spread to distant corners of the great dominion which the Goths established in the 3rd and 4th centuries between the Black Sea and the Baltic, and in the middle of the 3rd century we begin to find single objects with runic inscriptions on them in Gothland, Denmark and Norway.

Between the Black Sea and the Baltic we find at the same period runic letters in the Gothic language as on the spear-head from Kovel in Volhynia (fig. 4). On this may be read *tilarids*, which is either a man's name or, more likely, the name given to the costly spear-head inlaid with silver ornamentation. The word



FROM L. F. A. WIMMER, "DIE RUNENSCHRIFT," (WEIDMANN)

FIG. 5.—THE THORSBJAERG CHAPE

means "the one which reaches the goal," and it may have some magical significance.

Of the same period are certain Scandinavian discoveries of runes, among them the Thorsbjaerg chape from Slesvig (fig. 5) which bears the inscription *owlthuthewaR niwajmariR;* this is probably the names of two men, *Wulthu-thewaR* and *NiujamariR*, both names being of the familiar old Germanic double-jointed type.

It has already been pointed out that Slesvig and Fyn constituted a cradle for the runes during the Roman iron age and the earlier portion of the transmigration era (A.D. 250–450). There are many signs that runic writing was brought hither from the Black Sea by the Heruli, a people who play an important part in the history of the transmigration period and who seem to have had their origin in Denmark. Slesvig in those early days and until well into the middle ages was of primary importance for the intercommunication and exchange of merchandise between the Baltic regions on the one side and Western and Southern Europe on the other. In particular Slesvig had been long the traffic-route from the Rhineland and England up to the Scandinavian North. Regular communication by sea round Skagen and by the Skagarack and Kattegatt into the Baltic did not begin until the 13th century.

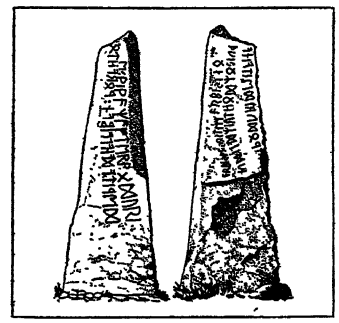


FROM S. MÜLLER, "NORDISCHE ALTERTUMSKUNDE" (WALTER DE GRUYTER & CO.)

FIG. 6.—THE GALLEHUS INSCRIPTION

A remarkable runic inscription found in Slesvig is that on a golden horn from Gallehus (fig. 6), which dates from the beginning of the 5th century. It reads: *ek hlewagastiR holtijaR horna tawido*—"THlewagast from Holt made the horn." There are altogether about a dozen inscriptions on loose objects, also inscriptions of the older type as well as about 40 runic *brakteas* dating from between the 3rd and 6th centuries, which were found in Danish soil.

At a very early period—some time in the 3rd century—runic writing had spread from Denmark into Norway. Here as early as the 4th century the custom had begun of fitting stone monuments with runic inscriptions. One of the finest and longest inscriptions is that of the Tune stone from South-Eastern Norway (fig. 7). It would seem to date from the earlier half of the 5th century and reads: (*wiwa*)*R* (*?*) *woduride staina* (*satido*) *thrijoR dohtriR da*(*i*)*lidun arbija si*(*bi*)*josteR arbijano, ek wiwaR after woduride wita*(*n*)-*dahalaiban worahto*(*runoR*), which apparently may be translated: "Viv (?) raised this stone to Vodurid. Three daughters shared the inheritance as nearest of kin among his survivors. But I, Viv, engraved the runes to my master (=breadgiver, *cf.* the English *lord*) Vodurid."



FROM L. F. A. WIMMER "DIE RUNENSCHRIFT," (WEIDMANN)

FIG. 7.—THE TUNE STONE, SOUTH-EASTERN NORWAY

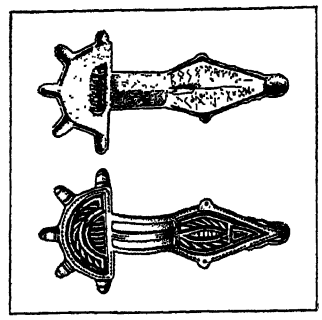
In Norway the older runic staves had a relatively wide vogue: from the period A.D. 250 to A.D. 800 there are extant, in addition to 10 *brakteas* with runic inscriptions, about 50 inscriptions, mostly on erected stones or stones inserted in tumuli but also on loose objects.



FIG. 8.—THE BJORKETORP INSCRIPTION

But the runes moved from south-western Denmark also up the Baltic. Here, as one might expect, the ancient centre for trade and intercourse in Northern Europe, the island of Gothland became also a region in which the older runic staves continued to be written throughout the entire period, though not to such an extent as in Norway. We find the runic inscriptions more sparsely on the mainland of Sweden—in Uppland, Södermanland and Östergötland. They are more frequent in Västergötland. In all about 20 runic inscriptions from the transmigration period have been found in Sweden, as well as a few runic *brakteas*. Of special note among them are the late (7th century) inscriptions from the most western parts of Blekinge which show a continuation of the

development of the runic letters which took place in south-western Norway, so rich in runes, during the early and middle periods of the transmigration era. Probably these inscriptions also came from Norwegian immigrants. The best preserved specimen is the Bjorketorp stone (fig. 8) which has its place in a fine stone setting and bears inscriptions on both its sides: *uthArAbAsbA* = ruin-bringing prophecy, and *hAid runo ronu fAlAhAk hAd(e)rA ginarunAR ArAgeu hAerAmAlAusR uti AR welAdAude sAR thAt bArutR* = "This is the secret meaning of the runes; I hid here power-runes, undisturbed by evil witchcraft. In exile shall he die by means of magic art who destroys this monument." The inscription constitutes, therefore, a magical protection for the fine stone setting.



AARBOGER FOR NORDISK OLDKYNSIGHED OG HISTORIE (DUKONGELIGE NORDISKE)

FIG. 9.—THE FREILAUBERSHEIM BROOCH

Of these Blekinge Stones the runic *k* has the form, fig. 3, 18, which about the year 500 was developed in Norway, while at the same time the form, fig. 3, 19, appears in Denmark, a form which proceeds thence to England.

For in the 5th century the runes went to the Germanic Continent and to England from South-Western Denmark. On the continent, where the runic *k* retains its original form, there have been found inscriptions from the Rhine Province, Hesse, Nassau, Thüringen, Württemberg, Bavaria, Austria, as well as in Charnay, the old Burgundian Kingdom in Eastern France, in what is now the *département* of Saône et Loire. These inscriptions are few and, like the Danish ones, all inscribed on loose objects, and they are not long. They are all held to belong to the period A.D. 450–550. As an illustration may be instanced the inscription on the clasp from Freilaubersheim in Rhenish Hesse (fig. 9): *boso wraet run-ath(i)k dalina godd(a)*, which means: "Boso wrote the runes—to thee, Dallina, he gave (the clasp)."

If this knowledge of runes constituted merely a brief episode on the western Germanic continent, it flourished for five centuries in England. The Anglo-Saxon rune staves like the continental-Germanic, have two cross-strokes in the letter *h*, differ from it in the form of the *k*, and from the Scandinavian and Eastern-Germanic, as well as from the Continental-Germanic runes with their 24 letters, in this, that new letters are created to render the most important novelties in the rich Anglo-Friese vowel system. Later there were added also new consonant letters. The beginning of this development of the system of letters had been already effected on the southern portion of the coast of the North Sea in Friesland, where, in the Holland of to-day, may be seen inscriptions belonging to the end of the 5th century and to the 6th with new runic letters for *a-* and *o-* sounds. In England there developed a runic stave with 28 letters in it (fig. 10) and in the 9th century the number increased to 33.

In England there are extant about 50 runic inscriptions upon loose objects and upon raised stones (stone crosses). Among the most remarkable and also the best preserved are those which are carved on a casket made of whalebone, the so-called Frank's casket

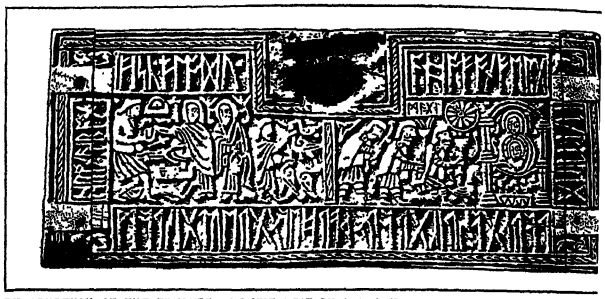


FIG. 10.—THE EARLIER ANGLO-SAXON RUNES

(fig. 11). The inscriptions together with illustrations from Biblical history and from Roman and Germanic legends cover the sides of the casket and the lid and are held to be not later than about A.D. 650. The inscription on one side reads: *hronæs ban fisk flodu ahof on fergenberig warth gasrik grorn thær on greut giswom*, which means: "The whalebone (is this). The flood threw the fish on the firm rock. The monster (?) was stranded on the stone in agony."

Here may also be reproduced the younger 33 lettered Anglo-Saxon runic stave (fig. 12), out of the Cod. Cotton. Otho I in the British Museum, a manuscript which gives the runic r of oldest date.

In England the runes persisted throughout the entire A Saxon period. The most remarkable monuments from times are the two celebrated runic crosses from Bewcastl Ruthwell on the Anglo-Scottish border.



BY COURTESY OF THE TRUSTEES OF THE BRITISH MUSEUM

FIG. 11.—FRANK'S CASKET

Thanks to the tradition kept alive in England from a times and also to the fact that the names borrowed by from the runes to render Gothic letters are to be seen manuscript (not, indeed, in an unchanged state) preserved National Museum at Vienna, we are able to reconstru proximately the name which every runic letter seems to borne from the commencement. Younger traditions handed in Scandinavia are also of value although the later pec

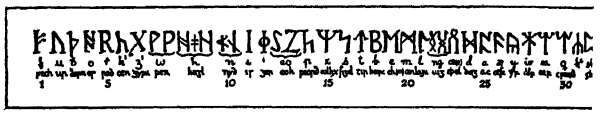


FIG. 12.—THE LATER ANGLO-SAXON RUNES

Northern runic staves contained only 16 letters and the na 8 letters therefore have been lost. In the first column bel given the Anglo-Saxon names of runic letters, in the seco Scandinavian and in the third the Gothic names reconstruc

f	*feh,*	money	*fé, fa*	goods	*faih* fe
u	*úr*	aurochs	*úrr*	aurochs	*urus*
th	*thorn*	thorn	*thurs*	giant	*thau*
a	*ós*	god	*óss*	god	*ansi*
r	*rád*	ride	*reið*	journey	*raid*
k	*cán*	torch	*kaun*	ab oil	*kau*
g	*geofu*	gift			*giba*
w	*wynn*	joy			*win*
h	*hægl*	hail	*hagl*	hail	*hagl*
n	*nied*	need	*nauð*	need	*nau*
i	*is*	ice	*íss*	ice	*eis*
j	*géar*	year	*aar*	year, harvest	*jer*
e	*éoh* = *éow*	yew-tree	*ýr*	small fir, bow	*eiw*
p	*peorð*	?			*pai*
z	*eolhs*	?	*elgr*	elk	*alg*
s	*sygil*	sun	*sol*	sun	*sau*
t	*tír*	honour	*tyr*	god	*tei*
b	*beorc*	birch	*biarkan*	birch-seed	*bai*
e	*eoh*	horse			*aih*
m	*man*	human being	*maðr*	human being	*ma*
l	*lagu*	water, sea	*legr*	liquid	*lag*
—	*Ing*	a hero			*Igg*
o	*éðel*	inheritance			*oth*
d	*dæg*	day			*dag*

Thus the great modification of the Germanic sound caused by vowel-mutation, by breaking and by other in sound during the transmigration period resulted in a c able enlargement of the runic alphabet in England. In navia, it is curious to note, the same linguistic developm duced a directly opposite result: the number of the ru reduced from 24 to 16. And this, although the Scand stock of sounds reached 30 or 40 during the later transm period. The explanation of this would seem to lie in t that, while the original 24 runes covered adequately the c manic sounds, it became the habit later, as the result of crease in the sound-system, to represent different sounds

same runic letter. This brought about the simplifying of the alphabet: when a single runic letter could be used to render several sounds, many of the old letters became superfluous. Simultaneously the formation of many of the runes was simplified. This twofold reduction of numbers and forms began in Scandinavia as far back as the 6th century, and at the beginning of the Viking era this had resulted in a special 16 letter Scandinavian alphabet. This alphabet appears in two distinct forms, the one
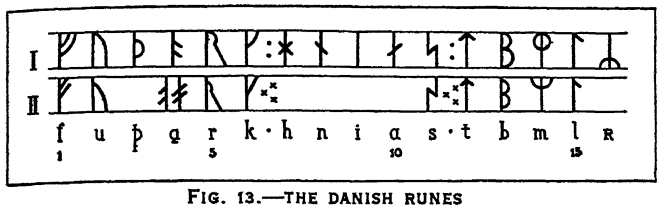


FIG. 13.—THE DANISH RUNES

Danish (fig. 13), the other Swedish-Norwegian (fig. 14). The Danish was used also in South-western Sweden.

In Denmark runes seem to have been very little used after the close of the 6th century, and the form of the runic *k*, as well as other details, indicates that it was through an impulse from Norway or Sweden that runes came into use again in Denmark at the close of the 8th century. About 200 inscriptions upon raised stones are extant, as well as a few upon loose objects. Most of these inscriptions date from between A.D. 800 and the middle of the 11th century. Despite their laconic and often stereotyped wording, they are among the most remarkable, both as regards style and matter, that have been found in Scandinavia. They give us the names of several hundred men and women who lived in Denmark during this important period, from members of the Royal house down to the lower grades of society, and they provide us with data for visualizing the life of the people and of individuals in war and peace.

The runic monuments which date from the beginning of this period are few in number. One of the oldest and most remarkable inscriptions with runes of the later period is the Helnæs stone at Fyn (fig. 15): *rhuulfR sati stain nuRa kuthi aft kuthumut bruthur sunu sin turuknathu (haliR uti) ouaiR fathi.* If it were written in a more adequate phonetic alphabet, *e.g.*, *ð* the Early Norwegian Icelandic alphabet which includes ð, this inscription would have run: *"HrólfR setti stein, NóRa goði, aft Guðmund bróð urusunu sinn drunknaðu haliR uti. ÁveiR fáði;* which means: "Rolf raised this stone, priest and chieftain of the Helnæs dwellers, in memory of his brother's son, Gudmund. The men were drowned at sea. Aveir wrote (the runes)."

From the earlier half of the 10th century we have the smaller of the two famous Royal Stones of Jällinge in Jutland (fig. 16): *kurmR kunu(n)kR karthi ku(m)bl thusi aft thurui kunu sina tannarkaR but;* which means: "King Gorm made this monument

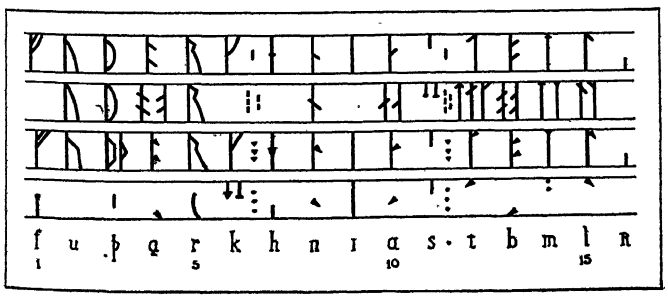
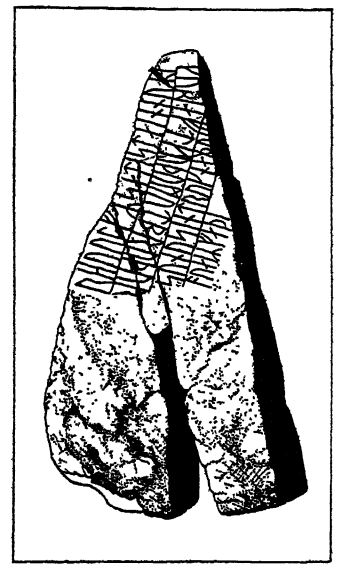


FIG. 14.—THE SWEDISH-NORWEGIAN RUNES

in memory of his wife, Tyra: he (Gorm) who improved Denmark."

The great majority of Denmark's 200 runic stones date, however, from the end of the 10th and the beginning of the 11th centuries. It was the period when the Vikings' raids on England were renewed, resulting at last in the conquest of the country by the Danish King Sven Twybeard, who is mentioned in two of the runic inscriptions, and Canute the Great. The relations between Denmark and England are reflected in the history of the runic inscriptions inasmuch as it was probably due to influence by the Anglo-Saxon runes that the Danish alphabet now began to be enlarged by so-called pointed runes, *see* page 664.

From Denmark the Danish runes spread about A.D. 1000 to Sweden where runic inscriptions on raised stones became more numerous than anywhere else in the world. There are known in Sweden about 2,400 runic inscriptions, chiefly from the 11th century and the beginning of the 12th, the majority of them written in Danish runes. No fewer than half of them belong to the central region of the kingdom, Uppland. These monuments enable us to follow the upward course of the Danish runes through Sweden from Skåne and Västergötland to the southern part of Norrland, and it can be noted that the inscriptions in the south are, on an average, of earlier date than those in the north. The custom of erecting runic stones was not long-lived anywhere. Generally speaking, it was abandoned whenever a region became definitely Christianized and controlled by the Catholic Church, but it seems to have had a vigorous final revival during the missionary period. The course of the spread of Christianity throughout Sweden during the 11th century —beginning in the south and proceeding to the north—is therefore traceable in a special way in the appearance of the runic stones. From the beginning runic stones were erected for the most part in the graveyard of the villages, and one principal reason for giving up the custom of erecting them must have been that with the spread of Christianity the dead had to be buried in the cemetery adjoining the parish church, often at a distance from the home. Thereby monuments lost much of their interest for the survivors. In Uppland, more especially, the runic inscriptions were accompanied by cleverly executed ornamental design, the patterns of which were taken from wood-cuts—the art of wood-cuts having been highly developed during the transmigration and Viking periods. Not merely the runes themselves but also these ornamental designs needed craftsmanship, therefore, and we find that many runic inscriptions are executed by expert craftsmen.



FROM L. F. A. WIMMER, "DIE RUNENSCHRIFT" (WEIDMANN)

FIG. 15.—THE HELNÆS STONE

The oldest and most remarkable (about A.D. 1025–1050) of these Uppland professional writers of runes was Asmund. He is probably identical with Osmundus, who is mentioned by the Bremen ecclesiastical historian, Adam. Osmundus was one of the Englishmen of Scandinavian origin who prepared the way in Sweden for the conquest of Christianity. Other talented masters of the art were Fot and Öpir. Asmund's stones record the names of a number of Swedes who took part in Canute the Great's conquest of England. On the Ängeby Stone (fig. 17), one of Asmund's inscriptions reads as follows: *rahnfriþr lit risa stain thina aftiR biurn sun thaiRa kitilmuntaR. kuþ hialbi hans ant aukuths muthiR. hon fil a uirlanti. in osmuntr markathi.* This means: "Ragnfrid had this stone erected in memory of Björn, her and Kättilmund's son. God and God's Mother help his soul! He fell in Estland. But Asmund engraved (the Stone)."



FROM L. F. A. WIMMER, "DE DANSKE RUNEMINDESMAERKE" (GYLDENDALSKE BOGHANDEL)

FIG. 16.—THE EARLIER JÄLLINGE STONE

When the reduction of the runic alphabet from 24 letters to

16 came about, the simplifying of the individual letters was carried furthest in the Swedish-Norwegian runes. These are to be found in Gothland, in eastern Götaland, in Svealand, and in Norway, dating from the beginning of the Viking era, about A.D. 800. As we have just seen, they are displaced on monuments by the Danish runes in the beginning of the 11th century in Sweden, but many circumstances indicate that even after this period they are used for more private purposes. Comparatively few runic monuments have Swedish-Norwegian runes on them but among these few must be mentioned the largest and most original of all, the Rök-Stone (fig. 18). The top and the four sides are covered with runes. The older forms of runes are also used together with different kinds of secret writing.

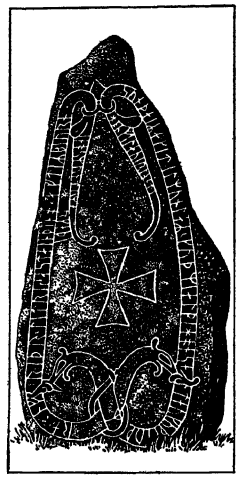


FIG. 17.—THE ENGEBY STONE

The stone was erected by a father in memory of his son and the inscriptions would seem to have in some degree magical purpose: to wreak vengeance on the son's slayers. The beginning of the inscription reads: *aft uamuth stonta runaR thaR in uarin fathi fathiR aft faikion sunu;* which means: "In memory of Vämod stand these runes. And Varin, the father, made them in memory of his son, overtaken by death."

The Swedish-Norwegian runes take an original form in Sweden. From the start they are characterized by a great reduction in the length of the cross-strokes. In order to reduce as much as possible the length of the stroke whether written or incised also, the vertical strokes were as far as possible done away with.

Thus came into existence the so-called Hälsinge Runes (fig. 19), named after the region of Hälsingland, in which they have been found inscribed on a number of rune-stones dating from the 11th century. It is, however, now established that they were known and used in the central region of Sweden adjoining Lake Mälar, where very likely they were invented. The Hälsinge Runes are a kind of runic shorthand and they give us a clear indication that runes were widely used not merely on monuments but for all kinds of announcements: legal provisions, contracts, genealogies, poems, etc. The abbreviated form of the Hälsinge Runes is clearly due to the need of saving time, trouble and material.

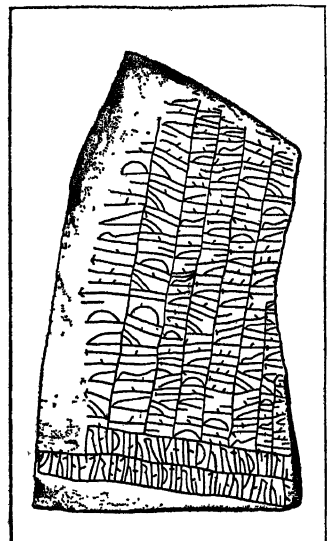


FIG. 18.—THE RÖK STONE SEEN FROM THE FRONT

In Norway there appeared in the 11th century a peculiar mixture of Swedish-Norwegian and Danish runes, which later led to an extension of the 16 letter alphabet to one better adapted to the northern sounds-system—the pointed runes. The Danes probably got the idea from England at the close of the 10th century. The Anglo-Saxon rune for *y* was a *u* inside which an *i* was written. This rune is to be met with in Denmark before the year A.D. 1000, and after this model there was constructed out of the *i* a special letter for *e* and out of the *k* a special letter for *g*. These new letters are used generally in the Danish runes during the 11th century, although not consistently. When the Danish and Swedish-Norwegian alphabet came to be blended during the 11th century in Norway, it would seem that towards the close of the century means were found to employ the wealth of letters thus produced to form a systematic representation of all the sounds in the language. The Latin alphabet, which had come into use with the introduction of Christianity, must have been of service in the construction of this radical improvement of the runes as equivalent for sounds. Thus came into existence the completed pointed runic alphabet (fig. 20).

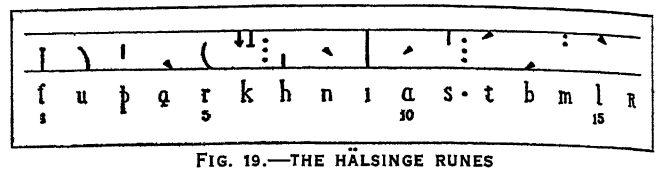


FIG. 19.—THE HÄLSINGE RUNES

Only in Gothland was the completed runic stave used to any great extent for inscriptions on monuments. But here and there in other parts of Scandinavia single monuments are to be found with inscriptions on them in the pointed runes. In Gothland there are about 250 erected stones adjacent to the churches and also out in the country parts, and the custom of raising such monuments persisted until much later. Gothland, moreover, had to begin with its own pointed runic alphabet, built up on the basis of the Danish runes alone. This was displaced later by the pointed runic alphabet in general use in Scandinavia.

The pointed runes were generally known and used in the whole of the Scandinavian North throughout the Middle Ages as the writing of cultured laymen. They were mainly used for private records. We possess a Danish legal manuscript, *Codex runicus*,



FIG. 20.—THE COMPLETED POINTED RUNIC ALPHABET

written in runes, dating from the end of the 13th century. There is extant, too, a prayer-book of later date, which is evidently intended also for a layman not familiar with Latin. St. Bridget, who was a member of a Swedish family of nobles, spells Swedish, when she comes to acquire the use of the Latin alphabet, in the way in which she learnt as a child with runic letters. There is evidence of the use of runes in Gothland as late as the 17th century though they were widely reinforced by Latin letters.

Runes were kept up longer than elsewhere in outlying Swedish regions like Dalarna and Härjedalen, where they were used for making occasional notes down to our own times. (O. v. F.)

BIBLIOGRAPHY.—Wilhelm Grimm, *Ueber deutsche Runen* (Göttingen, 1821); G. Stephens, *The Old Northern Runic Monuments of Scandinavia and England* (4 vols., Copenhagen, 1866–1901), and *Handbook of Runic Monuments* (1884); Cleesby and Vigfussen, *Icelandic-English Dictionary* (Oxford, 1874); Ludwig F. A. Wimmer, *Runenskriftens oprindelsc og udvikling i Norden* (Copenhagen, 1874), *Die Runenschrift* (Berlin, 1887), and *De Danske Runernindesmarker* (4 vols., Copenhagen, 1893–1908), abridged edition (1 vol., Copenhagen, 1914); I. Taylor, *Greeks and Goths: a Study on the Runes* (1879); Sophus Bugge, *Tolkning of runeindskriften på Rökoåstenen i Öster-Götland* (Stockholm, 1878), *Norges Indskriften med de aeldre Runer* (2 vols., Christiana, 1891–1913), and *Norges Indskriften med de yngre Runer* (Christiana, 1902); Fritz Burg, *Die älteren nordischen Runeninschriften* (1885); R. Henning, *Die deutschen Runendenkmäler* (Strasburg, 1889); Olsen, *Runerae i den oldislandske Literatur* (Christiana, 1891); W. Victor, *Die northumbrischen Runensteine* (Marburg, 1895); O. von Friesen, *Orn runerindskriftens närkomst* (in prep., Uppsala, 1904 *et seq.*), and *Upplands Runstenar* (Uppsala, 1913); P. C. M. Kermode, *Manx Crosses* (1907); Bruce Dickens, *Runic and Heroic Poems of the Old Teutonic Peoples* (1915); M. Tunkovič, *Slavische Runendenkmäler* (Starosloxan, 1915); O. Hupp, *Runen und Hakenkreuz* (Munich, 1921); A. Jóhanesson, *Grammatik der urnordischen Runeninschriften* (Heidelberg, 1923); E. Brate, *Södermanlands Runerskrifter* (Stockholm, 1924). *See* also Hermann Paul's *Grundriss der germanischen Philologie*, vol. i. (2nd edn., Strasburg, 1901) for Sievers' "*Runen und Runeninschriften*" and vol. iv. (3rd edn., Strasburg, 1913) for Norein's treatise on the grammar of Norse runes, and the *Catalogue of Runic Literature forming part of the Icelandic Collection* at Cornell University (Ithaca, N.Y., 1918).

RUNGE, CARL DAVID TOLMÉ (1856–1927), German mathematician and scientist, was born at Bremen on Aug. 30, 1856. He studied at Munich and Berlin. In 1883 he was appointed "privat-dozent" in Berlin, and in 1886 he became professor

of mathematics at the Technical High school, Hanover. He held the post of professor of applied mathematics at Göttingen until he retired in 1924. Runge died on Jan. 3, 1927. His early work was on the theory of functions and algebra, and showed the influence of Weierstrass and Kronecker. Later he devoted himself to the practical applications of his subject; he devised graphical methods, solutions of differential equations and Fourier analyses which were useful to engineers. His work with Kayser on spectral series is well known. Runge investigated the magnetic resolution of spectrum lines, the flame and spark spectrum of radium, and with Paschen designed a mounting for a concave grating.

He is the author of *Theorie und Praxis der Reihen* (1904); *Graphical Methods* (1912, etc.); *Vektoranalysis* (1919).

RUNNIMEDE or **RUNNYMEDE,** a meadow on the south bank of the river Thames, England, in the county of Surrey and the parish of Egham. It is celebrated in connection with the signing of Magna Carta by King John on June 15, 1215. It has been disputed whether the ceremony took place actually in the meadow or on Magna Carta or Charter island lying off it. The charter itself indicates Runnimede by name, but this may have included the island, which is the traditional site and was in 1217 the meeting-place of Henry III. and Louis of France.

RUNNING. The most primitive form of athletic exercise considered as a sport, running has been in vogue from the earliest times, and the simple foot-race (*δρόμος*) run straight away from starting point to goal, or once over the course of the stadium (a little over 200yds.), formed an event in the Greek Olympic pentathlon, or quintuple contest (*see* GAMES, CLASSICAL). There was also the race once over the course and return (*δίαυλος*) and the *δόλιχος*, a long race run many times (often as many as 12; *i.e.*, about 2¾m.) up and down the stadium. There was also the *δρόμος ὁπλιτῶν*, a short race for warriors, who wore full armour and carried sword and shield. Except in the warriors' race, the Greek runners were naked, save occasionally for a pair of light shoes. No records of the times returned have been handed down, but the contests must have been very severe since the ancient Olympic chronicles preserve the memory of several men who fell dead at the end of the long course. According to Virgil (*Aen.* V. 286 *et seq.*) running was practised in circus exhibitions in ancient Italy.

The best runners in the middle ages were most often found among the couriers maintained by potentates and municipalities. The Peichs, or Persian couriers, of the Turkish sultans, often ran from Constantinople to Adrianople and back, a distance of about 220m., in two days and nights. In districts of India and Africa not traversed by railways, native runners are still employed to carry the mails.

In all parts of Great Britain track, road and cross-country running have been popular forms of recreation for many centuries. To-day, however, practically all the sprint records are held by Americans, while many of those for the middle distances stand to the credit of Scandinavian or Continental athletes and all previous figures at distances from 30 to 100m. have been eclipsed by the 40-year-old South African farmer, Arthur Newton.

Running at the present day is divided into three classes—

Sprinting.—Sprinting consists of running over short distances with a full and continuous burst of speed, the chief distances being 100yds., 220yds. and 440yds., and the like metric distances. Distances up to and including 220yds. are, in America, called "dashes." The course for sprint races, when run in the open air, is marked off in lanes for the individual runners by means of cords stretched upon short iron rods. In the modern style of sprinting the result depends often upon the start. The old method of dropping a handkerchief was the worst possible way to give the starting signal, since the muscles react most slowly to the impression of sight, less so to those of touch, and most quickly to those of sound, a difference of $\frac{1}{25}$sec. in reaction amounting to over 1ft. in a run of 100yds. All modern foot-races are, therefore, started by the report of a pistol. Until 1887 all classes of foot runners commenced their races from a standing position. In that year Charles H. Sherrill, of Yale university, U.S.A., demonstrated an entirely new method, known as the "crouch," this method of starting becoming in a short time universal.

It has often been maintained that a 100yds. race can, and should, be run on one breath. This is not so. Some men breathe all the time, but the majority endeavour to increase their running as the 75yds. mark is reached and a second breath is taken. Many types of finishing style have been tried, and it is finally admitted to be wrong to fling up the arms as the tape is breasted. Some runners go straight past the winning-post without any break in the rhythm of the running action, others throw their bodies forward, and some few have successfully effected a jump; but the best type of finish is probably that recommended by the late S. A. Mussabini, in which the athlete goes down to the tape at the finish line, as if he were falling forward, in the last stride of the race.

The improvement in style, shoes and track surfaces has resulted in the continued reduction of sprinting records. Great Britain has produced a number of sprinters capable of equalling 10secs. at 100yds. and 22secs. at 220yds., and quite a number to beat 50 secs. for 440yds., but the palm for producing record-breaking sprinters must go to America.

At the English championships 10secs. has been beaten five times, the first occasion being in 1912; 22secs. for a furlong has been beaten nine times since 1913, and 49secs. for 440yds. only beaten four times since 1881. In the American championships "even time" has been beaten ten times at 100yds. and 11 times at 220yds., but 49secs. for 440yds. has been beaten only three times since 1896. The Oxford and Cambridge records read 100yds., $9\frac{9}{10}$secs., A. E. Porritt, Oxford, 1925; and 440yds., $49\frac{3}{5}$secs., D. MacMillan, Cambridge, 1912. Those for the American universities were, in 1927, 100yds., $9\frac{3}{5}$secs., H. P. Drew, University of California, 1914, and C. Paddock, University of Southern California, 1921; 220yds., $20\frac{2}{5}$secs., R. Locke, University of Nebraska, 1926; and 440yds., $47\frac{2}{5}$secs., J. E. Meredith, University of Pennsylvania, 1916. The official World's records are held by:—E. Tolan, U.S.A., for the 100 yds., $9\frac{2}{5}$secs., and R. A. Locke, U.S.A., for 220 yds., $20\frac{3}{5}$secs., as set out at the end of this article. Tolan has also twice run 100 metres in $10\frac{2}{5}$secs. These records as well as those of other similar events are shown in the table at the end of the article.

Experiments, made with an electrical timing apparatus of his own invention, by Prof. A. V. Hill, F.R.S., of the University of London, who has taken a keen interest in the scientific aspects of athletic sport, have brought to light many interesting points in connection with sprinting and the physiological processes involved in severe muscular exercise in man. Prof. Hill's observations and experiments, conducted at Cornell university, U.S.A., indicate that 90% to 95% of the effort made by a sprinter travelling at top speed is expended in overcoming not the resistance of the air, but the frictional resistance of his own muscles. The force exerted by the first-class sprinter at maximum speed is equal to 80% to 90% of his body weight, and in running 100yds. he does sufficient work to lift himself 240ft. to 270ft. into the air. He will bring into play approximately 8h.p. and attain his maximum speed at 60yds. or 70yds. from the start, when he may be travelling as fast as 24 m.p.h. Approximately one second is lost in the starting process, even when the modern "crouch" start is employed. After the 70yds. mark is reached the runner begins to lose speed, through fatigue occasioned by the rapid appearance of lactic acid in the muscles, as much as $\frac{1}{8}$ oz. of such acid being secreted in the muscle substance every second. In the course of a 200yds. race run at top speed throughout, the speed drops as much as 15% between 70yds. and 190yds.

The quarter-mile race is almost always run on a circular track and, at many important meetings, each runner is provided with his own lane to which he must keep throughout the race, the starting positions being so allotted that each runner may traverse the full course. Tactics, which do not apply to the shorter "dashes," enter into the quarter-miler's scheme of things, and the race is run according to the athlete's type. The quarter-mile is a distance which it is almost impossible to cover at top speed all the way. The sprinter-type of runner must try to start fast enough to get a good position rounding the first bend and should hold his top

Table of World's Records at Recognised Distances to July 1, 1930

Event.	Time.	Holder.	Nation.	Date.	Place.
100 yards	9 3/5 secs.	H. de Hart Hubard	U.S.A.	June 5, 1926	U.S.A.
	9 2/5 "	E. Tolan	"	May 25, 1929	"
120 "	11 2/5 "	R. E. Walker	S. Africa	Dec. 26, 1908	S. Africa
		C. H. Coaffee	Canada	Sept. 4, 1922	Canada
220 "	20 3/5 "	R. A. Locke	U.S.A.	May 1, 1926	U.S.A.
		B. J. Wefers	"	Sept. 26, 1896	"
300 "	30 3/5 "	G. M. Butler	England	June 26, 1926	England
440 "	47 2/5 "	J. E. Meredith	U.S.A.	May 27, 1916	U.S.A.
		M. W. Sheppard	"	Aug. 14, 1910	"
500 "	57 3/5 "	C. N. Seedhouse	England	Sept. 29, 1913	England
600 "	1 min. 10 2/5 "	D. G. A. Lowe	"	June 26, 1926	"
880 "	1 " 51 3/5 "	O. Peltzer	Germany	July 3, 1926	"
1000 "	2 " 11 1/5 "	C. Ellis	England	Sept. 7, 1929	"
1320 "	3 " 2 4/5 "	T. P. Conneff	U.S.A.	Aug. 21, 1895	U.S.A.
1 mile	4 " 10 2/5 "	P. Nurmi	Finland	Aug. 23, 1923	Sweden
2 miles	9 " 1 2/5 "	E. Wide	Sweden	Sept. 12, 1926	Germany
3 "	14 " 11 1/5 "	P. Nurmi	Finland	Aug. 24, 1923	Sweden
4 "	19 " 15 3/5 "	P. Nurmi	"	Oct. 1, 1924	Finland
5 "	24 " 6 1/5 "	P. Nurmi	"	Oct. 1, 1924	"
*6 "	29 " 59 2/5 "	A. Shrubb	England	June 5, 1904	England
7 "	35 " 4 3/5 "	A. Shrubb	"	June 5, 1904	"
8 "	40 " 16 "	A. Shrubb	"	June 5, 1904	"
9 "	45 " 27 3/5 "	A. Shrubb	"	June 5, 1904	"
10 "	50 " 15 "	P. Nurmi	Finland	Oct. 7, 1928	Germany
15 "	1 hr. 20 m. 4 2/5 "	F. Appleby	England	July 21, 1921	England
20 "	1 hr. 51 m. 54 "	G. Crossland	"	Sept. 22, 1894	"
25 "	2 hr. 29 m. 29 2/5 "	H. Green	"	May 12, 1913	"
1 hour	11 miles 1648 yds.	P. Nurmi	Finland	Oct. 7, 1928	Germany
2 hours	20 miles 952 yds.	H. Green	England	May 12, 1913	England

**Note*—On June 9, 1930, at London, P. Nurmi, Finland, ran 6 miles in 29 min. 36 2/5 secs. Record awaits acceptance by I.A.A.F.

Relay Records to July 1, 1930

4 x 110 yards	41 secs.	Newark A.C.	U.S.A.	July 4, 1927	U.S.A.
4 x 220 "	1 min. 25 4/5 "	University of Southern California	U.S.A.	May 14, 1927	U.S.A.
4 x 440 "	3 " 13 2/5 "	U.S.A. National Team	U.S.A.	Aug. 8, 1928	England
4 x 880 "	7 " 41 2/5 "	Boston A.A.	U.S.A.	July 6, 1926	U.S.A.
4 x 1 mile	17 " 21 2/5 "	University of Illinois	U.S.A.	June 23, 1923	U.S.A.

Metric Distances Relay Records to July 1, 1930

4 x 100 metres	40 4/5 secs.	German National Team	Germany	Sept. 2, 1928	Germany
		Sport Club Charlottenburg	Germany	July 22, 1929	Germany
4 x 200 "	1 min. 25 4/5 "	University of Southern California	U.S.A.	May 14, 1927	U.S.A.
4 x 400 "	3 " 14 1/5 "	U.S.A. Olympic Team	U.S.A.	Aug. 5, 1928	Holland
4 x 800 "	8 " 1 "	Teutonia Club	Germany	Sept. 3, 1927	Germany
4 x 1500 "	16 " 11 2/5 "	Finnish National Team	Finland	July 17, 1926	Finland

speed for 75yds. to 100yds., after which he drops his pace to a "float" with a long, swing stride. When he has travelled some 300yds. he begins gradually to increase his pace for the final dash for the tape. The middle-distance type of quarter-miler must make up in endurance what he lacks in speed, and should try to win his race by keeping out of the first struggle for position and so save his strength for the fight at the finish. J. E. Meredith, University of Pennsylvania, U.S.A., in 1916 ran a quarter-mile in 47 2/5secs., and half a mile in 1 min. 52 1/5secs. In the same class may be placed Eric Liddell, Scotland, who in 1924 won the Olympic 400 metres race (2½yds. less than 440yds.) in the new world's record time of 47 3/5secs.

Middle-Distance Running.—The chief middle distances are 600yds., 880yds., 1m. and 2m., but of these the 600yds. and 2m. are not reckoned as championship races. Endurance, speed and strategy are all essentials of success in middle-distance races, but a true appreciation of pace and the ability to run strictly in accordance with a pre-arranged time schedule are the most important attributes of the first-class performers at distances of 1m. and over.

The improvement which has taken place in half-mile records since the late P. M. Thornton, C.U.A.C., won the first English championship of 1866 in 2min. 5secs., as compared with the performances of J. E. Meredith, University of Pennsylvania, U.S.A., who in 1916 covered the distance in 1min. 52 1/5secs., and Dr. Otto Peltzer, Germany, who in 1926 established the world's record of 1min. 51 3/5secs., is due largely to the appreciation of the principle that there is no race in which judgment of pace in the initial 440yds. counts for so much as in the half-mile. The majority of coaches agree that the first quarter-mile should be run 3secs. faster than the second quarter-mile, but the late S. A. Mussabini, doyen of British coaches, held exactly the opposite view. The important principle involved is that there must be a 3secs. variation between the pace of the two quarter-miles.

In America the 100yds. dash is considered the principal event at all championship fixtures; but in England it is the 1m. race which is regarded as the blue ribbon of the track. To runners at this latter distance it is the prearranged time-table that is all important. The following schedule sets out the quarter-mile lap times of five of the fastest miles that have ever been run:—

Yds.	W.G. George (Eng.), 1886.	J. P. Jones (U.S.A.), 1913.	N. S. Taber (U.S.A.), 1915.	A. G. Hill (Eng.), 1921.	P. Nurmi (Finland), 1923.
	secs.	secs.	secs.	secs.	secs.
1st. 440	58 1/4	61 4/5	58	59 1/5	58 4/10
2nd. 440	63 1/4	67 2/5	67	64 2/5	63 3/10
3rd. 440	66	66 4/5	68	67 1/5	64 9/10
4th. 440	65	58 1/5	59 2/5	62 2/5	63 7/10
1 mile	4·12 3/4	4·14 2/5	4·12 2/5	4·13 4/5	4·10 2/5

W. G. George was the type of superman runner who appears but rarely, and it is significant that nothing approaching his performance of 1886 was produced until 1913. In 1915, N. S. Taber, Brown University, U.S.A., by means of a specially framed handicap, beat George's record, and in 1921 A. G. Hill went very near to still more sensational time when he won the A.A.A. championship. The fact that W. R. Seagrove and H. B. Stallard, both of Cambridge university, forced Hill to run the first quarter-mile in less than a minute upset his whole plan of campaign and probably cost him a world's record. Hill had been well trained by the late S. A. Mussabini, who had evolved a theory that each quarter-mile of a mile race should be covered as nearly as possible in the same time, and it was planned that Hill should hold to a 62secs. schedule for each lap. How he was forced by the pace set up by the Cambridge blues to digress from that schedule may be seen from the above table. Much the same thing happened at Stockholm in 1923, when Paavo Nurmi, the phenomenal Finn, established the present world's record. He also aimed at a 4min. 8secs. mile. His opponent, Edvin Wide, Sweden, however, led for the first lap at such a speed that Nurmi simply dared not let him get away. At the half distance they were absolutely level, 880yds. having been covered in 2min. $1\frac{8}{10}$secs., namely, $2\frac{1}{5}$secs. faster than Nurmi had planned. From that point the Finn forged ahead and, covering three-quarters of a mile in 3min. $6\frac{7}{10}$secs., was almost level with his schedule, which should have been 3min. 6secs. The first fast lap, however, had told on Nurmi and he was able to return only $63\frac{7}{10}$secs. for the fourth and final quarter-mile. There is little doubt that sooner or later a runner will appear with sufficient will-power to allow his opponents to do as they please, while he himself adheres strictly to his time-table, and then, provided the man has the form and the speed of a George, a Hill or a Nurmi, the 4min. 8secs. mile will become an accomplished fact.

The 2m. race is an indoor championship in America, and figures also in the inter-collegiate outdoor championships, in place of the 3m. which is included at the Oxford and Cambridge sports.

Long-Distance Running.—This includes all flat races from the three miles, which figures in the Oxford and Cambridge sports programme, upwards, as well as steeplechasing, road and cross-country running. Great Britain was for centuries the home of long-distance running, and for many years all world's records from two to ten miles were held by the English runner, Alfred Shrubb, those from 12 to 90 miles standing also to the credit of British athletes. Since 1912, however, there have appeared such phenomenal foreign performers as the late Jean Bouin, France, his compatriot, J. Guillemot, the Finns, Hannes Kolehmainen, Paavo Nurmi, Villie Ritola, V. Sipila and A. Stenross, and the Swedes, E. Wide and Sven Lündgren, who have changed most of the figures up to 30m. From 30m. to 100m. all records have been recently eclipsed by the 40-year-old South African farmer, Arthur Newton. Hard, conditioning training over a prolonged period is necessary for a distance runner. Good pace-making, strategy and such an appreciation of time and pace as will allow the athlete to "run to the watch," are of great importance. Nurmi, who was one of the greatest distance runners in the world from 1920 onwards, made it his practice to carry a stop-watch in his hand in order to time himself over the various stages of any race in which he ran. In England at the championship meetings the distance events are four and ten miles; and at the Olympic games, 5,000 metres (approximately $3\frac{1}{4}$m.) and 10,000 metres (nearly $6\frac{1}{4}$m.); there is also the marathon race (26m., 385yds.).

Steeplechasing was originally only a cross-country run over a course plentifully provided with natural obstacles; but at the present day the steeplechase takes place on the grass plat inside the cinder track of the athletic field; the obstacles, comprising 3ft. hurdles and a combined hedge and water jump, are artificial. The championship distance in England and America is 2m., and at the Olympic games 3,000 metres (3,280·87yds.).

Cross-Country Running still remains more popular in England than elsewhere, but of late years French teams have, upon occasion, beaten the best runners that England, Scotland, Wales or Ireland were able to assemble. An International race at 10m. takes place annually, and that is the distance also of the English national championship. A 10,000 metres (almost $6\frac{1}{4}$m.) steeplechase was added to the Olympic programme in 1920 and 1924. These Olympic races, however, have not proved satisfactory on account of the indifferent nature of the country selected.

Team Racing is a form of distance running which, in 1927, was rapidly regaining its popularity in Great Britain, largely through the enterprise of the Birchfield Harriers. There is no A.A.A. team championship, but a race of this kind was added to the Olympic programme in 1900 and won by England. In 1908 the distance was 3m. and Great Britain was again successful. In 1912 the distance was reduced to 3,000 metres (2m., less 239·13 yds.), and since this reduction in the distance was made America has won twice and Finland once. It is usual for a running team to be comprised of five men, the first four of whom to finish score points for their side, as one for first, two for second, and so on, the team having the least score being reckoned the winners.

Relay Racing.—This form of competition has long been practised in America and has become popular in Great Britain. Relay races are usually run by four men, each going a quarter of the distance. From 1911 to 1926 only one relay race was included in the English championships. This was really a medley race in which the first man ran 880yds., the second and third 220yds. each, and the fourth 440yds. In 1927 the medley relay was abandoned and two other relay races substituted, *i.e.*, a 440yds. relay, in which each of four runners goes 110 yds., and a 1m. relay (4 x 440yds.).

The American national championship relay distances are 440-yds., 880yds., 1m. and 2m., four runners representing each team, and each running an equal distance. In addition there is, in the United States, the most famous of all relay fixtures, the Pennsylvania university relay meet, at which English university athletes have competed successfully upon several occasions.

The Olympic relay distances are 400 metres (437·45 yds.) and 1,600 metres (almost a mile).

This method of racing was started in the United States about the year 1890, on the model of the Massachusetts Firemen's "bean-pot" race. The old method was for the men running the second quarter of the course each to take over a small flag from the first relay men as they arrived, before departing on their own stage of the race, at the end of which they, in their turn, handed on their flags to the awaiting next runners. The flags, however, were considered cumbersome, and for a time it was sufficient for the outgoing runner to touch or be touched by his predecessor.

RUODLIEB, a romance in Latin verse by an unknown German poet who flourished about 1030; he was almost certainly a monk of the Bavarian abbey of Tegernsee. The poem is one of the earliest German romances of knightly adventure, and its picture of feudal manners gives it value as an historical document.

The best edition is by F. Seiler (Halle, 1882).

RUPEE, the standard coin of the monetary system in India (Hindustani *rupiya,* from Sanskrit *rupya*). A silver coin of 175 grains Troy, called *tanka,* approximating to the rupee, was struck by the Mohammedan rulers of Delhi in the 13th century; but the rupee itself, of 179 grains, was introduced by Sher Shah in 1542. The English at first followed various indigenous standards; but since 1835 the rupee has uniformly weighed 180 grains, containing 165 grains of pure silver. The weight of the rupee (one *tola*) is also the unit upon which the Indian standard of weights is based. Down to about 1873 the gold value of the rupee was 2s., and ten rupees were thus equal to £1; but after 1873, owing to the depreciation of silver, the rupee at one time sank as low in value as 1s. In order to provide a remedy the government of India decided in 1893 to close the mints, and in 1899 to make the rupee legal tender at fifteen to £1. The Government also engaged to sell Council drafts on India to an unlimited amount at a price from 1s., $4\frac{1}{8}$d. to 1s. $3\frac{29}{32}$d. per rupee. This worked satisfactorily, owing to the fact that normally India exports more than she imports. Should there be a trade balance temporarily adverse to India, so that the market quotation of sterling against the rupee fell below 1s. $3\frac{29}{32}$ d., the Government undertook to sell reverse Council drafts on London. The exchange was thus maintained at 1s. 4d., and the rupee linked to a gold currency, sterling,

with the sale of Council and reverse Council drafts as a somewhat artificial substitute for the shipment of gold.

The success of this system depended upon two conditions. First, the bullion value of the rupee must not rise above 1s. 4d., otherwise it would pay the public to melt down rupees for their silver content. Secondly, the secretary of State must have sufficient rupees at his command to enable him to redeem such quantities of Council drafts as the public wished to buy. Until the outbreak of the World War, both these conditions were fulfilled. The secretary of State had little difficulty in amassing sufficient rupees to meet his engagements, while it was only found necessary to sell reverse Councils on three occasions in the present century.

The Rupee Crisis.—The World war altered the situation. India's exports increased owing to the Allies' demand for raw materials, while imports of manufactured goods were forcibly curtailed owing to the inability of belligerent countries to produce them. Also the campaign in Mesopotamia was financed in rupees. All these causes led to a greatly increased demand for rupees, and by 1916 the secretary of State was experiencing great difficulty in obtaining enough to meet in full the demand for Council drafts.

At the same time, partly owing to troubles in Mexico, the price of silver rose; in short, by 1916 the two conditions on which the Indian currency was based were ceasing to operate. Radical modifications had to be introduced. The sale of Council drafts was rationed, and their price gradually increased in sympathy with that of silver. All gold imported had to be sold to the Government, and the private importation of silver was prohibited. Rupee notes could be issued to a certain extent, but the danger of inconvertibility had to be watched. But the quantity of silver available still fell below the country's requirements, and the convertibility of the note issue was threatened. In April 1918, the Pittman Act enabled the U.S. Government to sell 200 million fine ounces of silver to India at a price of $1.015 per fine ounce. This shipment eased the situation and preserved the currency till the Armistice.

In May 1919, the Babington-Smith committee sat to evolve a new system, made necessary by the grave modifications due to war measures. It recommended the fixation of the exchange at Rs. 10 to the gold sovereign; the sale by open tender of Council and, if necessary, of reverse Council drafts; free importation and exportation of gold and free importation of silver. Owing to unforeseen circumstances, the scheme broke down almost immediately. The report was issued at the moment when the prices of commodities, including silver, were at their highest; and the slump followed. The price of silver collapsed, and rendered unnecessary the raising of the value of the rupee. Also the 1921 trade depression had a serious effect in India. The demand for raw materials dried up, but meantime goods ordered from Europe continued to arrive up till the end of 1921. Consequently, a heavy adverse trade balance set in. The rupee began to fall, until finally it arrived at round about the pre-war level of 1s. 4d. The sale of reverse Councils was quickly found to be too expensive a remedy, and was abandoned.

By 1923, conditions had improved, and the excess in imports of 1921 had largely been absorbed. The Babington-Smith report still remained nominally in force for a few years, but it became necessary to reconcile the official currency system with the facts of the case. The Hilton-Young committee was appointed, and presented its report in 1926. It recommended the formal adoption of the gold standard for India, and the establishment of a new central bank. A bill passed in 1927 gave effect to the first part of the report. It stabilized the rupee at 1s. 6d. gold. Pending the establishment of the central bank, the Government of India was bound to buy or sell gold at the gold points corresponding to the new parity of 1s. 6d.; these duties are to be taken over by the central bank when established. The Bill to establish the central bank was thrown out by the Assembly; the Government of India continued indefinitely to maintain the exchange at the new level of 1s. 6d.

The rupee is divided into 16 annas, and the anna is sub-divided into 12 pies. (*See* also CURRENCY.) (N. E. C.)

RUPERT (HRODBERT), **ST.,** according to the *Gesta Sancti Hrodberti,* which dates from the ninth century, a kinsman of the Merovingian house, and bishop of Worms under Childebert III. (695–711). At the invitation of the duke of Bavaria, Theodo II., Rupert went to Regensburg (Ratisbon), where he began his apostolate. He founded the church of St. Peter near the Wallersee, and subsequently, at Salzburg, the church of St. Peter, together with a monastery and a dwelling for the clerks, as well as a convent for women "in superiori castro Iuvavensium." He died at Salzburg. He is regarded as the apostle of the Bavarians.

See *Bibliotheca hagiographica Latina* (Brussels, 1899), n. 7390-7403; W. Levison, "Die älteste Lebensbeschreibung Ruperts von Salzburg" in *Neues Archiv für aeltere deutsche Geschichtskunde,* xxviii. 283 *seq.;* Hauck, *Kirchengeschichte Deutschlands* (3rd ed.).

RUPERT (1352–1410), German king, and, as Rupert III., elector palatine of the Rhine, was a son of the elector Rupert II. and Beatrice, daughter of Peter II., king of Sicily. He was born at Amberg on May 5, 1352, and succeeded to the government of the Palatinate on his father's death in 1398. On Aug. 21, 1400, having helped depose King Wenceslaus at Oberlahnstein, Rupert was elected German king at Rense, and crowned at Cologne on Jan. 6, 1401. An expedition to Italy against Gian Galleazzo Visconti, duke of Milan (1401–2), proved a failure, but he was recognized by Pope Boniface IX. in Oct. 1403. After some years of struggle with the anarchy in Germany and the partisans of Wenceslaus, Rupert died at Landskron near Oppenheim on May 18, 1410. He was buried at Heidelberg. He married Elizabeth, daughter of Frederick IV. of Hohenzollern, burgrave of Nuremberg, and left three sons and four daughters. Rupert, who earned the surname of *clemens,* was brave and generous, but his resources were totally inadequate to bear the strain of the German kingship.

BIBLIOGRAPHY.—C. Höfler, *Ruprecht von der Pfalz genannt Clem römischer König* (Freiberg, 1861); A. Winkelmann, *Der Romzug Ruprechts von der Pfalz* (Innsbruck, 1892); and J. Weizsäcker, *Die Urkunden der Approbation König Ruprechts* (1899).

RUPERT, PRINCE, COUNT PALATINE OF THE RHINE AND DUKE OF BAVARIA (1619–1682), third son of the elector palatine and "winter king" of Bohemia, Frederick V., and of Elizabeth, daughter of James I. of England, was born at Prague on Dec. 17, 1619. A year later his father was defeated at the battle of the Weisser-Berg, near Prague, and driven from Bohemia. After many wanderings the family took refuge in Holland, where Rupert's boyhood was spent. In 1633 the boy was present at the siege of Rheinberg in the suite of the Prince of Orange, and in 1635 he served in this prince's bodyguard. In 1636 he paid his first visit to England, was entered as an undergraduate, though only nominally, at St. John's college, Oxford, and was named as the governor of a proposed English colony in Madagascar. But this scheme did not mature, and Charles sent his nephew back to Holland, having, however, formed a high opinion of his energy, talent and resolution. In 1637 he was again serving in the wars, and in 1638, after displaying conspicuous bravery, he was taken prisoner by the imperialists at the action of Vlotho (17th October) and held in a not very strict captivity for three years. In 1641 he was released, and, rejoining his mother in Holland, was summoned to England to the assistance of his uncle, for the Great Rebellion was about to break out.

The Civil War.—In July 1642 he landed at Tynemouth. Charles at once made him general of the horse and independent of Lord Lindsey, the nominal commander of the whole army. From this point until the close of the first Civil War in 1646 Prince Rupert is the dominant figure of the war. His battles and campaigns are described in the article GREAT REBELLION. He was distinctively a cavalry leader, and it was not until the battle of Marston Moor in 1644 that the Royalist cavalry was beaten. The prince's strategy was bold as well as skilful, as was shown both in the Royalist movements of 1644 which he proposed, and in the two far-ranging expeditions which he carried out for the relief of Newark and of York. In Nov. 1644, in spite of the defeat at Marston Moor, he was appointed general of the king's army. But this appointment, though welcome to the army, was

obnoxious to the king's counsellors, who resented the prince's independence of their control, to some of the nobility over whose titles to consideration he had ridden roughshod, and to some of the officers whose discipline and rapacity were likely to be repressed with a heavy hand. These dissensions culminated, after the prince's surrender of Bristol to Fairfax, in a complete break with Charles, who dismissed him from all his offices and bade Rupert and his younger brother Maurice seek their fortunes beyond the seas.

Rupert's character had been tempered by these years of responsible command. By 1645, although the parliamentary party accused him not merely of barbarity but of ingratitude for the kindnesses which his family had received from English people in the days of the Palatinate War, Rupert had in fact become a good Englishman. He was convinced, after Marston Moor, that the king's cause was lost, in a military sense, and moreover that the king's cause was bad. When he surrendered Bristol without fighting to the uttermost, it was because Fairfax placed the political issue in the foreground, and after the capitulation the prince rode to Oxford with his enemies, frankly discussing the prospect of peace. Already he had deliberately advised Charles to make peace, and had come to be suspected, in consequence, by Charles's optimistic adviser Digby. But to Charles himself the news of the fall of Bristol was a thunderbolt. "It is the greatest trial to my constancy that has yet befallen me," he wrote to the prince, "that one that is so near to me in blood and friendship submits himself to so mean an action." Rupert was deeply wounded by the implied stain on his honour; he forced his way to the king and demanded a court-martial. The verdict of this court smoothed over the matters for a time, but Rupert was now too far estranged from the prevailing party at court to be of any assistance, and after further misfortunes and quarrels they separated, Charles to take refuge in the camp of the Scots, Rupert to stay, as a spectator without command, with the Oxford garrison. He received at the capitulation a pass from the parliament to leave England, as did also his faithful comrade Maurice.

For some time after this Rupert commanded the troops formed of English exiles in the French army, and received a wound at the siege of La Bassée in 1647. Charles in misfortune had understood something of his nephew's devotion, and wrote to him in the friendliest terms, and though the prince had by no means forgiven Digby, Colepeper and others of the council, he obtained command of a Royalist fleet. The king's enemies were now no longer the Presbyterians and the majority of the English people but the stern Independent community, with whose aims and aspirations he could not have any sympathy whatever. A long and unprofitable naval campaign followed, which extended from Kinsale to Lisbon and from Toulon to Cape Verde. But the prince again quarrelled with the council, and spent six years (1654–60) in Germany, during which period nothing is known of him, except that he vainly attempted (as also before and afterwards) to obtain the apanage to which as a younger son he was entitled from his brother the elector palatine. At the Restoration he settled in England again, receiving from Charles II. an annuity and becoming a member of the privy council. He never again fought on land, but, turning admiral like Blake and Monk, he played a brilliant part in the Dutch Wars. He died at his house in Spring Gardens, Westminster, on Nov. 29, 1682.

Apart from his military renown, Prince Rupert is a distinguished figure in the history of art as one of the earliest mezzotinters. It has often been said that he was the inventor of mezzotint engraving, but this is erroneous, as he obtained the secret from a German officer, Ludwig von Siegen. One of the most beautiful and valuable of early mezzotints is his "Head of St. John the Baptist." He was also interested in science, experimented with the manufacture of gunpowder, the boring of guns and the casting of shot, and invented a modified brass called "prince's metal."

Prince Rupert was duke of Cumberland and earl of Holderness in the English peerage. He was unmarried, but left two natural children; one a daughter who married General Emmanuel Scrope Howe and died in 1740, and the other a son, whose mother (who claimed that she was married to the prince) was Frances, daughter of Sir Henry Bard, Viscount Bellamont. The son was killed in 1686 at the siege of Buda.

See E. Warburton's *Life of Pr. Rupert* (1849) and additional authorities quoted in the memoir by C. H. Firth in the *Dict. Nat. Biog.*

RUPERT [RUPPRECHT] (1869–), German prince, the eldest son of King Louis III. of Bavaria, was born on May 18, 1869, at Munich. In 1906, after extensive travels in India and elsewhere, he was appointed to the command of the I. Bavarian Army Corps. At the outbreak of the World War he was commander of the Bavarian troops (the VI. German Army) and led them to victory in the great battles fought in Lorraine (Aug. 20–2, 1914). In the following October he was placed in command on the German front in Artois and southern Flanders, and, after having been advanced to the rank of field-marshal, was entrusted in the spring of 1917 with the chief command of the northern group of armies on the Western Front. In 1900 he married Marie Gabriele, a sister of the queen of the Belgians; she died in 1912; and in 1921 he married Princess Mitonia of Luxembourg and Nassau. Through his mother, the Archduchess Maria-Thérèse of Austria-Este, Prince Rupert was the descendant of the Stuart kings of England and, according to legitimist ideas, in the succession to the British crown. (*See* FRONTIERS, BATTLES OF THE.)

RUPERT'S LAND, a former district of Canada. The generous charter of Charles II. given in 1670 to the Hudson's Bay Company (*q.v.*) was interpreted to include all the country which was drained into Hudson Bay. As Prince Rupert was first governor of the Hudson's Bay Company his name was given to the concession under the name "Rupert's Land." It must be observed that Athabasca, New Caledonia and British Columbia were not included in the grant. They were held under the title Indian Territories by the Hudson's Bay Company by licence terminable every twenty-one years, the last term closing with 1859. Rupert's Land was transferred to Canada by the imperial government in 1870, and ceased to exist as a political name. It is still used as the title of the episcopal diocese, which is in the main coincident with the province of Manitoba.

RUPILIUS, PUBLIUS, Roman statesman, consul in 132 B.C. During the inquiry that followed the death of Tiberius Gracchus, conducted by himself and his colleague Popillius Laenas, he proceeded with the utmost severity against the supporters of Gracchus. In the same year he was despatched to Sicily, where he suppressed the revolt of the slaves under Eunus. During 131 he remained as proconsul of the island, and, with the assistance of ten commissioners appointed by the senate, drew up regulations for the organization of Sicily as a province. These regulations were known by the title of *leges Rupiliae,* Rupilius was subsequently brought to trial (123 B.C.) and condemned for his treatment of the friends of Gracchus. He died soon afterward.

See Cicero, *De Am.* 19, *Tusc. disp.* iv. 17, *in Verr.* ii. 13, 15; Diod. Sic. xxxiv. 1, 20; Vell. Pat. ii. 7.

RURAL DEPOPULATION. In all countries of the world there is a trend from the country-side towards the town; even in countries where the rural population is increasing, the urban population is increasing at a greater rate, so that practically everywhere the proportion of the rural to the total population is decreasing.

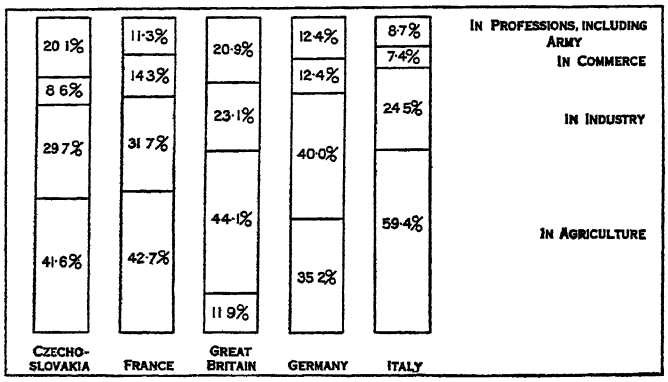
In the old world this tendency is most noticeable in Great Britain, where the rural population has decreased not only relatively, but absolutely. There are fewer people in rural districts than there were 60 or 70 years ago, and the agricultural personnel is smaller. In 1921, according to the Selborne Report, there were 700,000 fewer cultivators than in 1870. Incidentally, there are fewer cultivators per 1,000 acres than in any other European country.

In the new world, Australia shows the most striking drift from rural to urban districts; statistics prove that one-half of its population live in the five capital cities, and only somewhat over 30% can be classed as rural. This is an example of a new country, still in the agricultural stage of its development, with approximately the same apportionment of population as a long

industrialised county, Britain.

What Is the Ideal Ratio?—The old idea (were such an idea ever really formulated) of a balanced population, was that half the nation should live in the country and the other half in the towns. But the old order changeth, and the question is: how far is the change beneficial or the reverse, not only from the economic but from the social and political points of view and, above all, in its relation to the physical standard of the race?

Reverting to Australia, the fact emerges that a rural population



FROM CISAR & POKORNY, "CZECHOSLOVAK REPUBLIC" (BENN)

COMPARATIVE TABLE SHOWING HOW THE POPULATION OF VARIOUS COUNTRIES IS DIVIDED AMONG DIFFERENT OCCUPATIONS

of some 30% not only produces sufficient food for the other two-thirds, but actually an exportable surplus to the value of £125,000,000 per annum, being 50% of the total output from the land. The reason for this is that the output per head of those engaged in agriculture (including stock raising) is very high—perhaps the highest in the world. One Australian can plough, sow and harvest 300 acres of wheat. He employs 8 horses and a 5-furrow plough; later in the season, these 8 horses draw a combined reaping and threshing machine, which cuts the *ears* of corn, threshes, bags the grain, and leaves the bags standing in the field—all in one operation. Next, the cultivator drives a wagon with patent appliance that picks up the sacks. However, though the output per man be high, the yield per acre is low—only some 11 bushels, as compared with the English average of 31 bushels per acre.

This example shows the high output *per cultivator* under up-to-date extensive cultivation, and demonstrates that a ratio of rural to urban population of : 1 :: 1 need no longer be maintained, since the Australian ratio of : 1 :: 3 is evidently effective in that country. But Australia is an extreme example, and there is no doubt that as population increases there, intensive cultivation must replace extensive and the yield per acre go up, and the output per man go down.

In Canada, the population is about evenly divided between town and country. New Zealand, South Africa and the British Colonies are still predominantly rural and agricultural. A few decades ago, 65% of the population of the United States was rural, but this section has been decreasing rapidly, especially since 1918; in 1920 it had decreased to 49% of the total population, and the process continues. In France the population is evenly divided between town and country; and, even in a country like Denmark which lives by its agriculture, half the workers are urban and half rural. But the rural section exports large quantities of produce.

The accompanying diagram taken from the publication "La République Tchécoslovaque" throws an interesting light on the conditions in five European sections.

In Great Britain, the rural population is: 1 :: 5. Its output per man, however, is lower than in Australia, and it not only produces no surplus to export, but it meets only half the home food requirements. These ratios are, of course, only a rough indication, and accurate calculations would take up too much space, since the problem is complicated by the effect of imports and exports, also by the commodities being produced in some places under an extensive, and in others under a comparatively intensive, system of agriculture.

It is clear from the diagram that the proportion of cultivators in Great Britain is altogether too small. The same comment applies to the British empire; the temperate parts of the empire suitable for white habitation have an area of 7,000,000 square miles; yet including the motherland, there are only 3,500,000 white cultivators in this vast area. In contrast, European France, on one thirty-seventh of that area, employs nearly 9,000,000 tillers of the soil.

The conclusion seems to formulate itself: while no longer necessary to maintain a ratio of : 1 :: 1 between rural and urban populations, a ratio of : 1 :: 5 is exaggerated, and something between the two should be the objective.

Physical Deterioration.—So far the economic point of view has been considered briefly: how many cultivators are required to feed the rest of the nation? But the rural population has a second and most important function to perform; the physical standard of the race depends largely upon it.

All evidence points to the fact that the physical standard of the urban population deteriorates unless there is a constant infusion of fresh blood from the country; the birth-rate of the third generation of townsmen falls off noticeably, and American tests show that the country-born or their children produce more leaders of men than do the succeeding generations of townsmen. In the case of Great Britain, there is an added need for a high proportion of rural folk in that they provide the type of settler most needed in the oversea parts of the British empire—people possessed of a "land sense" and capable of developing the agricultural resources of its dominions and colonies.

It cannot be disputed that, taking a long view, stability—moral, social and economic—rests upon an adequate rural population. Indications are not wanting that the rural population of Great Britain is not only inadequate, but dangerously so.

Causation.—It is now time to examine the main causes of the drift to the towns. First may be put the love of excitement and adventure; enterprising youths wish to see the world; but there is little doubt that by the time they reach 40 many would gladly return to the country had they the facilities for doing so. Secondly, there is the higher wage attraction, often chimerical, since the urban wage in many cases is little higher than the rural when all pros and cons are weighed. A third reason is the alleged dulness of the country-side; but the advent of motor transport and wireless, and the great increase in village clubs with their social halls, have already wrought so great a change that this cause of depopulation is fast disappearing. A fourth cause, which, although important, figures more largely than the facts of the case warrant, is the increased use of machinery in agriculture; this may have some effect where cultivation is extensive, but not where cultivation is intensive. For instance, in Denmark more agricultural machinery is used than in Britain, yet twice as many cultivators per 1,000 acres are employed.

Great Britain has certain causes of rural depopulation which are peculiarly its own. Perhaps the most basic is that with the development of steam power, and with world conditions particularly favourable to British industry during the first half of the 19th century, the nation's whole attention was concentrated upon urban industry. The very future of the race was deemed to depend upon industrial development, its civilization was to be an urban civilization. This may be regarded almost as the *idée fixe* of the past century, not only of economists and politicians but of the whole nation; in consequence the rural side was neglected. Other nations, for various reasons, did not suffer to the same extent from this complex, they did not lose sight of the importance of the rural side, and they definitely endeavoured to keep a just balance between urban and rural development.

Secondly: the primary rural industry—agriculture—is under-capitalized. (The working capital per acre in Great Britain is much lower than it is in other great European countries.) It is an axiom that population follows capital. A third point is the lack of organization among the rural population; even a cursory study of European countries brings to light a strong contrast in

the degree of organization. A highly organized agriculture not only keeps people *in* the country, but definitely attracts them *to* the country. This is only a natural consequence, since members of an organized industry earn more profits, and are more secure of those profits than members of an unorganized industry.

Agriculture in Great Britain not only employs fewer cultivators per 1,000 acres than in highly organized countries, but it is practically without the network of subsidiary industries that give vast employment in other countries. In consequence, its absorbing power is low and the net result is that agriculture and other rural industries cannot absorb more than about half of the country-born children educated in rural schools.

From the diagram it will be seen that, of the five nations under review, not only has Great Britain the fewest agriculturists, but also the lowest number of persons who make their living by manual work. One reason for this is that Great Britain has been and still is the emporium of the world, and the great distributing nation. Although this may justify a larger number of non-manual workers than exists in other countries, it is clear that the number engaged in agriculture is too small.

The fourth cause of migration from the country must be put down to the prevailing system of education, which has not tended to create a "land sense"; rather has it influenced the rising generation away from the land. This defect is being overcome gradually, but has not yet disappeared. It certainly is not surprising if rural teachers, seeing the unorganized state of agriculture, and the consequent lack of opportunity, use their influence in favour of an urban career—at all events for their more intelligent pupils.

For the fifth cause of the depletion of the British country population, one must look into past history. The enclosure acts necessitated by the need for higher production to feed the growing towns, were operated in such a way as to reduce the number of those directly interested in the land, and to turn the agricultural labourers into a landless proletariat entirely dependent upon wages. These evils were avoided in Germany, for instance, by taking effective measures to enable the "ex-commoners" to become small occupying owners.

Remedies.—The mere enumeration of the causes of depopulation indicates the possible remedies.

Since agriculture is the main industry of the country-side, it is essential that it should employ the economic maximum of cultivators; but it must be on the basis of an organized and not of an unorganized industry. The form that organization should take, however, is important. The State, in the opinion of the present writer, should show itself generally sympathetic and should remove any existing barriers to voluntary effort, but it should not attempt to organize the industry; this can be done only by agriculturists themselves through the medium of co-operation carried out in co-operative creameries, bacon factories, sugar, jam, fruit bottling and pulping factories and the organization of marketing generally.

Since population follows capital there should be a definite system of agricultural credit, independent of, but working harmoniously with the system of urban credit, and upon a basis of co-operative control. Without exception in all other European countries it has been found necessary to base the organization of agriculture upon a system of organized rural credit. This has not been clearly apprehended in Great Britain, and, in consequence, much time and effort have been wasted.

Pari passu with higher organization comes a higher degree of intensification, since then it pays to make two blades grow where one grew before, and with increased profit more hired labour can be employed and at better wages. This in itself, however, is not sufficient; since enclosure divorced the labourer from the land, it is necessary to undo the process and give him easy access to land. Allied to this is the question of house accommodation. With more available houses, many young men would doubtless marry and remain in the country.

As already stated, several potent forces are at work making the country-side brighter; but something more than that is needed —community life must be developed. The countryman must be made to feel that he is indeed a member of the rural community, and has his part to play in it. It is really easier to create the community spirit in rural than in urban districts; and that spirit is a valuable national asset.

Factory and Farm.—Finally, much more could be done to encourage dual occupation. In Bohemia, the factories are not all crowded into great cities, making life hideous, but scattered throughout the country districts; the industrial buildings, not at all unpleasing, are surrounded by a kind of garden city, and employees who wish it can have a plot of land to cultivate. In the new industrial Italy, workers are frequently allied to both factory and land. Again, the majority of Antwerp dock labourers have a piece of land which they can till when shipping is slack. In England a certain amount of fortuitous dual occupation exists wherever allotments are provided, and there are one or two cases where work on the land has been definitely organized in connection with an urban industry. But there is room for great development. It is of extreme importance to enable men to occupy themselves profitably and wholesomely when otherwise they would be workless and deteriorating. The proper use of the land makes this possible. In this connection a sound motto would be: "ruralize the townsman."

But nothing should be allowed to divert attention from the main problem: the great need for increasing the number of cultivators both at the centre and in the outlying parts of the world. Certain writers have put forward the danger of a world-wide shortage of food due, they say, to the disappearance of virgin soil and to the land under cultivation having reached its limit of production. The answer to this statement is that in the first place, the limit of production is still an unknown quantity; every new discovery extends it. Secondly, of the area of the world suitable for white habitation, only a fraction is as yet under cultivation. But the danger does not lie here, rather it lies in a possible shortage of cultivators.

The argument is not merely economic, it arises out of the very nature of man. His roots are struck deep in the soil. To uproot, much more to cut off, is a dangerous operation. Civilization will tend to lose much of its reality, if there is not a reasonable proportion of human beings concerned with basic work, under good conditions, upon the land. The need of our time is spiritual and mental dynamic working through men of fine physique. Such is the dynamic which rises out of life and work on the land.

(C. Tu.)

UNITED STATES

In common with almost all other nations of the western world the United States has been growing more and more largely urban. It is, however, a mistake to suppose that the United States as a whole has been actually losing rural population (all people living in places of less than 2,500 are called rural by the census) or even farm population during most of this period of rapid urban growth. Only since 1910 does it appear that there has been an actual decline in farm population and only since 1920 has this decline been at all rapid. The estimated decline of 1910–20 was 462,691 while that of 1920–27 was about 3,800,000. There is not yet any definite proof of a continuous decline in the rural population as a whole, although there is little doubt that it has declined somewhat since 1920. There are, however, many counties in the northern States where the rural population has been declining for a long time. In some of the rural counties in central New York, the population outside the county seats has been declining for a century. But the loss in farm and rural population in the northern and eastern States has in the past been more than offset by the very rapid gains in the West and South-west so that the rural population has shown substantial gains at each census until 1920 when it only amounted to 3·2%. As compared with the urban population, however, the rural population has been growing very slowly.

The Causes.—The causes of the movement from the country to the city are many, but one stands out as most important. It is the development of farm machinery, which has made it unnecessary to have as much man power per acre as in former days. The

TABLE I. *Percentage Growth of Urban and Rural Population in the United States 1880–1920*

	Urban	*Rural*
1880–1890	55·3	13·6
1890–1900	36·2	12·2
1900–1910	38·8	9·2
1910–1920	28·8	3·2

individual farmer's volume of labour has been hugely increased by the gang plough, the multiple-row cultivator, the four horse grain drill, the threshing machine, the "combine," and now the tractor with an increasing variety of space-covering tools which may be attached to it.

But if such tools make it possible for a man to till more acres than his father, they have to be made and the village blacksmith who supplied our grandfathers with ploughs and flails and hoes, etc., is no longer in business. To the factory has gone not only the making of tools but most of the other equipment the farmer uses—his truck and automobile, his wire for fencing, his lumber, his stone or brick, etc. In addition all the manifold household tasks connected with making the family clothing, with butter and cheese, with butchering and with many other tasks formerly part of the routine of farm life have also gone to the factory. It is not surprising then that many farm boys and girls have followed their jobs to the factories and stores and are now numbered among our city population.

It must be remembered that man's consumption of agricultural products is *relatively* fixed while his consumption of fabricated goods may apparently increase without limit. Hence under a given system of agricultural production only a certain proportion of the population is needed on the farms while the rest can work at trades, in factories and in commerce. In the United States to-day it appears that about 20% of the population can supply the necessary agricultural products. Under the present industrial system most of the rest will live in cities (large or small) for there are the factories and stores, etc., which supply the non-agricultural products used. It is possible that in time Americans will learn better than to live in cities and then there may again be a rapidly increasing rural population but it will not be an agricultural population since that is not needed. When an increase in the proportion of the agricultural population sets in we may be sure that harder times are approaching.

As to other causes of rural depopulation often cited, viz., desire for the excitement of the city, the loneliness of the farm, the greater opportunity of the city, etc., we must recognize that they all have some influence but they are of minor importance. If the jobs available were in rural communities the young people would stay there and would make their own excitement if they must have it and would find opportunities there which were satisfactory. Indeed the development of giant power may lead to the growth of a rural industrial population. The use of the individual electric motor for driving machines in the factory may, in time, lead to the decentralization of production into small units just as the use of steam power led to the centralization of manufacturing in great units. There may then be a reversal of the present movement of population into the large cities. (W. S. T.)

RURAL EDUCATION. "Learn by doing." This well-worn phrase, so applicable to education in all its phases, applies with redoubled force to rural education, both with respect to the teacher and the taught. The curriculum of the rural primary school, while consistent with that of the town school in some respects, must be based very largely upon environment. For this purpose the basic subject would appear to be nature study. In rural areas the pupils are in the midst of nature's great laboratory, and have all necessary material at hand. A systematic study of nature will inculcate the habit of observation and the pupils will be trained to think and to inquire. Consequently, by the time the pupils reach the age of 11+ years, they should be well grounded in the subjects of the primary school curriculum—reading, writing and arithmetic—and should be interested in and observant of their environment, and be ready to study more systematically the applications of their observations.

The problem then arises as to the course to be followed in the central schools or senior classes. Here "the treatment of the various subjects of the curriculum should respond sympathetically to the local environment." It is necessary that the pupils be encouraged to take an interest in local industries and occupations and for this purpose the teacher must continuously draw illustrations from local examples. For boys, nature study should develop into rural science. For them there should be systematic instruction in the physics and chemistry of soils, manures, plant and vegetable life, taken in connection with gardening and rural carpentry. Girls should be provided with instruction in cookery, laundry and general housewifery. Their instruction in domestic science must be correlated with local conditions, and they should be taught to manage the domestic side of homes such as they are likely to meet with in rural areas. Personal hygiene should also form a prominent part of their curriculum, for the maintenance of good health is a necessary part of education. In their instruction in needlework, much importance should be attached to mending, patching and darning.

With such a curriculum, pupils should not only be able to make themselves ordinarily intelligible to others, but also be sufficiently intelligent themselves to make good use of the "tools" they have already handled and to become capable and happy citizens.

The problem of the curriculum for children of 11+ years is considerably more difficult in rural areas. The scattered character of the population, the difficulty of communication and the persistent "parochial" idea with regard to education, all render the task of the organisation of central schools more difficult for those who do not go on to a secondary school. In some areas, the village school must always remain the unit and post-primary education must be provided in the primary school by means of a special curriculum such as that outlined for the top classes, Where a number of schools are sufficiently near one another and the accommodation admits, senior classes can be collected in one building, where the number in the age-groups of the post-primary pupils will be sufficiently large to justify a separate teacher and the instruction should be to that extent the better.

As has been experienced in a large rural area, central schools can be established. Although generally they will be non-selective central schools, yet a selective central school here and there can with great advantage be established. Although selective central schools are not to be regarded as in any sense competitors of the present day secondary schools, yet such schools provide facilities for those of the primary school who are unable to find accommodation in the secondary schools and who need a secondary education of the more practical character. Education should be viewed as an "organic whole."

The majority of central schools established in a rural area will probably be of the non-selective type. Where such schools are established, there should be separate rooms for practical work for both boys and girls. Here especially, it is necessary that the pupils should "learn by doing," and in order to carry out this to the full, the teachers must be trained upon similar lines. There will probably always be rural schools and good teachers are as essential there as in town schools; and in the case of a rural teacher, knowledge of country life and occupations would appear to be a *sine qua non*. Such teachers are generally those who have spent the early part of their training at least in country schools. Consequently it would appear necessary to retain to a limited extent, albeit in a somewhat modified form, the rural pupil teacher system. When framing the syllabus of work to be done in colleges for the training of teachers, provision should be made for those teachers interested and experienced in country life and occupations by the introduction of special courses whereby that interest may be fostered, and that experience enlarged. However trained, the rural teacher must be interested in rural life, and the education given in rural schools must be thoroughly practical in all its aims and aspects and in every sense consistent with the environment.

BIBLIOGRAPHY.—*The New Prospect in Education* (Board of Education, Educational pamphlets, no. 60); H. Morris, *The Village College* (1924); *Report* of the Departmental Committee on the Training of the Rural Teacher (appointed 1927). (J. S. D.)

THE UNITED STATES

Rural education refers to the schools centred about rural communities varying in population from a few families to 2,500 people. Before the development of the consolidated schools rural education was limited to the elementary school which was housed in a one or two-room building. With the appearance of the union and consolidated districts rural education included all schools below college grade. The rural schools range in size from the one-teacher elementary school to the consolidated school which often includes both elementary and high school with several teachers. There are at least three distinct types of rural school organization: (1) the local district which includes usually a one or two-teacher school; (2) the consolidated district which is a union of two or more local districts, and (3) the county district which is the largest unit of rural school organization. In several of the States the township is the local school unit.

Since rural children live in a different environment from urban children, rural education attempts to utilize the materials of that environment. This does not mean that there is a fundamental difference in the ultimate aims of rural and urban education. Both types of school are attempting to provide conditions that will enable the children of each to meet effectively the problems of life. Rural education, like urban education, is utilizing materials from all sources which will enrich the experience of the individual, enabling him to seek new levels of achievement. The function of the rural school is not confined to the preparation of boys and girls to be farmers. While provision is made for training in this field and its related activities, provision is also made for those rural children who are planning on other lines of work than agriculture. Better rural schools are offering several curricula and are not limiting their work to one highly specialized curriculum.

Changing conditions in rural America demand that the educational facilities of the rural school must be equal to those of the urban school. The rural child, like the urban, is a potential member of the social, economic and political democracy. In many rural communities efforts are being made to apply all known means of improving the schools, such as modern buildings and equipment, scientific curricula and methods of teaching, effective supervision and professionally trained teachers. Every method that has proved effective in improving the urban schools is being applied to the rural schools with the necessary modifications to meet the needs of the rural people.

Campbell, in his book, *Rural Life at the Cross Roads* (1927), estimated that there were in the United States approximately 4,000 rural schools of the modern type which may be classed as fully adequate; about 10,000 rural schools employing several teachers each, but too small, too poorly organized, too poorly taught and too poorly supported by farm groups which have no definite purpose to achieve through them, to be classed as adequate; and approximately 168,000 one-teacher schools which are the least adequate of all. (W. D. A.)

RURKI, a town of British India, in the Saharanpur district of the United Provinces. Pop. (1921) 16,716, including the cantonment. It is the headquarters of the workshops of the Ganges canal, and also of the Bengal Sappers and Miners. The Thomason Civil Engineering College, founded in 1848, was instituted in order to train Indians in engineering, and students originally received stipends. The college works in co-operation with the workshops and foundry of the canal, and also trains in surveying, photography and other subjects, having chemical, physical, electrical and mechanical laboratories and workshops.

RUSCHUK (Bulg. *Russé*), the capital of the department of Ruschuk, Bulgaria, on the right bank of the Danube, where it receives the R. Lom. Pop. (1926) 45,672. It is connected by rail with Varna and Sofia; by boat and rail with Bucharest. It is the chief Danubian port of Bulgaria, and an important commercial centre. It possesses sugar, tobacco and cigarette factories, soapworks, breweries, aerated water factories, dyeworks, tanneries, sawmills, brick and tile works and a celebrated pottery.

In Roman times Ruschuk was one of the fortified points along the line of the Danube. In the *Tabula Peutingeriana* it appears as Prisca, in the *Antonine Itinerary* as Serantaprista, in the *Notitia* as Seragintaprista and in Ptolemy as Priste Polis. Destroyed by barbarian invaders in the 7th century the town recovered its importance only in comparatively modern times. It played an important part in the Russo-Turkish wars of 1810, 1828–29, 1853–54 and 1877–78. In 1877 it was nearly destroyed by Russian artillery.

RUSELLAE, an ancient town of Etruria, Italy, about 10 m. S.E. of Vetulonia and 5 m. N.E. of Grosseto, situated on a hill with two summits, the higher 636 ft. above sea-level. It was one of the twelve cities of the Etruscan confederation, and was taken in 294 B.C. by the Romans. In 205 B.C. it contributed grain and timber for the needs of Scipio's fleet. The place was deserted in 1138, and the episcopal see was transferred to Grosseto. The walls, nearly 2 m. in circumference, are in places well preserved. They consist of large unworked blocks of a travertine which naturally splits into roughly rectangular blocks; these are quite irregular, and often as much as 9 ft. long by 4 ft. wide: in the interstices smaller pieces are inserted.

RUSH, BENJAMIN (1745–1813), American physician, was born in Byberry township, near Philadelphia. In 1760 he graduated at Princeton. In 1768 he took his M.D. at Edinburgh, and after spending a year in the hospitals of London and Paris began practice in Philadelphia. In 1774 he founded with James Pemberton the first anti-slavery society in America. In 1776, as a member of Congress for the State of Pennsylvania, he was one of those who signed the Declaration of Independence. In 1787 he was a member of the Pennsylvania convention which adopted the Federal constitution. After lecturing many years at the Philadelphia medical college, he became professor of the institutes of medicine and of clinical practice, succeeding in 1796 to the chair of the theory and practice of medicine, at the University of Pennsylvania. In 1799 he was appointed treasurer of the U.S. Mint in Philadelphia. He died in Philadelphia on April 19, 1813, after a five days' illness from typhus fever.

RUSH, RICHARD (1780–1859), American statesman and diplomat, son of Dr. Benjamin Rush, was born in Philadelphia, Pa., on Aug. 29, 1780. He graduated at Princeton in 1797, and was admitted to the bar in 1800. He was attorney-general of Pennsylvania in 1811; controller of the Treasury of the United States, 1811–14; attorney-general in the cabinet of President James Madison, 1814–17; acting secretary of State from March to Sept., 1817; minister to Great Britain, 1817–25; secretary of the Treasury in the cabinet of President J. Q. Adams, 1825–29; and candidate for vice-president on the Adams ticket in 1828. In 1818, while minister to Great Britain, he, in association with Albert Gallatin, concluded with British plenipotentiaries the important treaty which determined the boundary line between the United States and Canada from the Lake of the Woods to the Rocky mountains and provided for the joint occupation of Oregon for ten years. He also conducted the negotiations with Canning in 1823 relating to the South American policy of the Holy Alliance.

He followed the Adams-Clay faction of the Democratic-Republican Party in the split of 1825–28, but returned to the Democratic Party about 1834 on the bank issue. In 1835 he and Benjamin C. Howard, of Baltimore, Md., were sent by President Jackson to prevent an outbreak of hostilities in the Ohio-Michigan boundary dispute. In 1836–38 Rush was commissioner to receive the Smithson legacy (*see* SMITHSONIAN INSTITUTION), and in 1847–49 he was minister to France. He died in Philadelphia on July 30, 1859.

He published *A Narrative of a Residence at the Court of London from 1817 to 1825* (2 vols. 1833–45; all editions after the 1st ed. of the 1st. vol. are entitled *Memoranda of a Residence,* etc.); *Washington in Domestic Life* (1857), compiled from letters written by Washington to his private secretary in 1790–98; and *Occasional Productions, Political, Diplomatic and Miscellaneous* (1860); and while attorney-general he suggested the plan for the compilation, *Laws of the Nation* (5. vols., 1815), ed. by John B. Colvin.

RUSH. Under the name of rush or rushes, the stalks or hollow stem-like leaves of several plants have minor industrial applications. The common rushes (species of *Juncus; see* JUNCACEAE)

are used in many parts of the world for chair-bottoms, mats and basket-work, and the pith serves as wicks in open oil-lamps and for tallow candles—whence rushlight. The fibrous stems and leaves of the bulrush or reed-mace, *Typha angustifolia*, are used in north India for ropes, mats and baskets. *Scirpus* and other Cyperaceae are used for chair-bottoms, mats and thatch; the rush mats of Madras are made from a species of *Cyperus*. The sweet-rush, yielding essential oil, is a grass, *Andropogon Schoenanthus*, known also as lemon grass. Large quantities of the horse-tail, *Equisetum hiemale*, are used under the name of Dutch or scouring rush for scouring metal and other hard surfaces on account of the large proportion of silica the plant contains. Flowering rush is *Butomus umbellatus* (*see* ALISMACEAE); wood-rush is the common name for *Luzula* (*see* JUNCACEAE). *Acorus Calamus* (family Araceae), sweet-flag, is also known as sweet-rush.

RUSHDEN, urban district, in the Wellingborough parliamentary division, Northamptonshire, England, 66m. N.W. from London by the L.M.S. railway. Pop. (1931) 14,247. The church of St. Mary is a cruciform building. It is mainly Decorated with Perpendicular additions, but retains some Early English details. The industrial population is employed in boot and shoe making. The town is now almost continuous with Higham Ferrers.

RUSHDI PASHA (*c.* 1864–1928), Egyptian statesman, was born about 1864, and educated in France. On his return to Egypt he became successively a judge in the Mixed Tribunals, a judge in the Egyptian Court of Appeal, and Director-general of Wakfs. He became minister of justice in 1908, and two years later minister of foreign affairs, on the assassination of Boutros Pasha, returning later to the ministry of justice. In April 1914 he was made prime minister and at the outbreak of the World War was acting as regent in the absence of the khedive. The fact that Egypt was still technically part of the Ottoman empire, and that Turkey at first declared for neutrality, made his position extremely difficult. He had, however, a strong cabinet, and, when Turkey entered the war on the side of Germany, he agreed to the proclamation of a British protectorate. Abbas Hilmi was deposed, and Prince Hussein chosen as sultan by the British government.

After the Armistice, there was a strong movement, led by Saad Pasha Zaghlul (*q.v.*) for the recognition of Egypt's independence. Rushdi pressed the British Government for a definition of the position, and even asked to be received in London with Adly Pasha to discuss the question. This proposal was not accepted, and on March 1, 1919 he and his cabinet resigned. A few days later Zaghlul Pasha was arrested by the British authorities and deported to Malta. This step led to serious rioting, and he was soon released and continued his journey to Paris to champion Egypt at the Peace Conference. The British Government had to appeal once more to Rushdi Pasha, who consented, after the release of Zaghlul, to form a ministry again. The treatment which he had received had, however, greatly diminished his prestige, and he was obliged to resign again ten days later. He retired into private life, and did not take office again until the Milner Commission (1919) had made its report.

An Egyptian cabinet was required which should have sufficient support in Egypt to undertake negotiations in London towards an agreed settlement. Adly Pasha was made prime minister, and Rushdi became president of the Council, being chosen to accompany him to England. He was, however, failing in health, and his final illness was probably aggravated by his anxiety with regard to the negotiations, as he believed that the British terms would prove unacceptable. He died on March 13, 1928.

RUSHMORE, MOUNT, MEMORIAL: *see* BORGLUM.

RUSHVILLE, a city of Indiana, U.S.A., 39 m. S.E. of Indianapolis, on Flat Rock Creek, at an altitude of 967 ft.; the county seat of Rush county. It is on Federal highway 52, and is served by the Baltimore and Ohio, the Big Four, the Erie, the Nickel Plate, and the Pennsylvania railways. The population was 5,498 in 1920 (95% native white) and was 5,709 in 1930 by the Federal census. It has various manufacturing industries and a large trade in grain, livestock (especially blooded hogs), and lumber. Rushville was chartered as a town in 1816 and as a city in 1883.

RUSHWORTH, JOHN (*c.* 1612–1690), the compiler of the *Historical Collections* commonly described by his name, was the son of Lawrence Rushworth of Acklington Park, Warkworth, Northumberland. In 1638 he was appointed solicitor to the town of Berwick. He was enrolled in Lincoln's Inn in 1641, and was called to the bar in 1647. He attended all public occasions of a political and judicial character, such as proceedings before the Star Chamber or the Council, and made shorthand notes of them. On April 25, 1640, he was appointed an assistant clerk to the House of Commons. He became secretary to Fairfax, and then, for a short time, to Cromwell. He was afterwards employed by the council of State and during the protectorate, and sat in Cromwell's parliament for Berwick.

He made his peace with the Government of Charles II., and though he was threatened with trial as a regicide he was not seriously molested. During the reign of Charles II. he continued to act as agent for the town of Berwick, and he sat for it in parliament. He was also for a time agent for Massachusetts. From 1684 till his death on May 12, 1690, he was a resident in the King's Bench prison. At this time he had destroyed his memory by over-indulgence in drink. The collection of papers which he made was published in eight volumes folio between 1659 and 1701. The volumes from the fourth onwards appeared after his death.

RUSKIN, JOHN (1819–1900), English writer and critic, was born in London, at Hunter Street, Brunswick Square, on Feb. 8, 1819, being the only child of John James Ruskin and Margaret Cox. They were Scots, first cousins, the grandchildren of a certain John Ruskin of Edinburgh (1732–1780). John Ruskin, the author's grandfather, was a wine merchant in Edinburgh, who ran through his fortune, and ended his days in debt. His son, John James Ruskin (1785–1864), father of the author, was sent, on leaving Edinburgh High School, to London to enter the wine trade. There, in 1809, he founded the sherry business of Ruskin, Telford and Domecq; Domecq being proprietor of a famous vineyard in Spain, Telford contributing the capital of the firm, and Ruskin having sole control of the business. Ruskin built up a great business, paid off his father's debts and formed near London a most hospitable and cultured home, where he maintained his taste for literature and art.

Margaret Ruskin, the author's mother, was a handsome, strong, stern, able, devoted woman of the old Puritan school, Calvinist in religion, unsparing of herself and others, rigid in her ideas of duty, proud, reserved and ungracious. The child was brought up under a rigid system of nursing, physical, moral and intellectual; kept without toys, not seldom whipped, watched day and night, but trained from infancy in music, drawing, reading aloud and observation of natural objects. When he was four the family removed to a house on Herne Hill, then a country village, with a garden and rural surroundings. The father, who made long tours on business, took his wife, child and nurse year after year across England as far as Cumberland and Scotland, visiting towns, cathedrals, castles, colleges, parks, mountains and lakes. At 14 the child was taken through Flanders, along the Rhine, and through the Black Forest to Switzerland, where he first imbibed his dominant passion for the Alps. His youth was largely passed in systematic travelling in search of everything beautiful in nature or in art. And to one so precocious, stimulated by a parent of much culture, ample means and great ambition, this resulted in an almost unexampled aesthetic education. In childhood also he began a systematic practice of composition, both in prose and verse. His mother trained him in reading the Bible, of which he read through every chapter of every book year by year; and to this study he justly attributes his early command of language and his pure sense of style. His father read to him Shakespeare, Scott, Don Quixote, Pope and Byron, and most of the great English classics; and his attention was especially turned to the formation of sentences and to the rhythm of prose. He began to compose both in prose and verse as soon as he had learned to read and write, both of which arts he taught himself by the eye. He wrote enormous quantities of verse, and began dramas, romances and imitations of Byron, Pope, Scott and Shelley.

His schooling was irregular and not successful. At 15 he was sent for two years to the day-school of the Rev. T. Dale of Peckham, and at 17 he attended some courses in literature at King's college, London. In painting he had lessons from Copley Fielding and afterwards from J. D. Harding. But in the incessant travelling, drawing, collecting specimens and composition in prose and verse he had gained but a very moderate classical and mathematical knowledge when he matriculated at Oxford; nor could he ever learn to write tolerable Latin. As a boy he was active, lively and docile; a good walker, but ignorant of all boyish games, as naïve and as innocent as a child; and he never could learn to dance or to ride. He was only saved by his intellect and his fine nature from turning out an arrant prig. He was regarded by his parents, and seems to have regarded himself, as a genius.

At the age of 17 he saw Adèle, the French daughter of Monsieur Domecq, Mr. Ruskin's partner, a lovely girl of fifteen. John fell rapturously in love with her; and, it seems, the two fathers seriously contemplated their marriage. The young poet wooed the girl with poems, romances, dramas and mute worship, but received nothing except chilling indifference and lively ridicule. To the gay young beauty, familiar with Parisian society, the raw and serious youth was not a possible *parti*. She was sent to an English school, and he occasionally saw her. His unspoken passion lasted about three years, when she married the Baron Duquesne. Writing as an old man, long after her death, Ruskin speaks of his early love without any sort of rapture. But it is clear that it deeply coloured his life, and led to the illness which for some two years interrupted his studies and made him a wanderer over Europe.

As the father was resolved that John should have everything that money and pains could give, and should one day be a bishop at least, he entered him at Christ Church, Oxford, as a gentleman-commoner—then an order reserved for men of wealth and rank. Ruskin's Oxford career, broken by the two years passed abroad, was not very full of incident or of usefulness. Both he and his college took kindly the amazing proceeding of his mother, who left her husband and her home to reside in Oxford, that she might watch over her son's health. The one success of his Oxford career was the winning the Newdigate Prize by his poem "Salsette and Elephanta," which he recited in the Sheldonian Theatre (June 1839). Two years of ill-health and absence from home ensued. And he did not become "a Graduate of Oxford" until 1842, in his 24th year, five years after his first entrance at the university. In fact, his desultory school and college life had been little more than an interruption and hindrance to his real education—the study of nature, of art and of literature. Long before Ruskin published books he had written for various periodicals on architectural and other subjects.

After leaving Oxford, Ruskin set to work steadily at Herne Hill on the more elaborate defence of Turner, which was to become his first work. *Modern Painters*, vol. i., by "a Graduate of Oxford," was published May 1843, when the author was little more than twenty-four. It was vehemently attacked by the critics, and coolly received by the painters. Even Turner was somewhat disconcerted; but the painter was now known to both Ruskins, and they freely bought his pictures. The family then went again to the Alps, that John might study mountain formation and "Truth" in landscape. In 1845 he was again abroad in Italy, working on his *Modern Painters*, the second volume of which appeared in 1846. He had now plunged into the study of Bellini and the Venetian school, Fra Angelico and the early Tuscans, and he visited Lucca, Pisa, Florence, Padua, Verona and Venice, passionately devoting himself to architecture, sculpture and painting in each city of north Italy. He wrote a few essays for the *Quarterly Review* and other periodicals, and in 1849 (*aet.* 30) he published *The Seven Lamps of Architecture*, with his own etchings, which greatly increased the reputation acquired by his *Modern Painters*.

On April 10, 1848, a day famous in the history of Chartism, Ruskin was married at Perth to Euphemia Chalmers Gray, a lady of great beauty, of a family long intimate with the Ruskins. The marriage, we are told, was arranged by the parents of the pair, and was a somewhat hurried act. It was evidently ill-assorted, and brought no happiness to either. They travelled, lived in London, saw society, and attended a "Drawing-room" at Buckingham Palace. But Ruskin, immersed in various studies and projects, was no husband for a brilliant woman devoted to society. No particulars of their life have been made public. In 1854 his wife left him, obtained a nullification of the marriage under Scots law, and ultimately became the wife of John Everett Millais. John Ruskin returned to his parents, with whom he resided till their death; and neither his marriage nor the annulling of it seems to have affected seriously his literary career.

Ruskin's architectural studies, of which *The Seven Lamps* was the first fruit, turned him from Turner and *Modern Painters*. He planned a book about Venice in 1845, and *The Stones of Venice* was announced in 1849 as in preparation. After intense study in Italy and at home, early in 1851 (the year of the Great Exhibition in London) the first volume of *The Stones of Venice* appeared (*aet.* 32). It was a concrete expansion of the ideas of *The Seven Lamps*—that the buildings and art of a people are the expression of their religion, their morality, their national aspirations and social habits. It was, as Carlyle wrote to the author, "a sermon in stones," "a singular sign of the times," "a new *Renaissance*." It appeared in the same year with *The Construction of Sheepfolds*—a plea for the reunion of Christian churches—in the same year with the essay on *Pre-Raphaelitism*, the year of Turner's death (19th December). *The Stones of Venice* was illustrated with engravings by some of the most refined artists of his time. The author spent a world of pains in having these brought up to the highest perfection of the reproductive art, and began the system of exquisite illustration, and those facsimiles of his own and other sketches, which make his works rank so high in the catalogues and price-lists of collectors. This delicate art was carried even farther in the later volumes of *Modern Painters* by the school of engravers whom Ruskin inspired and gathered round him. And these now rare and coveted pieces remain to rebuke us for our modern preference for the mechanical and unnatural *chiaroscuro* of photogravure—the successor and destroyer of the graver's art.

Although Ruskin was practised in drawing from the time that he could hold a pencil, and had lessons in painting from some eminent artists, he at no time attempted to paint pictures. He said himself that he was unable to compose a picture, and he never sought to produce anything that he would call a work of original art. His drawings, of which he produced an enormous quantity, were always intended by himself to be studies or memoranda of buildings or natural objects precisely as they appeared to his eye. Clouds, mountains, landscapes, towers, churches, trees, flowers and herbs were drawn with wonderful precision, minuteness of detail and delicacy of hand, solely to recall some specific aspect of nature or art, of which he wished to retain a record. In his gift for recording the most subtle characters of architectural carvings and details, Ruskin has hardly been surpassed by the most distinguished painters.

In 1853 *The Stones of Venice* was completed at Herne Hill, and he began a series of *Letters* and *Notes* on pictures and architecture. In this year (*aet.* 34) he opened the long series of public lectures wherein he came forward as an oral teacher and preacher, not a little to the alarm of his parents and amidst a storm of controversy. The Edinburgh Lectures (November 1853) treated Architecture, Turner and Pre-Raphaelitism. The Manchester Lectures (July 1857) treated the moral and social uses of art, now embodied in *A Joy for Ever*. Some other lectures are reprinted in *On the Old Road* and *The Two Paths* (1859). These lectures did not prevent the issue of various *Notes* on the Royal Academy pictures and the Turner collections; works on the *Harbours of England* (1856); on the *Elements of Drawing* (1857); the *Elements of Perspective* (1859). At last, after prolonged labour, the fifth and final volume of *Modern Painters* was published in 1860 (*aet.* 41). This marks an epoch in the career of John Ruskin; and the year 1860 closed the series of his works on art strictly so called.

The last forty years of his life were devoted to expounding his views, or rather his doctrines, on social and industrial problems, on education, morals and religion, wherein art becomes an incidental and instrumental means to a higher and more spiritual life

And his teaching was embodied in an enormous series of lectures, letters, articles, selections and serial pamphlets. These are now collected in upwards of thirty volumes in the final edition. The entire set of Ruskin's publications amounts to more than fifty works having distinctive titles. For some years before 1860 Ruskin had been deeply stirred by reflecting on the condition of all industrial work and the evils of modern society. His lectures on art had dealt bitterly with the mode in which buildings and other works were produced. In 1854 he joined F. D. Maurice, T. Hughes and several of the new school of painters, in teaching classes at the Working Men's College. But it was not until 1860 that he definitely began to propound a new social scheme, denouncing the dogmas of political economy. Four lectures on this topic appeared in the *Cornhill Magazine* until the public disapproval led the editor, then W. M. Thackeray, to close the series. They were published in 1862 as *Unto this Last*. In the same year he wrote four papers in the same sense in *Fraser's Magazine*, then edited by J. A. Froude; but he in turn was compelled to suspend the issue. They were completed and ultimately issued under the title *Munera Pulveris*. These two small books contain the earliest and most systematic of all Ruskin's efforts to depict a new social Utopia. They contain a vehement repudiation of the orthodox formulas of the economists; and they are for the most part written in a trenchant but simple style, in striking contrast to the florid and discursive form of his works on art.

In 1864 Ruskin's father died, at the age of 79, leaving his son a large fortune and a fine property at Denmark Hill. John still lived there with his mother, aged 83, infirm, and failing in sight, to whom came as a companion his cousin, Joanna Ruskin Agnew, afterwards Mrs. Arthur Severn. At the end of the year 1864 Ruskin delivered at Manchester a new series of lectures—not on art, but on reading, education, woman's work and social morals—the expansion of his earlier treatises on economic sophisms. This afterwards was included with a Dublin lecture of 1868 under the fantastic title of *Sesame and Lilies* (perhaps the most popular of his social essays), of which 44,000 copies were issued down to 1900. He made this, in 1871, the first volume of his collected lectures and essays, the more popular and didactic form of his new Utopia of human life. It contains, with *Fors*, the most complete sketch of his conception of the place of woman in modern society.

In the very characteristic preface to the new edition of 1871 Ruskin proposes never to reprint his earlier works on art; disclaims many of the views they contained, and much in their literary form; and specially regrets the narrow Protestantism by which they were pervaded. In the year 1866 he published a little book about girls, and written for girls, a mixture of morals, theology, economics and geology, under the title of *Ethics of the Dust;* and this was followed by a more important and popular work, *The Crown of Wild Olive*. This in its ultimate form contained lectures on "Work," "Traffic," "War" and "The Future of England." It was one of his most trenchant utterances, full of fancy, wit, eloquence and elevated thought. But a more serious volume was *Time and Tide* (1867), a series of twenty-five letters to a workman of Sunderland, upon various points in the Ruskinian Utopia. This little collection of "Thoughts," written with wonderful vivacity, ingenuity and fervour, is the best summary of the author's social and economic programme, and contains some of his wisest and finest thoughts in the purest and most masculine English that he had at his command. In 1869 he issued *The Queen of the Air*, lectures on Greek myths, a subject he now took up, with some aid from the late Sir C. Newton. It was followed by some other occasional pieces; and in the same year he was elected Slade professor of art in the University of Oxford.

He now entered on his professorial career, which continued with some intervals down to 1884, and occupied a large part of his energies. His lectures began in February 1870, and were so crowded that they had to be given in the Sheldonian Theatre, and frequently were repeated to a second audience. He was made honorary fellow of Corpus Christi, and occupied rooms in the college. In 1871 his mother died, at the age of 90, and his cousin, Miss Agnew, married Arthur Severn. In that year he bought from Linton, Brantwood, an old cottage and property on Coniston Lake, a lovely spot facing the mountain named the Old Man. He added greatly to the house and property, and lived in it continuously until his death in 1900. In 1871, one of the most eventful years of his life, he began *Fors Clavigera*, a small serial addressed to the working men of England, and published only by George Allen, engraver, at Keston, in Kent, at 7d., and afterwards at 10d., but without discount, and not through the trade. This was a medley of social, moral and religious reflections interspersed with casual thoughts about persons, events and art. *Fors* means alternatively fate, force or chance, bearing the *Clavis*, club, key or nail, *i.e.*, power, patience and law. It was a desultory exposition of the Ruskinian ideal of life, manners and society, full of wit, play, invective and sermons on things in general. It was continued with intervals down to 1884, and contained ninety-six letters or pamphlets, partly illustrated, which originally filled eight volumes and are now reduced to four.

The early years of his Oxford professorship were occupied by severe labour, sundry travels, attacks of illness and another cruel disappointment in love. In spite of this, he lectured, founded a museum of art, to which he gave pictures and drawings and £5,000; he sought to form at Oxford a school of drawing; he started a model shop for the sale of tea, and model lodgings in Marylebone for poor tenants. At Oxford he set his pupils to work on making roads to improve the country. He now founded "St. George's Guild," himself contributing £7,000, the object of which was to form a model industrial and social movement, to buy lands, mills and factories, and to start a model industry on co-operative or Socialist lines. In connection with this was a museum for the study of art and science at Sheffield. Ruskin himself endowed the museum with works of art and money; a full account of it has been given in E. T. Cook's *Studies in Ruskin* (1890), which contains the particulars of his university lectures and of his economic and social experiments. It is unnecessary to follow out the history of these somewhat unpromising attempts. None of them came to much good, except the Sheffield museum, which is an established success, and is now transferred to the town.

In *Fors*, which was continued month by month for seven years, Ruskin poured out his thoughts, proposals and rebukes on society and persons with inexhaustible fancy, wit, eloquence and freedom, until he was attacked with a violent brain malady in the spring of 1878 (*aet.* 59); and, although he recovered in a few months sufficiently to do some occasional work, he resigned his professorship early in 1879. The next three years he spent at Brantwood, mainly in retirement, and unhappy in finding nearly all his labours interrupted by his broken health. In 1880 he was able to travel in northern France, and began the *Bible of Amiens*, finished in 1885; and he issued occasional numbers of *Fors*, the last of which appeared at Christmas 1884. In 1882 he had another serious illness, with inflammation of the brain; but he recovered sufficiently to travel to his old haunts in France and Italy—his last visit. And in the following year he was re-elected professor at Oxford and resumed his lectures, but increasing brain excitement, and indignation at the establishment of a laboratory to which vivisection was admitted, led him to resign his Oxford career, and he retired in 1884 to Brantwood, which he never left. He now suffered from frequent attacks of brain irritation and exhaustion, and had many causes of sorrow and disappointment. His lectures were published at intervals from 1870 to 1885 in *Aratra Pentelici, The Eagle's Nest, Love's Meinie, Ariadne Florentina, Val d'Arno, Proserpina, Deucalion, The Laws of Fesolé, The Bible of Amiens, The Art of England* and *The Pleasures of England*, together with a series of pamphlets, letters, articles, notes, catalogues and circulars.

In the retirement of Brantwood he began his last work, *Praeterita*, a desultory autobiography with personal anecdotes and reminiscences. He was again attacked with the same mental malady in 1885, which henceforth left him fit only for occasional letters and notes. In 1887 it was found that he had exhausted (spent, and given away) the whole of the fortune he had received from his father, amounting, it is said, to something like £200,000; and he was dependent on the vast and increasing sale of his works, which produced an average income of £4,000 a year, and at times

on the sale of his pictures and realizable property. In 1872 a correspondent had remonstrated with him in vain as to taking "usury," *i.e.*, interest on capital lent to others for use. In 1874 Ruskin himself had begun to doubt its lawfulness. In 1876 he fiercely assailed the practice of receiving interest or rent, and he henceforth lived on his capital, which he gave freely to friends, dependants, public societies, charitable and social objects. The course of his opinions and his practice is fully explained in successive letters in *Fors*.

Until 1889 Ruskin continued to write chapers of *Praeterita*, which was designed to record memories of his life down to the year 1875 (*aet.* 56). It was, in fact, only completed in regular series down to 1858 (*aet.* 39), with a separate chapter as to Mrs. Arthur Severn, and a fragment called *Dilecta*, containing letters and early recollections of friends, especially of Turner. These two books were published between 1885 and 1889; and except for occasional letters, notes and prefaces, they form the last writings of the author of *Modern Painters*. His literary career thus extends over fifty years. But he has left nothing more graceful, naïve and pathetic than his early memories in *Praeterita*—a book which must rank with the most famous "Confessions" in any literature. The last ten years of his life were passed in complete retirement at Brantwood, in the loving care of the Severn family, to whom the estate was transferred, with occasional visits from friends, but with no sustained work beyond correspondence, the revision of his works, and a few notes and prefatory words to the books of others. He wished to withdraw his early art writings from circulation, but the public demand made this practically impossible.

The close of his life was one of entire peace and honour. He was loaded with the degrees of the universities and membership in numerous societies and academies. "Ruskin Societies" were founded in many parts of the kingdom. His works were translated and read abroad, and had an enormous circulation in Great Britain and the United States. He died suddenly after only two days' illness on Jan. 20, 1900. He was buried in Coniston churchyard by his own express wish, the family refusing the offer of a grave in Westminster Abbey.

Ruskin's life and writings have been the subject of many works composed by friends, disciples and admirers. The principal is the *Life*, by W. G. Collingwood, his friend, neighbour and secretary (2 vols., 1893; 2nd ed., 1900). His pupil, E. T. Cook, published his *Studies in Ruskin* in 1890, with full details of his career as professor, and a *Life of Ruskin* in 1911. J. A. Hobson, in *John Ruskin, Social Reformer* (2nd ed., 1899), has elaborately discussed his social and economic teaching, and claims him as "the greatest social teacher of his age." An analysis of his works has been written by Mrs. Meynell (1900). His art theories have been discussed by Professor Charles Waldstein of Cambridge in *The Work of John Ruskin* (1894), by Robert de la Sizeranne in *Ruskin et la religion de la beauté* (1897), and by Professor H. J. Brunhes of Fribourg in *Ruskin et la Bible* (1901). The monumental "library edition" of Ruskin's works (39 vols., 1903–12), prepared by E. T. Cook, with A. Wedderburn, is the greatest of all the tributes of literary admiration. *See* also *Centenary Addresses* (1919) ed. J. H. Whitehouse; J. R. Morley, *John Ruskin and Social Ethics* (1917); A. Williams-Ellis, *The Tragedy of John Ruskin* (1928). (F. Har.)

RUSSELL (Family). The great English Whig house of the Russells, earls and dukes of Bedford, rose under the favour of Henry VIII. Obsequious genealogists have traced their lineage from "Hugh de Rozel," *alias* "Hugh Bertrand, lord of le Rozel," a companion of the Conqueror, padding their fiction with the pedigree of certain Russells who are found holding Kingston Russell in Dorset as early as the reign of King John. But the first undoubted ancestor of the Bedford line is Henry Russell, a Weymouth merchant, returned as a burgess for that borough in four parliaments between 1425 and 1442. He may well have been the son of Stephen Russell, another Weymouth merchant, whose name is just before his in the list of those men of substance in Dorsetshire who, in 1434, under the act of parliament, were to be sworn not to maintain breakers of the peace. Stephen Russell, having served the office of bailiff of Weymouth, was returned as burgess to the parliament of 1395, and one William Russell was returned for King's Melcombe in 1340. Both Stephen and Henry were in the wine trade with Bordeaux, and in 1427 Henry Russell was deputy to the chief butler of England for the port of Melcombe. In 1442 a pardon under the privy seal significantly describes Henry Russell of Weymouth, merchant, as *alias* Henry Gascoign, gentleman, and it is therefore probable that the ducal house of Bedford springs from a family of Gascon wine-merchants settled in a port of Dorsetshire, a county remarkable for the number of such French settlers.

Henry Russell of Weymouth made a firm footing upon the land by his marriage with Elizabeth Hering, one of the two daughters and co-heirs of John Hering of Chaldon Hering, a Dorsetshire squire of old family, heir of the Winterbournes of Winterbourne Clenston and of the Cernes of Draycot Cerne. John Russell, eldest son of this match, born before 1432, and returned to parliament for Weymouth in 1450, had his seat at Berwick in Swyre, he and his son and heir, James Russell, being buried in the parish church of Swyre.

John Russell, son and heir of James, on the accession of Henry VIII. advanced rapidly serving the crown as soldier and as diplomatic agent. He fought well at Thérouanne, saw the Field of the Cloth of Gold and the French disaster at Pavia, lost an eye by an arrow at Morlaix. In 1523 he was knight-marshal of the king's household. In 1526 he married a rich widow, Anne, daughter and co-heir of Sir Guy Sapcotes by the co-heir of Sir Guy Wolston, a match which brought to the Russells the Buckinghamshire estate of Chenies, in whose chapel many generations of them lie buried. His peerage as Lord Russell of Chenies dated from 1539, and in the same year he had the Garter. Having held many high offices, he was named by Henry VIII. as one of his executors. At the crowning of Edward VI. he was lord high steward, and after his defeat of the western rebels was raised, in 1550, to the earldom of Bedford. Queen Mary, like her brother, made him lord privy seal. He died in London in 1555, leaving to his son a vast estate of church lands. In the west he had the abbey lands of Tavistock, which give a marquess's title to his descendants. In Cambridgeshire he had the abbatial estate of Thorney, in Bedfordshire the Cistercian house of Woburn, now the chief seat of the Russells. In London he had Covent Garden with the "Long Acre."

He left an only son, Francis, second earl of Bedford, K.G. (*c.* 1527–1585), who, being concerned in Wyatt's plot, escaped to the Continent and joined those exiles at Geneva whose religious sympathies he shared. He returned in 1557, and was employed by Queen Mary before her death. Under Queen Elizabeth he governed Berwick, and was lord-lieutenant of the northern counties.

Three of his four sons died before him, the third, killed in a border fray, being father of Edward, third earl of Bedford, who died without issue in 1627. The fourth son, William, created Lord Russell of Thornhaugh in 1603, was a soldier who fought fiercely before Zutphen beside his friend Sir Philip Sidney, whom he succeeded as governor of Flushing, and was from 1594 to 1597 lord-deputy of Ireland. He died in 1613, leaving an only son, Francis, who in 1627 succeeded his cousin as fourth earl of Bedford. This earl built the square of Covent Garden, and headed the "undertakers" who began the scheme for draining the great Fen Level. He opposed the king in the House of Lords, but might have played a part as mediator between the sovereign and the popular party who accepted his leadership had he not died suddenly of the smallpox in 1641 on the day of the king's assent to the bill for Strafford's attainder. William, the eldest surviving son, succeeded as fifth earl, Edward, the youngest son, being father of Edward Russell (1653–1727), admiral of the fleet, who, having held the chief command in the victory of La Hogue, was created in 1697 earl of Orford. The fifth earl of Bedford, after fighting for the parliament at Edgehill and for the king at Newbury, surrendered to Essex and occupied himself with completing the drainage of the Bedford Level. He carried St. Edward's staff at the crowning of Charles II., but quitted political life after the execution of his son, Lord Russell, in 1683. In 1694 he was created duke of Bedford and marquess of Tavistock, titles to which his grandson, Wrothesley Russell, succeeded in 1700.

The "patriot" Lord Russell had added to the family estates by his marriage with Rachel, daughter and co-heir of Thomas Wrothesley, the fourth earl of Southampton, from whom she finally inherited the earl's property in Bloomsbury, with Southampton House, afterwards called Bedford House. Her son, the second duke of Bedford, married the daughter of a rich citizen, John Howland of Streatham, a match strangely commemorated by the barony of Howland of Streatham, created for the bridegroom's grandfather, the first duke, in 1695. The third duke, another WROTHESLEY RUSSELL (1708–1732), died without issue, his brother JOHN (1710–1771) succeeding him. This fourth duke, opposing Sir Robert Walpole, became, by reason of his rank and territorial importance, a recognized leader of the Whigs. In the duke of Devonshire's administration he was lord-lieutenant of Ireland, and he served as lord high constable at the coronation in 1760.

His son Francis, styled marquess of Tavistock, was killed in 1767 by a fall in the hunting field, and Lord Tavistock's son FRANCIS (1765–1802) became the fifth duke. This was the peer whom Burke, smarting from a criticism of his own pension, assailed as "the Leviathan of the creatures of the crown," enriched by grants that "outraged economy and even staggered credibility." He pulled down Bedford House, built by Inigo Jones, Russell Square and Tavistock Square rising on the site of its gardens and courts. Dying unmarried, he was succeeded by his brother JOHN, the sixth duke (1766–1839), whose third son was the statesman created, in 1861, Earl Russell of Kingston Russell, better known as Lord John Russell. Lord Odo Russell, a nephew of "Lord John," and ambassador at Berlin from 1871 to his death in 1884, was created Lord Ampthill in 1881. HERBRAND ARTHUR RUSSELL (b. 1858), the eleventh duke and fifteenth earl, succeeded an elder brother in 1893. (O. B.)

RUSSELL, BERTRAND ARTHUR WILLIAM, F.R.S. (1872–), was born May 18, 1872. His father was son of Lord John Russell, his mother a daughter of the second Lord Stanley of Alderley. At the age of three he was left an orphan. His father had wished him to be brought up as an agnostic; to avoid this he was made a ward of Court, and brought up by his grandmother at Pembroke lodge, in Richmond park. Instead of being sent to school he was taught by governesses and tutors, and thus acquired his perfect knowledge of French and German. In October 1890 he went into residence, as a very shy undergraduate, at Trinity college, Cambridge. After being a very high Wrangler and obtaining a First Class with distinction in philosophy he was elected a fellow of his college in the autumn of 1895. But he had already left Cambridge in the summer of 1894 and for some months was attaché at the British embassy at Paris. In December 1894 he married Miss Alys Pearsall Smith at the Friends meeting house at Westminster. After spending some months in Berlin studying social democracy (*German Social Democracy,* 1896), they went to live at a small cottage, some miles from Haslemere, where he devoted his time to the study of philosophy. A visit to the Mathematical Congress at Paris in 1900 with his friend Alfred Whitehead (afterwards professor of philosophy at Harvard) had important results. Russell was impressed with the ability of the pupils of the Italian mathematician Peano, and immediately studied Peano's works. In a short time he wrote his first important book, *The Principles of Mathematics* (1903) and in collaboration with Alfred Whitehead proceeded to develop and extend the mathematical logic of Peano and Frege. The first volume of their joint book, *Principia Mathematica,* was published in 1910.

During all this period Russell lived very simply and worked very hard. He and his wife had moved to a small house near Oxford, but he often went abroad, and from time to time, as when Mr. Chamberlain started his tariff reform campaign, abandoned philosophy for politics. In 1910 he was appointed lecturer at his old college. After the World War broke out he took an active part in the No Conscription fellowship. He was fined £100 as the author of a leaflet describing an early Christian conscientious objector. His library was seized to pay the fine; it was bought in by a friend; but many valuable books were lost. His college deprived him of his lectureship. He was offered a post at Harvard university, but was refused a passport. He intended to give a course of lectures (afterwards published in America as *Political Ideals,* 1918) but was prevented by the military authorities. In 1918 he was sentenced to six months' imprisonment for an article he had written in the *Tribunal.* His excellent *Introduction to Mathematical Philosophy* (1919) was written in prison. His *Analysis of Mind* (1921) was the outcome of some lectures he gave in London which were organised by a few friends who got up a subscription for the purpose. The *Practice and Theory of Bolshevism* (1920) was written after a short visit to Russia to study the conditions on the spot.

In the autumn of 1920 he went to China to lecture on philosophy at the Peking university. In the spring he caught pneumonia, and for three weeks was on the point of death. To the distress of his friends some enterprising Japanese newspapers announced his death. The more philosophic Chinese, who wished to be present at the deathbed of the philosopher Lo Sou, offered to bury him by the Western Lake. But the German doctors saved his life. On his return in September 1921 he married Miss Dora Black and they lived for six years in a small house in Chelsea during the winter months. He earned a livelihood by lecturing, journalism and writing popular books such as the *A.B.C. of Atoms* (1923), the *A.B.C. of Relativity* (1925) and *On Education* (1926). The summers, spent near Lands End, were devoted to serious work such as the new Introduction to the second edition of the *Principia Mathematica;* the *Analysis of Matter* (1927); the *Outline of Philosophy* (1928); *Mysticism and Logic* (1929); *Marriage and Morals* (1929). He also in 1924 and 1927 lectured in the United States. In 1927 he and his wife started a school for young children.

His admirable and lucid English style may be attributed to the fact that he did not undergo a classical education at a public school; his religious views and his moral character may be due to the wise exercise of the paternal jurisdiction of the court of chancery; but his wit, his love of truth, and his capacity for hard work seem to be innate. (C. P. SA.)

Philosophy.—What is fundamental in Russell's philosophy is his logic; his views on metaphysics and ethics, on the nature and relations of matter and mind have changed profoundly in the course of his life, but these changes have all proceeded from successively deeper applications of his logical method. He, therefore, prefers to classify his philosophy not as a species of Idealism or Realism but as "Logical Atomism," since what distinguishes the whole of his work is his use of logical analysis as a method and his belief that by that method we can arrive at ultimate "atomic facts" logically independent both of one another and of being known.

His first great achievement was to free logical analysis from the domination of ordinary grammar, and to realize that the grammatical form of a sentence often fails to reflect the logical form of its meaning. In his *Principles of Mathematics* (1903) he insisted that relations could not be reduced to qualities of their terms, and that relational facts were not of the subject-predicate form, but he still thought that any descriptive phrase which could be made the subject of a sentence must stand for a term which had being, even if like "the round square" it were self-contradictory. But in his article "On Denoting" (*Mind,* 1905), and in subsequent writings, he put forward his "Theory of Descriptions" which is perhaps the most important as well as the least controvertible of his discoveries. According to this theory "the present king of France" is not a name for a non-existent entity but an "incomplete symbol" which only has meaning in connection with a context. The meaning of such a statement as that "the present king of France is bald" is firstly that there is someone who is at present both king of France and bald, and secondly that there are not at present two kings of France; and when such statements are analysed in this way the need to believe in entities such as "the present king of France" (which are said by some philosophers to have "being" but not "existence") is altogether removed. Similarly when it is said that "unicorns are not real," this does not have the same kind of meaning as

the grammatically similar statement that "lions are not versatile." For this last statement means that certain animals, namely lions, lack a certain characteristic, namely versatility; but "unicorns are not real" does not mean that certain animals, namely unicorns, lack the characteristic of reality. For there are no such animals and no such characteristic;—what is meant is simply that there are no animals which have one horn but otherwise resemble horses. The destructive effect of this logical analysis on many philosophical theories of existence and reality is evidently of the first importance.

Russell has applied similar methods to propositions, classes and numbers and argues that each of these categories consists of what he calls "logical constructions," and not of genuine entities. In saying, *e.g.*, that classes are logical constructions, he does not mean that they are entities constructed by the human mind, but that when we express facts by sentences which have for subject such a phrase as "the class of men," the true analysis of the fact does not correspond to the grammatical analysis of the sentence. When, for instance, we say "the class of men includes the class of criminals," the fact we assert is really about the characteristics of being a man and being a criminal and not about any such entities as classes at all. This notion of a logical construction was much employed by Russell in his work in mathematical logic, and he has also used it extensively in the philosophy of matter and mind, and has even adopted as a fundamental principle that constructions (in his special sense of the word) are to be substituted for inferred entities wherever possible.

By applying this method he has been led to a view of the world on which the ultimate constituents of mind and matter are of the same type, the difference between minds and bodies lying in their structure and not in the elements of which they are composed. A man's mind is composed of sensations and images, which are identified by Russell with physical events in his brain, the difference between physics and psychology lying not in the events they study but in the kind of laws about those events which they seek to establish, physics being concerned with structure and psychology with quality. This theory has been worked out in connection with modern physics in *The Analysis of Matter* (1927).

In the theory of knowledge Russell's earlier rationalism has been considerably modified in a pragmatist or behaviourist direction, and in the *Analysis of Mind* (1921) he rejects consciousness as a fundamental characteristic of mind and adopts a form of "neutral monism" about perception, which he combines with representationism as regards memory and judgment. An exposition of his philosophical attitude is to be found in *An Outline of Philosophy* (1927).

Mathematics.—Russell maintains that mathematics and formal logic are one and that the whole of pure mathematics can be rigidly deduced from a small number of logical axioms. He argued this in outline in the *Principles of Mathematics* (1903) which was followed by a detailed demonstration of his thesis in *Principia Mathematica* (1911–13) written in collaboration with Dr. Whitehead. In this colossal work the deduction is actually performed according to the strictest symbolic principles and carried so far as to include all the essential parts of the theory of aggregates and real numbers. Besides this the great advances made by Russell in the analysis of logical concepts allowed the deductions to be carried not only much further forwards, but also much further backwards towards first principles. Above all he succeeded in solving the notorious Paradoxes of the Theory of Aggregates by means of the "Theory of Types." As part of this theory, it was, however, found necessary to introduce an "Axiom of Reducibility" which has never obtained general acceptance, so that Russell's work cannot be regarded as a final solution of the problem, although in the second edition of *Principia Mathematica* (1925) he finds an ingenious way of overcoming the difficulties in the particular case of mathematical induction.

(*Cf.* article on MATHEMATICS, FOUNDATIONS OF.) (F. P. R.)

RUSSELL, GEORGE WILLIAM (1867–), Irish writer and painter, known as Æ, was born at Lurgan, Co. Armagh, April 10, 1867. Educated at Rathmines School, Dublin, he entered an accountant's office, but in 1897 joined the Irish Agricultural Organisation Society, and became an organiser of agricultural societies. From 1904 to 1923 he was editor of *The Irish Homestead,* the organ of the agricultural co-operative movement. In 1923 he became editor of *The Irish Statesman.*

Russell's publications include *Homeward: Songs by the Way* (1894); *The Earth Breath* (1897); *Literary Ideals in Ireland* (1899), a collection of essays written in collaboration with W. B. Yeats, W. Larminie and John Eglinton; *Ideals in Ireland* (1901), another book of collaborative essays; *The Nuts of Knowledge* (1903), a selection of lyrics. In 1904 appeared two books of verse, the *Divine Vision* and *New Poems,* an anthology of verses by young Irish poets; and a collection of mystical tales, *The Mask of Apollo.* Other books of verse include *By Still Waters* (1906), *Collected Poems* (1913), and *Gods of War* (1915). *The Hero in Man* (1909) and *The Renewal of Youth* (1911) were imaginative musings, as was *Imaginations and Reveries* (1915). In 1906 appeared *Some Irish Essays,* and in 1907 *Deirdre,* a three-act play. *Co-operation and Nationality* and *The Rural Community,* published in 1912 and 1913 respectively, were pamphlets embodying co-operative ideals, which are further developed in his *The National Being. Thoughts on an Irish Polity* (1917). *The Candle of Vision,* an attempt to discover the element of truth in the mystical imagination, appeared in 1918. This was followed by *The Interpreters* (1920), a symposium in the Platonic fashion. A volume of poems, *Voices of the Stones,* appeared in 1925. He received the honorary degree of Litt.D. from Dublin University in July, 1929.

RUSSELL, JOHN (1745–1806), British portrait painter in pastel, was born at Guildford, Surrey, on Mar. 29, 1745. At an early age he entered the studio of Francis Cotes, R.A. In 1767 he set up his own studio, and in 1770 obtained the gold medal at the Royal Academy for figure drawing. He exhibited regularly at the Academy from its beginning down to 1805. Although he painted in oil, in water-colours and in miniature, it was by his works in crayon that he became famous. He made his own crayons, blending them on his pictures by a peculiar method termed "sweetening," which consisted in rubbing in the colours with his fingers and softening them in outline until they melted one into another. His works have survived in perfect condition. He died at Hull on April 20, 1806.

His "Child with Cherries" is in the Louvre. The J. Horace Harding Collection, New York City, contains his "Mr. and Mrs. Aigar and Children." In *The Elements of Painting in Crayon* he described his methods. *See* George C. Williamson, *John Russell* (1894).

RUSSELL, JOHN RUSSELL, 1ST EARL (1792–1878), British statesman, third son of the 6th duke of Bedford, by Georgiana Elizabeth Byng, second daughter of the 4th Viscount Torrington, was born in London on Aug. 18, 1792. After an early education desultory on account of his weak health he spent three years at Edinburgh university, living in the house of Professor John Playfair. On leaving the university, he travelled in Portugal and Spain, and in 1813 he was returned for the ducal borough of Tavistock. In domestic questions he cast in his lot with those who opposed the repressive measures of 1817, and protested that the causes of the discontent at home should be removed by remedial legislation. Failing of success, he resigned his seat for Tavistock in March 1817, and meditated permanent withdrawal from public life, but was dissuaded from this step by the arguments of his friends. In the parliament of 1818–20 he again represented the family borough in Devon, and in May 1819 began his long advocacy of parliamentary reform by moving for an inquiry into the corruption which prevailed in the Cornish constituency of Grampound. During the first parliament (1820–26) of George IV. he sat for the county of Huntingdon, and secured in 1821 the disfranchisement of Grampound, but the seats were not transferred to the constituency which he desired. Lord John Russell paid the penalty for his advocacy of Catholic emancipation with the loss in 1826 of his seat for Huntingdon county, but he found a shelter in the Irish borough of Bandon Bridge. He led the attack against the Test Acts by carrying in February 1828 with a majority of forty-four a motion for a committee to inquire

into their operations, and after this decisive victory they were repealed (May 9, 1828). He warmly supported the Wellington ministry when it realized that the king's government could only be carried on by the passing of a Catholic Relief Act (April 1829). For the greater part of the short-lived parliament of 1830–31 he served his old constituency of Tavistock, having been beaten in a contest for Bedford county at the general election by one vote; and when Lord Grey's Reform ministry was formed, in November 1830, Lord John Russell became paymaster-general, without a seat in the cabinet. This exclusion was the more remarkable in that he was chosen (1st of March 1831) to explain the provisions of the Reform Bill, to which the cabinet had given formal sanction. The Whig ministry was soon defeated, but, after the general election, returned with increased strength. The Reform Bill became law (June 7, 1832), and Lord John stood justly in the mind of the people as its champion. After the passing of the Reform Bill he sat for South Devon, and was paymaster-general in the ministries of Grey and Melbourne.

Russell had visited Ireland in the autumn of 1833, and had come back with a keen conviction of the necessity for readjusting the revenues of the Irish church. To these views he gave expression in a debate on the Irish Tithe Bill (May 1834), whereupon Stanley, with the remark that "Johnny has upset the coach," resigned his place. The latter was abruptly, if not rudely, dismissed (Nov. 1834) by William IV. when the leadership of the House of Commons became vacant and Russell was proposed as leader. In Lord Melbourne's new administration of 1835 Russell became home secretary and leader of the House of Commons. In the third Melbourne administration (1839) Russell was secretary of State for the colonies and under him New Zealand became a British colony and England claimed the whole of Australia. A fine literary sense and a great love of all forms of religious and civil liberty fed his keen interest in culture for the people and resulted in a Government grant of £30,000 for education and the institution of official inspectors for schools. With Brougham he founded in 1835 the Society for Promoting the Diffusion of Useful Knowledge. At the general election of 1841 the Whigs sustained a crushing defeat; the return of Russell for the City of London was one of their few triumphs. In 1845 he committed himself for the first time to the repeal of the Corn Laws.

On Peel's resignation (1846) the task of forming an administration was entrusted to Russell, and he remained at the head of affairs from July 1846 to Feb. 1852, but, though his ministry at once set to work to adapt the Free Trade policy to all branches of British commerce, his tenure of office was not marked by any great legislative enactments. His celebrated Durham letter (Nov. 4, 1850) on the threatened assumption of ecclesiastical titles by the Roman Catholic bishops weakened the attachment of the "Peelites" and alienated his Irish supporters. The impotence of their opponents, rather than the strength of their friends, kept the Whig ministry in power, and, although beaten by a majority of nearly two to one on Locke King's County Franchise Bill in Feb. 1851, it could not divest itself of office. Lord Palmerston's unauthorized recognition of the French *coup d'état* was followed by his dismissal from the post of foreign secretary (Dec. 1851), but he had his revenge in the ejectment of his old colleagues in Feb. 1852. During Lord Aberdeen's administration Lord John Russell led the Lower House, at first as foreign secretary (to Feb. 21, 1853), then without portfolio, and lastly as president of the council (June 1854). In 1854 he brought in a Reform Bill, but in consequence of the war with Russia the bill was allowed to drop. His popularity was diminished by this failure, and although he resigned in Jan. 1855, on Mr. Roebuck's motion for an inquiry into the conduct of the war in the Crimea, he did not regain his old position in the country. At the Vienna conference (1855) Lord John Russell was England's representative, and immediately on his return he became secretary of the colonies (May 1855), but the errors in his negotiations at the Austrian capital followed him and forced him to retire in July of the same year.

For some years after this he was the "stormy petrel" of politics. He was the chief instrument in defeating Lord Palmerston in 1857. He led the attack on the Tory Reform Bill of 1859. A reconciliation was then effected between the rival Whig leaders, and Russell become foreign secretary in Palmerston's ministry (1860) and accepted an earldom (July 1861). During the American War Russell exercised a powerful influence in restraining his country from taking sides in the contest, and he warmly sympathized with the efforts for the unification of Italy, but he was not equally successful in preventing the spoliation of Denmark. On Palmerston's death (Oct. 1865) Russell was once more summoned to form a cabinet, but the defeat of his ministry in the following June on the Reform Bill which they had introduced was followed by his retirement from public life. His leisure hours were spent after this event in the preparation of numberless letters and speeches, and in the composition of his *Recollections and Suggestions* (1875). He died at Pembroke Lodge, Richmond Park, on May 28, 1878.

Earl Russell was twice married—first in 1835, to Adelaide, daughter of Mr. Thomas Lister, and widow of Thomas, second Lord Ribblesdale, and secondly, in 1841, to Lady Frances Ann Maria, daughter of Gilbert, second earl of Minto.

Russell's tales, tragedies and essays (including *The Nun of Arrouca*, 1822, and *Essays and Sketches by a Gentleman who has left his Lodgings*, 1820) are forgotten, but his historical works, *Life of William Lord Russell* (1819), *Memoirs of the Affairs of Europe* (1824–29, 2 vols.), *Correspondence of John, 4th Duke of Bedford* (1842–46, 3 vols.), *Memorials and Correspondence of C. J. Fox* (1853–57, 4 vols.) and *Life and Times of C. J. Fox* (1859–66, 3 vols.) are among the chief authorities on Whig politics. He also edited the *Memoirs, Journal and Correspondence of Thomas Moore* (1853–56, 8 vols.).

The chief biography is that by Sir Spencer Walpole (1891, 2 vols.). The volume by Stuart J. Reid (1895, "Prime Ministers of Queen Victoria" Series) should also be consulted.

See also J. Russell, *The Latter Correspondence of Lord John Russell, 1840–1878* (1925, 2 vols.).

RUSSELL, THOMAS (1762–1788), English poet, was born at Beaminster, early in 1762. He was educated at Winchester under Joseph Warton, and at New college, Oxford. He died at Bristol on July 31, 1788, and was buried at Powerstock, Dorset. In 1789 was published a thin volume, containing his *Sonnets and Miscellaneous Poems*, now a very rare book. It contained 23 sonnets, of regular form, and a few paraphrases and original lyrics. The sonnets are the best, and by right of these Russell takes his place as a precursor of the romantic school. His sonnet, "Suppos'd to be written at Lemnos," is his masterpiece.

RUSSELL, LORD WILLIAM (1639–1683), English politician, was the third son of the 1st duke of Bedford and was born on Sept. 29, 1639. About 1654 he was sent to Cambridge with his elder brother Francis (on whose death in 1678 he obtained the courtesy title of Lord Russell). On leaving the university, the two brothers travelled abroad, visiting Lyons, Geneva, Augsburg, and Paris, but returned to Woburn in December 1659. At the Restoration he was elected for the family borough of Tavistock. He appears to have indulged in the follies of court life and intrigue; for both in 1663 and 1664 he was engaged in duels, in the latter of which he was wounded. In 1669 he married Rachel (1636–1723), second daughter of the 4th earl of Southampton, and widow of Lord Vaughan, thus becoming connected with Shaftesbury, who had married Southampton's niece. With his wife Russell always lived on terms of the greatest affection and confidence. She corresponded with Tillotson and other distinguished men, and a collection of her admirable letters was published in 1773.

On the formation of the "country party," in opposition to the policy of the Cabal and Charles's French-Catholic plots, Russell began to take an active part in affairs. He then joined Cavendish, Birch, Hampden, Powell, Lyttleton and others in vehement antagonism to the court. With a passionate hatred and distrust of the Catholics, and an intense love of political liberty, he united the desire for ease to Protestant Dissenters. He inveighed (Jan. 22, 1673) against the stop of the exchequer, the attack on the Smyrna fleet, the corruption of courtiers with French money, and "the ill ministers about the king"; he supported the proceedings against the duke of Buckingham, and against Danby (*see* LEEDS, DUKE OF); and in March 1678 he seconded the address praying the

king to declare war against France. The country party hated Danby and James more than they hated Louis. The French king formed a temporary alliance with Russell, Hollis and the opposition leaders, on terms. Russell in particular entered into close communication with the marquis de Ruvigny (Lady Russell's maternal uncle), who came over with money for distribution among members of parliament. By the testimony of Barillon, however, it is clear that Russell refused any part in the intended corruption.

By the wild alarms which culminated in the Popish Terror Russell was apparently deeply affected. He threw himself into the party which looked to Monmouth as the representative of Protestant interests, a grave political blunder, though he afterwards was in confidential communication with Orange. On Nov. 4, 1678, he moved an address to the king to remove the duke of York from his person and councils. At the dissolution of the pensionary parliament, he was, in the new elections, returned for Bedfordshire. Danby was at once overthrown, and in April 1679 Russell was one of the new privy council formed by Charles on the advice of Temple. Only six days after this we find him moving for a committee to draw up a bill to secure religion and property in case of a popish successor. He does not, however, appear to have taken part in the exclusion debates at this time. In June, on the occasion of the Covenanters' rising in Scotland, he attacked Lauderdale personally in full council.

In January 1680 Russell, along with Cavendish, Capell, Powell, Essex and Lyttleton, tendered his resignation to the king, which was received by Charles "with all my heart." On June 16, he accompanied Shaftesbury, when the latter indicted James at Westminster as a popish recusant; and on Oct. 26 he took the extreme step of moving "how to suppress popery and prevent a popish successor"; on Nov. 2, now at the height of his influence, he seconded the motion for exclusion in its most emphatic shape, and on the 19th carried the bill to the House of Lords for their concurrence. The limitation scheme he opposed, on the ground that monarchy under the conditions expressed in it would be an absurdity. On December 18 he moved to refuse supplies until the king passed the Exclusion Bill. The prince of Orange having come over at this time, there was a tendency on the part of the opposition leaders to accept his endeavours to secure a compromise on the exclusion question. Russell, however, refused to give way a hair's-breadth.

On March 26, 1681, in the parliament held at Oxford, Russell again seconded the Exclusion Bill. Upon the dissolution he retired into privacy at his country seat of Stratton in Hampshire. In the wild schemes of Shaftesbury after the election of Tory sheriffs for London in 1682 he had no share; upon the violation of the charters, however, in 1683, he began seriously to consider as to the best means of resisting the government, and on one occasion attended a meeting at which treason, or what might be construed as treason, was talked. Monmouth, Essex, Hampden, Sidney and Howard of Escrick were the principal of those who met to consult. On the breaking out of the Rye House Plot, of which neither he, Essex, nor Sidney had the slightest knowledge, he was accused by informers of promising his assistance to raise an insurrection and compass the death of the king. Refusing to attempt to escape, he was brought before the council, when his attendance at the meeting referred to was charged against him. He was sent on June 26, 1683, to the Tower. Monmouth offered to appear to take his trial, if thereby he could help Russell, and Essex refused to abscond for fear of injuring his friend's chance of escape. Before a committee of the council Russell, on June 28, acknowledged his presence at the meeting, but denied all knowledge of the proposed insurrection. He reserved his defence, however, until his trial. He would probably have saved his life but for the perjury of Lord Howard, who expressly declared that Russell had urged the entering into communications with Argyll in Scotland. Howard's perjury is clear from other witnesses, but the evidence was accepted. Russell spoke with spirit and dignity in his own defence, and, in especial, vehemently denied that he had ever been party to a design so wicked and so foolish as that of the murder of the king or of rebellion. The legality of the trial, in so far as the jurors were not properly qualified and the law of treason was shamefully strained, was denied in the act of 1 William & Mary which annulled the attainder. Hallam maintains that the only overt act of treason proved against Russell was his concurrence in the project of a rising at Taunton, which he denied, and which, Ramsay being the only witness, was not sufficient to warrant a conviction.

Russell was sentenced to die. Many attempts were made to save his life. The old earl of Bedford offered £50,000 or £100,000, and Monmouth, Legge, Lady Ranelagh, and Rochester added their intercessions. Russell himself, in petitions to Charles and James, offered to live abroad if his life were spared, and never again to meddle in the affairs of England. He refused, however, to yield to the influence of Burnet and Tillotson, who endeavoured to make him grant the unlawfulness of resistance, although it is more than probable that compliance in this would have saved his life. He drew up, with Burnet's assistance, a paper containing his apology, and he wrote to the king a letter, to be delivered after his death, in which he asked Charles's pardon for any wrong he had done him. A suggestion of escape from Lord Cavendish he refused. He behaved with his usual quiet cheerfulness during his stay in the Tower, and spent the last morning in devotion with Burnet. He was executed at Lincoln's Inn Fields on July 21, 1683.

A true and moderate summing-up of his character will be found in his *Life*, by Lord John Russell (1820).

RUSSELL, SIR WILLIAM HOWARD (1821–1907), English war correspondent, was born at Lilyvale, near Tallaght, Co. Dublin, on March 28, 1821, being one of the Russells of Limerick, whose settlement in Ireland dates from the time of Richard II. He entered Trinity college in 1838. Three years later he was thrown very much on his own resources, but a relative, R. W. Russell, who had been sent to Ireland by *The Times*, deputed him to report the Irish elections at Longford, and his success definitely turned his attention to journalism. Coming to London in 1842, he went to Cambridge, but left before taking a degree. He was special correspondent for *The Times* in Ireland in 1845, in Denmark in the war of 1849–50, and in the Crimean War. His letters written from the Crimea were published in book form as *The War, 1855–56*. The exposure made by Russell of the mismanagement in the Crimea contributed to the fall of the Aberdeen ministry. Russell also served as correspondent in India in 1858, in America in 1861–3, in the Seven Weeks' War of 1866, in the Franco-German war of 1870; and he was with Wolseley in South Africa in 1879 and in Egypt in 1882. In 1860 he founded the *Army and Navy Gazette*. Russell was knighted in May 1895, and was the recipient of numerous war medals and various foreign orders. He died on Feb. 11, 1907.

His works include: *My Diary in India in 1858–59* (1860); *My Diary, North and South, during the Civil War in America, 1862* (1862); *My Diary during the Last Great War* (the Franco-Prussian War of 1870) (1873); *Hesperothen*, a description of a tour in the United States and Canada (1882); and *The Great War with Russia* (1895).

RUSSELL OF KILLOWEN, CHARLES RUSSELL, BARON (1832–1900), lord chief justice of England, was born at Newry, county Down, on Nov. 10, 1832, the son of Arthur Russell. The family was Roman Catholic. Educated first at Belfast, afterwards in Newry, and finally at St. Vincent's College, Castleknock, Dublin, in 1849, he was articled to a firm of solicitors in Newry. In 1854 he was admitted, and began to practise his profession. In the legal proceedings arising out of Catholic and Orange disturbances young Russell distinguished himself in the cause of his co-religionists. After practising for two years, he determined to seek a wider field for his abilities. He went to London in 1856, and entered Lincoln's Inn. In 1858 he married Ellen, daughter of Dr. Mulhulland of Belfast, and in 1859 he was called to the bar, and joined the Northern Circuit. He had to rely upon himself. But the equipment was sufficient. A well-built frame; a strong, striking face, with broad forehead, keen grey eyes, and a full and sensitive mouth; a voice which, though not musical, was rich, and responded well to strong emotions, whether of indignation, or scorn, or pity; an amazing power of concentrating thought; an intellectual grasp, promptly seizing the real points of the most entangled case, and rejecting all that

was secondary, or petty, or irrelevant; a faculty of lucid and forcible expression, which, without literary ornateness or grace of style, could on fit occasions rise to impassioned eloquence—all these things Russell had. But beyond and above all these was his immense personality, an embodiment of energetic will which riveted attention, dominated his audience, and bore down opposition. In his early years Russell's practice was mostly at the Passage Court at Liverpool, and he published a book on its procedure in 1862.

In 1872 Russell "took silk," and from that date for some time he divided the best leading work of the circuit with Holker, Herschell and Pope. Holker became solicitor general in 1874, Herschell in 1880, and about that time Pope left the circuit. Russell's success as a Q.C. during this period of his career was prodigious. He excelled in the conduct alike of commercial cases and of those involving, as he used to say, "a human interest," although undoubtedly it was the latter which more attracted him. He was seen to the least advantage in cases which involved technical or scientific detail. If his advocacy suffered a defeat, however, it was never an inglorious defeat. Those who were on the Northern Circuit at the time could not easily forget the case of *Dixon* v. *Plimsoll*—a libel action brought by a Liverpool shipowner against Plimsoll—in which Holker won a notable victory for the defendant; or *Nuttall* v. *Wilde,* a breach of promise action, in which Pope led brilliantly for the successful plaintiff, and Russell's speech for the defence was one of the finest in point of passion and pathos that was ever heard upon the Northern Circuit.

In 1880 Russell was returned to parliament as an independent Liberal member for Dundalk. From that time forward until 1894, he sat in the House of Commons: for Dundalk until 1885, and afterwards for South Hackney. During the whole of this epoch, in home affairs, Irish business almost monopolized the political stage; and Russell was Irish to the core. From 1880 to 1886, as a private member, and as the attorney-general in Gladstone's administrations of 1886 and 1892, he worked in and out of parliament for the Liberal policy in regard to the treatment of Ireland as few men except Russell could or would work. His position throughout was clear and consistent. Before 1886 on several occasions he supported the action of the Irish Nationalist party. He opposed coercion, voted for compensation for disturbance, advocated the release of political prisoners and voted for the Maamtrasna inquiry. But he never became a member of the Irish Home Rule or of the Parnellite party; he was elected at Dundalk as an independent Liberal, and such he remained. When, as attorney-general in the Gladstone administration, he warmly advocated the establishment of a subordinate parliament in Ireland, he did so because he sought the amelioration and not the destruction of Ireland's relations with the rest of the kingdom.

Russell rapidly became in London what he was already in Lancashire, a favourite leader in *nisi prius* actions. The list of *causes célèbres* in the period 1880–94 is really a record of Russell's cases, and, for a great part, of Russell's victories. The best known of the exceptions was the libel action *Belt* v. *Lawes* in 1882, which, after a trial lasting more than 40 days, resulted in a verdict for the plaintiff, for whom Sir Hardinge Giffard (afterwards Lord Chancellor Halsbury) appeared as leading counsel. The triumph of his client in the Colin Campbell divorce suit in 1886 afforded perhaps the most brilliant instance of Russell's forensic capacity in private litigation. More important, however, as well as more famous, than any of his successes in the ordinary courts of law during this period were his performances as an advocate in two public transactions of mark in British history. The first of these in point of date was the Parnell Commission of 1888–90, in which Sir Charles Russell appeared as leading counsel for Parnell. In April 1889, after 63 sittings of the commission, in the course of which 340 witnesses had been examined, Sir Charles Russell, who had already destroyed the chief personal charge against Parnell by a brilliant cross-examination, in which he proved it to have been based upon a forgery, made his great opening speech for the defence. It lasted several days, and concluded on April 12. This speech, besides its merit as a wonderful piece of advocacy, possesses permanent value as an historical survey of the Irish question during the last century, from the point of view of an Irish Liberal. The second was the Bering Sea Arbitration, held in Paris in 1893. Russell, then attorney-general, with Sir Richard Webster (afterwards Lord Alverstone, L.C.J.), was the leading counsel for Great Britain. Russell maintained the proposition, which he again handled in his Saratoga address to the American Bar Association in 1896, that "international law is neither more nor less than what civilized nations have agreed shall be binding on one another as international law." The award was, substantially, in favour of Great Britain.

In 1894, on the death of Lord Bowen, Russell accepted the position of a lord of appeal. A month later he was appointed lord chief justice of England in succession to Lord Coleridge. Brief as was his tenure of the office, he proved himself well worthy of it. He was dignified without pompousness, quick without being irritable, and masterful without tyranny. In 1896 Lord Russell (Pollock and Hawkins being on this occasion his colleagues on the bench) presided at the trial at bar of the leaders of the Jameson Raid. Russell's conduct of this trial, in the midst of much popular excitement, was by itself sufficient to establish his reputation as a great judge. One other event at least in his career while lord chief justice deserves a record, namely, his share in the Venezuela Arbitration in 1899. Lord Herschell, a British representative on the Commission, died somewhat suddenly in America before the beginning of the proceedings, and Russell took his place.

Russell contributed to the reform of the law by his advocacy of improvement in the system of legal education, and in promoting measures against corruption and secret commissions, though the bills he introduced did not become law. He died on Aug. 10, 1900. Few English lawyers have ever excited the admiration abroad that Lord Russell did, both on the Continent of Europe and in America.

See R. B. O'Brien, *Life of Lord Russell of Killowen* (1909).

RUSSELL SAGE FOUNDATION, an institution established by Mrs. Russell Sage in memory of her husband. The initial endowment was $10,000,000, to which $5,000,000 was added by her will. It was incorporated by an act of the legislature of New York in April 1907, "for the improvement of social and living conditions in the United States of America." The charter further states: "It shall be within the purposes of said corporation to use any means to that end which from time to time shall seem expedient to its members or trustees, including research, publication, education, the establishment and maintenance of charitable or benevolent activities, agencies and institutions, and the aid of any such activities, agencies or institutions already established." The income only may be spent.

The management of the foundation is vested in a board of nine trustees, which is self-perpetuating. The staff of the foundation study social conditions and methods of social work, interpret the findings, make the information available by publications, conferences and other means of public education, and seek in various ways to stimulate action for social betterment. Departments exist for dealing with charity organization, industrial studies, remedial loans, etc., and there is a consultation service on delinquency. The foundation does not relieve individual need and it avoids duplicating the work of existing agencies. In 1922 the foundation organized the Committee on Regional Plan of New York and its environs, providing the funds and office space and some staff assistance in preparing a plan for the future development of the New York region, an undertaking which took about seven years to complete.

RUSSIA. Russia is the general name given to those territories of Europe and Asia which are comprised within the Union of Socialist Soviet Republics (U.S.S.R.). The six republics within the Union are the Russian Socialist Federated Soviet Republic, the Transcaucasian Socialist Federated Soviet Republic, and the Ukrainian, White Russian, Uzbek and Turkmen Socialist Soviet Republics (*qq.v.*). In the Russian Socialist Federated Soviet Republic are included the following provinces, areas, autonomous areas and republics. The latter are inhabited chiefly by non-Russian peoples and the native tongue is the official language within them.

Provinces	*Areas*
Archangel	Far Eastern
Astrakhan	Leningrad
Briansk	North Caucasian
Ivanovo-Voznesensk	Siberian
Kaluga	Uralsk
Kostroma	
Kursk	*Autonomous Areas*
Moscow	Kalmuck
Nizhegorod	Karakalpak
North Dwina	Komi
Orenburg	Marii
Orel	Oirat
Penza	Votyak
Ryazan	
Samara	*Autonomous Republics*
Saratov	Bashkir
Smolensk	Buriat-Mongol
Stalingrad	Chuvash
Tambov	Crimea
Tula	Dagestan
Tver	German Volga
Ulianovsk	Karelian
Vladimir	Kazak
Vologda	Kirghiz
Voronezh	Tatar
Vyatka	Yakutsk
Yaroslavl	

The Transcaucasian Socialist Federated Soviet Republic includes within it the republics of Armenia, Azerbaijan and Georgia, with their dependent autonomous areas.

A separate article is devoted to each of the above units, and to their dependencies.

The name "Russia" is derived through *Rossiya* from Slavonic *Rus* or *Ros* (Byzantine Ῥῶς or Ῥῶσοι), a name first given to the Scandinavians who founded a principality on the Dnieper in the 9th century, and afterwards extended to the collection of Slav states of which this principality formed the nucleus. The word *Rus* is probably derived from *Ruotsi* (a Finnish name for the Swedes), which seems to be a corruption of the Swedish *rothsmenn* "rowers" or "seafarers."

PHYSICAL FEATURES

Extent.—The U.S.S.R. has an area of 8,336,864 sq.m. as against 8,660,000 sq.m. occupied by the former empire of the Tsars. This diminution in territory is due to the loss of Finland, to the formation of the separate countries of Estonia, Latvia, Lithuania and Poland from the western portions of the former Russian empire, to the cession of the Kars district to Turkey, and to the occupation of Bessarabia by Rumania, losses which followed the 1917 revolution. Russia occupies the eastern part of Europe, the Caucasus region, the whole of Northern Asia and the western part of Central Asia. Its northern boundary from the peninsula of Rybachi eastwards is formed by the Arctic Ocean (*q.v.*) and its seas, the White, Barents, Kara and Nordenskiöld. The Bering Strait separates it from Alaska on the north-east, and the eastern ocean boundary includes the Bering Sea, the Okhotsk Sea and the Sea of Japan. The southernmost point of the Russian east coast is Posieta Bay, and lat. 50° N. divides the island of Sakhalin into a northern Russian part and a southern Japanese part. On the west of Russia lie Finland, Estonia, Latvia, Lithuania, Poland and Rumania. The dispute between Russia and Rumania as to the occupation of Bessarabia is still unsettled; the present boundary between Rumania and Russia is the Dniester river, but the Russians claim that it should be the Pruth river. The northern coast of the Black Sea from the Dniester eastwards and the eastern coast as far as Makrialos are Russian. Turkey and Persia lie south of the Transcaucasian republics, and the southern part of the Caspian coast, from Astara on the west to the Atrek river on the east, is in Persian territory. To the south of Asiatic Russia lie Persia, Afghanistan, Eastern Turkestan, Mongolia, Manchuria and Korea.

The most northerly point is Cape Chelyuskin in the Siberian Area in 77° 52′ N., and the most southerly Kushk Post on the Afghan frontier in 35° 30′ N., the most easterly is Cape Dezhnev in the Far Eastern Area in 169° 3′ W., while in the Ukraine on the west Russia reaches 26° 10′ E. It is thus the largest unbroken political unit in the world and occupies more than one seventh of the land surface of the globe. The British Empire, with its scattered units, alone exceeds it in size. Russia is essentially continental; her greatest extent of coast line lies north of the Arctic circle, where much of the sea is icebound for ten months out of the twelve, only the port of Murmansk, under the influence of the warm Atlantic drift remaining open all the year round. On the eastern coast Vladivostok, the most southerly harbour, needs icebreakers to keep it open, while the Sea of Okhotsk is most unfavourable to navigation, owing to its dense fogs and masses of floating ice. The Caspian Sea is an inland sea; the only outlet from the Black Sea is through the Bosporus, and the ports on the northern shore are liable to be icebound. Leningrad is now Russia's sole outlet to the Baltic, and is usually icebound from the end of November to the end of April.

Russia has only a few island possessions. The Aleutian archipelago and Alaska were sold to the United States in 1867, and the Kurile Islands ceded to Japan in 1875. The Baltic Islands with exception of those at the mouth of the Neva were ceded after the 1917 revolution. The Commander Islands off Kamchatka, the Shantar Islands near the Pacific coast and the Island of Sakhalin north of lat. 50° N. remain Russian. The chief islands off the Arctic coast belonging to Russia are Kolguev Island, Novaya Zemlya (with Vaygach Island), the Nicholas II. group north of the Taimyr peninsula, the New Siberia Islands (north of Laptev Sound) and Wrangel Island. Attempts on the part of V. Stefansson in 1921–24 to establish a British claim to Wrangel Island met with no official support in Britain or Canada, and in August 1924, the Russian flag was hoisted on the island. Franz Josef land is not included among Russian claims and is at present a *terra nullius;* Spitsbergen and Bear Island were recognized as being under Norwegian sovereignty in 1920.

GENERAL STRUCTURE

Russia is a very large region of vast plains characterised by climatic extremes in eastern Europe, western and northern Asia. Within its limits Europe and Asia overlap into one another in various ways and even the Ural Mountains are only an incomplete boundary between the European section, in which southward drainage (to the Black and Caspian Seas) is more important and the Asiatic section, which drains largely to the Arctic, though some rivers flow into the Aral Sea.

The fundamental feature of Russia is the great platforms, once in all probability a continuous platform, of Archaean and Palaeozoic rocks, the latter still horizontal over enormous areas though folded, for example, in the Urals. Russia, therefore, apart from the border lands of the Pacific, Mongolia, Eastern Turkestan, Afghanistan, Persia and Armenia, shows far less mountain folding than do western and southern Europe and Central Asia, though the foldings of the latter have to some extent influenced the physical geography of the Russian plains and have penetrated into them to form the Urals.

The fold mountains of central Asia on the whole become continuously younger as we proceed from the region of Lake Baikal southwestwards to the Pamirs and the Hindu Kush. Range after range runs, more or less, west to east, each successive one tending to extend farther west than that to the north of it. These ranges are discussed in the general article on Asia (*q.v.*) and it is necessary here rather to refer to their influence on the northern platform. The ranges called Sayan (with basaltic lavas in the east), Tannu-Ola and Altai belong to ancient foldings, the last being mainly Hercynian or Permo-Carboniferous, according to prevailing opinion. These old ranges are deeply dissected by what seem to be erosion-valleys with steep sides and alluvial bottoms (old lake floors) on which settlements have been made, some lakes still remain. Lake floors abound on the surface of Asiatic Russia illustrating the fact that in earlier post glacial times lakes seem to have covered vast areas in this region. To the south of the Altai mountains is the great physical feature called the Dzungarian Gate between the Altai and the Tian Shan. This is a region of very varied topography in which, in spite of local heights, relatively low land (some of it less than 1,500 ft. above sea-

level) projects from the lower western lands far to the east between the mountain ranges named. Towards the west side of the Dzungarian region lies lake Balkhash, now without outlet but still fresh.

Natural Divisions.—On the south side of the Dzungarian Gate rises sharply the immense range of the Tian Shan, far surpassing the Alps in extent and differing markedly from them in character. Their general direction is west-south-west to east-north-east and they rise sharply from the high plains along their flanks with much conspicuous faulting. Westwards they branch forming almost independent chains with some northward deflection. Suess has suggested that their structural features may be traceable ultimately through western Asia via the Turgai steppe to the Urals as well as south of Aral to the Caucasus. The Urals lie approximately along long. 60° E., and far to the east the next conspicuous feature of northern Russia is the edge of the Yenisei plateau approximately along long. 90° E. These two lines, probably related to one another in origin, help to divide north Russia into natural regions,

(*a*) Northern European Russia west of the Urals.
(*b*) The Urals themselves.
(*c*) The great lowland of the Ob.
(*d*) The plateau east of the Yenisei and west of the Lena to which may be added
(*e*) The region east of the Lena dominated in the main by fold mountains belonging to the border zone of the Pacific ocean.

Northern European Russia possesses large areas of unfolded Palaeozoic rocks lying on an ancient (Archaean) floor of granites, gneisses, and syenites which emerges on the west in Finland, the Kola peninsula, and Scandinavia. Along the line from the White Sea to the Gulf of Finland (via lakes Ladoga and Onega) the ancient floor becomes covered by Palaeozoic rocks, Devonian, Carboniferous and Permian succeeding one another eastwards towards the Northern Dwina. The upper Permian beds have yielded Glossopteris and other plants characteristic of "Gondwana Land" and animal remains like those of the corresponding formation in S. Africa. Beyond that river the lower levels are mainly alluvials but there are glacial Pleistocene deposits between the river lines.

The basin of the Petchora is divided from the land farther west by a minor fold belt bringing up Devonian and some crystalline schist along the line of the Timan hills that may be traceable as a branching of the mid-Urals northwestward to Cape Kanin. The whole region has a very low relief and is consequently unprotected from Arctic cold. Apart from the Timan hills this region is below the 600 foot contour. Its lakes are discussed in the article on Europe (*q.v.*). Its chief rivers are the Petchora for which Strelbitsky gives a length of 915 m. and Tillo a length of 1,024 m., the Mezen for which the estimates are 496 and 507 m., and the Northern Dwina for which these authorities give a length of 358 and 447 m. respectively. These determinations vary because Strelbitsky ignored minor windings. The upper waters of Petchora and Northern Dwina interlace with those of the feeders of the Kama, a tributary of the Volga. As a consequence of the low relief the Petchora is navigable for 770 m., the Mezen for 450 m., and the Northern Dwina for 330 m., while the Vychegda, a large tributary of this river, is navigable for 500 miles. The Onega river has rapids on it.

The Urals.—The structural relationships of the Urals have been mentioned above. Here the Palaeozoic strata are folded on the west of a longitudinal axis which exhibits crystalline rocks and is faulted on a large scale. The Devonian rocks in this area are of marine origin. Its greatest heights are chiefly in the regions of folded Palaeozoic rocks and the folds die away into the Russian platform westwards in small parallel chains known as Parma. Though there is much copper in the Permian rocks on the west the main metalliferous veins of the area are in the faulted zone of crystalline rocks to the east. The greatest height reached in the Urals is 5,535 ft. in the northern Urals (at Töll-poz-iz or Muraï-Chakhl). The passes are often low, that on the way from Perm to Sverdlovsk being only 1,245 ft. above sea-level. The range is continued to the Arctic coast, Vaygach Island, and Novaya Zemlya. Details are given under articles Ural Mts., Uralsk Area, Novaya Zemlya, etc. On the south the Urals finger out in a plateau region dissected by feeders of the Ural, and a few feeders of the Volga. The Ural river drains the southern Ural mountains, turns west and then south to the Caspian Sea which it reaches after a course of 1,477 m.

The Ob Basin.—Eastwards the Urals fall rapidly down to the Ob basin which is one of the largest areas of unbroken lowland on the earth. The floor material is almost entirely alluvial with a little Tertiary here and there. It rises in the westward prolongations of the Sayan mountains and is 2,260 m. long but its very large tributary the Irtish comes from the Dzungarian Gate and adds enormously to the area of the basin, which is bounded southwards by the Turgai and the hills of Semipalatinsk, while the Tobol, another large tributary flows to the Ob from the north of the Turgai. It is widely thought that under the alluvial floor would be found a continuation of the platform of North European Russia let down through the dislocation of the east border of the Urals. The lowland extends without an appreciable break to the Yenisei, and only at some places near that river do the older rocks help to form the surface.

The Yenisei Area.—East of the Yenisei the character of the land changes abruptly, a sharp edge rises rapidly to more than 600, and in one place to quite 3,300 ft. above sea-level and east of this edge is a great dissected plateau of ancient rocks. Archaean rocks with granites, etc., are exposed near the Yenisei and away to the north-east, but there are larger areas of Cambrian and Silurian rocks and these are covered over a vast stretch of country by Permo-Carboniferous rocks. The plateau extends eastwards to the Lena along the valley of which is found evidence of an invasion of the sea in Cretaceous times. The plateau is an ancient block to which Suess gave the name of Angara land. Large areas on this plateau rise somewhat above the 1,600 ft. contour, and the diversities of surface are due largely to river dissection. There is evidence in the Taimyr peninsula of a fold axis with a general direction west-south-west to east-north-east but apparently no heights reaching above the 1,500 ft. contour.

The Yenisei is the collecting stream beneath the western edge of this old block and it rises in the Sayan mountains receiving nearly all its tributaries from the eastern side. Of these the upper Tunguska or Angara comes from Lake Baikal, the middle or stony Tunguska, and the lower Tunguska from the block itself. The river is some 3,000 m. long. Like the Ob, this river may be said to be formed of a pair of streams, the upper Yenisei and the Angara.

Eastern Siberia.—Beyond the Angara block eastwards stands an important series of mountain-ranges concerning which much new knowledge has recently accrued (*see* S. Obruchev, *Geogr. Journal,* lxx., 1927, p. 464), though it is not yet available for maps. The Stanovoi (Jurgur) mountains and the Kolimski (Kolyma) mountains are more or less parallel to the coasts of the sea of Okhotsk but the former are also roughly parallel to the edge of the Angara block on the other side of the Lena, and 100 m. or so north of Okhotsk they are linked not only with the Kolimski mountains to the east but with the Verkhoyansk mountains which go westwards and northwards keeping more or less parallel to the edge of the Angara block with the Lena between them and it. Like the other great rivers mentioned above, this one is formed of a pair, the upper Lena and the Vitim. The length of the Lena is estimated at 2,860 miles. The Verkhoyansk and the Kolimski mountains thus form a great semi-circle of mountains apparently determined in the west by the Angara block and in the east by the depression of the sea of Okhotsk. Within this semi-circle most atlases show ranges stretching northward, but according to Obruchev the older surveys are very incomplete. He finds that the ranges are disposed in more or less parallel curves within the main outer one above mentioned.

The Tas Kistabit mountains come next to the western Kolimski, the Cherski mountains are a longer range parallel to the whole curve of the Verkhoyansk-Kolyma line and stretching from the east of the Yana river to the west of the Omolon river. Within

this again is a smaller range. The Cherski mountains are the newly discovered ranges named after a Russian explorer who died in this region in 1892, the river Indigirka traverses it by a winding gorge often less than a mile wide and the tributaries of this river also make gorges in this range, in which an altitude of about 3,300 m. (10,727 ft.) was observed. These high mountains are apparently almost without glaciers because of the aridity of the region. A geological traverse going northward between the Kolima and the Indigirka shows an east-west axis of igneous material alternating with Permian and Triassic rocks.

East of the mouth of the Omolon river a great axis of crystalline rock, flanked on both sides by Permian runs parallel to the coast as far as Cape Dezhnev (East Cape). The Kolimski mountains curving from the southwards come north-eastwards as the Anadir mountains and end in Cape Chukotski. This latter high line is flanked on the south-east by the Penzhina and Anadir valleys forming an almost continuous low line from the sea of Okhotsk across the base of the Kamchatka peninsula to the Gulf of Anadir north of the Bering Sea. The Kamchatka peninsula is described at some length in a special article (*q.v.*). Northward from Cape Lopatka along the east coast as far north as the curve of the Aleutian islands is a belt of volcanoes, part of the "girdle of fire" of the Pacific. The central longitudinal range of the peninsula is continued north-eastward, south of the Anadir valley to Cape Navarin. There thus seem to be three great structural lines abutting upon the neighbourhood of the Bering Strait and the north coast of the Bering Sea.

The main curve of the Stanovoi (Jurgur) mountains, supposedly fold mountains, continues westward on the south and apparently approaches the Yablonoi mountains, really the eastern edge of the Malkan horst, at an angle. To the west-north-west lies the Vitim plateau. To the south-east is found a type of topography analogous to that of Kamchatka and extreme north-east Asia. There are successive ranges more or less parallel to the coast, imbricating to some extent and separated by lines of lowland fairly parallel with their axes. The Liao-ho, Sungari and lower Amur valleys form a continuous lowland from the Gulf of Pechihli to the strait between the mainland and Sakhalin. The Ussuri and lower Amur valleys form a low line from Vladivostok northwards with the high range of the Sikhota Alin on its eastern flank. The sea of Japan and the Gulf of Tartary, narrow waters separating Sakhalin from the mainland, form still another low line with the Sikhota Alin on the west and the high axis of Sakhalin, Hokkaido, etc., on the east. As in the case of Kamchatka so also here the high axis is met on the east at a considerable angle by the Kurile islands of volcanic type and south of this junction, that is in Japan, the high axis is volcanic, just as east Kamchatka is volcanic south of its junction with the Aleutians. The great river of this eastern region is the Amur, which has a very large tributary, the Sungari, on the south; the Amur's course is governed mainly by the mountain lines of the region and its length is about 1,700 miles.

Having now, with the aid of references to other articles, briefly sketched some main features of the regions of Arctic drainage, the circum-Arctic platform and the Pacific mountains, we may turn to regions which drain elsewhere and which illustrate, though only slightly, some influences of the mountain building forces working in central Europe on blocks of ancient rock which have resisted folding and have remained almost horizontal. These regions are those which drain to the enclosed seas, the Black Sea, Caspian Sea, Aral Sea and Lake Balkhash, or looked at structurally they reveal on the west a succession of very slight undulations, anticlines and synclines, of small relief, with axes north-west to south-east from the vicinity of the Carpathians to the borders of the Arctic region, and on the east the subdued features due mainly to the great virgations of the Tian Shan range.

Considering the matter first structurally we have from the Sea of Azov west-north-westward to beyond Kiev an anticlinal zone in which appear granites and gneisses, some of which are thought to be Archaean. The Dnieper from Kiev to Dnepropetrovsk (Ekaterinoslav) follows the northern border of this zone of hard rock through which the river cuts its way below the latter town. Next follows a syncline in which early Tertiary deposits are most widespread, whereas farther south they only capped parts of the old rocks. The syncline is named after the river Donetz which follows its axis. Towards the Sea of Azov Palaeozoic rocks are brought to the surface and the land stands somewhat higher. In this region is the Donetz coalfield, the coal belonging to upper Carboniferous strata as in western Europe. The next zone is the central anticline which is parallel with the two structural zones described and which is thought to die away towards the Caspian. The axis of this anticline is marked to some extent by the Don river where it flows south-eastward below Pavlovsk while, much further north-west, the course of the southern Dwina is clearly related to it. Along it in the Don region the Cretaceous deposits, capped interfluvially by early Tertiary here and there, form the most important outcrops but on the north-west there is a great area of Devonian (*v. inf.*).

North-east of this anticlinal zone is the immense "Moscow basin" floored mainly by Palaeozoic rocks mainly still horizontal, with some Triassic deposits, but there are patches of Jurassic and Cretaceous strata as for example around Moscow and in the great bend of the Volga, and also farther north from Kostroma to Ust-Sysolsk on a tributary of the Vychegda. There was an intrusion of the sea in Jurassic times which became much more extensive in the Cretaceous period; no upper Cretaceous is known, however, in northern Russia. Around the Moscow basin in the south-west and west the lower Carboniferous system (with poor coal at Tula, etc.), outcrops in a great curved belt from the region of Tula almost to the White Sea. Beyond this belt north-westward is the area of Devonian rocks towards Latvia and Estonia and across to the White Sea. They rest unconformably on Silurian rocks which outcrop along the southern shore of the Gulf of Finland and of lake Ladoga. The Devonian rocks are partly lacustrine (old red sandstone) and partly marine in origin, and the two types are often interstratified; a basal red sandstone is covered by a dolomitic limestone which in turn has a sandstone over it.

The Timan hills (p. 684) on the north-east may be said to be an upfold bordering the Moscow basin. The main axis of the basin is parallel to the course of the Volga above Nizhniy-Novgorod, continued north-westward by the Mologa, *i.e.*, rivers running broadly parallel to the sections of the Dnieper, Donetz and Don already noted. Permian rocks outcrop over large areas on the north. The dips of the strata are small and anticlines and synclines are here really slight undulations which might be followed right across Russia from the Dniester to the Timan hills always with lines roughly north-west to south-east (or west-north-west to east-south-east) well marked in geology and drainage, though not much indicated in relief save that there is a marked low line of the Dnieper valley above Dnepropetrovsk, the Pripet marshes or Rokitno swamps and the upper Bug, where it continues the line of the Dnieper and Pripet in Poland. This belt of lowlands is of special importance because of the great marshes just named; they form the effective barrier between Russia and peninsular Europe. (*See* EUROPE: *Geography.*)

Turning now to the east one notes the virgations of the Tian Shan, orographically very subdued in the Aralo-Caspian lowland. One stretches north-westward parallel to and north of the Syr Darya river and apparently re-emerges from the lowland in one of the southern branches of the Urals which are at first a plateau and only rise to any considerable height north of lat. 52° N. Another virgation stretches parallel to the first, this time just north-north-east of the Amu-Darya or Oxus river, and is continued into the Mangishlak peninsula that projects into the north-east of the Caspian Sea. Farther south still are the hills of the Persian border reaching the Caspian Sea between the Gulf of Kara Boghaz and the town of Krasnovodsk, and continued on the west of that sea by the mighty Caucasus. In the Aralo-Caspian lowland the rocks of these virgations are masked by a quaternary covering with Tertiary deposits south of the lower Oxus and on the Ust Urt plateau between Aral and Caspian. Between the Aralo-Caspian-Balkhash area and the Arctic drainage area of the Ob and its feeders, is the higher land of Semipalatinsk related

structurally to the Altai and floored by Palaeozoic and igneous rocks. West of this the land continues to be somewhat above the level of the lowlands on either side and is floored by Tertiary deposits, but the higher land narrows down in the Turgai region which according to general opinion until Oligocene times had a sea-communication right away to the Arctic on the north. The two great rivers of the region are the Amu-Darya (Oxus), 1,500 m. long, and the Syr Darya, 1,500 m. long, both reaching the Aral Sea.

Structural geologists have spread familiarity with the idea of a great sea called Tethys reaching in Mesozoic and Eocene times from the present Mediterranean area eastwards through the region occupied later by the young folded ranges of Asia Minor, Armenia, the Hindu-Kush and Himalaya, etc., out to the Malaya. Without venturing into details of advances and retreats of the sea it may be said that the uprise of the fold mountains of Asia Minor, Armenia, the Elburz Range and the Hindu-Kush left the part of that sea to the north of this more or less isolated as the Pontic brackish lake, losing its former connection via the Turgai low-line with the Arctic Ocean probably in Oligocene times and becoming much modified by the sinking of the southern parts of the Black and Caspian Seas (*q.v.*) which are both deep. Apart from these two depressions the land shelves easily from land to sea around the northern parts of the Black and Caspian Seas while the shallow Aral Sea is a part of the Pontic lake, now cut off by lowland from the north-east of the Caspian Sea. Balkhash is a freshwater lake on higher land farther east now, at any rate, without outlet, whatever may have been the condition of things in the past.

We thus have a series of enclosed seas and lakes (*q.v.*) of which Balkhash, the Aral and the Caspian have no outlet, and the two latter are salt, while the Sea of Azov communicates with the Black Sea through a break in the mountain line between the Caucasus and the Yalta mountains of the Crimea, and the Black Sea has communicated with the Egean and the Mediterranean since the sinking of the former. The rivers Dnieper (strictly 1,064 m. or with minor windings 1,328 m.), and Don (strictly 980 m. or with minor windings 1,123 m.), both flow south-eastwards for a considerable distance and then turn sharply south-westward to the Black Sea, probably as a consequence of the recent dominance of flow towards the Egean following the sinking of the latter. Prior to that sinking it is thought that the Danube for a time made its way eastward across the lowland to the Caspian Area which it may have reached via the curious Manych depression. The Volga (1,977 m. or with minor windings 2,107 m.), is the longest river of Europe flowing broadly east-south-east parallel to the axis of the Moscow basin and meeting the Kama as it turns south below Kazan. On its course southward it has a sharp eastward loop with Samara at the head opposite the southward bend of the Don, and quite near it, the Volga bends south-east, thus continuing the previous line of the Don, and so it reaches its delta on the Caspian Sea. The great rivers of the Aral basin, the Amu-Darya or Oxus and the Syr Darya have already been mentioned and the relation of their courses to structural lines has been indicated.

Apart from the borders of the Pacific Ocean, Mongolia, Sinkiang, Afghanistan, Persia and the Caucasus, the Russian Area is really great lowland broken only by the Ural mountains and the residual heights on the Angara block. It is a region of great lakes and inland seas, of which the north-west European group is discussed in the article Europe, while the Caspian, Aral, Balkhash and Baikal are subjects of separate articles. As there are immense tracts covered by glacial clays, there are areas, for example, in the south-east of the Ob basin, with myriads of small lakes in the hollows.

The Caucasus (*q.v.*) *and Transcaucasia* form very distinct regions structurally and physically, the Armenian mountain-knot being separated from the Caucasus by a relatively low narrow line occupied by the river Rion on the west and the river Kur on the east, but a long stretch of this "low line" is well over 1,500 ft. above sea. This line has to the east the deep basin of the southern Caspian and westward the deep basin of the southern Black Sea.

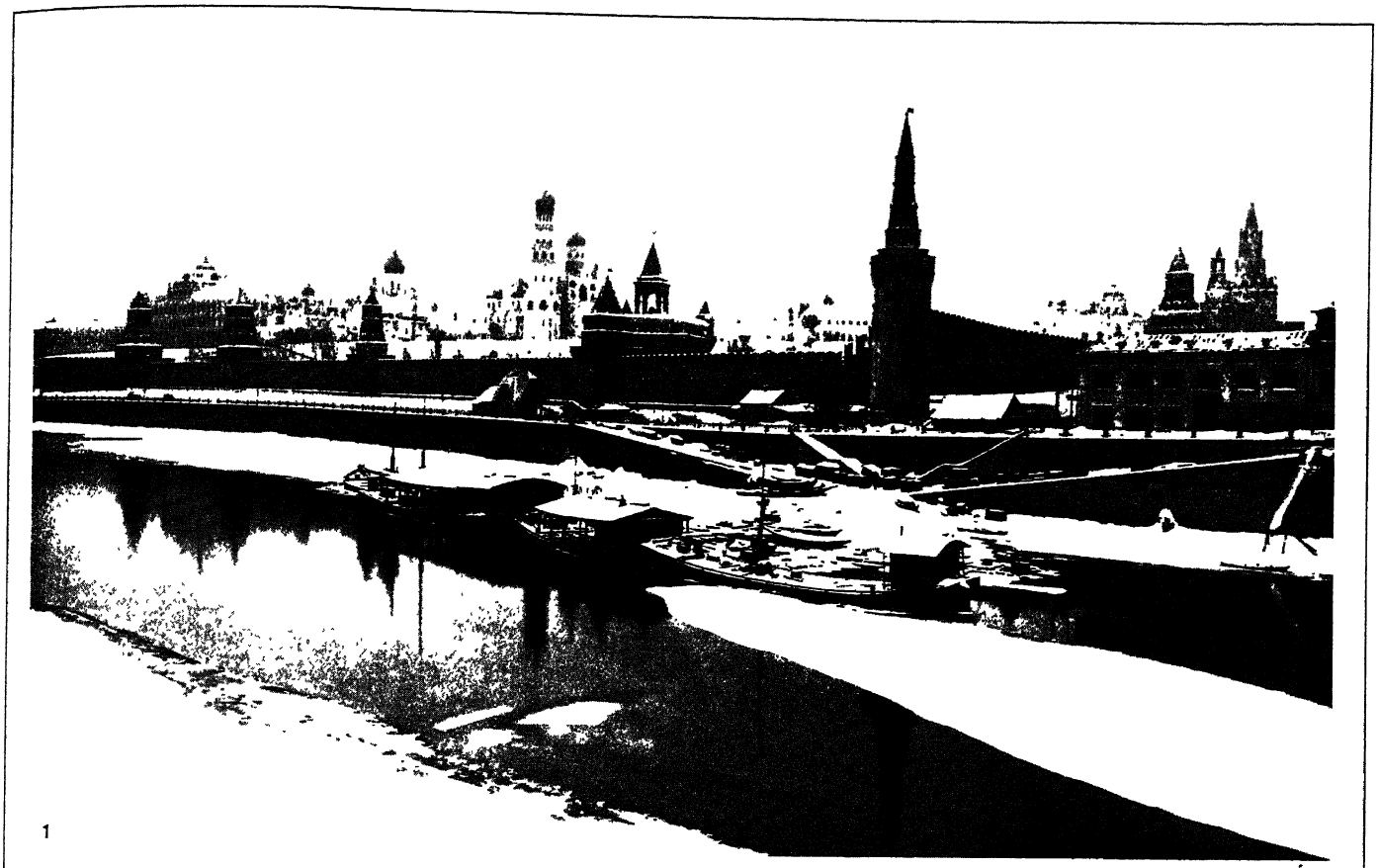
GLACIATION

The Pleistocene Ice Age affected Russia profoundly and its effects have been studied more particularly in European Russia. In north Russia river-drainage has re-established itself post-glacially to a greater extent than in Finland, which lay near the Scandinavian ice centre of the time. A great morainic belt may be traced between the Petchora-Vychegda-Northern Dwina basin and the Kama-Vyatka basin, and this belt continues south-westward past Kostroma, Moscow and the northern watershed of the Dnieper and Pripet system into Poland. North-west of this great belt, in the west, are many great remnants of moraines enclosing lake or swamp areas. To the south of it are swamp-areas such as the Pripet basin, the Riazan district and the tongue between Volga and Oka before they join. Boulder clay stretches some way south of the great morainic belt above mentioned, and this extension is enormously increased by the occurrence of great tongues of boulder clay in the basins of the Don and Dnieper on the left banks of their long north-west-south-east sections. In each case these boulder-clay extensions are much dissected by streams as would be expected on an area with impervious floor. The main morainic belt and the more southerly morainic limit above described are sometimes held to represent two separate glacial advances, the former being the more recent.

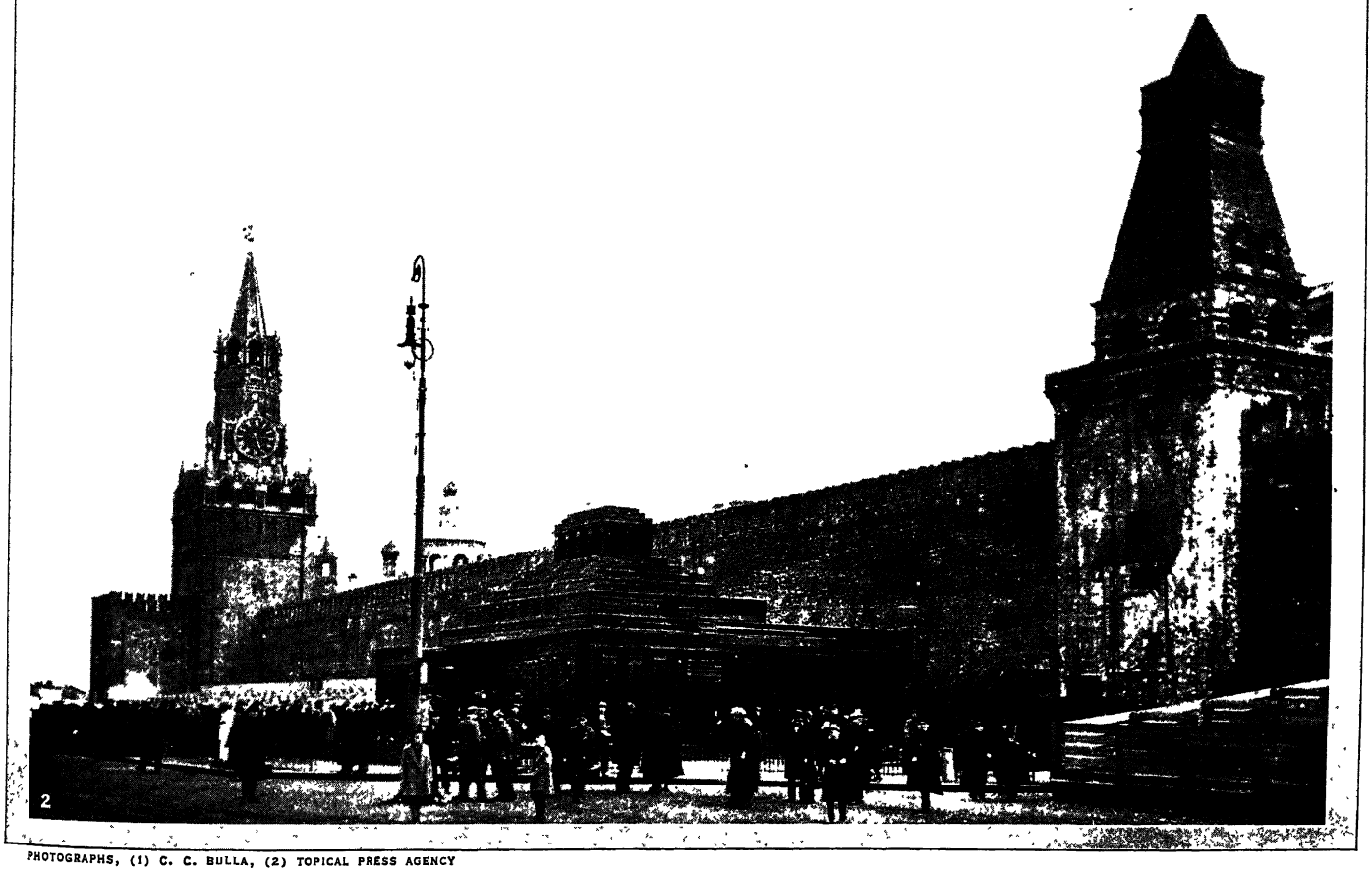
There seems little doubt that the Caucasus and the great highlands of Central and north-east Asia (including the Verkhoyansk arc and the Stanovoi range, as well as part of the Angara plateau) were centres of Pleistocene glaciation, but towards the north-east the low precipitation probably limited the extent of the glaciers. Beyond the boulder-clay zone follows the *loess*, an aeolian deposit due to the outblowing winds from an ice sheet or other cold centre. They pick up fine-grained material from terminal moraines across which they blow out and deposit this over a wide zone as a porous deposit in which, frequently, grasses have grown and decayed, leaving vertical tubes up which water may be brought, and depositing organic matter which has promoted the fertility of loess when it is exploited by man. Loess occupies practically the whole of South Russia and interlocks with the two tongues of boulder clay, sending north a broad tongue between the Don and the left bank feeders of the Dnieper to Orel, forming a region much poorer in streams than the boulder-clay tongues on its two flanks. East of the boulder-clay tongue of the Don basin, the loess reaches as far north as the Vyatka river and eastward into Turkestan. In Asiatic Russia the loess seems to occur mainly along the foot of the western highlands and across Turkestan towards the Caspian.

CLIMATE

The essential feature of the climate of the U.S.S.R. is its continental character; the regions of somewhat more temperate type became independent states after 1917. From the western border to the mountains fringing the Pacific and from the Arctic to the mountain zone of Central Asia, this great stretch of land lies open to the winds, the Urals being too low to form an effective climatic barrier, though they have some influence on isotherms and especially on isohyets. Oceanic influences play some part in the west, but the Arctic Ocean to the north has practically no moderating effect. Even if eastern Russia were not cut off from the ocean by a mountain fringe, moderating influences would hardly be felt, since the winds blow off shore most of the year and moreover the Sea of Okhotsk is under the influence of a cold Polar drift and is a region of floating ice and fog. During the long winter the land mass of Asiatic Russia becomes extremely cold especially towards the north-east, and the cold, dry, heavy air which settles above it so intensifies the high pressure belt of Central Asia that it is attracted northwards. Lake Baikal and the region to the east of it have a January pressure of 30·5″. The north-east coast of the Arctic lies north of the 30″ isobar and a belt of high pressure extends from Asiatic Russia in a south-west direction. The most intense tongue of January high pressure stretches west along lat. 50° N. and forms a vortex of variable winds. To the north of it the prevailing winds are south and west, while to the south of it in the steppes and steppe-deserts of European South Russia and of Turkestan the winds



1



2

PHOTOGRAPHS, (1) C. C. BULLA, (2) TOPICAL PRESS AGENCY

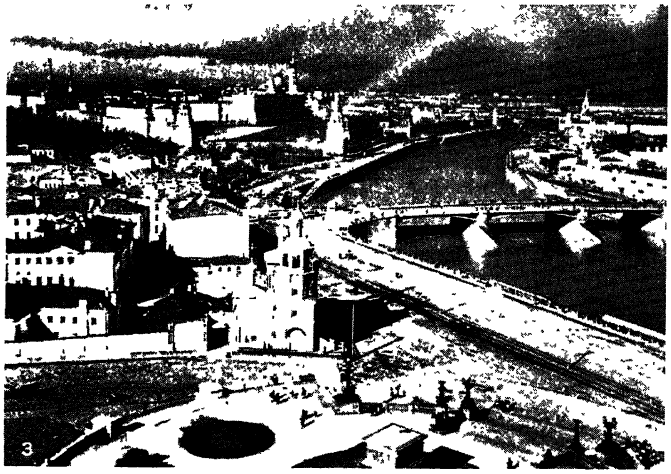
TWO VIEWS IN MOSCOW

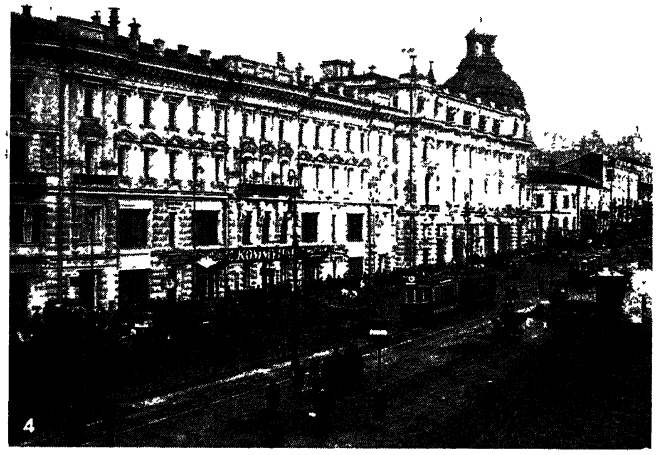
1. The Kremlin, from the River Moskva. The fortress is surrounded by a battlemented wall with nineteen towers
2. The Red Square (*see* Moscow, Plate, fig. 2), showing the tomb of Lenin outside the wall of the Kremlin

RUSSIA

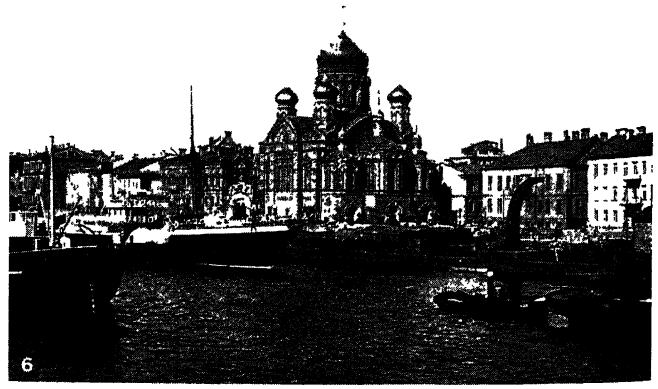












PHOTOGRAPHS, (1, 6) BURTON HOLMES, FROM EWING GALLOWAY, (2, 4) ORIENT AND OCCIDENT, (3) TOPICAL PRESS AGENCY, (5) COPR. PRESS CLICHE

SCENES AND CITIES OF OLD AND NEW RUSSIA

1. Moscow, within the Kremlin. The bell-tower, Ivan the Great (Ivan Veliki) (*c.* 1600), and the church of St. John the Divine are in the centre. The famous Tsar Bell (Tsar Kolokol), the largest bell in the world, stands in front of the tower. The building to the left is the Cathedral of the Archangel Michael, 15th century, in which the bodies of all the early tsars are buried. The church in the rear and to the right of St. John's is the church of the Assumption of the Virgin
2. Moscow, Sverdlov Place. This square, formerly Theatre Place, is one of the largest and most beautiful in the city, with theatres on three sides and gardens on the fourth. It was renamed in honour of the first chairman of the All-Russian Central Executive Committee. The building in the background, with the pillared façade, is the Dom Soyúzov, or House of the Trade Unions
3. Moscow, bird's-eye view towards the Kremlin. On the right is the winding Moskvá river, with its cast-iron bridge; to the left, in the background, is the walled Kremlin, with its many cupolas and minarets. The buildings of the new capital show a mixture of modern Occidental and traditional Oriental forms
4. Moscow, Lubiansky Avenue, a commercial street in the centre of the city, where the House of the Moscow Communist Economy is situated
5. A Russian peasant's house at Uglitch, in the province of Yaroslavl, one of the most ancient and interesting Russian towns. Many of its old buildings date back to the 14th century
6. Leningrad (St. Petersburg), showing the water front. Leningrad is built on the islands and banks of the Nevá river

are north, north-east and east, so that severe winter cold is carried far to the south. The region west of the Ob river is under the influence of the Icelandic low-pressure system of western Europe.

The general high pressure relations which are outlined above last from August to April. Thus about half of Russia has a winter of six months' duration, while from Yenisei eastwards there stretches a vast area of permanently frozen ground extending from the Arctic to the south of lat. 50° N. only southern Kamchatka and the Maritime provinces of the Far Eastern Area lying outside this zone, which extends westwards from the south of the Gulf of Taz to the open Murmansk coast. In this permanently frozen zone winter lasts 6 to 9 months or more and summer is too short to thaw the ground to any depth. Forest and tundra cover much of it, and in a few places, notably in the Yakutsk area there is some cultivation of potatoes and hardier cereals on the upper, temporarily thawed soil above the permanently frozen subsoil. The line marking the southern limit of the duration of winter for a period varying from 3 to 6 months extends westwards from the Tian Shan, passing well to the south of the Sea of Aral and crossing the Caspian and the Sea of Azov, so that their northern portions lie within it, and just skirting the north of the Black Sea. The effect of this prolonged winter on the life of the people is profound; agricultural and outdoor occupations (*e.g.*, building) are impossible, river navigation ceases and sledge transport takes its place. Terrible wind and snow storms occasionally sweep with great violence across the plains even in the southern steppe and the Ukraine, and cattle and sheep perish in great numbers.

In a great country depending mainly on agriculture this prolonged annual pause constitutes a very serious drawback. Its complex psychological and physical effects on the individual are also profound, especially when monotonous diet and insufficient vitamin supply accompany it. For an interesting account of the effects of severe climate on human personality *see* Czaplicka, *Aboriginal Siberia,* 1914. The deterioration of the tribes pushed to the north-east and of the Russian settlers in Kamchatka are patent and extreme cases and the slow cultural development of the Russian race must be in part attributed to climatic causes. The only regions with a winter frost of one month or less are the south-east coast of the Crimea, the malarial east coast strip of the Black Sea and the arid coastal regions of the eastern and western shores of the South Caspian. The Lenkoran district of the south-west Caspian shore, with an annual rainfall averaging 40 inches is an interesting example of micro-climate due to local relief. The warm Atlantic drift influences the winter of European Russia and her only all the year round open port is the recently built Murmansk on the Arctic coast. The prevailing westerly winds modify winter conditions in north and central European Russia, so that winter isotherms have a general north-west to south-east trend. The coldest winter in the world (as yet recorded) is experienced at Verkhoyansk in lat. 67° 30′ N., 134° E., 3,000 miles east from the Atlantic, where the average January temperature is −59° F, and where it dropped to −90° F in February 1892, the lowest temperature ever observed.

There is no direct insolation in winter, since it lies within the Arctic circle, night radiation from the snow covered earth is intense in the clear, dry atmosphere and, as Verkhoyansk lies in a valley bottom, inversion of temperature intensifies the cold. Woeikof attributes the fact that Sagastyr on the Arctic Ocean, in 73° 32′ N. has an av. Jan. temp. 25° F warmer than that of Verkhoyansk to the stronger winds on the flat and treeless tundra and to the absence of temperature inversion. S. Obruchev ("Discovery of a Great Range in North-Eastern Siberia," *Geographical Journal,* 1927, vol. 70) suggests that the Pole of Cold may extend over the Upper Indigirka. Another local relief effect is the cold temperature experienced immediately east of the Scandinavian mountains. A general feature of the Russian winter south of the Arctic circle is the clear bright sunshine and the absence of cloud, the maximum of cloudiness being experienced in autumn, except in the Far Eastern Area, where summer is the season of maximum cloud, and in the south of the Ukraine, the Kazakstan steppe and the Central Asiatic Republics where winter, though not very cloudy, is the season of greatest nebulosity. In three regions, the western Caucasus and west trans-Caucasia, the district between Lake Balkhash and the Tian Shan and in a belt on the left bank of the Amur from Blagovyeschensk to its mouth, spring is the cloudiest season. The general prevalence of clear skies in spring is a noticeable feature.

Seasonal Contrasts.—Summer is everywhere hot, and there is no place in European Russia, from Astrakhan to Archangel where the summer temperature does not reach 86° F. In Asiatic Russia the summer isotherm of 68° F goes through Omsk, Krasnoyarsk and Irkutsk, turns north to Yakutsk and then bends south to Vladivostok. Even the mouths of the Ob, Yenisei, Lena and Kolyma, in 70° N. lat. have an av. July temp. of 40° to 50° F. Verkhoyansk has an av. July temp. of 60° F and a maximum of 93° F has been recorded. The highest July averages and also the highest maxima are experienced in Turkestan, where 105° F and even higher temperatures have been observed. The av. July temp. for Southern Turkestan is over 86° F. Thus the range of temperature between winter and summer is great, the maximum, 118·6° F being near the pole of cold, from which it diminishes in a series of concentric rings. The line of the range of 79° F passes along the Arctic coast westwards roughly from Chaun Bay, cuts off the Taimyr peninsula and bends southwards along the course of the Yenisei, crosses the Upper Tunguska in an easterly loop and then curves westward to the Upper Yenisei. It makes a sharp bend north-eastwards round Lake Baikal, passes south again and then east to the mouth of the Sungari. The lines of equal range to the west of this have a general north-south trend, each having wide curves first to the east and then to the west as far as the Urals. West of the Urals the lines are less sinuous. The range at Moscow is 54° F and at Petrograd 48·6° F. The range at Batum on the west coast of the Black Sea drops to 30·8° F. The geographical distribution of great temperature ranges in Russia indicates that the determining factor of range is the intensity of winter.

These figures, showing a great range of temperature in regions of prolonged winter, indicate what a dislocation the brief spring brings to the life of Russia and how great is the strain on plant, animal and human life to secure adaptability. In European Russia the last days of frost are experienced for the most part in April, but north of lat. 55° N. in May and progressively later towards the north. In Asiatic Russia spring sets in at the end of April in the south and progressively later towards the north. Thus on a line from Yakutsk, passing north of Beresov on the Ob, south of Mezen and through Kola the average date of thawing on the rivers is May 21st. On a line extending from Sredne Kolimsk through the confluence of the Butyntai and Yana rivers, bending south over the plateau and turning north to Obdorsk the date is May 31st; on the upper Lena and its delta and at the mouth of the Yenisei, the thaw does not set in until the second week in June. The date of freezing of rivers in Russia varies from December near the north coast of the Black Sea, and for the northern part of the Caspian and the Sea of Aral to November on the northern coast.

In Asiatic Russia the date of freezing varies from November in the south to September for the Taimyr peninsula and the region east of Yana Bay. We thus have a picture of an unlocking of the winter grip setting in about April in the south and at dates varying from early May in the west to late June in the north-east, with a period of possible vegetation activity at its maximum in the south-west and rapidly diminishing towards the north-east. The melting of the snows and the consequent flooding of the roads and river banks and the coming of the spring rains, slight though their quantity may be, disorganise traffic. The badly constructed roads become seas of mud, the frozen marshes turn to quaking bogs and the rivers are at first obstructed by blocks of ice. On the lower courses of the rivers flowing to the Arctic blocks of ice brought by the warmer water from the earlier thawing upper courses are heaped upon the still frozen river, and as this latter melts and begins to flow the banks are flooded and ice blocks are carried on to the land to the accompaniment of deafening

crashes of the great blocks as they are hurled against one another.

A set-back to spring occurs in the second half of May, most sharply felt in Siberia, where the "icy saints' days," as they are called, are so blighting that it is impossible to cultivate the apple and the pear. This return of frost is experienced frequently in the Ukraine in a belt lying south of the extension of high pressure. Northerly and easterly winds may bring such biting frost that the leaves of the oak are shrivelled in an hour or two. It is significant to note that the maximum pressure conditions of April in the Polar region are succeeded by minimum pressure conditions in June. (This phenomenon of late spring frosts is by no means confined to Russia.)

Precipitation.—Evaporation from melting snows and drying surfaces keeps the spring temperature lower than the autumn temperature except in Turkestan and the steppes to the north of it, where snow does not lie because of the exposure of this treeless region to violent winter winds. In these regions, therefore, in accordance with the greater spring altitude of the sun, spring is warmer than autumn. The snow covering is thickest in the taiga belt (often 3 ft.) and in the west, under the influence of occasional cyclones, may form drifts of very great depth. The thin snow covering of Asiatic Russia melts in spring. Except in the extreme north of European Russia, in the deserts and steppes east of the Caspian roughly south of lat. 48° N., and in trans-Caucasia and the east coast strip of the Black Sea, summer is the season of maximum precipitation. The Pacific coastal strip, under the influence of the south-east monsoon has a particularly wet, stormy, cool summer unfavourable to agriculture, the maximum fall being in August. In Asiatic Russia east of the Yenisei and in the northern part from the west of the lower Yenisei to the Urals July and August are the rainiest months, a condition unfavourable to grain crops.

In a belt lying north of the steppe-desert and of the Caspian, east of a line curving through Astrakhan, Kazan and Bogoslovsk, and stretching west to the Altai, June and July are the wettest months. This belt terminates south of lat. 60° N. in the west and north of it in the east. To the west of it June is the wettest month in the south and August in the north, while in the central and western zone beyond, July is the month of greatest rainfall. To the north of this region July and August are the wettest months. Thus in many regions a wet August follows a severe winter. Winter rainfall is kept at a minimum by the prevalence of outblowing winds from the dry high pressure area, but in summer pressure conditions are reversed. Autumn, with its transition to the frost régime, is, like spring, a season of interruption of communications both by road and river, sometimes involving interruption of telegraphic communication because of the impossibility of getting over the roads to carry out repairs. Precipitation except near the Caucasus range and the coastal range of the east against which the south-east monsoon impinges, is fairly uniform, averaging about 20 inches in the central belt west of the Urals and 15 inches in that belt east of the Urals extending to the Pacific coastal ranges. Regions with such a rainfall may be humid in conditions of minimum evaporation, especially if the soil is clayey or icebound; they are arid in conditions favouring evaporation and dispersion of soil moisture.

In the tundra region of the north it sinks to 8 inches, while south of the central belt, in a region which includes the south of European Russia and the Central Asiatic Republics and the steppes and semi-deserts to the north of them, the prevailing winds throughout the year are from the dry north-east and rainfall therefore is scanty, in some places as low as 4 inches per annum, and agriculture depends on irrigation. A special problem of Russian agriculture is the irregularity of the amount of spring rainfall, complicated by the fact that this irregularity occurs in regions where the length of the snow covering varies from year to year in dependence on violent winds. A combination of poor snow covering and deficient spring rains leads to the terrible famines which are a recurrent scourge of south-east Russia. Related to this irregularity are such problems as the increasing desiccation of Turkestan, the present shallowness of streams which were navigable within recent historic times, and the drainage of marshes in the north by the slow elevation of the land. A general feature of the summer rainfall and of the May and June rainfall of the steppe is its liability to fall in sudden heavy showers, often accompanied by thunderstorms. This results in a quick run off of the water so that the effective moisture is small. In 1882 in Kursk province a heavy storm in July deposited within half an hour an amount of rain equal to 25% of the normal annual rainfall. Forest cutting in the upper courses of streams has greatly increased the denuding action of streams.

Certain regions form distinct climatic units. In this group, of course, fall the valley regions of the mountain zones, each valley often having a different exposure and different altitude. The east coast of the Black sea under the lee of the Caucasus has a milder climate and its rainfall (60 inches per annum) is of the same type as that of the west coasts of the Mediterranean, in dependence on the special pressure systems over the Black Sea. The region round Lake Baikal is much influenced by the presence of that body of water, especially in December before freezing sets in, when the combined influences of open water and of the liberation of latent heat during freezing cause the isotherms to loop north-eastwards around the lake. The special features of the eastern coastal region are discussed under Far Eastern Area (*q.v.*) and for those of the Arctic fringe *see* POLAR REGIONS.

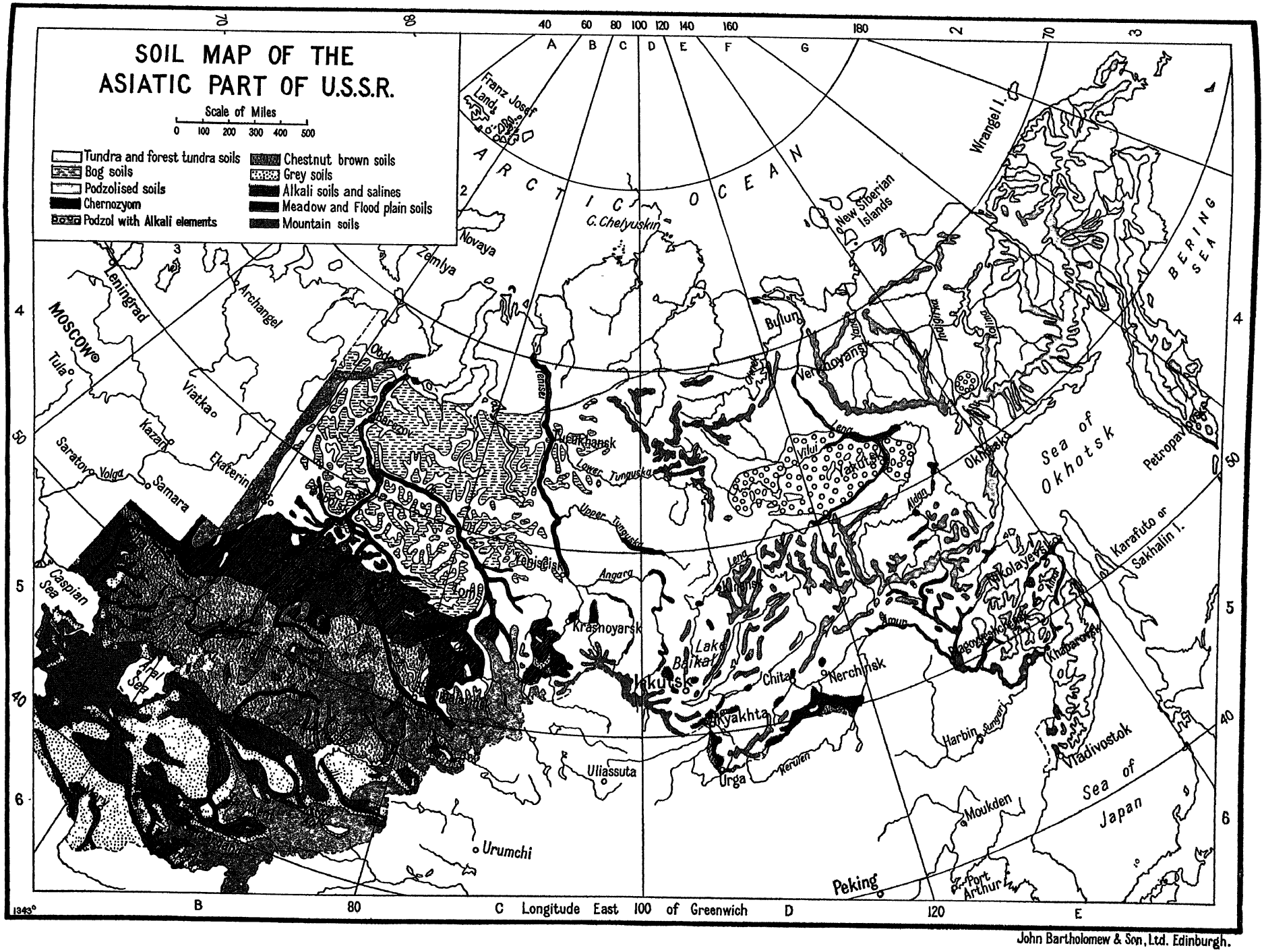
BIBLIOGRAPHY.—*Climatological Atlas of Russia*, St. Petersburg, 1900, giving the results of observations from 1849 to 1899; Kendrew, *The Climates of the Continents* (1927).

SOILS AND THEIR INFLUENCE

Soil study or *Pedology* as a scientific discipline owes its present position largely to Russian research, which has demonstrated that the soil is a distinct entity dependent on regional and climatic factors for its evolution and type. The vast extent of the Russian empire and the importance to its life of the Chernozyom (*Chernozëm*) or Black Earth, gave special opportunities for studying the characteristics of soil under widely differing climatic, geological, topographical and biological conditions. Foremost among these workers was V. V. Dokuchaiev (1846–1903) whose researches, published 1879–1883, included a cartography of Russian soils. The Dokuchaiev Institute of Soils in Leningrad published in 1926 a detailed map in colour of the soils of Russia compiled under the direction of K. D. Glinka and L. I. Prasolov, with the assistance of S. S. Neustruev, B. B. Polynov and N. I. Prochorov. Glinka's work on soils is of world-wide importance and the publication in 1928 by the Department of Agriculture of the United States of America of an English translation of his classic "The Great Soil Groups of the World and their Development" makes his results available for the first time to English speaking peoples.

An important series was published in English in 1927 by the Russian Academy of Sciences and includes thirteen pamphlets by different Russian soil scientists on various aspects of pedology affecting Russia. Fallou and Richtofen had previously recognized the importance of the study of the regional distribution of soils, but the definite connection of present climatic conditions with the geography of soil distribution was first laid down by Dokuchaiev and afterwards developed by N. Sibirtsev and K. D. Glinka. Russian scientists were pioneers in the detailed study of vertical sections of soils, which reveals important morphological characters of the various layers dependent to a large extent on climate. This study of soil horizons owes much also to Japanese and American investigators, while later the work of microbiologists (*e.g.*, S. N. Vinogradski and V. L. Omelianski) and of students of colloidal action (*e.g.*, K. K. Gedroiz) much widened the scope of study. The accompanying soil maps of Russia are based on the maps prepared by Glinka and Prasolov.

The Tundra.—The first main group is the tundra zone stretching across the whole of northern Russia. The name *tundra* implies treeless as opposed to forest lands, and two main zones can be noted. As one goes north-eastwards in Asiatic Russia, the climatic conditions become increasingly dry and precipitation ultimately reaches a minimum and there is much arid clayey and stony dry tundra, but in the remainder of the northern tundra zone there is



John Bartholomew & Son, Ltd. Edinburgh.

RUSSIA

MAP I

greater annual precipitation. Scanty though it may be, this precipitation is often sufficient to cause the soils to be classed as humid, owing to low temperatures, slight evaporation and the permanent freezing of the sub-soil which seriously limits the draining off of surface water. The excessively moistened horizon above the frozen sub-soil, which thaws during the brief summer and turns the region into an impassable quaking bog, is called "talik"; it is coloured by ferric rusty spots and wedges of humus. This "glei" horizon of tundra soils retains its motley colouring when dried. The vegetative mass of moss, lichen and dwarf shrub tends to form peat, and "hillock tundra" is apparently due to the formation of a frozen core which cuts off the moisture supply of the surface moss, thus causing it to die. The decomposition of vegetation causes denudation and cracking, with ultimate gradual disintegration of the hillocks, between which the surface water collects and runs off.

Remarkable features of tundra soil are the "polygon" or "medallion" type and the "spot" type. The former, tesselated soils, are due to cracking of the surface layer during drying with consequent drainage of water along the cracks, removing fine particles and sometimes depositing stones, so that sandy and occasionally stony streaks separate the polygons. "Spotty" tundra may be due to compression of the semi-liquid mass of earth between the frozen sub-soil and the newly freezing surface; this semi-liquid mass breaks through to the surface and forms spots deprived of vegetation; in other places it is apparently due to the action of wind. Peat formation is observed at the highest latitudes in the Arctic regions; except where the ice and snow cover is permanent. The frozen sub-soil and the severe climate make agriculture impossible here and the tundra is the land of the wild reindeer and the nomad reindeer breeder, who takes his herds to the south during summer and to the north during winter and supplements his dependence on the reindeer for food, transport and clothing by a little fishing in the summer and by occasional hunting. Huts erected on this frozen sub-soil sometimes cause thawing with a development of a consequent upward fountain, the water of which may freeze into solid ice. Remains of birches and spruces have been found beneath peat hillocks on the tundra.

The forest stretched much further northwards at some post-glacial stage (the "Atlantic" phase in western Europe), when the climate was warmer than it is now, but the advance of tundra on forest has been encouraged by human destruction of the thinner fringe of "island" forest to the north, which helped Sphagnum bog to swamp the forest fringe. Towards the west, under the influence of the Atlantic, the tundra belt is narrow; it increases in width towards the east under the influence of the continental Asiatic winter, and thrusts much farther south in Kamchatka, partly because of the height of the land and partly under the influence of cold ocean currents from the north; oceanic influences thus playing an entirely different rôle in the east. South of the tundra bog begins a zone of scattered dwarf spruce and birch trees, transitional forms to the trees of the taiga zone. In Asiatic Russia a belt of vast marshy plain covered with dwarf birch lies south of the tundra belt. Along the river valleys, better protected from the wind, which induces winter evaporation and thus hinders their growth, and also better drained so that sub-soil ice is not so near the surface, the forest pushes northward. In the immediate vicinity of the streams, forest is denuded by the blocks of ice brought down in spring.

THE FOREST ZONES

Podzol.—The coniferous forest (taiga) belt and much of the mixed coniferous and deciduous belt are characterised by podzolised soils. Podzol or ash-coloured soils are developed in conditions where the moistening of the upper soil horizons is sufficient to ensure the percolation of water into deeper horizons, and where there is sufficient, but not excessive evaporation so that the percolating solutions are drawn upwards. Forest conditions, which prevent rapid or excessive evaporation and which at the same time ensure moistening of the soil are peculiarly favourable to podzol formation, though this type of soil has also been found in meadow and meadow-moor regions. Owing to strong transpiration, the sub-soil under forest is drier than that under herbaceous vegetation, and the level of sub-soil water is therefore lower under forest. At the same time the upper horizon under forests is moistened by better preservation of the snow covering and by lower evaporation under the shade of leaves and forest bedding.

The main morphological characteristic of podzol is the presence of two horizons, an eluvial upper horizon A, which is comparatively deprived of colour and leached, with sandy particles, and an underlying eluvial horizon B, more intensely coloured, having an increased clayey content and chemically enriched with hydrates of sesqui-oxides and with humus. The upper horizon may be divided into a layer containing undecomposed organic matter (*e.g.*, hyphae of fungi), a greyish humus layer and a whitish horizon almost deprived of humus and enriched with silicic acid. The B horizon may have an upper coffee-coloured layer, with precipitated humus substances and a lower more yellow or rust-coloured layer with precipitation of iron hydroxide. This horizon may sometimes consist of *ortstein*, a compact indurated ferro-humus layer. The process of leaching to which the upper horizon of the soil is subjected is known as podzolisation and varies in degree, sometimes being indicated by almost imperceptible spots and at the other extreme by a compact whitish streak of a schistose character. The colloidal nature of humus plays an important part in the development of podzolisation. The type of parent rock is also important, the morphology of clayey, sandy-loamy and sandy podzolised soils varying greatly. The exact processes of podzol formation are still a subject of dispute; for an account of various theories *see* S. S. Neustruev, "Genesis of Soils" 1927, Pt. III. of *Russian Pedological Investigations*. This podzol zone is very extensive and broadens out in Asiatic Russia so that it reaches from the tundra in the north to the plateau region in the south.

The term *Rendzina* is applied to soils derived from the weathering of calcareous rocks.

Bog Soils.—There are vast regions that are intercalated among the forests covered by bog, especially in the west. Bog soils are formed where the pores of the soil are filled with moisture for a prolonged period, in regions of slight evaporation and marked atmospheric precipitation. The organic matter, paludinous herbaceous growths (Carex, etc.) and paludinous moss (Sphagnum, etc.) and sometimes the remains of alder, dwarf-birch, etc., instead of decomposing into humus, becomes enriched with carbon and transformed into peat. Micro-organisms play a large part in this carbonisation process, which penetrates to varying depths and which, where moisture rich in oxygen exists in deeper layers, may be superimposed on a humus layer. As a result of evaporation on the surface of the swamped soil, iron is precipitated in the upper soil-horizon directly beneath the peaty layer in the form of nodules of bog-iron ore. Bog-iron ore has been worked in a primitive way from very early times in Russia. The swamps and marshes have played a twofold part in history; they hindered the development of communications, but they frequently formed retreats for the Slavs and the Finns in early times. Novgorod escaped destruction by the Tatar horde in the 13th century because the Tatars could not cross the marsh in the rainy summer, and the strategic importance of the Pripet marshes has been evident from early days. Today the peat bogs have great commercial importance, for Russian scientists have invented a method of using peat fuel in the production of electricity.

The forest and marsh zone of European Russia is of peculiar interest historically, for it was in this less attractive region that the Slavs settled after the devastation of the fertile steppe by nomad Turkic hordes, and it was in this region that the Great Russian race consolidated the kingdom of Moscow, which afterwards re-absorbed the steppe. Here, too, various small minorities, Finnish and Turkic, were able to retain their national individuality even to the west of the Urals, and are now separate cultural units within the Russian state. The forests of this belt are subject to two forms of climatic zoning, a north to south zone related to temperature and a west to east zone related to decreasing humidity. The beech just makes an appearance in the Podolian bend of the Ukraine, but penetrates no further east, except in the moister regions of the Crimea and the Caucasus. The oak approaches, but

does not cross, the Urals, while the Siberian pine, larch and cedar penetrate from Asiatic Russia into the extreme north-east of European Russia.

Concerning north to south distributions, one notes that the oak appears south of a line drawn through Pskov, Kostroma, Kazan and Ufa, though islands of oak penetrate further to the north. Profitable production of apple, pear and cherry is roughly coincident with the oak belt. Hornbeam does not penetrate much beyond the northern boundary of the Ukraine, though maple and ash accompany the oak almost to its northern limit. The lime tree combines the two zones, preferring the east and not as a rule extending further north than lat. 62°–64° N. Apricots and walnuts, on the other hand, prefer the west, reaching 50° N. lat. in eastern Ukraine and spreading further north to the west.

Coniferous Deciduous Zones.—The Siberian coniferous zone is characterised by its wider north to south extent, by the great fringe of stunted birch to the north, where trees a hundred years old may be but a few feet high and are thickly encrusted with lichens, and by certain distinct varieties of conifers, *e.g.*, the silver fir, stone pine and the Siberian larch. In the virgin forests of the valleys and lowlands of Western Siberia are larches, pines and silver firs, mingled with birch and aspen, while poplar and willow fringe the streams. In this region are the *urmans*, dense thickets of trees often rising from a treacherous carpet of thickly interlaced grasses, concealing deep marshes, impassable except in winter. In the south-eastern trans-Baikal region, under the influence of the drought of the Gobi steppe, the forest thins out. The distribution of spruce and Scotch pine, the chief trees of the coniferous forest, depends largely on the parent rock. Spruce grows best on clayey, but not boggy, soil and is therefore closely related to the distribution of glacial boulder clay, while Scotch pine spreads best on sand and peat.

In the Bryansk district, on the cretaceous marl and phosphorite sand, near the southern limit of the coniferous forest, spruce is found with an admixture of oak, Norway maple, poplar, birch and elm. Along the river valleys of the steppe are interesting southward-extending strips of forest, oak growing on the high right bank and Scotch pine on the low sandy left bank. On some soils where sand lies above clay, the spruce, which is tolerant of shade, grows among the taller pines. Pine forests occur on loess covered chalk on the right bank of the Volga and in Voronezh, Kursk and Kharkov, and with them are certain rare plants, possibly relics of the Ice Age. A general characteristic of the oak is that it does not tolerate complete podzolisation and requires greater warmth than spruce, thus it penetrates north into the coniferous zone along river valleys where the soil is warmer and less podzolised and gives way to spruce on the interfluvial clay-lands. The earliest agricultural development in Russia took place in the region of the heavy clay soil of Moscow, as the first period of relying on forest wealth for trade gave way to dependence on local cultivation of crops in view of the closing of the trade channel to the Black Sea and Caspian by Mongol invaders. Agriculture involved forest clearing by cutting or burning, more frequently the latter because the charcoal helped to make the soil productive. Before a good yield could be obtained, many years of careful cultivation and manuring were necessary, and the population constantly tended to drift to the more fertile black earth region, while of late years the population on the clay soils (podzol) has been more and more diverted from agriculture to industry.

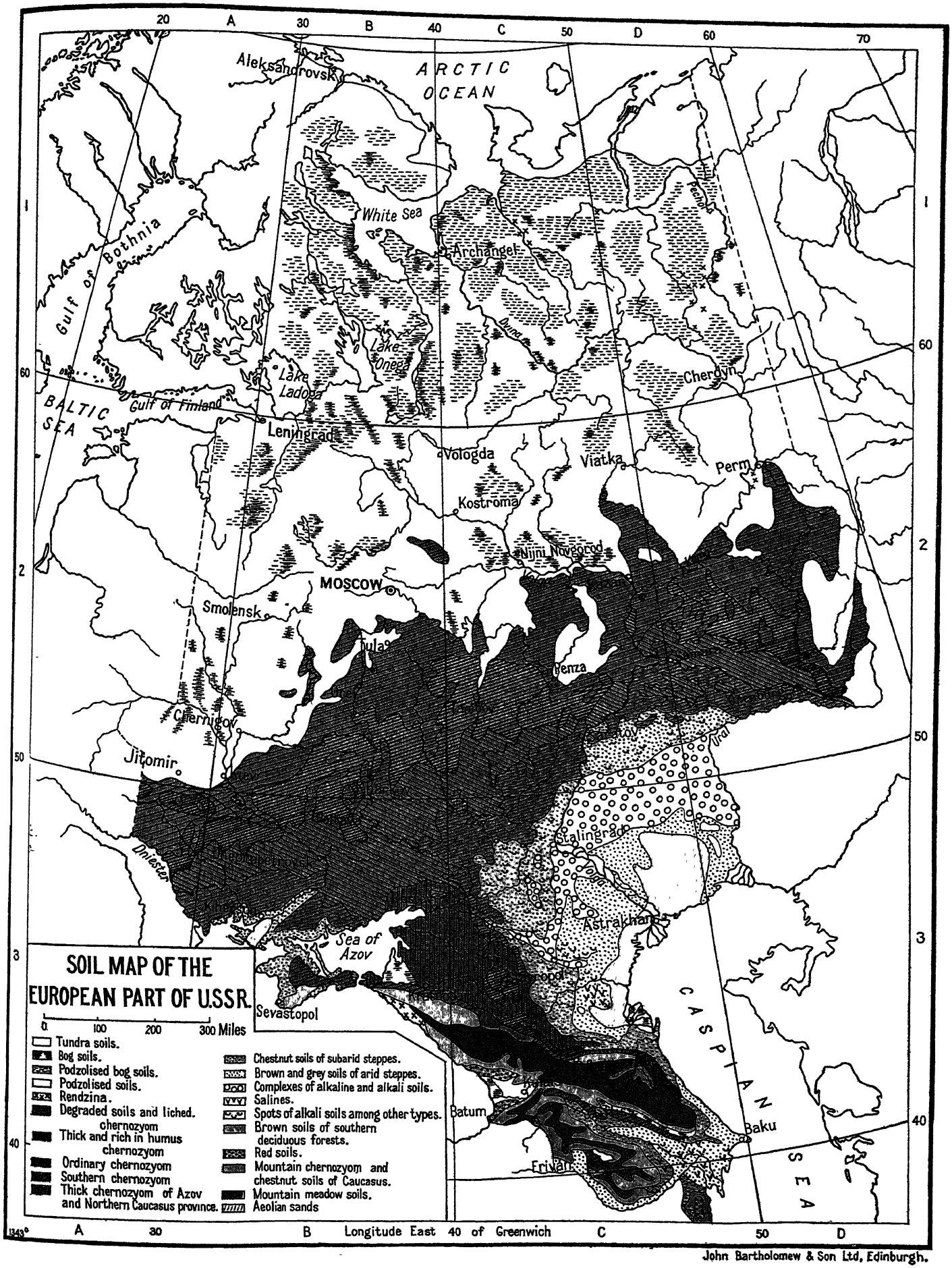
Cereals, chiefly barley, rye and oats, with flax and hemp, potatoes and cabbages and recently grass and lucerne are the chief crops. Some wheat is grown, but not so successfully as farther south. Intensity of cultivation thins out markedly to the north and in Siberia hardly exists, the long severe winter and the liability to recurrent frost in spring being unfavourable. Timber exploitation and hunting of fur-bearing animals are of ancient importance. Cattle breeding and dairying are developed in many parts. Human settlement in the northern hunting, fishing and forest-products belt is usually along the river valleys and the shores of lakes and seas, the peat bog watersheds being uninhabited. On the glacial soils of the central watershed the valleys are humid and cold and settlement is on the warmer, drier morainic hills, where the season for ripening crops is 10 days longer than in the valley bottoms. The podzol zone of Asiatic Russia is sparsely peopled in view of the severity of climatic conditions, and averages one inhabitant per square kilometer. This is a misleading way to put it since settlement is usually concentrated on the alluvial river strips and vast expanses of virgin forest have no settlements. Hunting and fishing are the main occupations, with cattle-breeding in the bog meadow belt lying east and west of the great bend of the Lena, on the alkaline podzol. Berry-bearing plants are found everywhere in this zone, whortleberry and arctic bramble spreading far into the north, while raspberries and currants form a luxurious undergrowth in many coniferous forest regions.

Black Earth.—The chernozyom (black earth) formations lie south of the podzol forest zone. Their origin was a subject of much discussion in the early days of soil study, though Glinka states that the Russian peasant had long ago arrived at the conclusion now generally held that chernozyom has been developed through the modification of an original material by the decay of animal and vegetable remains. Dokuchaiev in *The Russian Chernozyom* (1883) enunciated the view now generally accepted. Owing to the wide extent of chernozyom on loess, loess-like loams and loess-like clays it was once thought that chernozyom was a humus-coloured loess. But chernozyom is now known to occur on granites and andesites, on chalk, on Permian, Jurassic and other limestones, on Upper Permian marls, on Tertiary siliceous clays, and even on sands and sandstones, provided that the latter are rich in complex minerals.

The essentials for the formation of chernozyom are high evaporation with consequent desiccation of the soil during summer (high temperature with a high saturation-deficit) and long freezing of the soil in winter. During winter, water accumulates in the soil and provides for luxuriant spring vegetation, this moisture being exhausted by the end of May or the middle of June. The resulting drought retards the decay of the steppe grass (stipa), whose strongly developed root-systems provide abundant humus. The essential characteristic of chernozyom is its rich humus content, thick and rich chernozyom yielding 10 to 13% or more in southern latitudes, and 6 to 10% in northern latitudes, 6 to 10% is also the average content of ordinary chernozyom, while northern and southern chernozyoms yield 4 to 6%. The map shows that the central belt has the greatest humus content and that there is a decrease to north and south. During the intense summer evaporation there is a powerful ascending current of water in the soil, gypsum and calcium carbonates being deposited in separate horizons.

Morphologically a chernozyom profile consists of an upper humus horizon and a horizon of carbonate accumulation. "Thick" when applied to chernozyom denotes thickness of the humus horizon, though the limit of the underlying horizon is sometimes hardly distinguishable owing to its containing wedges, spots and veins of humus. It should be noted that chernozyom is found on mountain slopes (*e.g.*, in Turkestan and Trans-Caucasia), the height at which it will occur being determined by the climatic conditions at the foot of the mountain. If forested podzol occurs in this region, no black earth will exist on the mountain, but if the mountain rises from desert or desert steppe, chernozyom will occur on the mountain provided the altitude is sufficient.

Loess.—Loess, a fine grained porous deposit of material accumulated under the influence of winds blowing out from an ice-sheet across its marginal moraines, is widespread in South Russia and Turkestan. It gives rise to different soil types, the chernozyom being carried farther into moist conditions on loess because the porosity of loess drains off the superfluous water. Under arid conditions grey semi-desert and desert soils are formed on loess. When moister and milder conditions of climate supervened during the "Atlantic" phase of climate after the great retreat of the glaciers, forests sprang up in the regions affected, though apparently less on loess than elsewhere. Under forest the humus was removed by displacement of sesqui-oxides and colloidal clay from upper to deeper horizons, the resulting soil being termed degraded or liched (leached) chernozyom. The map shows this belt stretching in a south-west to north-east direction in European Russia and



John Bartholomew & Son Ltd, Edinburgh.

extending into Asiatic Russia as far as the Altai mountains, with a few patches further to the east as far as the trans-Baikal region. A tongue of it extends as far north as Perm and another tongue extends northwards on the left bank of the Vyatka. The oak forest is characteristic of the northern belt of degraded chernozyom in European Russia and there are three stages of development, the belt where the forest spread at the expense of the steppe and was continuous until man interfered, the belt of island-like clumps of oak near the rivers, and the steppe belt, where forest is found in the ravines only and the plateau is left to steppe vegetation. This latter belt has had interesting historic relations; the Slavs took to the forested ravines and left the plateaux to the nomad grazers, and to the present day village settlements run continuously along the ravines. The proximity to river water was an attraction, though ravine streams often disappear in summer except after heavy showers.

On plateau land enclosed in the angle between two rivers, upland oak occurs (*e.g.*, the Voronezh province oak used by Peter the Great for ship-building). Associated with the plateau oak forest are ash, lime, maple and elm. The fertility of the rich black earth is such that many years of continuous cropping hardly affects it and it is this zone which made Russia a famous grain-exporting region even in the time of Greek and Roman dominion. The islands and ravine strips of oak cease south of lat. 48° N., and of the line from the Stalingrad (Tsaritsyn) bend of the Volga to the Urals south of lat. 52° N. Patches of oak occur near the left bank of the Volga from the bend to 52° N. Thus the Pontic steppe was left free from forest and was a highway for nomad invaders. For types of agriculture, difficulties and history of the region *see* Ukraine and Black Earth Region (Central). In Asiatic Russia the railway runs through the chernozyom belt where Russian settlement has been intense since the latter part of the 19th century. The more easterly extensions of the steppe black earth lie in the zone of recurrent droughts and terrible famines, and under stress of famine conditions the ancient tradition of persistent wheat sowing on the three-field system is giving way to cultivation of maize and potato and to many-field systems; irrigation schemes are also being developed.

Drought Soils.—Chestnut-colour, brown-desert and grey-desert soils are developed under conditions of insufficient moisture. The chestnut-coloured soil fringes the black earth zone on the south, and, since its humus content may be 3 to 5%, it is very productive if sufficient moisture is available, and is specially favourable to the production of the harder wheats. It demands careful working and much forethought, however, in view of its position in a sub-arid zone liable to irregular recurrence of drought. With increasing aridity alkaline and saline soils occur. Capillary rising of water to the surface and subsequent evaporation and deposition of salt cause the development of saline soils. Snow-white salt efflorescences of sulphates and chlorides frequently cover a soft friable "puffed" layer containing separate salt crystals. Irrigation of the *tugai* or flood plains of Turkestan has resulted in a distribution of salt on the surface and an evolution through puffed layers to a hard, grey, porous, loamy crust (*takyr*). The micro-relief of the saline soils in the Aralo-Caspian basin and in Turkestan has encouraged salt accumulation, salt collects in hollows containing brackish ground-water. Alkaline soils appear to be derived from saline soils through the diminution of salt content. This has an important bearing on palaeogeography, though Vilenski's suggestion that all alkali soils were salines before the post-glacial period seems to need modification.

Mountain Soils.—Mountain soils are of much interest since they show a vertical distribution bearing somewhat the same relation to zonal soil distribution on the plains as vertical climatic zones bear to latitudinal ones. The relation is complicated by rain and river denudation and by glacial erosion. For the forest and other zones associated with the Caucasus, *see* NORTH CAUCASIAN AREA; GEORGIA; ARMENIA; AZERBAIJAN and DAGHESTAN. In the trans-Baikal and southern regions of the Far Eastern Area the mountain forest is linked in type with that of Manchuria. (*See* FAR EASTERN AREA.) In the Altai forest there is a relict oasis of the Tertiary deciduous forest.

Brown Soils.—The brown soils of deciduous forests differ from those of the arid steppes, which have a greyish tinge. Forest brown earths are formed under the influence of a temperate climate with fluctuations from year to year in the amount of rainfall so that the leaching of the soil, and consequently the humus content, varies. They have a neutral or slightly alkaline reaction and therefore readily dispersible humus bodies do not occur. Glinka and Ramann hold different views on the question of these brown earths, the former being doubtful as to the advisability of classifying them as independent soil types.

Red Soils.—The exact systematic position of the red soils in the Batum area is not definitely decided; they are not true laterite, though they may belong to the laterite type. In most cases the profile consists of a red and yellow coloured lower horizon and a brownish upper humus horizon. Glinka considers that the red-coloured and motley-coloured horizons of the Batum and Chavka soils are relict red soils from the Tertiary epoch, while the overlying more or less humus-coloured layers may be slightly podzolised soils. The probability of this hypothesis has been strengthened by the finding of similar relict soils in the Far Eastern Area, in the eastern Ural region, in the Kirghiz steppe and even in the centre of European Russia. These relict soils are partly subtropical red soils and partly kaolin-laterite, kaolin-bauxite and bauxite-laterite. Bauxite regions are important for the development of the aluminium industry. The red soils of the Batum region are very fertile and are specially suitable for tea plantations.

In conclusion it should be noted that Russian soil scientists, while regarding climatic zoning as a predominant factor in the formation of soil types emphasise the complicated interplay of other factors, parent rock, relief and its evolution, geological history, biological factors, and so on.

Dokuchaiev also considered that the age of the parent rock and the length of time during which soil formation in particular conditions had been in progress were both important factors, thus podzolisation tends to end in the production of podzol from chernozyom, while saline soils represent the youthful stage of alkaline soils. The concept of finality is, however, very rarely tenable in the complex and interdependent relations of organism and environment.

(For a discussion of Fauna and Flora *see* the articles on the continents of EUROPE and ASIA.)

BIBLIOGRAPHY.—*In English.* K. D. Glinka, *The Great Soil Groups of the World and their Development* (1928, with a detailed bibliography for each chapter). S. S. Neustruev, "Genesis of Soils," in *Russian Pedological Investigations* 1927, in which series there are 12 other pamphlets including L. I. Prasolov on "Cartography of Soils," and J. N. Afanasiev, on "The Classification Problem in Russian Soil Science"; E. Ramann, *The Evolution and Classification of Soils* (1928). *In Russian.* Among the numerous Russian publications are:—V. Dokuchaiev, *Russian Chernozyom* (1883), *Cartography of Russian Soils* (1879); various articles in the *Transactions of the St. Petersburg Society of Naturalists and of the Free Economical Society* (1879–83); *Materials for the valuation of land in Nizhniy-Novgorod* (1886); *Questions of valuation and classification of land in European and Asiatic Russia* (1898). Glinka and Prasolov, *Soil Map of the Asiatic Part of Russia* (1926) (8 sheets, in colour). K. Glinka, *Soil Science* (1915); *Soil Dispersions* (1924); articles in *Pedology* (1911–16); and in the *Transactions of the St. Petersburg Society of Naturalists*, vol. xxxiv., No. 5; *Clays of kaolin type in Voronezh province* (1919); K. Gedroiz, in the *Journal of Experimental Agronomy* (1906, 1908 and 1912); *Theory of Absorptive Capacity* (1922). L. Prasolov in *Pedology* (1916), on the "Chernozyoms of the Azov steppes." N. Sibirtsev in *Memoirs of the Novo-Alexandria Institute of Agriculture and Forestry* (St. Petersburg, 1898, 1901, 1909). The Russian journals (1) *Pedology* and especially articles by G. Tumin, S. Zakhorov, G. Morozov, S. Neustruev, V. Vernadski and G. Vysotski; (2) *The Russian Pedologist;* (3) *Transactions of the St. Petersburg Society of Naturalists;* (4) *Transactions of the Free Economical Society;* (5) *The Journal of Experimental Agronomy;* (6) *The Proceedings of the Kazan Society of Naturalists;* (7) *Agriculture and Forestry;* (8) *The Transactions of Agricultural Meteorology;* (9) *The Transactions of the Dokuchaiev Soil Committee;* (10) *The Transactions of Soil and Botanical Expeditions,* edited by K. Glinka; (11) *Transactions of the Amur Expedition,* 1912, vol. xv., edited by K. Glinka; *Transactions of the Siberian Institute of Agriculture and Forestry. See* also the article on *Soils;* M. D. Haviland, *Forest, Steppe and Tundra* (1926); B. A. Keller, "Distribution of Vegetation on the Plains of European Russia" in *Journal of Ecology,* vol. xv., No. 2 (1927).

POPULATION

The population of Russia, huge though it is, is small in comparison with the vast area over which it is spread, averaging about 18 per sq.m. This is partly due to the vast extent of land unsuitable for settlement, the great tundra expanse fringing the north, with the taiga belt south of it, and the huge deserts of Central Asia, and partly to the fact that Russia is an agricultural and not a manufacturing country. Dense agricultural populations exist in the monsoon lands of south-east Asia, but Russia lies too far north and is too much exposed towards the north to permit of all-the-year-round agricultural production, and therefore the possible density of her agricultural population is strictly limited by climatic conditions. The saturation point of agricultural population is, however, very far from having been reached. Many areas of land which could be cultivated are empty, and in the cultivated areas production is hindered by poor methods of farming the land, by the illiteracy of the peasant and by lack of transport facilities. Lack of transport facilities is perhaps the greatest drawback to agriculture: the effects of the construction of the trans-Siberian railway on grain-production and dairying were marked. Weak development of industry also limits agricultural progress, since large towns encourage a meat and dairy industry and intensive market-gardening. Russia has great mineral wealth and the construction of railways is increasing year by year so that her potential industrial development is great. The reasons for its retardation and for the poor stage of cultural development in the country and possibly even for the misgovernment and crises through which she has passed are partly historical.

It is to the Slav colonisation of the Russian plains and to the long Slav struggle with nomadic invasions from Asia that Western Europe owes her comparative freedom to develop a certain cultural unity. The rôle of buffer state was not voluntary, but the debt is none the less great, and the heroic struggle of the Slav races against repeated plunder and invasion, in hard climatic conditions, should command the respect and admiration of the world. Many times in the long history of recurrent plunderings and invasions, of terrible famines, of misgovernment, of enslavement at home and by Eastern races (serfdom existed till 1861 and even in the 19th century Russian slaves were sold in Oriental markets) the inhabitants of Russia must have felt what the 12th century historian records of the men of the Kiev steppe: "Men began to ask themselves whether life was possible under such conditions."

Vital Statistics.—The first Russian census, taken in 1897, recorded a population of 129,200,200. In 1926, in spite of the loss of some of its most densely peopled areas on the west, and of the deaths resulting from war and famine and the epidemics which followed in their wake, it numbered 146,989,460, about 83% of whom were engaged in agriculture. The birth rate is high, about 47 per 1,000, and the death rate, 30 per 1,000, is also high. Infant mortality is specially high, and it is calculated that 450 out of every 1,000 children born die within the first five years of life. The mortality of women in the prime of life has been high since the revolution. According to the 1897 census, the proportion of men and women was fairly even. In the 1920 census the ratio of men to women was 100:115·5, the excess of women being largely due to war deaths among men. In 1926, though there was much fighting in the period 1920–22, the ratio was 100:108. Professor Semenov Tian-Shansky in an article "Russia: Territory and Population" in the *American Geographical Review* of October, 1928, attributes this to the loss of man power, which has resulted in burdening women beyond their strength. It may, however, be also connected with the prolonged food shortage, for nutrition is of vital importance to the expectant and nursing mother. An interesting phenomenon, possibly due to the greater liability of male infants to catarrhal disorders in a cold and damp climate, is that the numerical predominance of women in the 1897 census in European Russia was chiefly to the north of the line of the annual isotherm of 7° C.

The high mortality in Russia results from complex factors, amongst which are the general poverty, resulting in insufficient and monotonous diet, peculiarly unfortunate in a country where resistance to climatic conditions demands food of high nutritive value, the lack of any medical help for large sections of the population, unhygienic conditions, including overcrowding in the cities and lack of sanitation and pure water supply in the country, and in many towns, and the general illiteracy of the population. This latter factor makes it impossible to instruct the population in methods of preserving health and avoiding the spread of the epidemic diseases so common in Russia The complete absence of isolation hospitals in most rural districts and the custom of admitting animals into the huts for the sake of warmth in winter add to the difficulties of prevention

In some districts, especially in the administrative unit known as the Central Black Earth Area, verminous conditions are rampant in the crowded peasants' huts and though the peasants consider their weekly steam bath a necessity, poverty compels them to resume their verminous garments. The Soviet government has achieved much in city centres in its struggle against child mortality: in Moscow the death rate fell from 23 per 1,000 in 1913 to 13 per 1,000 in 1925, this figure has declined chiefly since 1922 having naturally been high during the war and revolution The mortality of children in their first year of life fell from 177 per 1,000 in 1924 to 135 per 1,000 in 1925. This has been achieved, in spite of wretched housing conditions, mainly through the establishment of crêches and maternity hospitals and through a campaign of pictorial as well as written instruction in hygiene A darker side of the picture is the suicide record; between 1923 and 1926 the number of suicides in the U.S.S.R. increased by 50%. Progress in rural districts and in the autonomous areas and republics is necessarily slow and in some regions there are fewer medical facilities than previously. An interesting experiment is the recent establishment of a centre in Leningrad where men and women from remote areas receive instruction in the rules of hygiene and first aid so that they may return to their villages and thus act as pioneers The gathering in Moscow of representatives from all parts of the U.S.S.R. every year for congresses must help to spread hygienic and cultural ideals.

Ethnic Groups.—In ethnographic character the population of Russia is remarkably varied. The Russian Academy of Sciences calculates that Russia is inhabited by 169 ethnic groups, divided into 10 major divisions as follows:—Indo-Europeans 36 groups, Caucasian (now classified as Japhetic) 40, Semites 6, Finns 16, Samoyedes 1, Turks 48, Mongols 3, Tungus-Manchurian tribes 6, Palaeo-Asiatics 9, and groups of tribes from the Far East, with an ancient culture 4. Of these one quarter have a yellowish tinge in the skin, the rest may be considered white, thus racially as well as geographically Russia is Euro-Asiatic rather than European.

Numerically Great Russians form 52·9% of the population. Ukrainians 21 2%; Finns 3 3%, White Russians 3·2%, Uzbeks and Turkmen 2·4%, Tatars 2%, Jews 1·8%, Georgians 1·2%, Greeks and Armenians 1·3%. No other nationality numbers 1%. Thus the three branches of the Slavs form 77·3% of the population, while no other nationality reaches 4%. On the whole Turkic tribes occupy the most important rôle after the Slavs. These ratios vary very much in different districts. The Slav population is most dense in European Russia; in Asiatic Russia it has spread in a dense belt along the cultivable prairie land lying south of lat. 50° N. as far as the Yenisei river, along which a ribbon of Slav penetration has reached the Arctic, following the same line as Ugro-Samoyede peoples of long ago; in the same way a ribbon of Slav settlements accompanies the Ural river to the Caspian. East of the Yenisei Slav colonisation is mainly in ribbons along the rivers, or in islands in mining districts or on patches of fertile soil. Similarly south of the main wedge of colonisation, islands of Slav settlement exist among the Turkic peoples. These Turkic peoples, Uzbeks, Turkmen, Kirghiz, etc., are most continuous in the Central Asiatic Republics, *i.e.*, in the region lying west of the Dzungarian Gate from Mongolia to Eurasia and thus being the first to receive the impact of Turkish invasions under the stress of Mongolian attack. The Tatar Republic of the Volga with Bashkiria to the south-east, represents the most north-westerly extension of a solid wedge of Turkic settlement. The Mongol

peoples are mainly to be found south and east of Lake Baikal; the Kalmuck region (*q.v.*) on the Lower Volga is a Mongol intrusion far to the west, separated from its original base by a wedge of Turkic settlement. The Yakuts of the Lena represent a north-eastern spread of the Turkic element, now much intermingled with Slavic blood.

The Finnic aboriginal population, Karelians, Mordva, Marii, Votyak, Permyak, Komi, and the allied Samoyedes, were increasingly pushed outward by Slav settlement. Finns are to be found mainly in the north and west, and also in a belt of Finnish settlement in Asiatic Russia, lying north of the main Slav belt and extending to the Yenisei, again much intermingled with the incoming Slav population. East of the Yenisei the Finns form an insignificant element in the population. The Finns have preserved their distinctive culture best among the forests and marshes lying south of the tundra zone, and along the central course of the Volga. East of the Yenisei, in the Yakutsk A.S.S.R. and in the Far Eastern Area are scattered groups of Palaeo-Asiatics and of Tungus, while a wedge of Korean and Chinese colonisation has extended northwards into the south-east of the Far Eastern Area. Remnants of early Iranian peoples exist in the Central Asiatic Republics. Scattered Cossack and trading settlements exist even in the tundra zone, and in Kamchatka. These Russian settlers have tended to amalgamate to a marked degree with the natives in a region where the difficulties of the environment made unity of human effort essential. An interesting feature of Russian settlement is the greater density of population in high latitudes in comparison with other parts of the world. This movement towards high latitudes has been given a recent impetus by the construction of the Murmansk railway.

Colonisation of Siberia.—The first attraction of northern Asiatic Russia was its wealth of furs. Fur merchants from Novgorod penetrated as far as Tobolsk and had, in the 14th century, established settlements on the Taz; they called the country Ugra. As Novgorod decayed, the Ostyaks destroyed the settlements. From the time when the Cossack Yermak, towards the end of the 16th century, captured Sibir or Isker on the Irtish, the chief settlement of the Tatar Khan Kuchum, Russian hunters have exploited the fur bearing animals of its forests, partly directly and partly through barter with native hunters. The term *Cossack* under the Imperialist régime indicated a section of the Russian people liable to military service and receiving a monetary grant and arms from the government. Large stretches of land, usually on the frontiers, were reserved for them and they had a certain amount of autonomy. As an example of their formation it may be noted that Count Muraviev during his conquest of the Amur converted the Nerchinsk peasants into Cossacks in 1851. Government colonisation in early days consisted of sending parties of Cossacks to settle on the distant frontiers, of imperial guards (*stryeltsy*) to garrison the forts, and of *Yamschiks*, a special organisation of old Russia which arranged for the maintenance of horses at stations along the posting routes. The Cossack settlers did not form good colonising material, their interests being military and not agricultural. Cossack *ostrogs* or forts could hold sway over scattered native peoples, but could not at first conquer the settled Turkic regions of the south, so that the first colonisation was to the north and east where also furs were most readily obtainable.

The method of progression was by portages from one river to another. The Berezov ostrog, famous later for its princely exiles, was founded in 1593, Tomsk in 1604, Yeniseisk in 1618 and Yakutsk in 1637. The most effective native resistance was offered by the Tungus who were only subdued in 1623, and who are now demanding autonomy. In the Yenisei valley and throughout south-west Siberia the settlers found traces of a former civilisation, usually called Ugro-Samoyed, the Uigurs being a Turkish race supposed to have over-run the country during the wanderings of the Huns. Tumuli with monoliths and containing iron and bronze implements are numerous, especially in the Minusinsk district and traces of former irrigation canals exist and are often utilised by modern settlers. A long line of Cossack forts extended along the Irtish river from Omsk in a south-easterly direction as a protection for settlers against Kirghiz tribes throughout the eighteenth century. Another government means of colonisation was exile, which is first mentioned in 1648, the first exiles being mainly criminals, often mutilated as a punishment. By the end of the 17th century a policy of exile as a means of colonisation had set in and men were sent to Siberia for the most trifling offences, especially after the introduction of convict labour into the mines. In 1753 capital punishment was abolished and perpetual exile to hard labour in Siberian mines took its place.

Raskolniks (religious dissenters from the reforms of Nikon), rebel *stryeltsy* under Peter the Great, courtiers of rank during the reigns of the empresses, Polish confederates under Catherine II., the "Decembrists" under Nicholas I., nearly 50,000 Poles after the insurrection of 1863, and whole generations of socialists, including 45,000 political exiles after the 1905 rebellion, were sent to Siberia. In early days they were driven in herds from one village to another and often starved by the way, but in the 19th century somewhat less brutal conditions were organised. Between 1823 and 1898, no fewer than 700,000 exiles with 216,000 voluntary followers entered Siberia. In 1900 exile as a means of political persecution was abolished but was restored in 1904 and is still used. Some political exiles added to the cultural development of the country. The brother of Prince Kropotkin, whose researches in Siberia are well-known, arranged the remarkable archaeological museum at Minusinsk. Bogoras conducted research in the Chukchee country and the Decembrists built the town of Chita, but others either died of the hardships to which they were exposed or developed melancholia, and suicides were common. The *raskolniki* as a rule made good settlers being ascetic, industrious and abstemious. The *skoptsi* sect introduced agriculture and better standards of living into Yakutsk. *Brodyagi*, or escaped convicts, were a menace to settlers and natives alike.

Free Settlers.—The free settlers, however, have played the most important part in colonisation. In the first instance, they were runaway serfs, or fugitives from religious persecution and conscription, and thus they went into more remote parts to avoid re-capture. Many intermarried with the Buriats or Yakuts, and often adopted the language of the natives. Their descendants are called *Siberiaks*. The Russian government did not support voluntary emigration until after the abolition of serfdom in 1861; till that year it was a crime for a peasant to leave his native soil.

After the Russo-Japanese war, emigration set in intensively, and 350,000 families were settled between 1909 and 1913, while in 1913 the number of settlers was 234,877. There has been a marked decrease in the number of immigrants who return, with the exception of those going to Yeniseisk and Irkutsk, where climatic conditions reduced the colonists to destitution. During the general disorders of 1917 to 1922 colonisation ceased, but is reviving now. In 1925 a special commission of the Soviet government drew out a five year plan for settling 1,200,000 colonists in Siberia, and rebates from taxation and exemption from conscription are offered to suitable settlers. Many fishermen from the declining Caspian fisheries have been settled in the Far Eastern Area and encouraged to develop a winter lumbering and a summer fishing industry. But colonisation now is of a different order; the more accessible lands have been settled and the rate of further colonisation will depend upon the development of road construction. Much of the vast forest wealth is at present locked up through lack of transport facilities. In recent years, the town population in the colonised areas has grown with the rapidity characteristic of American development, *e.g.*, Novo-Sibirsk (formerly Novo-Nikolaevsk) had a population of 5,000 in 1897 and of 120,611 in 1926, Omsk in the same period has increased from 37,470 to 161,475 and Vladivostok from 28,896 to 102,454.

Towns and Settlements.—According to the 1926 census, thirty towns had populations of over 100,000, and these all showed marked increases on the 1897 population with the exception of Odessa, which has been adversely affected by the diminished trade in the Black Sea and by the severance of Bessarabia. Two, Moscow 2,018,286 and Leningrad (Petrograd) 1,611,103, were over a million. Kiev, Baku, Odessa and Kharkov had more than 400,000 inhabitants, Tashkent and Rostov-on-Don had

more than 200,000. The following towns (*qq.v.*) arranged in order of size, had populations ranging between one and two hundred thousand:—Dnepropetrovsk (Ekaterinoslav), Nijni-Novgorod, Kazan, Samara, Krasnodar (Ekaterinodar), Omsk, Astrakhan, Tula, Stalingrad (Tsaritsyn), Sverdlorsk (Ekaterinburg), Minsk, Orenburg, Novo-Sibirsk (Novo-Nikolaevsk), Voronezh, Yaroslavl, Ivanovo-Voznesensk, Tver, Stalin (Yusovka), Vladivostok, Samarkand. Fifty-four towns have more than 50,000, and 120 more than 20,000 inhabitants. The long struggle against the nomads is reflected in the type of Russian towns; the most ancient military settlements having been surrounded by wooden turreted walls; later the centre of the town was built of stone and has often retained its name of *kreml*, kremlin or keep. These ancient military centres and the later Cossack *ostrogs* to the south and east still retain their concentric forms and radiating streets.

A few towns of the west while under Polish-Lithuanian rule obtained the Magdeburg rights, notably Kiev in 1499, and traces of Germanic influence, such as tiled roofs, still remain. No chartered towns arose in Muscovite Russia. At the beginning of the 19th century, town formation began to be of an economic character, either factory or railway centres. An interesting illustration of the importance of the present Soviet All-Union Congresses in Moscow is the fact that the towns of Eastern Siberia have a higher cultural level than those of Western Siberia, because the merchants from the east traded in small bulk, but valuable goods, *e.g.*, gold, fur and tea, and therefore visited Leningrad, Moscow and Nijni-Novgorod, while those of the west, trading in heavy bulk and cheaper goods did not travel further than Irbit, and thus missed higher cultural influences. Most of the ancient towns of European Russia bear strong traces of Byzantine influence in their architecture; the Ukrainian stone tracery is distinctive. A marked feature of Russian towns is the appearance, on the outskirts, of the low wooden house of the same type as the peasant *izba*. The smaller towns are distinguished by the great width of the main street, which in spring and autumn is often a sea of mud. The ancient oasis towns of Turkestan now usually consist of a new Russian garden city and the ancient city with its winding narrow lanes and ruins of Mohammedan palaces and *madrasas*.

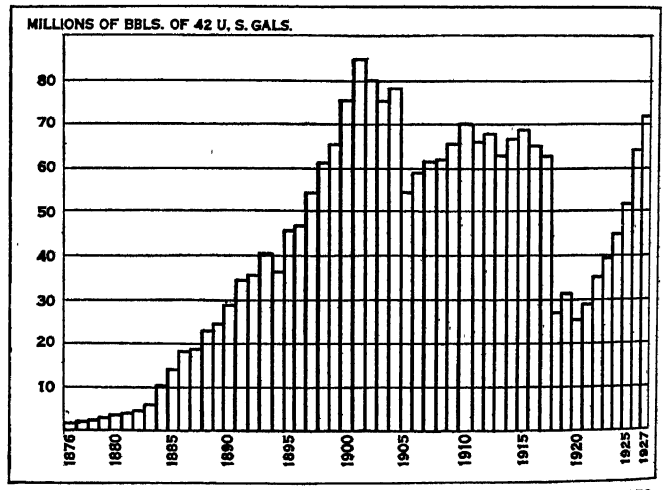
Samarkand, since it has become the administrative centre of Uzbekistan, is regaining some of its former importance. An interesting effect of the 1917 revolution has been to give an impetus to those towns which became the centres of administrative units with local autonomy. The housing shortage in Russian towns is acute: many towns suffered war damage and in addition wooden houses were torn down for fuel during the disastrous 1920–1922 period. Climatic conditions sharply limit the building season and add to the difficulties caused by lack of capital and shortage of building materials. In the case of areas where no town settlement existed *e.g.*, the Karachaev, the Central Government provided funds for building a town. Modern sanitation and good water supply are still lacking in most Russian towns and in some of the smaller towns the streets are not even swept. Many small villages remote from the railway, and on such bad roads that communication is difficult, remain in a very primitive condition and are popularly known as "bear corners." Incidentally bears and wolves are still a menace in districts not far removed from Leningrad, and their numbers increased during the war and famine. Semenov divides rural settlements into three main groups. Those in the northern zone stretch in ribbons along the river valleys and the shores of lakes and seas, and leave the peat-bog watersheds uninhabited. On glacial soils settlement tends to be on the clayey morainic hills, since the valleys are damp and frosty because of inversion of temperature. In the steppe blackearth zone settlements strongly reflect historic conditions; nomad raiders grazed their flocks on the watershed and the Slavs took to the wooded valleys. These settlements are large and stretch in almost continuous belts along the higher banks of the streams; another factor in this valley settlement was the difficulty of sinking wells on the watershed. Though settlements in the north-west are smaller and the region is less densely peopled, yet they are always compact, partly because of the necessity for warmth and partly through the need of co-operation against wild beasts.

BIBLIOGRAPHY.—B. Semenov-Tian-Shansky, *Dazimetric Map of European Russia* (1923); *Types of Regions in European Russia and the Caucasus* (1915); *Town and village in European Russia* (1910). All in Russian. "Russia: Territory and Population" in American *Geographical Review, October* 1928. *Atlas of Asiatic Russia*, with two volumes of text (in Russian, 1914).

AGRICULTURE AND INDUSTRIES

Russia is essentially an agricultural country, about 83% of the population being non-urban, and about 7·5% being engaged in large-scale factory industry. Cattle-breeding and dairying are poorly developed, though the growth of the dairy industry since its introduction into Siberia in 1893 has been phenomenal. With better transport facilities many meadow land areas could develop into dairying regions. Improvement of communications, increasing social and economic exchanges, have been a condition precedent to most of the greater developments of social and economic life in the past and is now of more importance than ever. Owing to poor transport conditions lumbering is little developed in spite of Russia's great forest wealth in the taiga belt and the mixed deciduous region to the south of it, in the Caucasus and in the Far Eastern Area. Many stretches of forest have been wasted through forest fires and through neglect, leading to disease and decay. Since 1921 active policies of railway repair and construction, of improvement of waterways, of re-afforestation, especially in belts round the drought areas and in the upper courses of streams have been carried out. Legislation for the prevention of forest fires has been introduced and the great development of electrification and of the use of peat fuel has lessened the use of wood fuel and so freed timber for export. In 1926–7 the income from timber export had reached five times that of 1913, in spite of the loss of some valuable timber-bearing regions in the west.

Hunting.—Closely linked with the lumbering industry is the hunting of fur-bearing animals, originally almost entirely in the hands of native tribes exploited by Russian merchants. To-day much hunting and trapping is carried on by the Russians themselves, though the natives still take their share and in 1925 a congress of native hunters in the Far East met to discuss better methods of hunting and of barter. In some regions hunting is a supplementary winter occupation for the peasant cultivator, *e.g.*, Cherepovetz and Tomsk; in others it is the main support of the Russian settler, *e.g.*, Tobolsk. The furs of greatest trade importance, in order of total value, are squirrel, wolf, ermine, hare, fox, skunk, bear, marten, Siberian skunk, lynx, wild cat and sable. Beavers and seals are also hunted. It will be noted that the sable, once so numerous, has been almost exterminated by ruthless exploitation. Closed seasons are now enforced and a farm for fur-bearing animals has been established in the Far Eastern Area on American lines. Wild birds are numerous in the marshes and round



GRAPH SHOWING PRODUCTION OF CRUDE PETROLEUM IN RUSSIA, 1876–1927

The production in 1927 (72,400,000 bbls.) was 5.86% of the total world production, ranking Russia second to the United States among the oil-producing countries

the lakes and form a supplementary article of diet, as do the fish in the lakes and streams.

Fishing.—The Caspian fishing industry is still important, caviare forming an export article, but it has much declined owing to ruthless capture of young fish and destruction of roe for caviare. Many unemployed fishermen from the Caspian have been settled in the Far East and are combining winter lumbering with summer fishing. The Pacific fisheries suffer from lack of refrigerators and ice trains. The North Sea cod and cod-liver oil export is developing, and since the construction in 1917 of the railway to Murmansk the difficulties of migration northwards for seasonal fishing have been diminished and it is hoped that here too lumbering may develop as a winter occupation for the fishermen. The fact that 88% of the fish is salted or dried, 2% canned and only 10% frozen militates against its export value.

Bee-keeping, like hunting and fishing, is an ancient occupation and, recently, Russian settlers have introduced it into the Far Eastern Area. About two-thirds of the honey and bees-wax produced reach the market, the rest being consumed by the producers.

ECONOMIC DIVISIONS

The Soviet government has classified the regions of Russia on an economic basis.

(1) In the North-West Area of Russia, which includes Murmansk, the Karelian Republic, Leningrad, Cherepovetz, Novgorod and Pskov provinces, there is little agriculture owing to unsuitable soil and climate; and the population relies mainly on lumbering, saw-milling, hunting and fishing. But these are not sufficient to maintain the peasants all the year round, and many migrate southwards seasonally to work at the river ports as freight hands during the open navigation season. Peasant industries supply local needs of homespun, leather and wooden articles, and pitch and tar are extracted in a primitive way. Agriculture is poorly developed and relies mainly on the old three field system, rye, oats, barley, potatoes and flax being the chief crops. Cattle, horses, sheep and pigs are bred. Bog-iron ore is worked and bauxite for aluminium near Tikhvin, but otherwise no mineral wealth is exploited. Flax production is specially developed in Pskov and cabbages and root crops are everywhere grown, cabbage soup forming a staple article of peasant diet. Experiments at the Murmansk Institute of Applied Botany show that potatoes and turnips thrive well north of the Arctic circle. The diminishing yield is inducing peasants to take to manuring and more intensive agricultural systems. Near the town of Leningrad vegetable growing and cattle breeding to supply the town meat market have developed. Factory industry is confined to the town of Leningrad (*q.v.*). Flax production, which demands heavy labour, is not developed near the town, since surplus labour is attracted to the factories.

(2) In the North-Eastern Area, which includes Archangel, Vologda, the North Dwina province and the Autonomous Komi or Zirian Area, there is much tundra with nomad reindeer breeding by native tribes. The timber wealth is great, especially in the basin of the Pechora and huts are everywhere built of wood; lumbering is the chief occupation of the people, with hunting and fishing as a supplementary source of income. In Kholmogory cattle breeding has been important since Peter the Great started the industry by importing breeds of cattle from Holland, and Kholmogory supplies Leningrad with veal. Dairying is important in Vologda and is of an export character, though it is hampered by lack of transport facilities. In consequence of the severe winter, cultivation is little developed, flax growing is of an export character and rye, oats and barley are sown, but grain has to be imported. Forest clearing by burning and subsequent sowing of crops still goes on here as in very ancient times, especially among the Finnish tribes. When the area thus cleared loses its fertility it is left to grow wild again and a fresh patch is cleared. Peasant industries include the preparation of pitch and tar for export through Archangel and the making of homespun linen and of every variety of wooden article. During the summer many peasants migrate to Archangel to work as dock hands, and to the North Sea fisheries. The coal, graphite, salt, naphtha and lead of the region are as yet unexploited.

(3) The Western Area includes Smolensk, Briansk, White Russia and part of Pskov, Tver and Kaluga. Cultivation is the main source of livelihood, flax, potatoes and grass crops are increasing and in several regions the three field system has died out, though in others it still prevails. Winter rye and oats are the chief grain crops, but grain has to be imported, and agriculture is insufficient for the needs of the people, so that in some areas 35% of the peasants are unemployed and wander seasonally in search of work. Drainage of the marshes is being undertaken on a large scale as a relief measure. Cattle breeding and dairying is important and Yorkshire breeds of pigs have been imported with a view to developing a bacon industry. Lumbering and industries dependent on it are important; there are cardboard and paper factories and a match industry depending on the ash forest. Glass and pottery manufactures are developing and in the south-east iron ore and coal are mined and there are smelting works. Phosphorite beds exist, but are little worked at present. Huge peat resources exist, and electrification dependent on them has recently been developed. Peasant-made wooden articles, including sleighs, carts, boats, plates, etc., are exported to other regions.

(4) The Central Productive Area includes Moscow, Vladimir, Ivanovo-Voznesensk, Tver, Yaroslavl, Kostroma, Ryazan, Kaluga and part of the provinces of Nizhegorod and Tula. This is the region of the great textile industries, cotton, wool, linen and silk, and factory life is more strongly developed here than anywhere else in Russia. The manufacture of food stuffs, metal and metal wares, the preparation of furs and sheepskins and of leather goods are other industries of the region. The chief cities are Moscow, Tula, Yaroslavl, Ivanovo-Voznesensk, and Tver, all with populations of over 100,000, and there are numerous smaller factory towns. Coal is worked in the south, iron in the south and south-east and phosphorite from the beds lying to the north-east of the coal field. A difficulty of the region was the inadequate fuel supply, but the Soviet government has erected several electric power stations working on peat and local coal which cheapen production by lessening the freightage cost of fuel.

A great part of the region is purely agricultural, and in the northern area agriculture has developed recently on modern lines, with a many field system, efficient manuring and up-to-date implements, but in the south it is still in a backward condition. The proximity of Moscow, which makes it easy for agronomical experts to help the peasants, has led to this more intensive development. The chief crops are winter rye, oats, potatoes, flax, barley, millet, buckwheat, hemp and summer wheat. Horses, cattle, sheep and pigs are bred. The grain supply is insufficient for the needs of the towns. Vegetables, pears, apples and currants and berries are grown to supply the town markets and meat, milk and dairy produce also depend on town demand. It was on the morainic boulder clay soil of this region that agriculture first developed among the Great Russian settlers, and it is interesting to note that manufactures are now replacing agriculture, in much the same way as agriculture formerly replaced reliance on trade in furs, honey, wax and slaves. Forest still covers 40% of the area, which is a transition zone from coniferous to mixed deciduous, which thins out in the south. Lumbering and industries dependent on timber occupy part of the population. Peasant industries, mainly conducted in *artels*, or co-operative groups, are very strongly developed and the factory textile industry has its origin in the early skill of the peasants in making homespun.

Millions of people are thus occupied and their products are sold at the Nijni-Novgorod fair; each district has its speciality. Footwear is made in Tver province, homespun linen in Yaroslavl and Kostroma. The latter province is also famous for its wooden spoons and its bast work (especially the bast shoes worn by peasants), small wooden articles, and for small silver, pewter and brass articles. In Nizhegorod wooden goods and felt boots and caps are the chief products. The Pavlov district is famous for its locks and the Vorsm district for knives. In Moscow province the peasants are noted for their skill in making furniture, pottery and toys, and Tula samovars (tea urns) are famous all over Russia. The development of peasant handicraft, called *koustar*, is very

strong here and is attributable partly to the six months' winter, when the peasant naturally found some other outlet for his energies since outdoor work was impossible, and partly to his need to supplement his scanty income from agriculture. Moreover the weak development of factory industry and the poor transport conditions made the peasant dependent on his own resources for clothing, utensils and other necessities. The Tsarist government encouraged peasant industry and established training schools for craftsmen. The industry declined sharply after the recent war and famine years, owing to lack of raw materials and to the peasants' lowered stamina. The Soviet government has organized peasant co-operatives, unions and artels, and is now developing these industries, as their importance for the peasants' life in view of the present small factory output is very great. Many peasants migrate to the Volga as boatmen and dock hands during the navigation season.

Lumbering and Peasant Industries.—(5) The Vyatka-Vetluga Area includes Vyatka, the autonomous Votyak and Marii areas and part of Nizhegorod and the neighbouring provinces. Much of it is covered by continuous coniferous forest, with Siberian larch, cedar and silver fir in the east, and there are vast expanses of moss covered bog. Flax, winter rye, oats, barley, buckwheat and potatoes are grown in the small area cleared of forest. Homespun linen of a coarse kind is made into flour sacks for the Nijni-Novgorod fair, but most peasant industries supply local needs only in view of the poor transport conditions and the distance from markets. Iron and silver are mined in the east and the working of the phosphorite beds on the upper Vetluga has developed markedly in the last few years. Sheep are reared, especially in Vyatka, where pig breeding and bristle export is developing, and there are some horses and cattle.

(6) The Uralsk Area is described in a separate article. According to the State plan the Bashkir republic and the south-east of the Votyak Area are included in (6). Hunting and lumbering are the chief occupations in the north, where the climate is too severe to admit of agriculture. Among the Finnish Voguls of the forest fringe the primitive system of sowing crops in a clearing till it is exhausted and then migrating still goes on. In the south on the clayey and sandy chernozyom, agriculture is the chief occupation, though years of drought bring terrible famines, as in 1921. Winter rye, summer wheat, oats, buckwheat, millet, potatoes, barley and flax are the chief crops. Bee-keeping is everywhere an important supplement to agriculture. Mining and metal working are strongly developed in the central region and in some parts of Bashkiria. (*See* Uralsk Area and Bashkir Republic.)

(7) The Central Volga Area includes Ulianovsk (Simbirsk), Penza, part of Nizhegorod and Saratov, the Tatar republic, and the Chuvash republic. Most of the region lies in the fertile chernozyom belt, though podzol is found in the north, and in the drought area of the south-east the soil is chestnut coloured, fertile if a sufficient water supply is available. Agriculture is the main occupation. Methods and implements of the peasants in many places are extremely primitive, but the shortage of horses and working cattle after the famine has led to the introduction of tractors in some places. Some model farms have been established and efforts are made to spread new methods and the use of drought-resisting seeds; progress in this respect is slow among the illiterate peasants, though the terrible lesson of the famine has somewhat quickened the change. In good years the region produces a surplus for export. The chief crops are rye, wheat, oats, millet, potatoes, hemp, flax and sunflower seed. The latter is used mainly in oil pressing factories, but the chewing of sunflower seeds is a widespread custom among the peasants. The area under potato and sunflower seed has markedly increased since 1921; the potato stands the spring drought well. Apples, cherries, berries and currants are cultivated on the high right bank of the Volga, and melons, watermelons and cucumbers are grown. Sheep and pigs are bred and have reached pre-war numbers. Factory industry consists exclusively of the making of food products, *e.g.* flour-milling, distilling, preserve and fruit syrup manufacture, etc., and of products depending on stock raising, leather goods, soap, tallow, etc. Combustible slates are found near Zhigulyakh and asphalt is prepared. The electric station at Syzran works on combustible slate. In summer the peasants are employed on the Volga steamers and as dock hands and fishing then supplements their diet. Poultry breeding is well developed in some parts. Peasant industries include the preparation of foodstuffs and leather goods and the making of homespun, especially woollen goods. There is some forest, but lumbering is a minor industry, though the making of wooden goods, partly dependent on imported timber, is a peasant industry to supply local needs. The phosphorite beds of the south and west are beginning to be exploited to supply the need for manure emphasized by the cattle and horse shortage since 1921.

(8) The Ukraine (*q.v.*) with the Moldavian A.S.S.R. forms a separate region.

Mining.—(9) The Southern Mining Area includes the eastern half of the Ukraine, the Crimean republic and the Rostov-on-Don district of the North Caucasian Area. The mineral wealth of the region is increasingly exploited and includes the Donetz coal and anthracite beds, the famous Krivoi Rog iron district, and that of Kertch, the rock salt of Artemovsk (Bakhmut), the manganese beds of the right bank of the Dnieper, with some graphite on the Dnieper and mercury at Nikitovka. Smelting and manufactures of metal goods and machinery have developed and there is a large industrial population. Electrification dependent on the falls of the Dnieper is nearing completion, and other electric plants are working on anthracite dust, peat, fuel, etc. But even in this region the majority of the people are engaged in agriculture on the fertile chernozyom and the less fertile, but still productive chestnut-coloured soils of the south. Large scale agriculture with motor-driven tractors and up-to-date implements and methods is a feature of the region. The chief crops are wheat, barley, rye, oats, buckwheat, potatoes, maize, millet and sunflower-seed and sugar beet. Fruits, especially the vine, and apricot and peach in the south grow well, the chalk soil of the Crimea is specially favourable to vineyards. Flour-milling, wine-making, drying and preserving of fruits, macaroni and tobacco manufacture are extensively carried on, and there is some sugar-refining. Fishing and the preparation of salt from the *limans* are carried on in the coastal areas. Most of the steppe has been ploughed, but in the region between Kherson and Perekop the virgin steppe, with its wealth of flora and fauna, remains untouched. Ostriches are bred here. The natural steppe vegetation of much of the area provides grazing for vast flocks of sheep and herds of cattle, and wool, leather and meat are produced in quantity.

Peasant industries are less developed here in view of the shorter winter and the better agricultural guarantee for the peasant. Health resorts dot the *limans* of the Black Sea coast with their curative muds and the southern shores of the Crimea, where the climate is mild and the beech and pine forests fringe the mountain slopes. The seasonal nature of the grain crop and the variable quantity of the amount for export, depending on recurrent spring drought, have created a class of unemployed dock hands in the seaport towns.

(10) The Lower Volga Area consists of the Saratov province, the German-Volga republic, Stalingrad and Astrakhan provinces and a small part of the east of the North Caucasian Area. The area is sub-arid, and the soils vary from chernozyom in the north to the salted light brown clays and sands of the semi-desert and to the desert near the Caspian Sea. Steppe prevails in the region except for a little forest in the north on the right bank of the Volga.

The population diminishes markedly from north-west to south-east, in dependence on increasing aridity. The only mineral wealth of the region is the salt of the Elton and Baskunchak lakes. Factory industry consists of the steam flour-mills of Saratov, the metal works, including manufacture of agricultural machinery, at Stalingrad (Tsaritsyn) and numerous sawmills working on timber floated down the Volga from the north. Agriculture is severely hampered by drought and by the prevalence of weeds due to the primitive fallow system. Moreover the lack of transport makes it impossible to export the surplus of wheat in good years and difficult to help the scattered population in years of drought and famine. Since 1921 efforts have been made to encourage the sowing and use of maize, which is drought resisting and which would

provide winter fodder for cattle and sheep. Wheat and rye are the chief crops, and oats, millet, barley, sunflower seed and potatoes are grown. The vine, apricot and other fruits are grown on the alluvial well watered banks of the Volga, and melons, water-melons, cucumbers and vegetables are also cultivated. Mustard resists drought well and is increasingly sown, especially in the German Volga republic, where agricultural methods are better and where irrigation works are being extensively constructed. The Kalmucks of the right bank steppe of the Volga are still in a nomadic stage. Sheep-rearing is their main occupation, but they make no provision of winter food or shelter for their flocks and many die of hunger in that season or perish in the terrible wind and snowstorms (*burans*) to which the steppe is liable. The fishing industry of the lower Volga and the Caspian provides seasonal occupation for the peasants, but has diminished markedly as a result of careless exploitation. Many peasants are seasonally employed on the Volga steamers and as dock labourers. The making of homespun woollen and felt goods, and of articles of household necessity is a peasant industry to supply local needs, but the peasant cotton weaving of the German Volga republic has an export character.

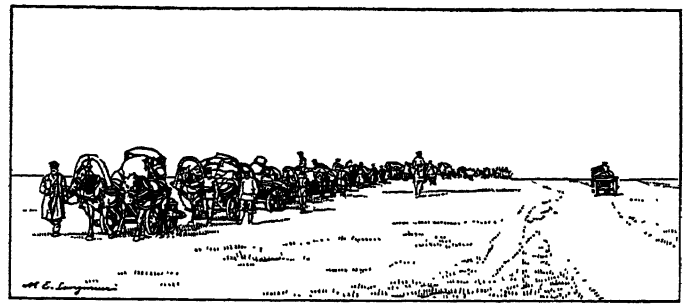
(11) The Central Black Earth Area. (*See* BLACK EARTH.)

The above regions cover European Russia and the Ural and pre-Ural Area of Western Asiatic Russia. The North Caucasian Area is described in a separate article. The varied nature of the occupations of trans-Caucasia is described under the separate republics of Armenia, Azerbaijan, Daghestan and Georgia, with their dependencies. In Asiatic Russia there extends north and south of the railway as far as the Altai a belt of grain cultivation and intensive dairying. (*See* SIBERIAN AREA.) Kazakstan (*q.v.*) is a region of mixed agricultural and semi-nomad stock-raising. In the Central Asiatic Republics, especially in Uzbekistan and Turkmenistan, cotton, grain and fruit growing, dependent on irrigation from glacier fed streams are the main occupations, with craftsmanship in metal, and in textiles such as silk and carpet weaving, as subsidiary occupations. To the south-west of them are the thinly peopled mountain republics and autonomous areas of the nomad and semi-nomad hill tribes. The Buriat-Mongol republic (*q.v.*) shows an interesting combination of mining, semi-nomad cattle-breeding and settled agriculture along the sheltered river valleys. The north of the Siberian Area (*q.v.*) and the whole of the Yakutsk republic (*q.v.*) lie in the tundra and taiga regions and have sparse native populations depending on fishing and hunting, many being reduced to an exclusive fish diet, often none too well preserved, for the winter months. Russian traders and hunters are scattered in small settlements, and in Yakutsk there is some cattle breeding on the podzol-alkali patch east and west of the town of Yakutsk. The Skoptsi, religious refugees, settled in and near Yakutsk and have succeeded in growing vegetables and scanty grain crops. There are also Russian mining settlements in Yakutsk and in the Far Eastern Area. For the complex life of the latter *see* FAR EASTERN AREA and KAMCHATKA.

COMMUNICATIONS

The development of Russia is severely handicapped by poor transport conditions internally and by the lack of ice-free ports. Batum on the Black Sea is open all the year round but is far removed from the main centres of activity, and the Black Sea is limited commercially by its semi-inland character. Murmansk on the Arctic is open all the year round and efforts have been made to develop it since 1917, when a railway was constructed linking it with Leningrad, but the increase of cost due to the long railway journey from Leningrad or the Central Productive Area is serious. When the railway line, now under construction, linking Kotlas with Murmansk via Soroka on the Gulf of Onega, is completed, trade from the Urals may go through Murmansk, though freightage costs for the long railway journey will raise the price of goods. Leningrad, Russia's chief outlet to Western Europe, is frozen from late November or early December to April. Vladivostok, at the extreme south of Russia's Pacific coast can be kept open by the use of ice-breakers, but it is, of course, far too remote to serve as an outlet for European Russia, which must thus depend to a great extent on trading agreements with the countries to the west for her export and import trade.

Recently an attempt has been made to revive trade with Northern Asiatic Russia via the mouths of the Ob and Yenisei and in 1928 a Kara Sea trading expedition, consisting of 3 British and 5 Norwegian vessels left Hamburg carrying agricultural machinery, metals, drugs and coal to exchange for timber, flax, cow-wool, hides and horsehair brought along the Ob and Yenisei. (*See* URALSK AREA for future plans.) Inland communications in Russia



A TRANSPORT TRAIN CROSSING THE STEPPES IN SOUTHERN RUSSIA

are very poorly developed. Professor Semenov-Tian-Shansky points out that through a third of its territory transport is still effected by means of dogs and reindeer, through about a sixth by camels, through about a half by horses and oxen and in some southern areas by mules, asses and buffaloes.

Railways.—West of long. 50° E. and south of lat. 60° N. a network of railways has developed, but to the east and north of this region railways are mere trunk lines with no radiating network. Even in the region mentioned the railway net leaves vast areas untouched, the best served areas being those in the immediate vicinity of Moscow and Leningrad. Moreover the services on these lines are inadequate for the growing needs of population, industry and agriculture and vast sums must be expended before adequate provision of rolling stock is made. The markedly seasonal climatic régime in an agricultural country results in congestion and choking of the railway net after the harvest, and much forethought is needed to prevent wastage. Ice wagons and cold storage facilities are very little developed and so the fishing and dairy industries suffer. Grain may be held up in Siberia by lack of transport at a time when famine in other districts makes it urgently needed. Road and railway construction in the past was mainly dominated by strategic considerations in an empire slowly pushing its way among hostile tribes. This period of eastern and southern expansion has ceased and the present government finds itself free to devote its resources to consolidating and developing communications from an economic and social standpoint, but is hampered by the general poverty of the country. Energetic measures have, however, been taken and many miles of new railway have been opened and are under construction.

The most important development contemplated is the linking of the grain producing area of western Siberia with the cotton growing Central Asiatic Republics by a branch of the trans-Siberian railway going southwards from Semipalatinsk, and a great part of this line is now under construction. Its effect will be to increase the area under cotton by reducing grain sowing for local needs. In view of this link, textile factories are being built in Uzbekistan so that cotton goods may be supplied to Siberia by this shorter route instead of the more expensive Moscow route, which involves transit costs for raw cotton to Moscow and for cotton goods back to Siberia. Pressure on railway freightage in European Russia will thus be relieved.

River Transport.—Though the network of rivers is great, river transport in Russia suffers from the long seasonal pause due to winter frost and also from the shallowness of many streams and rivers during late summer. The great rivers of Asiatic Russia, with the exception of the Amur, either flow into the Arctic or the Sea of Aral. The Volga, the most important channel of river traffic in European Russia flows into the closed Caspian Sea, though this disadvantage is somewhat compensated by its useful-

ness for export of naphtha from Baku. The canal now under construction to link the Volga and the Don is the first stage in a projected scheme for linking western European waterways with Asiatic Russia and Vladivostok. Increase of the canal links and deepening and improvement of the rivers is specially important economically in view of the heavy freightage costs of rail carriage in a country of such vast dimensions, but this development is in an initial stage only and it must be many years before it becomes effective.

Roads.—Road communication, so essential for cultural and social development, as well as for transport of goods, is peculiarly bad in Russia. Apart from the fact that the majority of roads are so badly constructed that they become impassable during spring and autumn, just when they are specially needed owing to the blocking of rivers by floating ice, so that neither sledge nor boat communication is possible, they are altogether absent in many districts. It is calculated that the loss to the state through the bad condition of roads is not less than 350 million rubles per year, while a further 200 millions is lost through spring and autumn closure. The number of motor vehicles in Russia in 1927 was estimated at 12,000; this should be compared with the fact that the United States, a smaller country with better railway transport, had more than 23 million motor vehicles in 1928. It is sometimes stated that road and railway construction in Russia is comparatively easy owing to the general low relief. Against this, however, must be set the difficulty for the railways of water supply in the hard winter frosts; in the Baikal section of the trans-Siberian railway and in other regions the frozen subsoil adds to the difficulty. A kindred problem will arise in the marshy tundra regions of both Russia and Siberia, when the railways are extended farther to the north.

Road construction over vast areas labours under this difficulty of a permanently frozen subsoil, which hampers drainage, while deformation due to freezing and subsequent thawing of the surface ground is another problem, to which is added the disintegrating effect of the great summer heat. In the steppe, semi-steppe and desert areas drifting sand and dust are the enemies. The trans-Caspian and Orenburg-Tashkent railways need constant care in this respect and government experimental stations for selecting plants which will prevent sand movement near the lines have been established. The strain on steel lines of severe winter frost followed by intense summer heat is great. The road problem is being attacked with characteristic vigour by the present government and by the nation at large. A society of "Friends of the Road" has been established and posters illustrating the dangers of bad roads and the advantages of good ones are displayed everywhere in order to encourage local soviets to take action. A special branch of the Academy of Sciences studies the science of road construction in relation to soil and climatic difficulties, *see* N. I. Prokhorov, *Soil Science in the construction of highways in the U.S.S.R.* (Leningrad, 1927). Thousands of miles of new road have been laid and in Leningrad province especially and in some other districts, new surfaces have been constructed for old roads. In 1928 a special "road week" on American lines was begun, with wireless, poster and other propaganda throughout the country. The ultimate effects of this national effort may be very great and much volunteer, in addition to government, construction and repair goes on.

Air Transport.—A very important development since 1923 is the spread of civil aviation, of incalculable importance in a country of such huge land surfaces. Regular services are established between Moscow, Nijni-Novgorod and Kazan, Tashkent and Alma-Ata, Bukhara and Khiva, Sevastopol and Eupatoria, Moscow and Odessa, Odessa and Batum, etc., and experimental flights to Yakutsk and Vladivostok are being carried out with a view to a future regular service.

EDUCATION

In the last years of the 19th century, the Tsarist government made little effort itself to provide the necessary increased provision for education for the masses, and suppressed all private and public initiative in this direction. Secondary education remained the privilege of the few. The Soviet government considers that the campaign against illiteracy is the most urgent task of the state. A certain section of writers on Russia under the old régime, some Russian, and some foreign, took up the attitude that the peasant was happier and wiser in his illiterate condition. These writers, however, ignored the heavy toll of life and especially child-life consequent on this illiteracy; the impossibility of coping with infectious and contagious diseases among the people themselves and among their live stock. In some rural districts the mortality of infants under one year was more than 50%. The lowering of agricultural efficiency consequent on illiteracy cannot be over-estimated; in the absence of scientific information the peasant merely relied on trial and error, and on tradition. The enthusiasm of the government for education is supported by the keen enthusiasm of the people themselves and great progress was made between 1920 and 1926, the number of literates per 1,000 in 1920 was 465 while in 1926 it had reached 567, and progress among women was specially marked. Education among the peasant population, however, lagged markedly, 758 men and 626 women per 1,000 of the urban population being literate in 1926 as against 524 men and 274 women among the rural population.

The Commissariat for Education.—The Commissariat for Education has charge of education for children and adults, of science and art, of literature and publications, including the State Publishing Department, of museums, theatres and cinemas. The national minorities also have their own local departments, and education is in the vernacular; this fact has been of enormous importance in spreading literacy. The difficulties of learning to read and write in adult life are serious even if the language used is the mother tongue, and they become insurmountable for most people if a foreign tongue is the instrument of instruction. Initial progress among some nationalities was slow in the absence of a written language and of printed books. But rapid progress in this respect has been made and most minorities are now supplied. The Turkic tribes have adopted the Latin script in place of the Arabic, thereby much reducing the difficulty of learning to read. In some districts, notably the Ukraine, a literature in the mother tongue existed, but had been suppressed by order of the Tsar; in these cases progress has been very rapid; the provision of educational facilities for children of school age in the Ukrainian republic now takes third place in the six republics of the U.S.S.R., though the Ukraine was formerly noted for its illiteracy. In this respect the Transcaucasian Federation occupies first and the White Russian republic second place.

Within the R.S.F.S.R., which comes fourth on the list, are included many areas where education is peculiarly difficult and these offset the good school provision in such places as the Crimea, Moscow and Leningrad. The increasing pressure of financial burdens resulted in the closing of some schools opened in the first enthusiasm of the new ideals, and so, side by side with the attempts to liquidate illiteracy, the production of illiterates through lack of educational opportunities still goes on, though in a diminishing ratio. Lunacharsky, the Minister of Education, in a stirring appeal for further effort, quotes a peasant's speech, "Here am I 45 years of age being taught, and there is no one to teach my little son of 10 years," and he also quotes the many appeals for further educational opportunities addressed to him by women on their own behalf and for their children.

Child Education.—The Soviet scheme divides education of young children into three groups. (1) Kindergartens and crêches for children of pre-school age (3 to 8 years), (2) unified labour schools for children of 8 to 12 years, (3) institutions for orphans, neglected children and mentally or physically defective children. In pre-1914 times there were 300 kindergartens, mainly in towns, supported by private persons or liberal zemstvos. In 1925 there were 1,146 kindergartens and children's homes providing for 60,000 children. "Children's squares" had been established in rural districts for the harvest period, where the children of peasant mothers working on the fields are taken care of by a teacher or a nurse. The number of unified labour schools in 1925 was 87,000 providing for 6,817,000 children as against 94,000 primary schools providing for 5,900,000 children in pre-war times. In this

connection it must be borne in mind that Finland and some parts of the west now lost to Russia had better school provision, so that the figures are not really comparable. In 1925 there were 46 schools for mentally defective children with 3,230 pupils and 56 schools for blind, deaf and dumb, and crippled children; these are mainly residential. In 1926–7 the number of elementary and secondary schools had increased markedly. The disproportion between the provision of education for the peasant and for the towns comes out sharply in the following figures when it is remembered that more than 80% of the population is rural.

School Statistics.—The towns in 1926–7 had 6,960 elementary and secondary schools attended by 1,893,386 pupils, while the villages had 92,937 schools with 7,498,322 pupils; the towns had 1,218 schools with a nine-year course attended by 395,552 pupils and the villages 470 attended by 173,350 pupils. The difficulty of providing for village education even in countries where the railway net is good and distances are small is great, but in a country like Russia where the railway net is poor, and the railways so overcrowded that it may be two or three days before a passenger can secure a seat, and where distances are so great that a child may be 200 or 300 m. from the nearest secondary school, they are at present an insuperable problem and many rural children attend school for two years only (from 8 to 10 years). Other villages have no schools at present; the replacement of school buildings destroyed during the war and the building of new schools at present absorb much of the education budget. Moreover there were no teachers trained to meet the new demand for them and much money has gone in provision of training colleges.

As time goes on these two items must diminish and money will be available for equipment, which is in a deplorable condition in many schools. The minister of education hopes, in spite of all these difficulties, that school places will be available for all children by 1934. Incidentally it should be noted that the first ideal of free education has had to be replaced by fee-paying rules in view of the general impoverishment of local budgets. A gradual change is coming over the spirit of education and instead of the earlier attempt to insist on uniformity, attempts are made to discover individual inclinations and abilities, and there is less attempt to introduce politics to children too young to understand them.

A distinctive feature of Soviet education is its attempt to link the school with life outside the school at every possible point. Sport and physical culture are increasingly encouraged with the following proviso, "Soviet sport is particularly anxious to do away with the disease of 'record-breaking,' for it considers physical culture as a means of preserving and improving health, not as an end in itself."

The complicated problem of the homeless orphans of the war and famine is still a cause for anxiety; many homes have been provided, but the children have often become so wild and detached from normal life by their terrible experiences that they prefer the freedom of the streets and the open road, often travelling incredible distances. Recently attempts to attract them have been made by establishing colonies where they are allowed to pursue arts and crafts or to cultivate their own gardens and fields. Some have been adopted by peasants; many have died; thousands are in homes and colonies and yet numbers remain, sleeping on the pavements, in cellars, even in cemeteries, and growing up to be a menace to the state.

Technical Education.—Technical education is available at trade schools, factory workshops, and training workshops for juveniles. There are also numerous technical and agricultural institutes for adults, some providing whole-time and others evening or part-time instruction. The loss of skilled workers during the war has created a shortage and much attention is devoted to this branch of the work. An interesting change of attitude to peasant industries, at first considered an unnecessary part of the ideal state, which was to be divided between large scale production and agriculture, has set in and training schools for peasant crafts are springing up rapidly. Provision for adults desiring to educate themselves is widespread and includes guidance in home studies, evening and holiday classes, political schools, cottage reading classes, clubs, travelling libraries, special itinerant bookstalls with cheap rates for peasants, etc. An interesting feature is the "wall" newspaper, consisting of handwritten matter and drawings, which is pasted in prominent positions in factories and clubs. Special peasant newspapers are now issued containing simple matter expressed in a way likely to be understood by semi-literates; these peasant newspapers publish letters from peasant contributors. A special development for illiterates is the teaching poster, consisting of pictures designed to illustrate simple rules of health.

Universities.—Institutes of university standing are divided into two groups: (1) Workers' faculties, (2) Universities. The organisation of workers' faculties began in 1920 with the co-operation of the trade unions; most of them are in Moscow and Leningrad. Those attached to the science side usually send on their students to technical institutes, those on the agricultural side train agronomic instructors. In 1926–7 there were 109 workers' faculties with 45,702 students and 124 universities with 160,000 students. Thus the total number of students receiving education of a university standing is small. The universities suffered severely from the changed conditions after 1917 and from the low standard of preparation achieved by the students during the disastrous years up to 1923. Even now many students have had much interrupted pre-university preparation, and it will be some time before a generation which has had uninterrupted school preparation reaches the universities.

Scientific work in Russia was of a very high standard in pre-war times and in spite of all difficulties the famous Academy of Sciences has maintained its reputation. Regional research has developed rapidly and a series of monographs on the new republics and on the economic division of the country according to the State plan has been published. These all suffer from inadequate maps, but contain much new and useful material. A new geological map of the Asiatic part of Russia has been issued, incorporating recent traverses and Obruchev has worked out on the spot the relations of mountains in the Verkhoyansk arc, previously unknown. (*See* S. Obruchev, "Discovery of a Great Range in North East Siberia," *Geographical Journal*, November 1927.) A remarkable soil map of Asiatic Russia has been published in several sheets by the Dokuchaiev Institute under the direction of Glinka and Prasolov. The work of the Physiological Laboratories under the direction of I. P. Pavlov (*q.v.*) is world famous. (*See* Pavlov, *Conditioned Reflexes*, 1927.) Numerous State Research Institutes have been established and have achieved striking results, *e.g.*, the utilisation of peat, shale and brown coal for the production of electricity. All visitors to Russia note the great interest which the Soviet government takes in the artistic and archaeological treasures of the nation and the importance attached to their display in museums open to the public. Museum visits play a large part in education. Meyerhold's experiments in theatrical presentation and the work of the Moscow Art Theatre are well known. An interesting development in Russia is the theatre for the national minorities where encouragement is given to production in the mother tongue and to the development of native culture. The national minorities also have their own press. Rigid press censorship, as in the old régime, is still the order of the day, but there has been a widening of the scope of publication and the limitation of publication merely to communist literature is giving place to wide publication of scientific and other educational works. The press, the newspapers, wireless and education are, however, all used by the dictatorship as instruments of propaganda. (*See* ADMINISTRATION.)

RELIGION

Religion.—In 1917 the former Orthodox Greek State Church was disestablished, and many of its treasures were subsequently confiscated and arranged in museums. Many monasteries and churches were taken over as state property. The former more or less open persecution of non-conformists, who numbered many millions and the repeated massacres of Jews have therefore ceased. This persecution was a curious feature, since it existed alongside

of great tolerance for the Islamic faith. At first active campaigns against every form of religion, including the Islamic, were carried out by the Soviets, but milder measures have supervened and, in some cases, Islamic schools are permitted. The general law, however, is that class instruction for children and young people in religion is forbidden. Religious services, including those of the Islamic faith may be openly held and churches may be leased from the state by not less than 20 citizens constituting part of the congregation. Priests and clergy have no electoral rights and are liable to the death penalty if they attempt to use religion as a political instrument. In view of their former terrible persecution, the Jews are regarded as an oppressed nationality by the Soviets; grants of land in the Crimea and the North Caucasian Area have been made to them and they are encouraged to take up communal farming. (R. M. F.)

GOVERNMENT AND ADMINISTRATION

The essential feature of the present government of Russia may best be realized from the following quotation from the *Guide-book to the Soviet Union*, 1928. "The undisguised and deliberate use of the State Institutions as an instrument in the class struggle is fully in accord with the Marxian doctrine of the State, namely, that it is a class organisation; in this case it is the organisation of the ruling proletarian class. This conception of the State permeates all forms of social and economic life in the Union." In accordance with this theory no attempt is made to encourage popular representation, but every attempt is made to preserve the present Communist oligarchy. At present the Russian Communist party is the only authorized and organized party in the U.S.S.R. and controls the whole governmental machinery for the exercise of its dictatorship. The Communist party is controlled by a Central Committee of 71 members. This committee chooses an executive body, known as the Political Bureau (Politburo), of nine members who largely determine party policy. Joseph Stalin, as the General Secretary, has, since the death of Lenin, been in effect in general control of Soviet policy. While the Russian Communist party stands alone, within the party in 1926 and 1927 there arose an important radical opposition group led by Trotsky, Zinoviev, and other leaders. In November and December, 1927, the Central Committee of the party, dominated by Stalin, succeeded in expelling them from the party and later about 30 of these opposition leaders were banished. The Communist party thus retains control even though its membership in January, 1927, was only 774,571 out of the whole 146,000,000 of the people in the U.S.S.R.

The United State Political Department (O.G.P.U.), the successor to the former secret police department of the Tsarist régime, is entrusted with a political mandate "to suppress political and economic counter-revolution, espionage and banditism." It works for the stability of the Communist régime. "The O.G.P.U. directs the work of the local organs of the State Political Department through its agents attached to the Council of People's Commissaries of the United Republics acting in accordance with a special statute to be confirmed by legislative act. Supervision of the legality of the actions of the O.G.P.U. is carried out by the procurator of the Supreme Court of the U.S.S.R. on the basis of a special resolution of the Central Executive Committee of the U.S.S.R." (Chapter IX. of the *Constitution of the U.S.S.R.*, 1923.) This procurator is appointed by the praesidium of the Central Executive Committee.

The permanent governing body of the U.S.S.R. is the *praesidium* of the Central Executive Committee (Tz.I.K.). The Tz.I.K. derives from the Congress of Soviets (*see* below). The Praesidium naturally includes some of the leaders of the Communist Party, and is therefore in close touch with the Party executive. It consists of 21 members, seven representing the Praesidium of the Federal Council, seven representing the Praesidium of the Council of Nationalities and seven elected by the two Councils in joint session. The Central Executive Committee is divided into two chambers, the Federal Council (414 members) and the Council of Nationalities (100 members). There are six chairmen of the Central Executive Committee, one representing each of the six constituent republics. The praesidium of the Tz.I.K. transacts all current legislative work and part of the administrative work, and is responsible to the Central Executive Committee, while during the intervals between the meetings of the Central Executive Committee (which meets three times per annum upon notice from the praesidium) it is the legislative, executive and administrative organ of authority of the U.S.S.R. The following extracts from chapter V. of the 1923 Constitution explain its powers:—

1. The praesidium of the Central Executive Committee supervises the carrying into effect of the Constitution of the U.S.S.R., and the execution of all resolutions of the Congress of Soviets and the Central Executive Committee of the U.S.S.R. by all organs of authority.

2. It has the right to suspend and repeal the resolutions of the Council of People's Commissaries and individual Commissariats of the U.S.S.R. and also of the Central Executive Committees and Council of People's Commissaries of Union Republics.

3. It has the right to suspend resolutions of the Congresses of Soviets of Union Republics and subsequently to present such resolutions for examination and confirmation by the Central Executive Committee of the U.S.S.R.

4. It issues decrees, resolutions and ordinances and examines and confirms draft decrees and resolutions submitted by other organs *e.g.*, the Central Executive Committees of the separate republics.

5. It settles questions of the mutual relations between the Council of People's Commissaries of the U.S.S.R. on the one hand, and the Central Executive Committee of the united republics and their praesidiums on the other.

Congress of Soviets.—The Congress of Soviets (1,500 members) meets once a year, and the Central Executive Committee is granted the right to postpone the summoning of the Congress under extraordinary circumstances. During the interim between its meetings the supreme organ is the Central Executive Committee of the U.S.S.R., consisting of the Federal Council and the Council of Nationalities. The Congress of Soviets is composed of representatives of town Soviets on the basis of one delegate to 25,000 electors and representatives of provincial Soviets on the basis of one delegate to 125,000 of the population. The town population is thus given a marked advantage in representation in comparison with the peasant population. Delegates to the Congress of Soviets are elected at the provincial congresses of Soviets. The Council of Nationalities is formed of representatives of allied and autonomous socialist, soviet republics, five delegates from each, and of representatives of autonomous regions, one delegate from each. The composition of the Council of Nationalities is confirmed as a whole by the Congress of Soviets of the U.S.S.R. As a rule the Congress of Soviets does not frame laws, it merely lays down the basic principles of policy in the various domains of national life.

The Sovnarkom.—The Council of People's Commissaries (Russian abbreviation *Sovnarkom*) is composed of the Chairman and his deputy and ten people's commissaries responsible, by the terms of the constitution to the Central Executive Committee for the following branches of administration:—Foreign Affairs, Army and Navy, Foreign Trade, Transport, Posts and Telegraphs, Labour, Finance, Workers' and Peasants' Internal Trade and Public Economy. The five latter commissariats discharge functions which are within the competence of the separate republics and they also exist therefore in all the allied and autonomous republics, discharging their functions independently in their respective spheres, but in accordance with the guiding principles and instructions of the United Commissariats of the Union. This Council, within the limits of the rights granted it by the Central Executive Committee, issues decrees and resolutions which must be executed throughout the territory of the U.S.S.R., though these decrees and resolutions may be suspended by the Central Executive Committee. The Central Executive Committees of the respective republics may appeal against such decrees and resolutions to the Central Executive Committee, but may not suspend them, except in cases where they are in opposition to the constitution or to the legislation of a Union republic.

The government of each of the republics is arranged on the same lines, with a praesidium, a central executive committee and a council of people's commissars. The right of amnesty and also the right of pardon and rehabilitation in regard to citizens condemned by the legal and administrative organs of the U.S.S.R. is retained by the Central Executive Committees of each of the six republics.

The various republics, autonomous republics, areas and autonomous areas draw up their own budgets, and these are embodied in a single State budget of the U.S.S.R. But the Central Executive Committee determines taxes and revenues applying to the whole union and authorises the additional taxes and dues forming part of the budgets of the united republics. No electoral rights are enjoyed by persons who exploit other people's labour or who trade and live on rents, otherwise electoral rights are granted to all members of the community over 18 years of age, except to monks, clergy or those employed in religious establishments. Members of the Central Executive Committee of the U.S.S.R. may take part in a consultative capacity in the proceedings of all local councils or executive committees.

THE PEASANT QUESTION

The Civil and Criminal Codes.—The Civil and Criminal Codes and the organisation of the juridical system underwent a profound change at the time of the revolution, and during the period of military communism. A reconstructed code was issued in 1923 and later amended, and new codes were again drawn up in 1927. It is evident that a process of long adjustment between theoretical new codes and their interpretation and the method of enforcing them must take place in any country, but in a country so vast as Russia, containing so many illiterate people the process must be very complicated, especially as the constituent republics have, within certain limits, a right to amplify and alter the code of laws. The difficulty of finding judges capable of interpreting new codes, especially in the villages and rural towns, must be almost insuperable and it is probable that traditional methods and old interpretations will persist for some time and that the ultimate legislative code will be profoundly modified. The high ideal of early days "Here in the camp of Socialism are mutual confidence and peace, national freedom and equality, a dwelling together in peace" (First Section of the 1923 *Constitution*) has faded and freedom of thought and speech are still, as in the days of Tsarism, suppressed by the death penalty and temporary or permanent exile. The number of convicts in the prisons of the U.S.S.R. shows a progressive and marked increase between 1923 and 1927, but this, of course, may be due to the greater possibility of enforcing law and order since the cessation of civil fighting, which persisted in some more remote regions until 1925, and which was followed in many places by general lawlessness and banditism. War and revolution and famine have created throughout the chief constituent republics of the Union a vast army of homeless beggars who have become entirely dependent on charity or crime for food. (X.)

Theoretical control by the Communist Party has some practical limitations. The peasant, though limited severely in voicing his opinions, not only by the disproportionate representation given to town workers, but also by the general illiteracy of the peasantry and the frequent remoteness of the villages from centres of political activity, yet has at his control the weapon of refusing to produce more grain or raw material than will suffice for his own needs. Partly to prevent the peasants from uniting to take such action and partly for other political reasons every effort is made to stir up strife between the *kulaks*, as the wealthier peasants are called and the middle class and poorer peasants. Yet even in this respect a certain amount of caution is perpetually called for, since it is obvious that the two latter classes can produce enough for their own needs only and it is on the former class that surplus for the towns and for export depends, and legislation shows a tendency to oscillate between attacks on the wealthier peasants and withdrawals when lessened sowing results from the attacks. Much lessened sowing since 1921 has, however, been involuntary and has been due to the diminution in the number of horses and working cattle and to the lack of agricultural implements. The increasing discord between the factory worker and the peasant is also unfortunate in its effects. The lot of the peasant cultivator is hard and, while legislation brings repeated lessening of hours and amelioration of conditions to the factory worker, the peasant must put in such long hours of arduous toil during his season of work that the Russian word for harvest has become synonymous with that for suffering. It is natural, therefore, that resentment is springing up on his side against the present dominance of the industrialised population in the framing of legislation. Thus the tradition of class hatred bequeathed from the old régime has taken another form which promises to be equally disastrous. A peasantry divided against itself with an industrial population divided against the peasantry may prevent union for political purposes, but it also prevents union for progress. In another direction Communism is limited by human nature. The primeval instinct for barter maintains retail, and even some wholesale, private trade, in spite of heavy taxes and other disabilities. It must be borne in mind, however, that so large a population could not be dominated by so small a minority unless deep-seated needs were being satisfied. Under the tsarist régime political freedom did not exist, and moreover, there was not even freedom to meet to discuss problems of social improvement. The Zemstvo law of 1890 reduced peasant representation on the Zemstvo to a powerless minority. There was a distinct attempt to keep the poorer classes illiterate while at present, though educational facilities are all too limited, the government makes strenuous efforts to combat illiteracy. For the first time the peasant finds himself free from the burden of debt imposed by the onerous terms of settlement which accompanied the measures for the emancipation of the serfs. Any national minority is now free to use its own language and to develop its own culture; congresses to discuss problems of local administration are encouraged; representatives from all parts of the U.S.S.R. meet to discuss their problems and to exchange ideas. The psychological effect on the nation of the new opportunities of sharing in social legislation and of meeting other workers from such varied regions, must ultimately profoundly alter social and cultural conditions in Russia.

BIBLIOGRAPHY.—In addition to the works quoted in the text and in separate articles *see* also *in Russian: Atlas of the U.S.S.R.* (Moscow, 1928), with text; *Map of European Russia, showing communications and forest* (1925) 9 sheets; *Atlas of Asiatic Russia*, with 2 vols. of text and an index vol. (1914); *Geological Map of European Russia* (1926, one sheet); *Geological Map of Asiatic Russia* (1925, 6 sheets); *A Volume of Dasyimetric (Demographic) Maps of European Russia*, with a separate vol. of text (Leningrad, 1923–24); *The Agricultural Map of the U.S.S.R.* (Leningrad, 1926, with text); S. Sokolov and P. Uvarov, *Geography of the U.S.S.R.* (Moscow, 1928); *Towns of the U.S.S.R.* (Moscow, 1927); *Territorial and Administrative Divisions of the U.S.S.R.* (Moscow, 1928); *Communal Encyclopaedia* (Moscow, 1927); P. G. Timofeev, *Economic Geography of the U.S.S.R.* (Moscow, 1926); *Annual Report of the Mineral Resources of the U.S.S.R.* (1925–26), and other Annual Reports of the Central Statistical Board of the U.S.S.R.; a number of valuable reports presented to the State Planning Department of the U.S.S.R. on regional conditions; a series of regional monographs on the economic geography of the U.S.S.R. under the general editorship of M. B. Volf and G. A. Mebus; the monographs and annual bulletins of the separate republics and autonomous area; *Izvestia* of the Russian Geographical Society; V. Semenov-Tian-Shansky, *Town and Village in European Russia* (1910); the works of Prince P. A. Kropotkin. V. Semenov-Tian-Shansky, *Types of Regions of European Russia and the Caucasus* (1915); N. I. Vavilov, *Studies on the Origin of Cultivated Plants* (Leningrad, 1926); P. Semenov, *Russia* (in 18 vols., 1899); the newspapers *Economic Life* and *Izvestia*; P. Semenov, *Geographical Dictionary of the Russian Empire*, 5 vols. (1885); G. I. Tanfil'en, *Geography of Russia and the Ukraine* (Odessa, 1922).

In English: E. and C. Paul, *Restoration of Agriculture in the Famine Area of Russia* (Trans.) (1922); K. Leites, *Recent Economic Developments in Russia* (1922); *Reports of the International Labour Office concerning Soviet Russia;* A. Santalov and L. Segal, *Soviet Union Year-Book*, annually; A. Rado, *Guide Book to Soviet Union*, Moscow and Berlin annually; *Ten Years of Soviet Power in Figures.* Central Statistical Board U.S.S.R. (1917–27); *Bank for Russian Trade Review* (issued monthly); *The British-Russian Gazette and Trade Outlook* (issued monthly); *Government Handbooks* I.D. 1207. *The Ukraine, The Don and Volga Basins, Caucasia, Eastern Siberia, Sakhalin*, (1920); N. Makeev and V. O'Hara, *Russia* (1925); J. Mavor, *An Economic History of Russia*, 2 vols. (1924); Kluchevsky, *Course of*

Russian History (transl.), 3 vols. (1911–13); D. Mackenzie Wallace, *Russia,* 2 vols. (1877); G. F. Wright, *Asiatic Russia,* 2 vols. (1903); H. Howorth, *The History of the Mongols,* 3 parts (1876), with a supplementary volume and index (1927); *Turanians and Pan-Turanians,* Govt. publ. I.D. 1199, N.D.; R. Beazley, N. Forbes, and G. A. Birkett, *Russia from the Varangians to the Bolsheviks* (1918); F. H. Srine and E. D. Ross, *The Heart of Asia* (1899); W. R. Rickmers, *The Duab of Turkestan* (1913); M. Rostovtzev, *Iranians and Greeks in South Russia* (1922); works of M. A. Czaplicka. E. H. Minns, *Scythians and Greeks. In French:* L. de Launay, *La Géologie et les Richesses Minerales de l'Asie* (1911); "La tectonique de l'Asie" in *Comptes Rendus* de la XIII. session Congr. Géol. Internat. (Belgium, 1922); Michel Tetiaeff, "Les grands lignes de la géologie et de la tectonique des Terrains Primaires de la Russie d'Europe," *Annales de la Soc. Géol. de Belgique,* t. xxxix. Memoires; Leroy-Beaulieu, *L'Empire des Tsars* (1882); E. Réclus, *Géographie Universelle* (still invaluable in spite of changes). *In German:* S. Obruchev, *Géologie von Sibirien* (1926); E. Suess, *Das Antlitz der Erde* (1885–88); A. Schultz, *Sibirien* (1923). (X.)

DEFENCE

Historical.—The early military history of Russia was marked by invasions by the Huns (A.D. 376) and partial conquest by Tatars (1223) followed by strong Tatar influence, by a Tatar war (1380), the burning of Moscow (1383), and by an invasion by Tamerlane (1395). Firearms and cannon were introduced into the country by Ivan the Great in 1475. The year 1479 was marked by a serious Tatar invasion, repulsed by Svenigorod in 1481. A long war with Poland lasted from 1506 to 1523, followed in the next century by another, in which the Russians were victorious, in 1654. The progress of Russian power under Peter the Great (1689–1725) and under Catherine II. (1762–96) was phenomenal. In a war with Sweden (1700) Peter suffered defeat by Charles II. at Narva, but in 1709 the tables were turned in the decisive battle of Pultowa. The year 1711 was marked by war with Turkey, 1715 by great extensions of territory over Finland, Estonia and Livonia. In 1769–84 the Crimea was successfully invaded, and the dismemberment of Poland under Catherine followed in 1772–95. In 1796 an unsuccessful war was undertaken against Persia. Suvorov, the great Russian soldier, in 1799 led the army which, in conjunction with the Austrians, checked the French in Italy. December 1805 marked defeat at the hands of Napoleon at Austerlitz, and September 1809 defeat by the Turks in the Silistria area. War with France, which opened in June 1812, was noted by defeats at Smolensk (Aug. 17) and the Borodino (Sept. 7) but still more so by the historic burning of Moscow (Oct. 15) which brought disaster to Napoleon's veteran army and the turn in his fortunes. In October 1813 the Emperor (Alexander I) was present at the Battle of Leipzig, and in March 1814 at the Allied entry into Paris. War again broke out with Persia (1826–28) and with Turkey in 1828–29. The year 1830 marked the Polish war of independence, 1840 the failure of an expedition against Khiva, 1848–49 the participation of Russia in the Hungarian war. In 1853 Russian forces were concentrated on the frontier of Turkey, and there followed the Crimean War (*q.v.*) that ended in March 1856. Another insurrection in Poland occurred in 1863. In 1864 victories were gained over the Caucasus tribes, and in 1866 there was war with Bokhara with indecisive results. Samarkand was taken in 1868. Russia was neutral in the Franco-Prussian war of 1870, but the lessons learned thereby were embodied in a reorganization of the army in 1871. In 1873 Khiva was taken. In 1875 there was war with Khokand which resulted in annexation in 1876. Enthusiasm for the cause of Bulgaria led to war with Turkey in 1877–78. In 1879 the severe battle of Geok-Tepe was fought against the Tekke-Turkomans (Sept. 9) against whom further operations resulted in the siege and capture of that place in January 1881, and their submission to Skobeleff in April. In 1884 Merv was captured by Komaroff. Conventions with Persia (1884), an advance from Herat (Feb. 1885) and attack upon the Afghans (March 30) led to British preparations for war with Russia, but the question of the Afghan boundary was settled by negotiation in September.

The year 1898 was notable for the extension of Russian influence in China, the military occupation of Port Arthur, and a Russo-Japanese convention about Korea, which in course of time was followed by further developments that led to the appointment of a Russian viceroy in the far east (August 1903), to friction with Japan, and to the loss of Russian military prestige in the Russo-Japanese War of 1904–5. As an aftermath the year 1905 was marked by wide-spread disorder and bloodshed, which came to a head in Poland and elsewhere, and again broke out spasmodically during the years which intervened before the World War (*q.v.*). The pitiful tale of military heroism and disaster in the Russian theatre of war, of an army handicapped by corruption and by incompetency in the public services is told elsewhere. A revolution in March 1917 led to the collapse of discipline in the army, to the accession of the Bolsheviks to power, to the conclusion on December 17 of an armistice with the Central Powers that was followed, in due course, by the abandonment by Russia of her obligations to her Allies. She thus failed to share in the victory for which her army, in the first stages of the war, had done so much to prepare. (There were still over 13 Russian infantry divisions and over 4 of cavalry with a ration strength of 323,000 on the Caucasus and Azerbaijan front in June 1918.)

The historic parallel of the French Revolution was followed after the war. Although, with foreign aid, some of the leaders and of the troops of the Tsarist army endeavoured to overthrow the new régime, the new "Red" Army of the Soviets owed its efficiency to the embodiment therein of the veterans of that army who changed their allegiance. As will be shown in due course, special measures have now been taken to prevent the parallel from going farther and resulting in the accession to power of a great military genius after the throes of a rule of violence. Since the conclusion of the World War in November 1918, the Red Army has been engaged in consolidating and in extending the rule of the Union of Socialist Soviet Republics; the Russia of the military history which we have recalled but excluding Finland, the Baltic Provinces that are now the independent republics of Estonia, Latvia and Lithuania, Poland, and Bessarabia. The Soviets included are those of Russia, the Ukraine, White Russia, Transcaucasia (Georgia, Azerbaijan and Armenia), and the Turkoman and Usbeg Republics, with a total population of about 140,000,000.

Present-day Army.—The army of the Union of Socialist Soviet Republics of the present day is based upon a military system that was introduced in 1925. In principle it includes a permanent army and a militia, the object of the latter being to give military training to the surplus men in the annual contingent of nearly 1,000,000 men reaching the age for military service who cannot be trained in the permanent army. The special aspects of the system are the establishment of a powerful political department (with troops at its disposal), the refusal to entrust the armed defence of the Union to any but "workers," and the application of compulsory military service to both sexes. Equipment with automatic rifles, and specialization in chemical warfare are other features.

Study of what is known about the present-day army leads to the conclusion that the Union of Socialist Soviet Republics is the most "militarist" state in the world, in spite of the fact that for over five centuries no invasion of Russian territory has ever been crowned with ultimate success. In his dissertation on War, Clausewitz wrote that Russia could not be conquered by invading armies but rather by political crises and revolution, and it may possibly be assumed that the object of this vast military organization is intended mainly to secure the despotic rule of a small minority. According to Press reports, especially when manoeuvres or military exercises on a large scale are being undertaken, constant appeals are made by the authorities for defence against what, to other countries, appear to be purely imaginary dangers of invasion or attack. The League of Nations *Armaments Yearbook,* now the standard authority on the armies of the world, contains a special note to the effect that, in dealing with the Russian army, the documents which are obtainable do not suffice to provide adequate information on essential points. This deficiency must be taken into consideration in studying the notes on the present day Russian army which follow.

Recruitment and Service.—Liability to compulsory military

service is universal from the age of 19 to the 40th year. Only "workers" are entrusted with the armed defence of the Union, the remainder are subjected to other military employment. Women belonging to the "workers" category can perform voluntary military service in time of peace. In time of war such service can be made compulsory for them. Service is divided into (a) preparatory military training; (b) service with the colours; (c) Reserve service. Preparatory training begins at the end of the 19th year and lasts for 2 years. Service with the colours is performed either with the regular army, or in mobile territorial formations, or, finally, outside the army proper. Normal service with the regular army is for 5 years, of which the last is spent on furlough. For certain specialists 3 years are spent with the colours, 2 years on furlough. For those required for staff and administrative work, 2 years with the colours, 3 on long leave. About 270,000 of the annual contingent go to the regular army, navy, customs police, etc. For those drafted into territorial mobile formations, 3 months' training are undergone during the first year, and periods of from 5 to 8 months according to the arm of the service spread over the next 4 years, not more than 2 months being done in any one year. Trainings, lasting for one week, can be imposed in intervening years. In 1928 the number undergoing preparation training in the 4,500 training centres for this territorial militia was put at 842,000. The numbers for regular and territorial military training and for training in duties outside the army (6 months, spread over 5 years) are fixed annually by the Soviets of Labour and Defence. After the 5 years' training comes reserve service in the 1st Line up to the age of 33, and in the 2nd Line up to the age of 40. Reservists can be called up for a total of 3 months' training during reserve service. Certain exemptions and postponements from service with the colours in the army are allowed for family, religious or educational reasons. Officers are recruited from men in the ranks, to whom special training is given

Strength and Organization.—It is clear that the application of such a system of military training to a population numbering nearly 140,000,000 will in course of time produce trained military personnel on a scale unequalled in any other state in the world, but the extent to which use could be made of mobile armies beyond the existing frontiers of the Union of Republics is a matter of conjecture depending largely upon administrative skill, and improvement of communications. The number actually serving continuously in the Red Army and Navy has recently been put at 562,000, of which number 100,000 belong to the "subordinate command personnel." This estimate apparently takes no account of the special political troops, frontier guards, and detachments for special purposes, or of the above-mentioned 842,000 undergoing preparatory military training at the territorial centres.

The field army is organized in light infantry and cavalry corps and divisions, and in independent cavalry brigades. A light infantry corps contains 2 divisions of light infantry, 1 group of "heavy" artillery, 1 "battery" (battalion?) of field engineers and 1 signal company. A light infantry division contains 3 light infantry regiments (each of 3 battalions with scouts, signals, a field battery, instructors in engineering and camouflage and a chemical section), 1 cavalry regiment, 1 group (3 batteries) of light artillery, 1 howitzer group, 1 divisional artillery park, 1 divisional training school for artillery and 1 for the other arms, 1 field company of engineers, 1 signal group and 1 motor group. A cavalry corps contains 2 cavalry divisions and a signal squadron. A cavalry division contains 2 cavalry brigades, each of 2 regiments, 1 group of horse artillery (3 batteries and ammunition column), 1 training school, 1 field hospital, 1 field squadron of engineers and 1 signal squadron. An independent cavalry brigade includes 3 cavalry regiments, 1 group of 2 batteries (horse-drawn), half a field squadron of engineers and a training school.

No reliable estimate can be formed of the number of the above units which could be put in the field in a mobile army. Unofficial publications estimate the Red Army at 63 divisions of infantry, 12 divisions and 43 brigades of cavalry. Other points of interest in the military organization are that an infantry battalion contains 3 companies of riflemen, each containing 3 combatant sections (many of them armed with automatic rifles) and an administrative section, and 1 company of machine-gunners (12 machine-guns); that camouflage companies of engineers contain 4 sections, with a staff; that there are "technical corps" consisting of armoured-car troops, railway sections, signal sections, air troops, and chemical warfare troops; and that an *Aviachim* association was formed in May 1925 (2,000,000 members by December 1926 in 33,000 sections distributed over the country) to deal with air and chemical defence. The association is trying to persuade farmers to use certain chemical products with a view to developing chemical defence.

Higher Command.—Special interest is attached to the system of higher command, which percolates down to the commands of army formations, whereby precautions are taken to secure and to maintain political control over the Red Army and over all military organizations. (There is a military commissary with every light infantry corps and division, a political inspectorate with every cavalry corps, a military commissary and political section with every cavalry division, and a political section with every independent cavalry brigade.) The supreme military authority is defined as the Assembly of Soviets of the Union, and, failing the Assembly, the central executive committee of the Union. In their hands lie the powers to declare war, to make peace, and to organize and to control all the military forces. Under the control of the central executive committee there is a soviet of the people's commissaries to carry out its decisions. The President of that Soviet also presides over a sort of committee of national defence, called the Soviet for Labour and National Defence, which co-ordinates the activities of all public bodies concerned both with national defence and with economics. Then there is a people's commissariat for military and naval affairs, which organizes and prepares the forces for war, and issues orders for mobilization. The executive control of the forces is entrusted to yet another authority, the revolutionary military soviet of the Union. The people's commissary presides. His deputy and the commander-in-chief are ex-officio members. The others are elected by the soviet of people's commissaries. The revolutionary military soviet controls all the military and political departments of the army. The commander-in-chief, who is appointed and dismissed by the soviet of people's commissaries, is allowed freedom of action in strategical questions, but he must report his decisions to the people's commissary and to the revolutionary military soviet. There is a chief of the army staff, with the usual sections, and to him there is attached yet another commissary for war, who is appointed by the revolutionary military soviet. A political department of that soviet controls political instruction and administrative policy in the army, and, in that connection, it is interesting to note that nearly as much is spent upon political as upon military training of the army according to the latest figures available (1,992,000 as compared with 2,691,000 roubles). There is also a strong supply department, under its own chief.

In addition to all the political ramifications in the army itself, there is the additional check provided by the special troops, who, though administered by the military authorities, are under the civil authorities for employment. They are mainly communists, volunteers who have served in the army, and they are divided into political department troops and frontier guards, organized in military units, and special detachments which, if in the military districts, are placed under the military authorities. Such is the system under which precautions are taken to secure political control over the army. According to the latest available figures, which are those for 1924–5, the cost of the salaries of the administrative authorities is more than a third as much as the amount spent on the pay of the whole army (22,438,000 roubles, as compared with 68,967,000). Judging by the precedent of the pre-Napoleonic armies of the French Republic, military efficiency would be difficult to secure under such conditions, especially in field operations.

The troops are distributed territorially in the following military areas, the headquarters are given in brackets: I. Moscow (Moscow), II. Leningrad (Leningrad), III. Volga (Samara), IV. Ukraine (Kharkov), V. Northern Caucasus (Rostov), VI. Western Front (Smolensk), VII. Turkestan (Tashkent), VIII. Siberia (Novo Nikolayëvsk) and IX. The Red Flag Army of the Caucasus

(Tiflis). Officers commanding military areas are appointed by, and under the orders of, the Revolutionary Military Soviet. For military operations they are under the commander-in-chief.

Military Education, etc.—The military educational establishments include training schools for subalterns of all arms (3 to 4 years course); repetition courses for them of 3½ to 8 months; advanced courses (8 months) for higher ranks and for training specialists in camouflage, chemical, and tank warfare (11 months). Political as well as military training is applied at these schools, as it is at the military colleges, for training higher commanders and staff officers. There are eight such colleges (1) for general education, as well as military training, (2) Technical and engineering, (3) administration, transport and supply, (4) naval, (5) aviation, (6) medical, (7) Politico-military, (8) Technical-military. Many other Colleges (*e.g.*, the National Army Institute, Moscow; Institute of Roads and Bridges, and the Electro-technical Institute, Leningrad) possess military sections, open to experienced army officers under 34 years of age.

The possession of personnel specializing in camouflage, chemical warfare, etc. has already been noted under "organization," and the large proportion of automatic rifles in the hands of the infantry has been mentioned. It is not possible to give exact figures. The types known are the Choka (8·8 mm.) firing 150 rounds a minute, and the Feodoroff (6·7mm.) firing 80 to 100 rounds a minute, the range of both being given as 1420 metres. Revolvers of Nagarre and Browning patterns, both with 7 chambers, seem to be provided in large numbers. Great attention is clearly paid to propaganda, to which the Russian character appears to be particularly susceptible. Action in China, especially during the year 1927, teaches an object lesson in the intensive use of propagandist-agents to shake the *moral* of opposing armies, and public announcements have at times been made to the effect that the use of military forces in support of the world-revolution on communist lines for which the foreign policy of the Union of Socialist Soviet Republics stands would be delayed until subversive propaganda had so shaken an opposing nation as to affect its fighting forces, and willingness for combat.

As is to be expected, information is not published about the condition in which the historic Russian fortresses such as Kronstadt in the Baltic, Sevastopol in the Black Sea, Vladivostok in Siberia, and other naval or mercantile ports are maintained. A small sum, which amounted in 1924–25 to 500,000 roubles, is allotted in the Estimates for army fortifications.

Military Air Forces.—It is well known that great efforts are being made to establish a formidable air force. The association of the Friends of the Air Fleet, with numerous members, was in May 1925 embodied in the more extensive Aviachim Association. It is known that the officer in charge of supplies for the Red Army has under him an air department; that there is an air department in each of the military districts which are grouped in the 9 military areas; that an aeronautical corps exists amongst the technical corps of the army; and that there is a special aviation college amongst the military colleges. Beyond that all details are a matter of conjecture. The peace establishment of the air force about 3 years ago (1925) was estimated at about 10,000, and the total number of serviceable aeroplanes at about 550, organized in from 40 to 50 air squadrons, allotted to the different military districts. The vast size of the territory of the Union, combined with the lack of communications, lend special importance to the development of air forces. The amalgamation of the air and the chemical warfare organizations in 1925 to form the Aviachim Association is worthy of special notice in view of the possible use of harmful gasses dropped in bombs by aeroplanes or by airships.

General Notes.—To sum up, the Russian army on paper is very thoroughly organized and appears formidable. On the other hand, no amount of paper organization can at once remove failings inherent in the national character or disabilities in the economic position of the country. The old Imperial Russian army suffered from a shortage of educated officers and non-commissioned officers and of skilled technical personnel; in present-day Russia this defect must still be pronounced. The lack of power to manufacture her requirements in munitions, failure in distributing the available resources, corruption in the public services, and the backward state of the communications of the country were fatal to Russia's armies in the World War; it can hardly be said that the manufacturing strength of the country has increased under Soviet rule, while the transport system went from bad to worse, though transport was reorganized by Dzerjhinsky and much improved in 1923–4. There is no assurance that discipline and *moral* are as high as they were under the old régime. On the whole, therefore, it may be doubted whether the Red forces would be as formidable in the field as they are imposing on paper. The Bolshevist authorities have, however, brought to a high degree of efficiency a strategical weapon which at times has been of more value than armies, that of subversive propaganda. The founder of Soviet policy, Lenin, laid down that "the soundest strategy in war is to postpone operations until the moral disintegration of the enemy renders the delivery of the mortal blow both possible and easy."

Russia's chief economical and strategical need has always been a free outlet to the oceans of the world. Her northern shores are ice-bound for a great part of the year; so is her now constricted coast in the Baltic on the west; and other nations control the exits from the Black Sea in the South. Only in the far east, at an uneconomical distance from her main centres of population, is an unimpeded outlet to the high seas possible. On land, Russia's unwieldy size and the poor development of her communications have been serious handicaps to offensive action on her part, but have, on the other hand, always in the end baffled enemies who have sought to invade her. The value of the mounted arm in this country of wide plains and great distances has always been expressed by the high proportion of cavalry in the Russian army, a condition still maintained.

The changes brought about by the World War on the European frontier of Russia have simplified her defence problem on that side, since she is now bordered by a series of small and comparatively weak States, of which Poland is the strongest. The Finnish frontier comes uncomfortably close to the former capital (now Leningrad) and to the naval fortress of Kronstadt, but aggression on the part of Finland is not a probable contingency. In the south, the possession by Rumania of the former Russian province of Bessarabia may at some date prove a subject of contention. But the western frontier of Russia certainly lies under no such threat as it did in 1914 from Germany and Austria-Hungary. On the Caucasus frontier Russia is faced by a much weakened Turkey.

In the east, the activities displayed by the Soviet authorities in endeavouring to extend their influence over Persia, Afghanistan and China may ultimately cause them to clash with India, or with Japan in Manchuria or China. The Bolshevists have recently sought to gain their ends by propaganda and by fostering internal disorders, rather than by an open resort to arms. The final point of which to take note is the departure from the Tsarist precedent of distributing non-Russian elements in the population over the whole army, so that they served in units away from their own homes. Under the territorial organization described above, the troops are localized, and the formations and smaller units have thus assumed a national or racial character, if the system, as described on paper, is carried out in its entirety. This obviously tends to efficiency and to higher *moral*, as experience in other countries has proved. On the other hand, if ever that very unsettling phrase (born of the Versailles Conference) "self-determination on the principle of nationality," which has caused so much bloodshed and general disturbance in the world, should come into vogue in the territory of the Union of Socialist Soviet Republics, the central control over all military forces, now rigidly enforced, might become more difficult to maintain.

See also the League of Nations *Armaments Year Book* (Geneva, 1928), and information published in *Izvestia* on various dates, especially on May 22, and Sept. 23, 1925. (G. G. A.)

Navy.—With the Revolution the Russian navy, which cannot be said to have attained a very high order of efficiency at any time, fell into a state of complete disorganization, but in recent years efforts have been made to restore discipline and to put some of

the ships into a semblance of good condition. The Red fleet, as it is now called, consists of the Baltic Fleet, Black Sea Fleet and the Caspian, Far East, Arctic and White Sea naval forces. The Baltic Fleet, which is much the largest, consists nominally of:—three battleships, four cruisers, three divisions of five destroyers each, nine submarines and a number of miscellaneous craft. The Black Sea Fleet consists of:—two cruisers, four destroyers, six submarines and some miscellaneous craft. The remaining squadrons are composed only of small craft.

Every ship has been renamed, some several times over, to mark some Communist occasion or to commemorate some Red leader. The greatest secrecy is observed with regard to the movements and doings of the Red fleet, even in Russia itself. It is the exception that allusion is made to a ship's name in print. When accounts are given of manoeuvres they endeavour to exaggerate the number of ships engaged and the importance of the events.

Personnel.—The ships' companies consist mainly of conscripts who are taken on for four years. About 25% re-engage for an additional year, and this may be repeated until they are 30 years of age. Petty officers, or *starshinas,* are specially selected and can serve up to 40 years of age. Officers were abolished when the Bolsheviks first came into power, but it was soon obvious that without them the navy could not function at all, with the result that they were re-introduced under the new phrase "the commanding staff." This is divided into junior, middle and senior categories. Candidates for officer rank undergo a preliminary training at a preparatory school, from which they are sent to the naval school for three years. The most successful candidates go on to a naval academy. Ostensibly their rank is not recognized and everyone is addressed as "comrade," but in fact this, like many other Bolshevik decrees, has been proved an absolute farce, and the officers wear uniforms much like those in other navies, while the middle and senior ranks live in a separate wardroom and have cabins to themselves.

A great deal of time is spent on "political training," and every ship has a complete political staff, the chief of which is known as the military commissar of the ship and ranks with the captain. This individual is endowed with extraordinary authority; he may punish any officer, report on the captain, and only on purely technical matters can the captain overrule him. The political element interferes so much with the training and fighting efficiency of the fleet, that until it is entirely eliminated, which is hardly a probable development under Soviet rule, the navy of Soviet Russia cannot be regarded as in any way the formidable force which the ships themselves would appear to represent on paper.

Administration.—The supreme command of the Red fleet is exercised by a "chief of the naval forces of the S.S.R. and head commissar." The present (1928) occupant of the office was originally a fabric worker. Before the Revolution he was a private in the army. A few of the old Tsarist officers remain; amongst these is the present commander-in-chief of the Baltic Fleet.

(E. A.)

BIBLIOGRAPHY.—See *Brassey's Naval and Shipping Annual,* also F. Jane, *Fighting Ships* (annual), and for history, G. S. Clarke, *Russia's Sea Power Past and Present* (1898); *The Russian Fleet under Peter the Great* (edit. L. A. G. Bridge, Navy Records Society, 1899); V. I. Sernenoff, *Rasplata; a Diary of the Blockade of Port Arthur and of Admiral Rodjestvensky's Fleet* (trans. Prince Louis of Battenberg, 1909); *Official History of the Russo-Japanese War* (Committee of Imperial Defence, 3 vols., 1910–20); H. W. Wilson, *Battleships in Action* (2 vols., 1926).

ECONOMIC AND FINANCIAL CONDITIONS

The Pre-War Situation.—Pre-war Russia was in many respects a country of strange contrasts. While she remained a nation which was only semi-industrialised, the industry which existed in the Petersburg and Moscow districts and in the South was of a very modern kind, equipped with up-to-date German and English plant and often staffed by German and English managers and engineers. There existed in Russia from as early as the 13th and 14th centuries co-operative associations known by the name *artel.* The artels originally consisted of bodies of working-men associated, without formal constitution, for the purpose of jointly carrying out and dividing the profits of some undertaking, generally in connection with hunting and fishing, and as such they survived among the fishermen of Archangel up to modern times. In course of time, artels were extended to industrial and financial enterprises, and the members frequently contributed not only work, but capital. Such artels were independent bodies working for their own profit and at their own risk. Combinations of the artel type developed later into the normal type of co-operative productive associations adopting formal constitutions. While only 15 per cent of the Russian people lived in towns, and twice as many persons were employed in village handicraft industry as in factories, large factories employing more than a thousand hands covered nearly a half of all factory workers, or nearly as large a number as in U.S.A. In the countryside primitive peasant agriculture, with its 3-field system and often its old communal "strip" system and periodic redistribution of holdings, existed alongside landlords' estates which were often run on model large-scale lines; and politically Tsarist absolutism faced a peasantry hungry for land and an urban proletariat which nourished the most revolutionary socialism in Europe. Primarily an exporter of agricultural produce and an importer of manufactures, Russia possessed supplies of every known mineral; and while her coal resources supplied only 80 per cent of her internal market, she controlled over 90 per cent of the world output of platinum, was the leading producer of manganese, and was second only to U.S.A. in production of petroleum, estimates placing her oil resources at some 35 per cent of the world's deposits.

The principal industrial centres of Russia were five in number. In four of these—the Donetz basin in the South, the Urals, the Moscow region and the Dombrova region of Poland—industry was localised under the attraction of coal and metal deposits. The fifth was the Petersburg area, with its chain of metal works on its southern outskirts, attracted to the city as a port and as the political capital. The textile industry, including cotton, wool, silk, linen and jute, was less closely localised, being found in Moscow and the neighbouring provinces to the East, round Petersburg, and also in territory which now belongs to Estonia and Poland. Baku, in the Caucasus, was a developing centre of the oil industry. A small chemical industry in the south, sugar production in the Kiev district, flour milling in the chief grain regions, paper and wood-working, leather and spirit and tobacco—these complete the list of the principal manufactures. In the most important of these industries a considerable rôle was played by foreign capital as well as by foreign technical personnel. Nearly half the capital in the Donetz coal industry was foreign, and over three-quarters in iron-mining, engineering and the oil industry.

On an average in the years before the war Russia imported capital to the amount of some 200 million rubles per annum, while by 1914 between 1,500 and 2,000 million gold rubles (approximately, 10 rubles=£1) of foreign capital was invested in industry, and a further 5,000–5,500 million rubles was invested in various state and municipal or state-guaranteed loans. On the foreign capital a large toll of interest payments had to be made, which already considerably exceeded the sum of annual borrowings and constituted the main explanation of the so-called "favourable" balance of trade (or unpaid excess of exports over imports), which on the average of the four pre-war years amounted to 377 million roubles. For certain important raw materials also Russia was dependent on foreign countries—for half of her raw cotton supplies, for dyes and certain other chemicals, for a fifth of her coal supplies, as well as for a large amount of machinery and industrial equipment; and it was to provide the means for importing these, as well as to pay the annual interest on foreign capital that the grain export trade was of such great importance.

Russian industry was also aided by a rapidly developing system of joint stock banks, many of which made long-term advances to industry on a considerable scale, on the model of the German "commercial banks," playing the rôle of collecting individual savings as deposits, and then re-lending them to industry. The State Bank, which was both the Government's banker and the Bank of Issue, also engaged in considerable direct dealings with industry, often appointing nominees on the Boards of companies

which it financed, and, in particular engaged in financing and in direct dealings in the grain trade. Unlike many other central banks, its branch system was considerably developed, and in 1914 it possessed nearly 1,000 local branches and agencies. A distinct tendency had appeared, however, before the war for the State Bank to assume more and more the position of a "bankers' bank," like the Bank of England and the Federal Reserve Banks of U.S.A., conducting rediscount operations for other banking institutions, rather than financing industry and trade direct; and between 1912 and 1914 about half of its loan and discount operations were of this kind.

Effect of the World War.—The financial strain of the World War, with its resulting currency inflation, the heavy demands of war requirements on industry and an inadequate transport system, combined with the cessation of certain vital imports from the West, had already begun to produce signs of economic exhaustion and collapse by the winter of 1916. The fact that Russia was self-sufficing in foodstuffs did not help her as much as is often supposed, since the power of inducing the peasant to sow his fields and bring his grain to market depended (apart from methods of compulsion) on the ability of the towns to offer manufactured goods to the peasant in return; and the preoccupation of industry and transport with the needs of war and the consequent scarcity of ordinary manufactured goods soon aroused the peasant to the fact that he was selling his grain for paper money which had a steadily diminishing purchasing power, with the result that his willingness to market his produce sharply decreased. This caused a growing food shortage in the towns, which reacted on the position of industry in a vicious circle, and raised the wind of a gathering discontent among the masses—a discontent finding vent in the first revolution of March 1917, and later, as the economic crisis worsened, in the Soviet revolution of November 1917. To prevent competition in grain purchase from enhancing food prices, the Provisional Government which came into existence on March 15, 1917, adopted on March 19 a State grain monopoly with fixed maximum prices.

While inflation, therefore, continued to exert its full influence in raising industrial prices, the price which the peasant received for his produce was forcibly kept down. This increased the tendency for the peasant to hold back his grain from the market, thereby accentuating the food crisis in the towns at the same time as it fanned the flame of social discontent in the villages. The new Soviet Government, accordingly, assumed power in face of a serious food situation, of a decline of industrial production to a level of less than 70 per cent of the normal, and of a transport crisis of which the fact that a third of the railway locomotives were derelict or awaiting repair was a crucial symptom. In turn, this situation was aggravated in another vicious circle by an acute fuel crisis as a result of the difficulties of moving coal from the pitheads. The passing of war into civil war, and its continuance until the end of 1920, together with a blockade from the West and the occupation by invading armies of some of the most important industrial areas, such as the Donetz coal field and the oil fields, continued this economic decline until in 1921, when drought and famine stalked through the Volga region, it threatened complete and catastrophic collapse.

The Economic Policy of the Bolsheviks.—The policy of the Bolsheviks when they assumed power in November 1917 was not to achieve complete socialism at one fell swoop, as is often imagined. Lenin's theory based itself on the Marxian analysis of capitalism as a system under which a class that monopolised property lived by exploiting a propertyless class, and which consequently tended to become increasingly unstable and inefficient as a result of the class antagonism that it engendered between exploiters and exploited. In such a class system, to his view, the State, even if clothed in democratic forms, was simply the instrument of the ruling class, designed to perpetuate the dominance of that class. Hence the pre-requisite of any fundamental change of system was that the workers should seize power through their own organs of control (a revolutionary Party, the Soviets and the Trade Unions), and set up a new State machine subordinated to the interests of the workers. Having by this first step occupied the "key positions," which gave the possibility of shaping the development of society on a new course, the further task was to abolish class monopoly of economic property by transferring property into the hands of the new Workers' State, and to achieve the economic transition to socialism.

The political act of seizure of power was conceived as a sudden revolutionary act. The subsequent economic change was to be more or less gradual according to conditions and according as the new State was able to build the necessary machinery to run the economic system on socialist lines. The ultimate goal was the attainment of a classless society, where a privileged class based on property ownership ceased to exist and all stood on an equal footing as workers in an economic system which was communally owned and run.

In accordance with this theory, nationalisation in the early months of the Bolshevik revolution was only carried so far as was considered necessary from the political standpoint of class power. From this point of view the control of the banks, the transport system, the grain trade and electrical stations was considered to be as much a part of the holding of "key positions" as was the control of the police and the military, of the State departments and of the Press. The major part of industry, as for instance the textile industry, was still left in private hands; and it was apparently intended that for a time, at any rate, large spheres of industry should continue under private control, subject to certain measures of State control such as the British Ministry of Munitions exercised during the war, and to fairly considerable measures of control exercised by factory committees in the various enterprises. In agriculture no immediate nationalisation was achieved or intended. One of the basic principles of Lenin's policy was that in an agrarian country where the urban proletariat constituted a minority of the population (in Russia they constituted less than 10 per cent of the population) the workers could only hold power if they cemented a firm alliance with the poorer sections of the peasantry, securing at least their passive political support and their economic goodwill as food producers. Consequently, while the land was nominally nationalised, one of the first acts of the Soviet Government was the Land Decree, which directed the village committees to organise the distribution of the landlords' estates among the poorer peasantry. Only such of the estates as had been farmed on model intensive lines were to be reserved from this distribution and organised as State farms. As a result some 97–98 per cent of the cultivated land in European Russia and 96 per cent in the Ukraine came into the hands of the peasantry (as against 76 and 55 per cent respectively before), while some 3 per cent remained in the hands of state or co-operative farms.

"War Communism."—But the rallying of the anti-Bolshevik forces in the Caucasus, in Siberia and in Murmansk, and the recrudescence of civil war precipitated certain sweeping changes in the economic sphere, and led to the system which has come to be known as "war communism." With civil war on the horizon the attempt to run industry on the basis of the continuance of the private *entrepreneur*, subject to control by the Soviet State, was almost bound to break down. In many cases the owner refused to continue production under the new conditions. In other cases the factory committees or the local Soviet, in defiance of the central authorities, took over factories into their own hands and ran them independently on syndicalist lines. As an attempt to deal with the resulting chaos the pace of nationalisation was considerably accelerated, until even quite small workshops were swallowed up in the nationalisation decree; and State administrative organs, called *Glavki*, including technical experts and representatives of the trade unions, were set up in each industry to take over the control of industry and to appoint the factory management. Hasty improvisation and the pressure of urgent war needs tended to produce an increasing centralisation of control, even in matters of executive detail, in the hands of these *Glavki*—a centralisation which, by the end of the civil war produced serious administrative congestion and paralysed initiative.

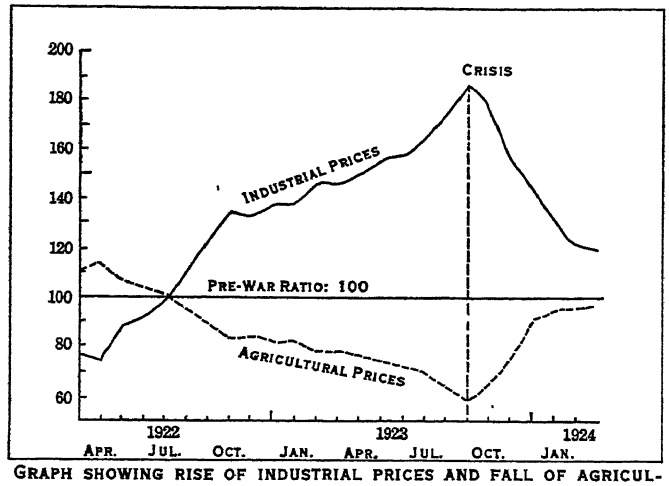
At the same time the continuance of inflation produced a rapid depreciation of the currency, in face of which the various State

organs came more and more to conduct their transactions by direct barter, without the intervention of money. It became customary for the *Glavki* directly to hand over supplies of fuel, materials, and often food rations to the enterprises under their control, debiting them with the value of these things assessed at arbitrarily fixed prices. In return the enterprises handed over their products to the *Glavki*, which then arranged the distribution of them through the State Commissariat of Supplies or the co-operatives. In 1920–21 about nine-tenths of the worker's wage was paid in direct rations or in orders on the co-operative store, and not in money.

Meanwhile, the difficulty of maintaining the food supply from the countryside increased, in spite of the distribution of the land to the peasants. Though the Land Decree reconciled the villages politically to the new *régime*, it did not afford any additional incentive to the peasant to market his grain; while in so far as the land of the former large estates was now less efficiently farmed, the Decree accentuated the food problem. In the spring of 1918, accordingly, the policy which had already been inaugurated under the Provisional Government was carried an important stage further, and the drastic step was taken of requisitioning the peasant surplus by declaring that all surplus grain above the requirements of the peasant household for food and seed-corn was to be surrendered to the State collecting-organs at the official prices. To enforce the measure and to counter evasion Committees of the Village Poor were organised, since the poorer peasants who produced little or no surplus were thought to be the natural allies of the towns in forcing the richer peasants (called *kulaks*) to submit to the decree. Trade union and military detachments were organised at the same time and sent to the villages to make forcible seizure of requisitioned grain; and Food Commissars were appointed to particular areas, with extraordinary powers to punish evasion with the penalty of death. At the same time all private trade in requisitioned products was prohibited, and also in certain other products not actually requisitioned but declared a state monopoly. Nominally, at least, only the organs of the Commissariat of Supplies and of Agriculture and the co-operatives were allowed to handle the majority of agricultural products; although in practice a considerable measure of illicit private trade continued in the "free market."

Temporarily the requisitioning policy was able to increase the food supplies at the disposal of the army and the towns by overcoming the problem of grain hoarding. But from its very character it could offer only a short-period solution of the food crisis. Previously the poor return (in industrial goods) which the peasant secured for his produce caused him to hold back grain from the market. Now this loophole was closed to him; but the lack of incentive merely transferred its effects a stage further back, causing the peasant to restrict his sowings of grain and to confine his efforts merely to cultivating and harvesting as much produce as he required for his own needs. By 1920 the sown area had shrunk by nearly 30 per cent, and the yield per acre by 40 per cent, so that the total harvest was scarcely more than two-fifths of the normal pre-war amount. In pre-war days the peasant marketed less than a third of his total crop, using the remainder for seed-corn and his own consumption; and when we have made allowance for the home-consumption of the village, it is clear that the surplus available for the towns had in 1920 shrunk much more catastrophically than the total yield. This decline continued in 1921, when it was aggravated by the tragic failure of the crops in the Volga region, so that instead of drawing upon the surplus grain of this rich producing area, the government had to draw supplies from other areas—principally by a 1,000-mile railway haul from across the Urals—and to despatch them to the famine-stricken area.

The New Economic Policy.—The end of the civil war, accordingly, saw Russia face to face with an economic crisis darker even than the ravages of civil war; and if any reconstruction was to be possible, certain drastic changes had to be made at once in the improvised military measures of administration which the civil war had produced. Already at the 9th Congress of the Communist Party in the Spring of 1920 and again at the 8th Soviet Congress in November and December severe criticism of the *Glavki* system in industry had been voiced, and as a result certain measures of decentralisation in the administrative apparatus had been introduced. Between December and March 1921 a vigorous discussion was conducted in the official Press on the general economic situation, with a resulting plethora of suggestions and the emergence of seven or eight different "platforms" or policies



GRAPH SHOWING RISE OF INDUSTRIAL PRICES AND FALL OF AGRICULTURAL PRICES LEADING UP TO THE ECONOMIC CRISIS IN OCTOBER 1923

within the central committee of the Party. The recrudescence of an acute fuel crisis at the beginning of the year and the spread of a wave of peasant discontent, resulting in actual risings in certain provinces, and finding a reflection in the revolt at the Kronstadt naval station at the end of February, precipitated a decision; and the crucial change came when Lenin at the 10th Party Congress in March proposed the abandonment of the grain requisitions, their replacement by an Agricultural Tax on the peasant assessed (at first in kind, after 1923 in money) as a proportion of his produce, the scrapping of the war-time State grain-monopoly and the reversion to free trade in grain.

This was the crucial turning-point from "war communism" to what came to be known as the New Economic Policy; and in its wake a series of further important changes quickly followed. The peasant was now free to sell his surplus as and when he liked —to the organ of the Commissariat of Supplies, to the co-operatives or to the private trader. This implied a revived currency for the paper rouble, and indirectly led the various State economic organs to abandon their war-time system of direct barter, and to re-introduce normal exchange dealings on a money basis. Partly for this reason, and partly to relieve the burden, both financial and administrative, which rested on the central authorities, an increasing number of enterprises were removed from the category of those which were furnished direct with supplies of fuel and materials and food in kind through the Glavki, and were permitted to operate on the market at their discretion. Some smaller factories were leased to private owners or to co-operative groups; while offers of special "concession" rights for working certain mineral areas, etc. (such as the Lena goldfield concession) were made to foreign capitalists, and "mixed companies," formed by the combined participation of State and private capital, were legalised. By the end of 1922 the number of leased factories and workshops amounted to about 4,000; but they averaged only 18 workers each and covered in all only 5 per cent of industrial production.

A movement in the direction of autonomy likewise occurred in the case of the co-operatives and the trade unions. During the civil war "appointed members" had been added by the government to the Board of Centrosoyus, the wholesale organisation of the consumers' co-operatives, and this body had come in practice to be merely a commercial agency working on commission for the Commissariat of Supplies. Now financial autonomy as an independent trading organisation was restored to it. Greater freedom was also given to the trade unions which by 1920 had come to

be in practice merely appendages of the State machine, with their personnel appointed from above. One of the cardinal principles expounded by Lenin in 1921 was that trade unions must be democratic organs of the masses, voicing the interests and feelings of the rank and file and so acting as a check on "bureaucratic" tendencies of the State apparatus, while at the same time sharing in the control of industry and advancing candidates from among their own ranks for administrative and managerial posts.

This New Economic Policy (usually referred to as *NEP*), viewed in its true perspective, amounted to a return to the policy which the Soviet Government had pursued during the first eight months. All belligerent countries during the war adopted certain measures of centralisation and semi-military regulation, to which the name of "war socialism" has sometimes been given. Similarly in Russia "war communism" represented a war-time improvisation, which in many respects went aside from the "normal" course which in more peaceful circumstances would probably have been pursued. The economic system which Lenin had envisaged in 1918 and to which the New Economic Policy was a return was termed by him "State Capitalism." It was called by this term since it was a "mixed system," under which over 90 per cent of factory industry, including all the larger enterprises, was owned and operated by the State; but at the same time these socialist elements existed alongside a certain amount of small-scale private industry and private trade, and faced the mass of primitive small peasant farms, which covered over 95 per cent of agricultural production.

This State Capitalism, however, differed essentially, according to Lenin, from anything to be found in Western countries even in war-time, in that in Russia a death-blow had been dealt to the existence of a privileged class, and the workers occupied the "key positions" which enabled them to shape the development of society along a new course. The ultimate goal to be attained was a classless society. As long, however, as private production and trade continued, the possibility existed of the rise of a new propertied class, amassing wealth and the differential privileges which go with it. In the village, for instance, the peasant who had more cattle and instruments than his neighbours might perhaps after a few years of astute business graduate from village trader and usurer to become a merchant or factory owner in the town.

To extend the influence of the socialist elements, accordingly, in this transitional "mixed system" Lenin relied on two things. First, he looked to industrialisation, and in particular to the development of electrification, to accomplish the industrial revolution which was still incomplete in pre-war Russia. As this process advanced, the "specific weight" of the large-scale socialist elements would increase, and small-scale private economy would be subordinated or transformed. Secondly, he looked to the co-operative system as the link between the state and the peasantry, lending special aid to the poorer villagers so as to prevent them from being proletarianised as of yore, and drawing the peasant into collective activity, first in matters of sale and purchase, later in credit and the supply of instruments and the use of agricultural machinery, and finally in the actual cultivation of his land in common. In the interim nothing must be done to break the *smytchka* between the village and the town. Politically the urban workers must keep the peasants as partners, even if only junior partners; while economically State industry must develop, not at the expense of peasant agriculture, but along with it, the growth of the one facilitating the growth of the other. Under "war communism," which was under that system, this essential *smytchka* was broken.

The Organization of Industry.—The new form of organization which followed the introduction of NEP had as its keynote the grouping of factories into federations or "Trusts," and the endowment of these Trusts with powers of financial and commercial initiative to operate as independent units on the market, subject only to a general control over the general features of their policy by the higher State bodies. The controlling Board of the Trust is appointed by the State Supreme Economic Council, usually in consultation with the trade union of the industry and including a certain number of trade union nominees; and the Board in turn appoints the managers of the factories under its control, again usually in consultation with the trade union. The legal position of the trust directors is that of "trustees" of the State property (land, buildings and machinery) entrusted to them. They are removable at the end of any year at the will of the higher authorities, and their profits, after providing for reserve and a welfare fund, are at the disposal of the State.

Moreover, their output programme for the economic year has to be sanctioned by the Supreme Economic Council, which can expand it or curtail it in line with the general State plan of production for the year; and the Commissariat of Trade has power to fix maximum selling prices for the Trust's products. The Trust has power to enter into contracts, like any ordinary firm. It can use its working capital for this purpose; and on the security of this working capital (securities, stocks of goods, cash balances) it can raise credits from the banks or issue bonds. But it cannot pledge its fixed capital (plant, land and buildings) for this purpose, and the State is not responsible for the debts it may incur. In practice it makes its own contracts for purchase of raw materials, pays wages on the basis of a collective contract with the trade unions, and enters into contracts with trading organs for the disposal of its finished output. If it desires to renew or extend its plant or to erect new factories, it can do this either by capitalising its reserve fund, by raising a loan, or by securing a direct grant from the State for this purpose.

The basis on which such federations are organised is exceedingly flexible. In some cases, as in the metal industry, a Trust may be based on a vertical amalgamation of a group of large enterprises at various stages of production (*e.g.*, from mining to finished engineering), either in the same locality or in different parts of the country. In other cases it may be a horizontal grouping of a few similar factories and workshops in a small provincial town. Some of the textile Trusts are vertical groupings of cotton factories from spinning to finishing processes; others group together linen and wool and cotton mills where these are found together in a particular locality. Already by the winter of 1922 nearly 500 Trusts had been formed, covering some 75 per cent of the workers in nationalised industry. On the average each Trust covered 2,200 workers; but while 41 of the Trusts were large concerns covering 12,500 workers, with an average of 900 workers in each factory, about half the total number of Trusts were quite small and local in scope, employing an average of only 360 workers each.

Trade: Internal and External.—In the first year of their formation the Trusts experienced considerable difficulties in the marketing of their produce, owing to the absence (as a legacy of "war communism") of any developed commercial apparatus. The cooperative wholesale organisation, Centrosoyus, suffering from lack of working capital and from the disorganisation of the war period, was still unable to handle more than a minor proportion of the total trade between village and town. The Trusts, accordingly, under the urgent need to sell their products to realise working capital, utilised private traders and agents wherever possible, and in numerous cases instituted their own retail establishments or even stalls and booths at local markets and fairs. The upshot of this situation was the interesting experiment under which the Trusts on their own initiative combined together to institute common marketing organisations, or *Syndicates*. These are similar in constitution to cartels or syndicates in capitalist countries, and are generally joint stock companies of which the capital is owned by the participating Trusts.

These Syndicates, with two exceptions, possess no legal monopoly of the market, and while as a rule they cover a major part of the industry, a certain number of producers, both State and private, usually exist which market their products independently. The Syndicate, as the sales organisation for the member firms, then arranges contracts of sale with Centrosoyus, State wholesale companies or private traders, or sometimes deals direct with the provincial unions of consumers' co-operatives or even with the local retail organisations. In all some 23 Syndicates have been formed, the syndicated Trusts constituting in number about half the total industrial Trusts and covering about four-fifths of the man-power in State industry. In addition to the Syndicates the

sphere of wholesale trade is covered by Centrosoyus, private traders and certain State trading bodies. These latter are generally special trading companies such as Mostorg, Ukraintorg, instituted by a local or provincial Soviet or a group of State departments, which hold the majority of the capital of the company. The following table shows the relative importance of the different types of organisation in wholesale trade and illustrates the tendency for private capital to occupy a decreasingly important place.

	1924–25	*1926–27*
State and Co-operative	90%	95%
Private	10%	5%

In retail trade the consumers' co-operative stores play a much greater rôle than any State body; and it is here, as one would expect, that the private trader, particularly in the villages, has survived to the greatest extent. In retail trade State organisations (as part of their policy) participate only to a very small extent. A few Syndicates, such as the Textile Syndicate, own retail shops in the towns, and the State trading company, G.U.M., occupies the big arcades which traverse the east side of the Red Square in Moscow. The following table shows the relative proportions in which the turnover of retail trade is shared between the State, the cooperatives and the private trader.

	1924–25	*1926–27*
State and Co-operative	57%	67%
Private	43%	33%

While free trade prevails in internal trade, subject only to the need for a trader or trading company to secure a license to legalise his activities, foreign trade is subject to a state monopoly which is operated through the Commissariat of Trade. (Formerly there were separate Commissariats for Foreign Trade and Internal Trade. Since 1926 they have been amalgamated.) In practice a large number of bodies engage in import and export operations, such as the special autonomous trading company of the Commissariat of Trade called Gostorg, certain State trading bodies like Mostorg and Ukraintorg, and the special import and export companies of particular industries like Exportkhleb (grain) and Metalimport and Electroimport; also Centrosoyus, the Textile Syndicate and "mixed companies" such as the Russo-German Co. and the Russo-British Grain Export Co. Ltd., in which foreign capital participates. But not only must such bodies obtain a licensed right to trade abroad, but their program of imports and exports has to be sanctioned, and can be revised, by the Commissariat of Trade. This enables the latter to maintain a balance between the total volume of imports and exports, and also to discriminate according to plan against certain types of imports and to encourage others, with the combined result of giving to the Russian economic system a highly "protected" character.

In practice the control over imports and exports, and hence over the balance of foreign payments, has enabled the rouble exchange to be maintained at a higher rate (in terms of foreign currencies) than the internal purchasing-power of the rouble in the home market warrants (as, indeed, tends to occur in any country where import is restricted by protective tariffs etc.). And the general effect of the State import policy has been to limit the import of finished industrial goods as rigidly as possible, and instead to import raw materials and machinery which are required for the development of Russian industry. In this way the State monopoly of foreign trade has constituted an integral part of the Soviet policy of accelerating the process of industrialisation; since without this regulation of import and export finished manufactures rather than machinery and raw materials would have flowed in from abroad under the attraction of the higher Russian industrial price level.

State Economic Planning.—In the realm of industry the state regulating authority is the Supreme Economic Council, which was originally instituted by the Government in December 1917 to supervise and coordinate the process of nationalisation, its governing Board being composed of representatives of the chief Commissariats, of government departments and of the trade unions and the cooperatives, with a permanent commission of scientists, economists and technical experts attached to it in an advisory capacity. The original intention was that this body should be the supreme administrative organ in the economic sphere, coordinating all the various parts of the economic system. But in practice it found itself unable to handle so comprehensive a task, and to-day it constitutes virtually a Commissariat of Industry, having, perhaps, somewhat the same relation to industry as had the British Ministry of Munitions to the engineering trades during the war. Internally it is divided into two main departments: the Chief Economic Administration, which is concerned primarily with framing industrial policy, and the Central Administration of State Industry, which is more narrowly executive. This latter body is headed by a directorate composed of the heads of various sub-departments corresponding to the main industries, to supervise the work of the Trusts concerned.

Agriculture, banking and finance, transport and foreign trade, however, fall outside the sphere of the Supreme Economic Council; and to coordinate all these aspects of economic life with the activity of industry according to a single plan is the work of the Council of Labour and Defence (called STO). This is the supreme executive organ in the economic sphere, and being appointed directly by the Council of People's Commissaries (equivalent to a Parliamentary Cabinet) it has authority over all State departments which possess economic functions, including the Commissariats of Trade, Agriculture, Ways and Communications, Finance and the Supreme Economic Council itself. Attached to it is an important institution called the State Economic Planning Commission (Gosplan), which is an expert advisory body, similar to a permanent Royal Commission or group of standing commissions. The economic plan for each year, covering the output of the main industries, the volume of agricultural purchases and of foreign trade, the policy of the State Bank, and the annual Budget, is drawn up by Gosplan, and the provisional plans of various State departments are reviewed, reported upon and coordinated by it; while the final power of sanctioning the plans for the coming year rests with STO. The closest parallel in this country to the work of these two bodies, STO and Gosplan, is probably the suggested Committee of Economic Policy and the Economic General Staff which are outlined in the Report of the Liberal Industrial Inquiry of 1927–28.

Banking and Finance.—With the reorganisation of industry on an independent financial basis under the New Economic Policy there arose the need to revive the banking system, which during "war communism" had fallen into disuse and decay, and to introduce a stable monetary unit. In November 1921 the State Bank was re-chartered as a credit institution, with power to make long and short-term advances to industry and trade and State departments. The major part of its capital was subscribed by the Commissariat of Finance, which accordingly exercised a predominant voice in its control. A year later the Bank was made the Bank of Issue for the new 10-rouble banknote currency, the *chervonetz*, which was issued against a minimum legal "cover" of 25 per cent in gold and platinum and foreign valuta. Throughout 1923 the new notes were issued at the same time as the Treasury continued to issue the old depreciated paper rouble in large quantities, the latter continuing to have a certain currency for "small change" transactions, while the *chervonetz*, being issued in no smaller denominations than 10 roubles (gold), became increasingly used as a unit of account and an investment medium. Finally, in March 1924 the currency of the old depreciated paper rouble was terminated, and in its place new Treasury Notes of denominations up to 5 roubles were issued through the Commissariat of Finance, their quantity being limited by law to half the amount of *chervontzy* in circulation.

To-day the State Bank is much less of a bankers' bank than it was before the war. It continues as before to make both long- and short-term advances to industry (the ratio between the two being roughly 1:4) and to government departments. But the proportion of its credit operations which is transacted through intermediary credit institutions is much smaller—some 15 per cent as against 50 per cent. In recent years its branch system has expanded fairly rapidly, and it now possesses some 500 local branches. In addition to the State Bank itself there are several

other important credit institutions, which perform very similar functions to the joint stock commercial banks before the war.

Most important of these is the Bank for Industry and Trade, which was chartered in October 1922 with a capital mainly subscribed by the Supreme Economic Council, the Commissariat of Trade and various industrial Trusts and Syndicates. In addition to ordinary bill-discounting and short-term advances, in May 1926 it opened a special department of long-term credits for the purpose of financing capital development in industry. Of the total credit operations it is responsible for about a tenth, and some authorities have desired to make it the main institution for the financing of industry, with the State Bank retiring to the position of a rediscount bank, dealing with industry, not directly, but by financing intermediary credit institutions. Trade is largely financed by the All-Union Co-operative Bank, the Ukrainian Co-operative Bank and the Bank for Foreign Trade (which also holds investments in subsidiary institutions abroad such as the Bank for Russian Trade in London and the *Banque Commerciale pour l'Europe du Nord* in Paris). Agriculture is served by some 12–13,000 autonomous local societies of co-operative credit, which in return receive aid from the Central Agricultural Bank. There are also various municipal banks, engaged in financing municipal enterprises and local industry; while the Bank for Electrification is mainly a bank of long-term credit, designed to facilitate investment in electrical construction. Private capitalists stand at a disadvantage as against State organs or "mixed companies" in securing accommodation from the State banks; and they have organised credit associations of their own.

Industry and Agriculture.—Since the introduction of NEP the recovery of Russia's economic life has proceeded at quite a rapid rate in spite of the absence of any appreciable inflow of capital from abroad. According to the figures of the Central Statistical Department, of Gosplan, and of the Supreme Economic Council, industrial output in the aggregate had by October 1927 surpassed the pre-war level; and estimates were made for a continued increase of output over the next five years (1927–1932) amounting to the high figure of some 10 per cent per annum. The production of certain lighter finished goods, such as tobacco and food products, wool and paper, and also of oil and coal already exceeded the pre-war output by a considerable amount. On the other hand, basic metal production, which had been most devastated by the civil war and was more difficult to reconstruct, still lagged behind the pre-war standard by some 20–30 per cent. At the same time agricultural yield had recovered to within 4–5 per cent of the average pre-war standard, and the sown area to a slightly larger extent. But of greater significance than the total yield is the fact that the quantity of agricultural produce *placed on the market,* and available for the towns and for export, is still scarcely more than three-quarters, and of grain hardly more than half of the pre-war amount, since a much smaller proportion of the total harvest is now sent for sale outside the village than before. This situation is illustrated by the figures given by the Central Statistical Department in the accompanying table.

The causes of this decline in the marketable surplus are probably several. First is the disappearance of the old landlords' estates, which formerly produced a fifth of the marketable surplus —a deficiency which is as yet far from being repaired by the growth of State farms. Second is the greater equalisation of land-holdings in the village, coupled with the lighter burdens of rent, taxes and mortgages, which mean that the average standard of life of the village has probably been raised and the village to-day is consuming a larger proportion of its own produce. Third is the fact that the ratio between the price of industrial goods and of agricultural goods has changed since the war to the disadvantage of the latter, so that for each bushel of grain the peasant only procures in exchange a smaller quantity of textile or leather goods, of oil or metal or salt or sugar than he did before the war. (This is, indeed, a world-wide phenomenon.) This "gap" between the two sets of prices has been called "the scissors"; and while it is to-day much smaller than it was during the famous "scissors crisis" in 1923, it still remains considerably wider than before the war. (In wholesale prices the "scissors" has almost disappeared; but in retail prices it still remains.)

	Total grain production (million poods)	% of total	Grain put on market outside the village (m. poods)	% of total	Percentage of harvest put on market
Before the war					
(1) Landowners .	600	12	281·6	21·6	47
(2) Rich peasants	1,900	38	650	50	34
(3) Poor and "middle" peasants .	2,500	50	369	28·4	14·7
Total . .	5,000	100	1,300·6	100	26
1926–27					
(1) State and collective farms	80	1·7	37·8	6	47·2
(2) Rich peasants	617	13	126	20	20
(3) Poor and "middle" peasants .	4,052	85·3	466·2	74	11·2
Total . .	4,749	100	630	100	13·3

This shrinkage of the marketable surplus has had its effect primarily on grain exports, which in recent years have been between a fourth and a fifth of their pre-war amount; and since in the last few years town consumption (with the rise of wages) has increased faster than the supply of grain, the exportable surplus of grain has tended to decline rather than to increase. The effect on Russia's total export capacity would have been more serious, had not the export of certain other commodities, such as oil, been expanded. But the grain situation, coupled with strained political relations abroad and the absence both of any appreciable foreign interest payments or foreign borrowings, remains the principal cause of the diminished foreign trade turnover, which is little more than a quarter of the pre-war amount. As a result Russia is seriously handicapped in obtaining by import the machinery and raw materials that she requires.

The problem of the *smytchka,* therefore, between village and town, peasant agriculture and socialist industry, still remains fundamental for the Soviet *régime.* Already in 1923 the question of the relative rates of development of industry and agriculture had begun to give rise to violent discussion and even to the growth of a definite opposition element within the Russian Communist Party. In that year the widening of the gap, or the "scissors," between industrial prices and agricultural prices had gone so far that a bushel of grain only exchanged for a third the quantity of industrial goods that it did before the war. An important section of opinion among the Communists attributing this phenomenon to the "under-development" of industry, were inclined to favour a continuance of "the scissors" (at least on a more moderate scale) as a means of enriching State industry at the expense of the village, and so enabling industry out of its profits to accumulate capital to finance industrial expansion and to accelerate the industrialisation of the country.

The exponents of the official view, however, denounced the opposition policy of Trotsky and his followers as a blow at the vital *smytchka* between village and town, and proposed instead to close the "scissors" as rapidly as possible by forcing industrial Trusts and Syndicates to lower their prices, even at the cost of drastically reducing industrial profits. If the "scissors" continued, it was argued, and industry enriched itself by "exploiting" the village, this would have a similar effect to the requisitioning policy under "war communism," and would check, or even reverse, the recovery of agricultural production. By the end of 1924 a rigorous enforcement of the official policy had halved the gap; but although the policy of reducing industrial prices as rapidly as possible continues, the "scissors" still remain. In 1925 a further series of measures were taken to accelerate the growth of agriculture, including a lightening of the agricultural tax, easier terms of leasing land and hiring labour, and the development of co-operation and of agricultural credit.

These new concessions to the village stimulated a fresh wave

of opposition within the Party; and this time Kamenev, Zinoviev and Smilga joined hands with Trotsky, Radek and Preobrajensky, whom they had previously opposed, and went to the extreme of organising a secret opposition "fraction," carrying on propaganda of its own against the official policy. Their chief complaint was that the concessions to the village had played into the hands of the rich peasant, or *kulak*, and had begun to revive a tendency to class differentiation in the countryside, and to the actual dominance of certain areas by "*kulak* influence." At the same time industry, they argued, was failing to expand with sufficient rapidity, and capital accumulation for purposes of industrialisation was proceeding at too slow a speed. When, however, in the autumn of 1927 fresh difficulties were experienced in grain collections, the marketable surplus, and particularly the exportable surplus, falling considerably short of what had been expected, it became clear that the expansion of industry was being retarded by the relative backwardness of agriculture—a backwardness, not so much of the total yield, as of the proportion of that yield placed upon the market. To have met this situation by making further tempting concessions to the village was hardly possible in the existing circumstances—it would at any rate have given apparent justification to the opposition charges that the Soviet leaders were encouraging the *kulak*.

Instead, a step was taken in the direction of the opposition policy by what came to be known as the new "Left" policy of placing the bulk of the Agricultural Tax on the rich peasants, so as to exempt 35% of the peasantry altogether, and of dissolving numerous agricultural co-operatives which were alleged to be under *kulak* influence and reorganising them with a membership composed of poor and "middle" peasants. At the same time in July 1928 a declaration of the Central Committee of the Party definitely eschewed all forms of overt "pressure" on the peasant in marketing his grain (which had occurred in certain cases in the early months of the year) and proposed to improve the price which the State purchasing-organs offered for grain. Incidentally it was hoped that the heavier taxation on the rich peasant would induce him to market a larger proportion of his crop, this proportion being smaller by 50 per cent than before the war. In order to accelerate the growth of the grain surplus, reliance was placed on an intensive development of State farms—many of them being planned on a 10,000 acre scale—since it is these which place the largest proportion of their yield upon the market. According to the existing plans it is hoped that the growth of collective farming over the next five years will give to state and collective farms nearly as important a place on the grain market as the landlords' estates possessed before the war.

Capital Accumulation and Industrialisation.—The rate at which capital can be accumulated and industry developed in the future is, therefore, closely bound up with the problem of the relation between village and town. To procure this capital by borrowing from abroad, as have so many other agrarian countries which have become rapidly industrialised, was not in existing circumstances practicable. The opposition, and Preobrajensky most explicitly, inclined to the view that State industry could only find the means for expansion if it treated peasant agriculture as a "colonial" area and drew a large profit by turning the terms of exchange between town and village in favour of the former. The official view, however, opposed this policy; and this second source of capital accumulation was also ruled out. The problem essentially consists in the fact that if labour and economic resources are turned to building factories, railways and electric-power-stations, there must necessarily be less available for producing commodities for immediate consumption, like boots and clothes and tobacco.

In so far as the "scissors" still exists, part of the brunt is being borne by the peasantry; but in so far as this checks the supply of foodstuffs and raw materials, it reacts unfavourably on the development of industry. The only remaining method of accumulating the required capital consists in causing the real wages of workers, and hence urban consumption, to rise more slowly than industrial production expands, so devoting the first-fruits of every increase of industrial productivity to capital investment. Nearly all the problems and the economic controversies in present-day Russia hinge on this fundamental question concerning the proportion in which economic resources are to be devoted to serving the needs of capital construction, of the peasantry, or of the urban workers. There exists among Russian economists one trend of opinion which would slow up the rate of capital accumulation, and consequently the development of the heavy industries and the import of constructional materials, in order to make finished industrial goods more plentiful to the peasantry, and so encourage the development of agriculture. Another trend of opinion, on the other hand, would exact more from the peasant at the moment, even at the expense of a check to agriculture, in order to give more to the town worker and to the development of capital construction work. The opposition view leans towards the latter policy; the official view steers a middle course.

So far as one can judge from available statistics, the rate of capital accumulation at present, as a proportion of the national income, does not fall short of the pre-war amount. A fair amount of constructional work is being done in the building of new factories, in electrification schemes, in the mechanisation of coal mining, in oil boring and refining, in housing and public buildings, in the extension of transport facilities. In the year 1925–26, after making allowance for that part of construction and repair work which merely replaces current depreciation, the resources devoted to capital purposes amounted to some 1,300 million roubles. Of this amount about a third represented investment in industry, about a fifth in agriculture, a further fifth in housing, and about 100 million roubles in electrification and 150–180 million in transport. In 1926–27 the aggregate figure was raised to about 1,750 million roubles.

Of the State investments the major part comes from the profits of industry. To some extent Trusts and Syndicates build up reserve funds out of their profits, and then draw upon these reserves for capital purposes. More important than this, however, is that part of the surplus of the more profitable branches of industry—chiefly the lighter finishing trades like textiles—which goes into the Treasury and is then advanced in the form of grants for capital construction to those branches of industry which are considered to require them most—primarily the heavy constructional trades. This sum is added to by further grants out of taxation, and also out of the proceeds of special State Loans, issued to the general public and generally earmarked for this purpose, such as the 1927–28 special Industrialisation Loan. Finally, a certain amount is provided through the banking system in the shape of long-term credits advanced to trade and industry.

State Finance.—The fact, therefore, that a major part of the new capital for industry, which in other countries would pass through the Stock Exchange by private share subscriptions, in Russia passes through the Budget, gives to the Russian Budget special importance, and also gives to State expenditure an apparently inflated appearance. The following summary of the chief items in the Budget for 1926–27 shows the important rôle that both the receipts from industry and also new State investment in industry play in the total Budget turnover:—

(millions of roubles)

Receipts		*Expenditure*	
Taxation	2,403	Defence and Administration	1,389
Loans	308	Repayment of debt	99
Railways	1,490	Railways	1,738
Posts and telegraphs	156	Posts and telegraphs	165
State forests	217	Subventions to local budgets	488
Industry, commerce, banks and mines	348	Industry, agriculture, etc.	885
Miscellaneous	132	Miscellaneous	187
	5,054		4,951

Of the total taxation revenue the largest part—about a half—is played by customs and excise. The Agricultural tax yields about 15 per cent, and the Income Tax on individuals and on corporations yield about 25 per cent. A large part of the expenditure on education, health and police, and also a large part of the

financing of local industry, figures in the budgets of the separate republics and not in the Budget of the whole Union. The revenue is here raised, partly by subventions from the central Budget to the amount of between 25 and 30 per cent, and the remainder by local surcharges, or additional percentages, added to the central taxes, together with the profits of local industry and municipal enterprises.

BIBLIOGRAPHY. For pre-war Russia: Margaret Miller, *Economic Development of Russia, 1905–14* (1926); J. Mavor, *Economic History of Russia*, 2 vols. (2nd ed., 1925); *The Russian Year Book, 1911–15*. For recent economic development:—Maurice Dobb, *Russian Economic Development since the Revolution* (1928); J. Mavor, *The Russian Revolution* (1928); *The Soviet Union Year Book, 1925–28;* Memorandum No. 25 of The London and Cambridge Economic Service, prepared by Conjuncture Institute, Moscow; *Sov. R. in the Second Decade*, ed. Chase, Dunn, Tugwell (1928); K. Leites, *Recent Economic Developments in Russia* (up to 1920) (1922); S. N. Prokopovitch, *Economic Conditions in Soviet Russia* (up to 1923) (1924); M. Farbman, *Bolshevism in Retreat* (1923) and *After Lenin* (1924). For particular aspects.—International Labour Office (Geneva), *Industrial Life in Soviet Russia, 1917–23, Organization of Industry and Labour Conditions in S.R., The Cooperative Movement in S.R., The Trade Union Movement in S.R.;* L. N. Yurovsky, *Currency Problems and Policy of the Soviet Union* (1925); S. Katzenellenbaum, *Russian Currency and Banking 1914–24* (1925); L. Pazvolsky and H. G. Moulton, *Russian Debts and Russian Reconstruction* (1924); Prof. A. Karlgren, *Bolshevist Russia* (trans. 1927); M. Hindus, *Broken Earth* (the village) (1926); I. Stalin, *Leninism* (trans. 1928); L. Trotsky, *Towards Socialism or Capitalism?* (trans. 1926).

In Russian:—J. S. Rosenfeld, *Promishlennaia Politika S.S.S.R.;* Prof. Den (Ed.), *Tyajolaia Industria S.S.S.R.;* L. Kritsmann, *Geroicheski Period Velikoi Russkoi Revolutsii* (1925); *Na Novikh Putyakh*, Vols. 1–3; *Narodnoe Khosiaistvo* for each year, issued by Gosplan. (M. H. D.)

HISTORY

I. PREHISTORY

The great East-European plain which was in the process of history united, together with Siberia, under the sway of Russian tsars, presents in spite of its general uniformity two contrasting geographic aspects which profoundly influenced the trend of its historical development: the northern and the southern. A primitive forest extending over the northern part of Russia reminds one of that described by Tacitus in his *Germania.* It was indeed its continuation and connected Russia with the western part of the European plain. It was comparatively late that this part of Europe was set free from its prehistoric ice-cover. It is still full of seas and great rivers which for long remained the only ways of communication for a scanty population scattered in distant glades. The primitive settlers added a few patches of cultivated land to their habitual means of livelihood—fish in the rivers, wild bee-hives and fur-bearing animals in the forests.

Quite different is the southern Russian landscape. It is the steppe, the prehistoric seat of nomad hordes which inhabited it from time immemorial until quite recently. These lived on horseback and in tents, used mare's milk as their food and throve on the booty taken in regular incursions against northern sedentary tribes. Here the most ancient traces of aborigines are found, of the palaeolithic stage, followed by the neolithic, also traces of Aegean culture in its primitive form. Here also we learn, by the intermediary of ancient Greek colonies on the northern Black sea shore, the names of ancient peoples of Southern Russia; we are unable, however, to identify their nationality. The most ancient of them, the Cimmerians, are said to have been replaced by the Scyths (*see* SCYTHIA) and these by Sarmatians (*q.v.*). Some patriotic Russian historians (Zacelin, Ilovaisky, Samokvasov) tried to prove that these populations were Slavs but later research points to an Iranian origin (*e.g.*, the present representatives of the Sarmatae-Alani are found to be the Ossetes, who are not Slavs but a Caucasian people).

The original home of all Slavs is not to be sought in the steppe, but in the forest. Prof. Niederle states that, originating in the marshy land between the Vistula and Dnieper, the southern Slavs (Serbs and Bulgarians) descended to the Danube as early as the first century A.D. The first federation of eastern Slav tribes (Russians) appears in the 3rd–4th centuries A.D. as a powerful and numerous people called Antae, living between the Dnieper and Dniester. They were involved in the wars of the Goths and Huns and were defeated by the Avars in the 6th–7th centuries. In the 7th century appears a new conquering nomad nationality in the steppe, the Khazars (*q.v.*) possessing a certain degree of civilization. They brought under their subjection some eastern Slav tribes whose names are given in the ancient Russian annals (Severiane, Radimichi, Viatichi, Poliane). Khazar domination lasted until the beginning of the 10th century, when other nomads of Turkish descent and wilder habits—Hungarians (middle 9th century) and Petchenegs (end of 9th century) overran the steppe and broke for long the connection between Slav settlements and the Black Sea shore.

Origin of the "Russ."—The Slav forest tribes were now obliged to adapt themselves to the new situation. As a reply to the invasion of the steppe by the Turk hordes there appears a new organization of defence from the north. The defenders are the "Russ"—a "Varangian" tribe, in ancient annals considered as related to the Swedes, Angles and Northmen. Both "Russ" and "Varangians" are also known to Byzantine chroniclers (Ῥῶς, Βαραγγοι) first as Northern pirates, then as warriors serving in the imperial guard and finally (10th century) as chiefs of the caravans of traders coming yearly to Constantinople by the "Great Waterway," the Austrvegr of northern sagas, through the waterfalls of Dnieper, whose names are given by the emperor Constantine Porphyrogenetus both in "Russian" (Scandinavian) and in "Slavish" (Ῥωσσιστί and Σκλαβινιστί). Arabian writers represent the original seat of the "Russ" as an island covered with woods and marshes: this brings us to the source of the waterway mentioned: the sea of Ilmen near the ancient town Novgorod and Ladoga sea, where the river Neva has its origin. Excavations of 9th–10th century tumuli confirm the presence of northern warriors buried (or burnt) with their horses and arms, in that very tableland where four chief waterways of Russia, the Neva basin, Volga, Dnieper and Dvina converge and form outlets to the Baltic, the Caspian and the Black seas and thus determine the direction of ancient trade-routes. Numerous finds of Arabian, Byzantine and Anglo-Saxon coins (9th–11th centuries) along all these routes testify to a flourishing trade which corresponds exactly to the period of foundation of new states by northern Vikings at the one end and the florescence of Arabian and Persian Caliphates before the Mongol invasion at the other end of these trade-routes.

The First Russian Princes.—Russian legend says that the "Russ" were first asked to come to Novgorod by the local population which wanted them to put an end to their internal feuds. Rurik (Hrörekr) was the first (semi-legendary) "kniaz" (koning, prince) of Novgorod, but his companions wished to descend the Austrvegr, nearer to Byzantium, and Oleg (Helgi) settled in Kiev. The Russian Annals date the arrival of Rurik in Novgorod A.D. 862. But the first reliable datum is that of Oleg's commercial treaty with the Byzantines (911). A subsequent treaty was concluded in A.D. 945 by Oleg's successor Igor (Ingvar) together with his companions, whose signatures contain only three Slav names among 50 Norse. Constantine Porphyrogenetus gives a very picturesque description of this trade which still remained the chief business of the "Russ" dynasty. During winter the princes and their *gesiths* who distributed among themselves the towns in the basin of the Dnieper were busy making circuits among neighbouring tribes in order to force them to pay annual tribute. Their booty consisted of furs, money and slaves. As spring came they loaded their small boats "made of one single tree" (μονόξυλος) and convoyed their caravans down the Dnieper ready to ward off attacks of nomad steppe tribes. In the treaties mentioned their rights of trading in the capital were strictly defined. The "konings" extended their power over local tribes and to defend the land from nomad incursions, they constructed earthen walls on the frontiers of the steppe. The local aristocracy joined the ranks of their "drushina" (*gesith, comitatus*) and the process of assimilation began. The term "Russ" was now used to designate the southern outpost of the whole system of defence, *i.e.*, Kiev with the surrounding country. The son of Igor and his wife Olga (Helga) had already a Slav name, Sviatoslav. However, he still remained a northern Viking combined with a southern nomad

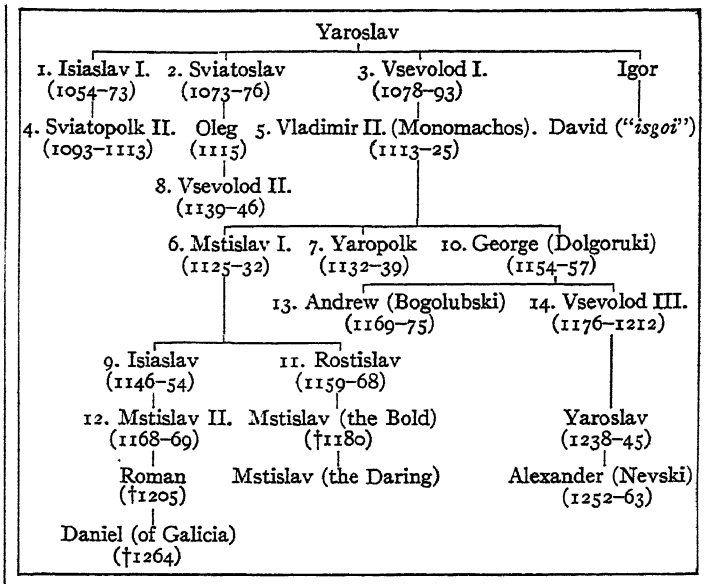
Sviatoslav did not yet feel at home in Kiev. He wanted to come still nearer to Byzantium and chose Pereyaslavets on the Danube in the Bulgarian land, because, he said "there was the centre where all goods gather from all parts: gold, clothes, wine, fruits from the Greeks, silver and horses from the Czechs and Hungarians, furs, wax, honey and slaves from the Russ." Sviatoslav also defeated the Khazars and the Volga Bulgars, but he was defeated by the emperor Zimisces and slain on his way back home by the Petchenegs (972). With him died the Scandinavian tradition of the Kiev dynasty.

II. THE CHRISTIANIZED RUSSIA UNDER THE GRAND DUKES OF KIEV

From the reign of Sviatoslav's youngest son Vladimir the Norman dynasty was definitely settled in Kiev. It still preserved its connections with other parts of Europe, attempted distant military expeditions against its Slav neighbours and ruled the large territory from the northern lakes to the nomads of the steppe and from the then uncertain Polish frontier to the river Volga and the Caucasus. This was the most brilliant period of southern Russian history; but its brilliancy rested on an extremely unsafe base, as the connection between the newly built State and the country inhabitants remained very loose. The only link which unified the subdued tribes was the power of the grand duke of Kiev. The population paid their tribute to the prince's tax-collectors; but otherwise they were left to themselves and preserved their ancient tribal organisation and habits.

Christianity Accepted.—Another element of union of enormous importance was added by the acceptance of Christian faith in 988 by Vladimir "the Saint." He took his religion from Byzantine Greeks, but the service was in vernacular as the prayer books and Bible had already been translated in Slavonic by the "Slav apostles" Cyril and Methodius in the 9th century. From 1037 the Russian Church was subject to the Constantinopolitan patriarchate; for two centuries nearly all "metropolitans" and most of the "bishops" were Greeks. Eventually the Slav and Russian element prevailed. After Vladimir's death (1015) his son Sviatopolk "the Damned" assassinated his brothers (Boris and Glec, canonised as Saints), but was defeated by another brother Yaroslav, elective prince of Novgorod, who reunited all territory under the grand duchy of Kiev and embellished his capital with a cathedral in Byzantine style. He also founded the Bechersk monastery which became a famous seat of faith and learning; he collected books and had them translated. Under Yaroslav the earliest document of Russian law was revised under the name of *Russkaya pravda* (Russian right). He gave refuge to two sons of Eadmund who fled from Cnut; to king Olaf, banished from Norway, also to Harald Hardrada (III.) who married his daughter; he gave his other daughter to Andrew, the king of Hungary; his third daughter married Henry I. of France. His sons married Polish, Greek and German wives. He died in 1054. In order to prevent feuds among his numerous descendants he introduced an order of succession to the grand duchy of Kiev which was based on the principle that all territory as a whole belonged to the family, and different parts of it were distributed among them in temporary possession according to seniority and to the profitableness of the seat of administration. The most profitable towns on the main trade-route were Kiev, Pereyaslavl (on the steppe frontier), Novgorod (the first Norman residence), then Smolensk (on the upper Dnieper) and Chernigov (on its confluent—Desna). All brothers of the first generation were considered as senior to the following generation. As soon as Kiev passed to another brother all the members of the family changed their seats and approached one step nearer to Kiev. If one died before reaching Kiev, his descendants were called *isgoi* and excluded from "mounting the scale." In the next column is a numbered table of successive reigns in Kiev during seven generations after Yaroslav.

The order of succession from brother to brother was kept only in the two first generations (1 to 5). Numbers 9 and 12 show preference given to nephews over uncles. And indeed, as early as 1097, at a conference held by the dukes at Liubech it was decided that the sons should keep their fathers' heritages. The direct succession from father to son prevailed in all dukedoms. Kiev was seen to be losing its former significance. Its great importance was based on trade; but southern trade was destroyed by the appearance in the steppe (1054) of the Polovtsi, nomads far more dangerous than the Petchenegs. It will also be seen that of all Yaroslav's sons only one line survived: that of Vsevolod and his brilliant son Vladimir Monomachos. Monomachos' line was then divided into two: the elder one (6, 9, 12) remained in Kiev and in its turn it was subdivided in two—Roman and Daniel preferred to move west from the then unsafe Kiev to Galicia, while two Mstislavs, the Brave and the Daring, as their nicknames show, remained to the end the knights errant of the chivalrous South. The cadet branch of Vladimir Monomachos (10, 13, 14) opened a new period of Russian history. The centre of influence changed then to northern woodland, far from the steppe. It was a far poorer but safer and, in the long run, more profitable settlement. In 1169 Andrew's troops stormed Kiev. This was the end of southern brilliance though Kiev was not definitely destroyed till 1240, by a last and most terrible invader, the Mongol Batu, Genghis-khan's nephew.



The Decay of Kiev.—The title of grand duke of Kiev thus lost its importance and with it broke down the unity of Russia. Ducal appanages became independent dukedoms; Russian territory was split in a dozen separate units which waged endless wars against each other. This was the darkest period of Russian history. The old Kiev centre suffered the most from these internal dissensions and from incursions from the steppe. The frontier population was nearly exterminated and mixed with Turk ethnic elements. However the ancient tribes remained untouched to the west and north of the river Dnieper. In their midst, about the 14th century appeared new branches of Russian people speaking their separate dialects: the "Little-Russians" and the "White-Russians" (the old "Krivichi").

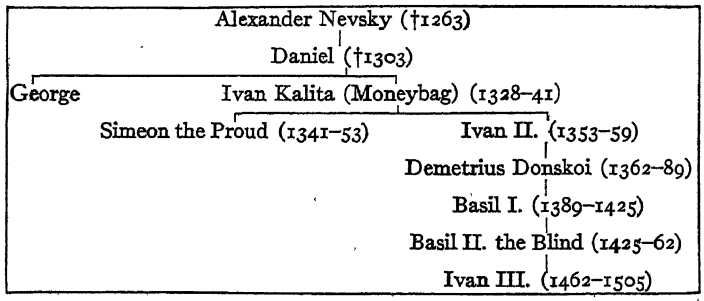
The New Political Centres.—By and by three distinct centres emerged from the chaos: Galicia, Novgorod and Moscow. Each was characterized by the prevalence of one of three main features of the political life of Russia during the Kiev period. These three features are (1) the *popular assembly* ("veche") which represented the ancient tribal organisation and which met in towns thus consisting chiefly of townsfolk; (2) the *princes;* (3) the *boyars* and the "drushin" (*comitatus*), a landed aristocracy, partly of ancient tribal descent, partly the military companions of the prince at the conquest. This aristocracy developed especially in Galicia where the social structure approximated to western feudalism. On the north-western frontier it was, on the contrary, the democratic element that prevailed. The chief city, Novgorod, became a republic. "Lord Novgorod the Great" was ruled by a popular assembly (*veche*) which elected its mayor (*posadnik*) and its commandant (*tysiatski*) and concluded treaties with the

dukes who were invited only to watch over the defence. Novgorod had a largely developed trade and enormous dominions extending from its gates and from the mouth of the Neva over the whole Russian north up to the White sea and the Urals. That country was rich in furs, the chief export. The higher class of citizens was here formed of capitalists and rich merchants who at a later date gave an aristocratic tint to the republican rule of Novgorod.

Another element existed in the political structure of central Russia: the backwoods of the Oka and upper Volga. This country was cut off from all European connections. Its population consisted exclusively of agricultural colonists settled on ducal land. Thus the duke appeared here as a proprietor and organiser of social life. Towns were scarce and the population scattered in clearings. The few *veches* in the chief towns had no influence; noble landed proprietors were completely absent. Thus the power of the duke was here practically unlimited. Ducal psychology was framed accordingly. Unlike the valiant knights of the south, they formed a dynasty of great appropriators, stingy and acquisitive, ruling their dukedoms as private estates. They thus accumulated elements of strength which as time went on aided them to become masters of the whole of Russia.

III. THE RISE OF MOSCOW

After the conquest of Kiev by Andrew Bogolubsky the title of grand duke passed from Kiev to a northern town, Suzdal, and from there to Vladimir on the Kliazma. But as early as 1147 Moscow is mentioned in the annals. Its situation was exactly at the centre of Russia between the Oka and the upper Volga. It had long been a great centre of continental river trade, far from the southern area of Tatar devastation. The line of dukes of Moscow starts from Alexander Nevsky's younger son Daniel. The following is their genealogy during the domination of the Golden Horde (1240–1480).



All these princes had to ingratiate themselves with the Khans of the Golden Horde to receive from them the *yarlyk* (investiture) as grand dukes. They regularly journeyed to Sarai, the capital of the Khans at the mouth of the Volga and underwent every kind of humiliation. But they returned as chief collectors of the Tatar tribute, which gave them power over neighbouring dukedoms. Only the dukedom of Tver competed with them very stubbornly.

The dukes themselves involved the Tatars in their feuds and brought punitive expeditions on Russia. The khan's protection gave the Moscovite dukes the upper hand over their enemies. They very soon succeeded in increasing their possessions. Ivan I. extended his domains, by purchase and by violence, over the whole province of Moscow. Demetrius added to it the upper Volga region (excepting Tver and Yaroslavl), Tula and Kasinov; Basil I. —the remaining part of Oka and Susdal, Vladimir, Murom and Nijni-Novogorod; Basil II.—Elets in the south, Vologda and Ustyug in the north. A religious sanction was given to Moscovite unionist tendencies by the metropolitans of the Russian church who in the persons of Peter, Theognost and Alexis settled in Moscow. Accordingly, the grand dukes of Moscow added to their title: "of all Russia." Demetrius won a great name by his brilliant victory over the Tatars of the Golden Horde led by Mamai in a bloody battle on Kulikovo plain (1380). He thus appeared as a leader of all the national forces (excepting the grand duke of Ryazan) against the oppressors, and he received the blessings of the church at the hand of St. Sergius of Radonesh, the prior of the convent of the Holy Trinity. However two years later Moscow was sacked and burnt by another conqueror, Tokhtamish, who in his turn was defeated by Timur, his former protector. The Mongolian yoke lasted for another hundred years, although in milder forms. While Moscow was steadily growing in importance in comparison with the rival grand dukedoms of Tver and Ryazan, the boyars and other "men of service" came in crowds to serve "the grand duke of all Russia." The institutions of Moscow which up to then resembled very much those of a large private estate, began to evolve into a system of State administration.

"All Russia" United.—Ivan III.'s acquisitions of Novgorod and Tver (1471, 1485) enlarged Russian territory up to the limits of settlements of the Great Russian branch of the nation and brought Russia into direct contact with other countries, Livonia, Lithuania and the Tatar khanate of Crimea. The title of "All Russia" became a reality, and systematic foreign relations were started. The "all Russian" potentate proffered historical claims against Lithuania which possessed a part of formerly Russian territories. The successful wars which followed extended the western frontier to Chernigov, and Novgorod Seversk, while leaving further claims for Smolensk, Kiev "and all Russian patrimony" to Ivan's successors. Ivan also built the fortress Ivangorod close to the gulf of Finland, thus opening the chapter of Russian pretensions on the Baltic. The Crimean khan Mengli-Gherai accepted his friendship and helped him to put an end to the Golden Horde. As early as 1480 Ivan refused the Tatar tribute and threw off the yoke. The title of "grand duke" seemed inadequate after all these successes; more pretentious claims were based on a new theory suggested by southern Slav and Greek divines.

Moscow—"Third Rome."—According to this the Moscovite duke was a successor of the Byzantine emperors and the only representative of the Orthodox Church in the world. Indeed, the Greek Orthodox Church had accepted the "Union" with the Catholics as early as 1439, at the Florence council, while Constantinople, "the second Rome," had been taken by the Turks in 1453. Obviously, the Greeks had been punished by God for their apostasy and their succession had to pass to the "third Rome," which was Moscow, and to the Russian grand duke, who remained the only faithful and really Christian prince in the world.

The realisation of this new scheme began by the marriage of Ivan III with Zoë (in Russian: Sofia) the only niece of the last Byzantine emperor Constantine Paleologus (1472). With her arrival new habits appeared at the Muscovite court intended to magnify the new "autocrat" (a title used by Ivan in foreign relations). The church that gave its sanction to that change claimed a reward: the prince had to help it against all "heresies" and internal dissensions. The prior of Volokolamsk convent, Joseph, insisted on burning some rationalistic heretics in Novgorod. He also defended the principle that "wealth gives power" to the Church, and he mercilessly crushed monastic and ascetic tendencies of the reformer, Nil Sorsky, the "abstainer from property." Thus the official theory on Russian Church and State was formed as early as the end of the 15th century. Under Basil III. the unification of Russian territory was consummated by the acquisition of another republic, Pskov (1510); by the final annexation of Ryazan, the last independent grand dukedom, and by a new extension at the expense of Lithuania—the acquisition of the frontier city of Smolensk (1514). The minority of Basil's son Ivan, who was three years old when his father died (1533), and subsequent disputes over the regency between rival factions, lasting 14 years, did not interrupt the growth of the Muscovite State. The reign of Ivan the Terrible marks the beginning of a new period of Russian history.

IV. THE MUSCOVITE TSARDOM

The reign of Ivan IV. (the Terrible) was an epoch of great and systematic reform. It gave its final shape to the Muscovite Tsardom which it preserved until the epoch of Peter the Great. At the age of 17 Ivan demanded to be crowned as tsar (shortened from Latin Caesar) and he connected this official assumption of title with a legend according to which the imperial regalia had been handed over to his predecessor Vladimir Monomachos by a Byzan-

tine *basileus*. The Constantinopolitan patriarch was induced to confirm that legend but he substituted Vladimir the Saint for Vladimir Monomachos in order to make good a chronological error. Popular songs preserved the memory of Ivan IV. as a democratic tsar, who "ferreted out treason" (*i.e.*, the boyars) "from Russian land." And indeed, he definitely deprived the "little dukes," who gathered at his court of their remaining sovereign rights and forced them to exchange their hereditary possessions for other landed estates, while their "service" to Moscow was made obligatory. To pass over to foreign countries was qualified as treason. The same measures were extended to boyars. Both dukes and boyars tried to recompense themselves by assuming political power in the *duma* of the Tsar, and the most powerful of them formed a "selected *Rada*" (a sort of privy council) through which they ruled the state. They summoned the first Russian *zemski sobor* (1550)—"men of all people" (*i.e.*, popular representatives), who revised the criminal code of Ivan III. They also took part in a Church council of 1551, where this code was signed and certain traditional rites in church and private life were sanctioned as specifically national. At two previous synods of 1547 and 1549 about 40 new Russian saints were canonised.

Autocratic Tendencies.—However the régime of the "selected *Rada*" did not last long. Ivan IV. resented it as an interference with his own power and he broke with the counsels of his youth. He grew nervous and suspicious and began systematically to extirpate ducal and boyars' families. To show his wrath against his enemies he left Moscow (1564) and settled in Alexandrovskaya Sloboda. He then divided the kingdom into two parts: his private *oprishnina* which he ruled personally, and the remaining "land" (*zemschina*) which he handed over to a christened Tatar, Prince Simeon Bekbulatovich. Far from suspending reconstruction, this curious division helped to reorganise the Russian ruling class—the "men of service"—on more democratic lines. Ivan IV. imitated for this purpose Byzantine patterns. He strictly regulated the connection between possession of landed estates and military obligations. His foreign policy—his long and successful war with Poland, Lithuania and Sweden in order to break through to the Baltic—also forced him to adopt reforms in the army and the financial system. Russian fusiliers (*streltsi*) and foreign mercenaries first appeared under Ivan IV. He also introduced new military taxation and ordered a first general description of taxable land (*pistsoviya knighi*) in order to make the levies proportionate to the record of lots of taxed land; here too he borrowed his system from Byzantium. At the same time he centralised the receipts of the State in a "great treasury" while separating them from his own income, which was concentrated in the "great palace." Through its four boards (the "fourths") the "great treasury" collected taxes chiefly from the north, while the peasants of the Muscovite centre had to work for "men of (military) service." The nobles received the honorary title of "courtiers" (*dvoriane*), to distinguish their upper section—the tsar's guard—from the "sons of boyars," who formed the lower section—the provincial gentry. Both "courtiers" and "sons of boyars" were yearly sent to defend the western and the southern frontiers—especially the latter, which was fortified by walls and hedge-rows (*zaseki*), to ward off the Tatar incursions. The posts of commandants for each "campaign" were distributed by the central board called *razriadni prikaz*.

The son and heir of Ivan IV., Theodore, was a weak man whom his father called more fit to be a bell-ringer in a convent than a tsar. The direction of affairs fell to the hands of his father-in-law Boris Godunov, an able man who continued the policy of Ivan IV. The Church of Russia received its independence and equality with other orthodox churches by the granting to its head the metropolitan Job of the title of patriarch at the hands of Jeremiah, patriarch of Constantinople (1589). Another important measure was intended to strengthen economically the middle landlord class created by Ivan IV. as against the boyars. Peasant labourers were forbidden to leave their estates or migrate to other landowners. All such "fugitives" who fled from their masters after 1592 (the time of the completion of government registers) were ordered back in 1597. This was the origin of legal serfdom.

Extinction of the Dynasty.—In 1598 Theodore died; after some hesitation Boris had himself elected tsar by a *zemsky sobor*. He pursued Ivan IV.'s policy of weakening the boyars. But he met with opposition on their part. The only legal heir of Theodore, Demetrius, had been killed in Uglich, the place of his exile, in 1591. But the boyars with the help of the Poles opposed to Boris a "Pseudo-Demetrius," a young and well educated man of obscure origin. Boris died (April, 1605) soon after the appearance of this pretender (Autumn, 1604), who was accompanied by Polish volunteers and aided by the Cossacks. On June 19, 1605, the impostor entered Moscow. On May 17, 1606, he was killed in a popular outbreak caused by the boyars who took advantage of the popular dislike of Pseudo-Demetrius' free habits of life and the Catholic tendencies of his Polish protectors. The old dynasty was completely extinguished. The throne of the Tsar passed to an influential boyar, Basil Shuisky (1606–1610). He gave a formal promise to the boyars "not to repeat the policy of Ivan IV." against them, *i.e.*, not to exterminate them by capital punishment, by exile and confiscation of estates, without resorting to the boyars' Court. However, the power of the boyars could not be restored; much more influential now was the rising class of small landlords, "men of service." Still more dangerous for Basil were the Cossacks and the fugitive serfs in the newly colonised south of Russia. A real social uprising was started in the south by a former serf, Bolotnikov. The ferment was rife over the south and the east. A second false Demetrius appeared and in the spring of 1608 marched on Moscow. He established his camp at Tushino, near Moscow. The boyars wavered between the Tsar Basil and the "thief of Tushino": there were many "flittings." Basil turned to Sweden for help but as soon as he received aid from Charles IX. of Sweden Charles's rival, Sigismund, king of Poland, also entered Russia as Basil's adversary and a new pretender to the Russian throne. In Sept. 1609 Sigismund appeared before Smolensk. In July 1610 Basil was dethroned by the boyars and the "men of service." The throne remained empty through internal dissensions and a real "time of troubles" set in, which lasted for three more years (1610–13).

The "Time of Troubles."—The boyars preferred a Polish candidate and together with the "men of service" they offered the throne to Sigismund's son Vladyslav. A delegation was sent to Smolensk, and Moscow voluntarily received Polish troops under Żolkievsky. A treaty was concluded with Vladyslav which secured the rights of the *duma* and the privileges of the landed gentry. A Polish dynasty might have settled in Moscow but for Sigismund's desire to keep the throne for himself. Sigismund's pretension woke up the spirit of national opposition. The second Pseudo-Demetrius at once won popularity—especially among the Cossacks and the lower classes. But in December 1610 the impostor was killed by a Tatar of his suite. The middle landlord class then took action on the urging of the Patriarch Hermogene. The "men of service" under Lyapunov and the Cossacks under Prince Trubetskoy and ataman Zarutsky blockaded Moscow; inside the town a popular uprising forced the Poles to retreat to the Kremlin. But here again dissensions arose among the besiegers. Lyapunov was killed by the Cossacks, and the men of service returned to their homes. The south of Russia was in complete disorder; crowds of Cossacks and Polish marauders dispersed all over the north. This finally decided the gentry to make a new effort and to gather a new national army which would "exclude the Cossacks and stand firm until a new sovereign is elected by all the land." Prince Posharsky was made commander-in-chief of the army and Cosmo Minin, a butcher from Nishni-Novgorod, the treasurer. All northern towns and districts sent their detachments and their representatives to the army as it advanced up the Volga. In April 1612 it stopped at Yaroslavl. As Novgorod had been taken by the Swedes, Posharsky offered the throne to Charles Philip, brother of Gustavus Adolphus. In August Posharsky's army moved southwards to Moscow. On Nov. 27 the Poles capitulated in the Kremlin, and a national candidate was set free: the young Michael Romanov, whose father, the metropolitan Philarete, a nephew of the first wife of Ivan IV., was at that moment a prisoner in Poland. All votes were at the disposal of a national tsar, more acceptable to the gentry as he did not belong to an old princely family, and young enough (he was 17) to secure the boyars against over-

bearing conduct. Michael was unanimously elected by a regular *zemsky sobor* on Feb. 21, 1613.

V. THE FIRST ROMANOVS

The *zemsky sobor* which elected Michael (1613–1645) continued its session for three years, helping the new Tsar to restore the disorganized and ravaged country. A second *zemsky sobor* was then summoned which pursued for three more years the work of pacification. The co-operation of the tsar with the representatives of different social groups was becoming a regular system. But as the third year's session began (1619) the father of Michael, now patriarch, Philarete came back from Polish captivity, and until his death in 1633 he ruled Russia as the "second lord" at the side of his weak son. The peace with Sweden and Poland was concluded at Stolbovo (1617) and Deulino (1618), with the loss of the Finnish seashore and Smolensk. But the struggle on the western, as well as on the southern frontier was far from being finished. Anticipating new conflicts the Government reconstructed entirely the army: they invited foreign commanders and hired whole regiments of mercenary infantry. To cover the increased expenses they had to introduce new heavy taxation. New registers of lots of cultivated land which had survived the devastation of the "Troubled times" were established. However, an attempt to take back Smolensk from the Poles (1632–34) proved unsuccessful and the Government did not feel strong enough to wage war with the Turks to retain Azov, a fortress on the sea of Azov which had been taken by a Cossack raid in 1642. The Russian colonization at that time went no further than the lines of Belgorod and those of Simbirsk and Zakamsk, which were fortified in 1636–56. To the south of the "Belgorod line" there developed at that very time a cross current of Little-Russian (Ukrainian) colonization from the western bank of the Dnieper. The new Cossack settlers (Poltava, Kharkov) felt the more independent from the Poles the further they went east, and in 1654 their hetman Pogdan Khmelnitsky voluntarily surrendered the Ukraine to the protectorate of the "eastern orthodox tsar." A large autonomy of the Ukraine was acknowledged by Tsar Alexis. A war with the Poles ensued, in which the Russians finally took Smolensk, occupied Vilna and Kovno and forced Lublin to surrender. But before finishing with the Poles Moscow was implicated in a war with Sweden. By the resulting peace of Kardis (1661) Russia gave Livonia to Sweden; by the peace of Andrussovo, she resigned Lithuania, but kept for herself Smolensk, the eastern Dnieper bank and Kiev (1667).

European Influence: The Raskol.—The reigns of the first two Romanovs are closely connected in home as well as foreign policy. Moral and intellectual development was steadily influenced by the increasing intercourse with Western Europe. Since the "time of troubles" foreigners had come in crowds to Moscow. The clergy objected to too close relations with these foreigners which began to have their reflection in a change of habits and even religion. Consequently, about 1652, foreigners were relegated to a suburb called "the German suburb." However, this proved still worse for the Old Russian tradition, as the European culture now formed a single and undiluted unit which strongly influenced the court and the upper social classes. Russian boyars—such as Ordyn-Naschokin, Rtischev, Matveyev, Golitsin—began to learn foreign languages, to acquire foreign books, to wear foreign clothes, to furnish their apartments with foreign household goods. Translations of foreign books increased in number from 24 in the first half of the 17th century to 94 in the second half. Tsar Alexis was especially accessible to the allurements of foreign comfort and pastime, going so far as to enjoy n private "English comedy" in German adaptations.

The national religious tradition of the 16th century appeared ntiquated. The patriarch Nikon found that certain rites of the ational Church which distinguished it from Greek orthodoxy, far rom proving Russian superiority in faith, were based on ignorant listortion of ancient Greek originals of the books of Service. He sked some scholars of the theological academy of Kiev (founded y Peter Moghila about 1625) to prepare a revised edition. The najority of the clergy declared this attempt sacrilegious, as the Old Russian saints had saved their souls according to the old books and rites. Nikon insisted on his "corrections." He invited two patriarchs (*cf.* Alexandria and Antioch) to come to Moscow and at a council of 1667 the "schismatics" were excommunicated. A long struggle began between the "old faith" and the "Nikonianism," as the official Church was now generally called. Popular masses followed the "schism" (*Raskol*) and as hopes for reconciliation passed they began to believe that the end of the world was approaching.

VI. PETER THE GREAT'S REFORM

The reign of Alexis' invalid son Theodore (1676–1682) was a sort of prologue to Peter the Great's reform. The leading part fell, under Theodore, as well as during the minority of Peter (1682–1689), to a well educated boyar, Prince Basil Golitsin. He was the favourite of Theodore's energetic sister Sophia who broke the tradition of seclusion of Russian women. After Theodore's death Sophia, with the help of the streltsi, made her brother Ivan a second Tsar at the side of Peter and assumed the regency. Peter (ten years old) was left to himself and amused himself in the neighbouring village of Preobrajenskoye with technical and mechanical arts as applied to military games. He surrounded himself with lads of his age who soon became his first regular soldiers. The ill success of Golitsin's much vaunted expeditions to Crimea (1687 and 89) gave Peter the chance to overthrow Sophia, to send her to a convent and exile Golitsin. However, as Tsar, Peter continued his free life of sport. He now became a habitué of the "German suburb," where he made acquaintance with many foreign specialists. A Swiss adventurer, Franz Lefort, initiated him into the pleasures of debauchery and became his best friend. He also encouraged Peter to extend his playing at soldiers to a real campaign against Azov. During two difficult campaigns (1695–96) Peter learnt chiefly the insufficiency of his knowledge, and Lefort urged him to complete his military and naval education abroad. Peter followed the advice: he joined his embassy in the capacity of a private working man and visited Germany, Holland and England (1697–98). He was forced to return speedily to Russia to stifle the new rebellion of the streltsi fostered by Sophia's agents.

Russia in Europe.—He then made peace with the Porte (1699), and on the following day declared war on Sweden and invaded Livonia. This "Northern War" lasted until 1721, and it proved to be the chief factor in Peter's military, financial and administrative reforms. Independently from these reforms made necessary by the war, Peter directly after his return from western Europe forced his subjects to shave their beards (which was felt as an unbearable religious offence) and to dress as foreigners. The Old-Believers ("schismatics") especially saw in it a proof that Peter was the expected Antichrist.

Peter's army was crushed by Charles XII. at Narva (1700). But while Charles was engaged in defeating Peter's allies, Denmark and Poland, Peter called up the yearly levies, created a new standing infantry, cavalry and artillery, occupied Livonia, Estonia and the mouth of the Neva, where he founded his new capital, St. Petersburg, on May 1, 1703. The "window to Europe" was thus opened. To cover his new and enormous expenses, he acquired the habit of taking money wherever he found it. He thus completely destroyed the old system of central administration, the "prikazes," and he distributed instead the financial resources of Russia directly among his generals by dividing Russian territory in eight "governments." Each "government" (gubernia) had to pay for the upkeep of a certain number of regiments. Russia thus received in 1708–12 its first regular division into provinces.

Charles XII. made the mistake of advancing from Poland to the south of Russia, instead of proceeding straight against Moscow. The Cossack hetman Mazeppa promised to help him, but was unable to raise the Ukraine. He joined Charles with an insignificant force. At Poltava (June 27, 1709) Charles was defeated by Peter and fled to Turkey. The Poltava battle produced a strong impression abroad: Russia was becoming a European state. Russian soldiers restored (August 11) the Polish throne, drove the Swedes from Pomerania and appeared in the middle of

Germany. The young Russian fleet won a naval victory over the Swedes at Hangö-Udd. Peter married his niece, Anne, to the duke of Courland (1710) and another niece, Catherine, to the duke of Mecklenburg (1716). He favoured Prussia at the expense of Denmark and Hanover. A Russian army landed near Stockholm (1719 and 1720). In 1721 peace was concluded at Nystadt; Russia received Ingermanland, Estonia and Livonia, also parts of Karelia and Finland. After that Peter accepted the title of emperor.

Internal Reform.—Peter was now free to pay more attention to internal reforms. He had to restore the central administration which he had destroyed and to bring it in harmony with his new provincial organisation. In the absence of Peter, who only once a year, at Christmas, appeared in his capital (since 1715 in Petersburg), the only central institution which ruled Russia was the "Senate." From 1711 Peter engaged foreign advisers (Baron Luberas and Heinrich Fick) to introduce into Russia the *collegia* on Swedish pattern (1718–1722). Three "colleges" managed finance: *Kammer-, Staats-* and *Revision-collegia.* Three others were to increase the productive forces of Russia: *Kommerz-, Manufactur-* and *Berg-collegia.* Three chief "colleges" stood above the others, on an equal footing with the Senate, as they represented the Tsar's prerogatives: foreign affairs, army and navy. In the provinces all the colleges were supposed to be represented, but as this proved too expensive the whole government of a *gubernia* was reduced to the single *voyevoda* of former times and to his office.

Peter was not a social reformer, but his reforms brought about great changes in the social composition of Russian society. All strata of "men of service" now melted definitely into one unified class of *dvorianstvo* (gentry), which had to pass a uniform time (the fourteen "ranks" of the "Table" of 1722) of obligatory service. Possession of landed estates lost all trace of being a remuneration for service. At the same time the different groups of land labourers, half-free and unfree, on the gentry's estates, became a unified class of serfs, subject to the poll tax, introduced by Peter in 1718–22 and collected by the landlords. Peter also tried unsuccessfully to differentiate the burgesses from other classes by organizing them in merchant guilds and introducing a kind of municipal self-government under the German name of *Rathaus* and "burgomaster" (1699–1721).

Peter's educational reforms proved premature. There had been already founded, under Sophia, a "Slavo-Greek-Latin" theological academy in Moscow (1685–87), where the influence of Kiev amalgamated with the more orthodox Greek tendencies. Peter added to it a "navigation school," led by an English mathematician, Farquharson (1701, transferred to Petersburg as the "naval academy," 1715). Both academies soon became centres of two sets of lower schools, clerical and lay, in the provinces. But they were few—about 40 of each for the whole of Russia—and they had to secure their pupils almost by force. A few hundred pupils only finished their studies here. Peter also ordered the publication of useful books—mostly translations—and he introduced the present Russian lay alphabet. But Peter's books proved too specialized for Russian readers and the language of the translations was nearly unreadable: a literary language had first to be created.

Peter's reforms did not leave untouched the sphere of religion. As the clergy was mostly opposed to his reforms, he deprived the Russian Church of its spiritual head—the patriarch, "a second Monarch." Aided by an educated bishop, Theophane Prokopovich, Peter abolished the patriarchate and put in its place the "holy synod" (1721). The "beheaded" Church was thus deprived, in the opinion of adversaries of that reform, like Stephen Yavorsky, of its legislative authority in questions of dogma.

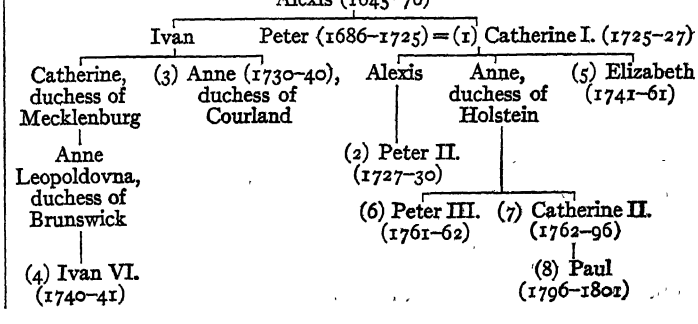
VII. PETER THE GREAT'S SUCCESSORS

Peter met with opposition in his own family: his son Alexis grew up under the influence of the clergy and obviously disapproved of Peter's reform. He fled abroad from Peter's menaces, was brought back by fraud and imprisoned on suspicion of a conspiracy against his father's life and died by torture (1718). There remained only two daughters from the second marriage of Peter with a Livonian prisoner, Martha Catherine: Anne and Elizabeth. In 1722 Peter reserved for the monarch the right to designate his successor. But at the moment of death on January 28, 1725, he failed to do so. Peter's upstarts, like Menshikov, who had everything to fear from the survivors of old nobility, resorted to the guards and with their help proclaimed Catherine. The legitimate heir, the son of Alexis, Peter, was thus put aside. The Russian throne became "not hereditary and not elective, but *occupative.*" The period from Peter's death to Catherine II.'s accession (1725–1762) was an eclipse. Male members of the Romanov dynasty, the grandson of Peter (the son of Alexis) Peter II. and his other grandson (son of Anne of Holstein) Peter III. were frail and feeble of mind. The women—both Peter's niece Anne (John's daughter) and his daughter Elizabeth —were stronger in mind and body. But they shared their power with favourites, and their choice was not always a happy one. Court life flourished under these women's reign and it became very luxurious and expensive. A special school was founded by Anne ("the corps of nobles") to teach the noble guards foreign languages, dances and good manners. Balls, theatrical plays, musical entertainments—chiefly by foreign artists—became a regular pastime. The country was badly ruled; foreign policy was venal. Russia took part in European wars with little benefit for herself. From reign to reign the noble guards gained in influence, as they practically disposed of the throne. Catherine I. (1725–27) was followed by the rightful heir Peter II. (1727–1730), owing to a compromise between Menshikov and the representatives of the old nobility. His reign was fraught with struggle between the two. But Anne, the widowed Duchess of Courland, possessed a "bad title." The aristocrats offered her the throne on the condition of limiting her power by the "supreme council" (created under Catherine I.) in questions of her marriage, succession, war and peace, taxation, military appointments, etc. Anne signed, but profiting by the guards' dissensions tore up the signed charter, and reigned as an autocrat, aided by her favourite, Biren (1730–1740). She tried to secure the succession in the lineage of her sister, the deceased Catherine of Mecklenburg, by designating as successor under the regency of Biren the baby Ivan, just born to her niece, Anne of Brunswick. After a few months the guards showed their hatred of the rule of the "Germans" by overthrowing the regency of Anne and enthroning Elizabeth, Peter the Great's daughter, who was expected to return to Peter's national policy (1741–1761). And indeed the first fruits of Peter's reforms ripened during Elizabeth's reign: national poetry, a theatre and the first Russian university which was created in Moscow (1755), all auguring a deeper culture and knowledge for the next generation.

VIII. CATHERINE II.

Elizabeth wished to secure the throne for the lineage of her sister Anne of Holstein[1] and she invited her nephew Peter, educated in the Lutheran religion and in the ideas of Prussian drill, to come to St. Petersburg, to learn Orthodoxy and Russian habits. He came and was married (1744) to princess Sophia of Anhalt Zerbst—the future Catherine II. He was no mate for her. As fast as he lost Russian sympathy by his open aversion to everything Russian, Catherine ingratiated herself by exactly

[1]The following is a genealogical table of the descendants of Peter the Great:



opposite behaviour. After half a year of the reign of Peter III., Catherine was raised by the guards officers to the throne. The brother of her favourite Grigori Orlov, Alexis, assassinated Peter as soon as he was banished to Ropsha by Catherine.

The long reign of Catherine II. (1762–1796) was a turning point in Russian history. She received the fruit of half a century's evolution since Peter the Great's reforms. A prolific writer herself, in regular correspondence with the foremost men of her age, with Voltaire, Diderot, d'Alembert, Grimm, etc., not to speak of fellow potentates, such as Frederick II., Maria-Theresa, Joseph II., she wished to make her reign brilliant and herself an ideal enlightened monarch. She began her reforms by compiling from Montesquieu and Beccaria an "instruction" (*Nakaz*) on the basis of which a new code of laws was to be composed. In order to discuss it she gathered an elective assembly of 564 deputies chosen from all classes except the clergy and the serfs, and from all parts of the empire. However, she met with opposition on the part of the gentry to her schemes to fix within definite limits their power over the serfs. Far from engaging in a struggle with the ruling class she yielded to their desires; their power was increased and a number of crown estates were distributed among the ranks of her favourites, thus turning their peasant population into serfs.

Foreign Policy.—Catherine then began to search for "glory" in foreign politics. She conceived a bold scheme: (1) to recover from Poland the western provinces with an Orthodox White-Russian and Little-Russian population and (2) to take possession of the Black sea shore, drive out the Turks from Europe and found in their place a series of new states in Moldavia and Walachia, in the Balkans and in Greece. She wished to take Constantinople and to place there her second grandson Constantine as the emperor of a new Greek empire. His very name was chosen to symbolize this project. Catherine was favoured in accomplishing at least a part of these designs by discords between two German states, Prussia (under Frederick II. and Frederick William II.) and Austria (under Joseph II., Leopold and Francis II.). In her first Turkish war (1768–1774) she had Prussia on her side and Austria against her; after Rumiantsev's victories she concluded a peace at Kuchuk-Kainardji, the beginning of the "eastern question" (*q.v.*), as by it Russia received the right to protect Turkish Christians. At the same time (1772) she took part in the first partition of Poland, proposed by Frederick in order to consolidate his territory and to compensate Russia for her war expenditure. In the second Turkish war (1787–1791) Catherine had Austria on her side and Prussia against her. She had to content herself, after the victories of Suvarov and Repnin, with the acquisition of Ochakov and the steppe between the Dniester and the Bug. But she consoled herself with new annexations from Poland (the second partition 1793 and the third partition 1795; *see* POLAND), while Prussia and Austria were busy fighting against the French Revolution. Catherine also annexed Courland (1795). Her numerous lovers flattered her imperial ambitions: the bold Gregory Orlov in her early years (1762–1775), the ingenious Potemkin in the midst of her reign (1776–1791) and the young Platon Zubov, handsome but insignificant, in her declining years (1791–1796).

Administrative Changes.—Between her two Turkish wars (1775–1785) Catherine returned to the legislative mania of her early years. Made wise by her experience with the "commission of the code" of 1767, she turned from Montesquieu to Blackstone and profited by the administrative knowledge of J. Sievers, a skilful adviser of German Baltic origin. She then published in 1775 her "statute of provinces," a good piece of organic legislation. Here for the first time in Russian history a local unit of administration, judiciary and self-government, was created. The Statute introduced a regular system of courts of justice, separate financial and administrative offices and—last but not least—corporations of local gentry meeting every three years to discuss their affairs and to elect their "marshals." This system lasted until the reforms of Alexander II. The reform of 1775 was completed by two "charters" granted in 1785 to "nobility" and to "burgesses." The charter of nobility served to perpetuate the power of the ruling class until the liberation of the serfs in 186 while the burgesses' charter laid the basis for real municip self-government.

The protection extended to the gentry inevitably created growing disaffection on the part of the serfs, who impatientl awaited their turn for emancipation. In 1773 the Yaik (Ural cossacks revolted under Pugachev, who called himself Peter II He roused the Bashkirs and the serfs allotted to the factories i the Urals, assailed Kazan on the Volga and sacked it. Throug the whole empire the peasants only awaited his coming to rise but he did not feel equal to the task, nor could his bands stan against regular troops. He therefore suddenly returned to Cossac country, lost his army, was extradited by his associates, tried an beheaded in Moscow.

Catherine definitely turned her back on the liberal ideas o her youth after the beginning of the French Revolution. Sh began to persecute representatives of the advanced opinion whic she herself had helped to create. Radischev, the author of a spirited book, *A Journey from Petersburg to Moscow*, was sentenced to death as a Jacobin in 1790, but the sentence was commuted to ten years' exile in Siberia. Novikov, a freemason who accomplished admirable educational and editorial work, was sent to Schlusselburg prison in 1792.

Paul I.—Catherine's son and successor Paul mounted the throne when he was 44, with a bitter feeling of having been deprived by his mother of his right to succeed his assassinated father, Peter III. He hated Catherine's favourites and her policy, both internal and external. His ill-balanced mind and tyrannical proclivities inspired fear in his associates, and in the sixth year of his reign (1796–1801) he was the victim of a court conspiracy. He stabilized the succession of the Russian throne by his "imperial family statute" (1797, in force until 1917). He sent Suvarov to Italy to fight against the French revolution; and he ended his reign while preparing with Napoleon an expedition to India against England. In social questions Paul's policy was also inconsistent. He alleviated the serf's obligatory work for his landlord by reducing it to three days in a week; but he gave away the peasants of the crown to noble proprietors as serfs, in an even larger number than Catherine (120,000 yearly). This did not make him, however, popular among the nobility, as his exalted idea of the divine right of the tsars caused him to treat them in a purely oriental way. He used to say that a person could be reputed of importance only as long as he was permitted to converse with his majesty.

IX. ALEXANDER I.

Alexander I.'s reign (1801–1825), like that of Catherine whom he professed to imitate, opened with attempts at a very liberal legislation (1801–5), which were interrupted by active foreign policy and wars (1806–9). There followed a new attempt at a constitutional reform (1809), hampered by the nationalist opposition, which urged and approved the annexation of Finland (1809) and of Bessarabia (1812). The invasion of Napoleon (1812) brought the national feeling to extreme tension. The following years (1813–1818) were devoted to the assertion of Russia's influence in Europe. The last years of the reign (1819–1825) were marked by a reactionary policy, which provoked the first revolutionary movement in Russia.

Alexander received a careful education at the hand of his grandmother, who wished him to inherit the throne instead of Paul, his father. The Swiss republican Laharpe had a very strong influence on him in his early years (1784–95). But this education was interrupted by an early marriage (at 16) and it did not go beyond imparting to Alexander some general ideas unsustained by exact knowledge. His sentimental feelings were cooled by the court intrigues, the hidden enmity between his grandmother and father and finally by the harsh system of Paul's reign which Alexander was expected to approve and obliged to share in. The consequence was that he grew up a past master in dissimulation and self-restraint. His evasiveness in face of other people's strong opinions was often taken for weakness. But he knew how to promote his own views and if impeded in his designs he was capable of violent explosions of wrath.

Initial Liberalism.—In the first year of his reign Alexander surrounded himself with a few friends of his youth—Novosiltsev, Stroganov, Prince Adam Czartorisky, Prince Kochucey,—a "private committee," whom he wished to help him in drafting large schemes of reforms. He at once cancelled a series of reactionary measures of Paul and declared his desire to abolish arbitrariness and to inaugurate a reign of law. Public opinion received him with enthusiasm. But the "private committee," which met regularly for about a year, found dangerous and untimely a formal declaration limiting the power of the autocrat, and abolition of serfdom. The most important fruit of these good intentions was the introduction of "ministries" instead of the colleges of Peter the Great, which had been practically abolished by Catherine. A new senate statute was intended to make this institution the highest legal authority (1802). A very cautious ukase of 1803 permitted noble landowners to liberate their serfs, granting them at the same time lots of land. Only 47,000 serfs were thus liberated and became "free agriculturists." Somewhat larger measures limited the power of landowners over the serfs in Livonia and Estonia (1804–5). A new and important impulse was given to public education which was considered to be a preliminary condition to all substantial reforms. Three new universities were created.

Since 1801 Alexander had feared the consequences of Napoleon's ambition and he took upon himself, although it had no relation to Russian national interest, to organize a new coalition against France. In 1805 and 1806 he was involved in wars which ended in crushing defeats at Austerlitz and Friedland. He then changed his policy and concluded an accord with Napoleon directed against England, whose commerce with the continent had to be forbidden in all countries which adhered to this "continental system." At his personal meeting with Napoleon at Tilsit (1807) Alexander played a part which made Napoleon call him a "northern Talma" (a renowned actor) and a "Byzantine Greek." But he was in part genuinely under Napoleon's influence, and was entangled into new wars, with Sweden—which finished with the annexation of Finland (1809), and with Turkey—which lasted for six full years (1806–12) and ended with the annexation of Bessarabia. A year later (1808) Alexander again met Napoleon at Erfurt, but Napoleon's intention to raise the Polish question did not please Alexander, while Napoleon was offended by the refusal of the tsar to give him his sister in marriage. Relations were very strained by the end of 1810.

Conservative opinion was very much incensed against Alexander's alliance with the "Corsican usurper," especially as at that very time another and more serious attempt was made to introduce in Russia a constitutional government. Speransky, a prominent statesman, whose views were favoured by the emperor at that time, prepared a scheme, based on the introduction of self-government in four stages, beginning with electoral assemblies (*dumas*) in the cantons and ending at the top with the *duma* of the State. Each lower *duma* elected deputies to the upper one: cantonal *dumas* to district *dumas*, district *dumas* to provincial ones; these latter sent all their members to the State *duma*, a legislative assembly, deprived of legislative initiative but enjoying the right to make motions concerning the interest of the State, responsibility of functionaries and violation of fundamental laws. The Senate retained only judicial power, while the newly reformed ministries remained organs of the executive. The council of State, composed of high dignitaries and presided over by the emperor, was to prepare drafts of laws. In fact nothing except the council of State and the reformed ministries was realised (1810). Conservative opinion, as represented by nobility and bureaucracy, was furious with Speransky, and the tsar did not choose to defend him. On a futile pretext Speransky was dismissed from his office of imperial secretary and sent to exile (1812). His successor was an extreme nationalist and conservative, Admiral Shishkov.

Nationalism and Reaction.—When the war of 1812 began, the nationalist feeling reached its pitch. It was to be a "Scythian" war—a war of retreat. "Time" and "space" were to be the chief allies of Russia, whose military forces were two or three times weaker than those of Napoleon. And indeed, the deeper Napoleon penetrated into Russia's endless plain the more equal the chances became. Alexander named another conservative, Kutusov, instead of Barclay, commander-in-chief, and a third conservative, Count Rostopchin, general governor of Moscow, which was the final aim of Napoleon's strategy. After the bloody but undecided battle at Borodino (Sept. 7, 1812) Moscow surrendered to Napoleon. For five weeks of his stay in Moscow he waited in vain for a peace proposal. Moscow was burnt by the inhabitants. His army was in process of dissolution, and winter was approaching. Then followed the famous retreat, during which the "Grand Army" was nearly annihilated, and the "wars of liberation" of 1813 and 1814, which brought Alexander and his army to the walls of Paris. At the Congress of Vienna (1815) he figured as a saviour of Europe, and he continued to play a leading part at Aix-la-Chapelle (1818), Troppau-Laibach (1820) and Verona (1822). All these events produced an enormous impression on the sensitive temperament of Alexander. "The fire of Moscow," he said later to the German pastor Eilert, "lit up my soul, I then got to know God and became another man." Alexander now found in the Bible the proofs of his mission and he proposed to his allies to establish a "Holy Alliance"—a monarchs' League of Nations based on the precepts of the scriptures. His intention was liberal, but Metternich made use of the idea for his policy of repression of all liberal movements in Europe.

The Revolutionary Movement.—Quite different were the impressions which the younger generation of officers who took part in the Napoleonic wars brought with them back to Russia. Many of them while abroad read political newspapers, and were present at the debates of representative assemblies. They learnt to quote the books of Delolme, Destutt-de-Tracy, Benjamin Constant, Filangieri, Bignon, etc. After their return to Russia they were shocked by the contrast of arbitrary rule, the abuses of bureaucracy, the venality and secrecy of the courts, the sufferings of the serfs and the indifference to popular education. Two secret political societies were formed by the most active of these officers in 1816–18: by Pestel in the southern army and by a group of guard officers in Petersburg—the Muravievs, Nicholas Turgenev. The former society—more radical—imitated the organisation of Carbonari; the latter borrowed their principles from the Tugendbund. Later on Pestel drafted a republican and strongly centralised constitution, while Nikita Muraviev composed a monarchical and federal constitution on the basis of those of Spain of 1812 and of the United States. Pestel's tactics were revolutionary, while the Petersburg group intended to help the government openly in questions of education, philanthropy, economics and improvement of justice, thus preparing Russia for a constitutional régime. They expected Alexander to sympathise with them, as in 1815 Alexander gave a constitution to Poland, and at the opening of the diet he mentioned that he was preparing one for Russia. He also acknowledged the old institutions of Finland. However, Alexander soon ceased to distinguish between "the holy principles of liberal institutions" and "destructive teaching which threatens a calamitous attack on the social order" (his expressions in the speech mentioned). He entirely agreed with Metternich (in 1820) that the liberal principles themselves were destructive. A period of reaction began in Russia. The transition to it was marked by an attempt to impart to Russia Alexander's religious enlightenment. The ministry of public education was united, for that purpose, with a new ministry of spiritual affairs, where all religions including the Russian Orthodox were treated equally (1817). Prince Alexander Golitsin, the procurator of the holy synod and the president of the Russian branch of the Bible Society founded in 1812, was made the chief of the United ministries. The consequence was that in 1819–21 the young universities recently opened were entirely destroyed—especially by the curators of Kazan, and Petersburg circuits, Magnitsky and Runich. They removed the best professors and prohibited good textbooks on natural law, morals and logic, on the ground that the teaching must be based exclusively on holy scripture. For Russian church dignitaries even their mystical pietism was heresy. Golitsin was forced to leave his

office, after he had been anathematized by the archimandrite Photius, a fanatic protected by Alexander's favourite and true servant Arakcheev. During the last part of the reign Arakcheev, an ignorant and brutal man, enjoyed the power of prime minister.

Under these conditions secret societies changed their character. The measures of Alexander convinced them that monarchs' promises are not to be relied upon. They were also strongly impressed by military pronunciamentos in Spain and Naples (1820). Quiroga, Riego and Pepe now became their heroes. Nicholas Turgenev recorded in his diary in 1820: "we formerly asked, every time we met the readers of newspapers in the club, whether there was a new constitution. Now we ask whether there is a new revolution." One may judge of the impression produced on the officers of the guard when they learnt that they had to stifle the Neapolitan uprising, by orders of the Laibach Congress.

The former secret "society of welfare," imitating the Tugendbund, was officially closed in 1821, as being too moderate. Two societies appeared instead: the "northern" and the "southern" constitutionalists and republicans. The constitutionalists were losing ground; radical elements even among them (like the poet Ryleev) began to prevail. Proposals of regicide were heard from Kakhovsky and Yakubovich, but they were rejected or indefinitely postponed. In any case, revolutionary tactics were considered inevitable. But no definite scheme was in preparation. Suggestions were made for forcing the tsar, at some favourable opportunity, to nominate a liberal ministry of Speransky and Mordvinov, who would convoke a "Great Council" (later on Russian revolutionaries called it a Constituent Assembly) which should decide on the form of the Government.

A favourable occasion presented itself quite unexpectedly. Alexander died in Taganrog on Nov. 20 (Dec. 1) 1825. The order of succession happened to be undecided. Constantine, the elder of two surviving brothers, had renounced the throne in 1823; but Nicholas did not wish to acknowledge this, and he swore allegiance to his brother. Constantine would not accept the throne. Nicholas threatened to leave Russia. The correspondence between Warsaw and Petersburg was thus protracted for about two weeks. The "Decembrists," as they were called later, decided finally to raise the Guard regiments for Constantine against Nicholas and to force Nicholas—in case he survived that day—to appoint a liberal ministry which would do the rest. The rising was a failure (*see* NICHOLAS). The last of Russian palace revolutions was spoilt by too much idealism; but it served as an ominous prognostication of the coming democratic revolutionary movement.

X. NICHOLAS I. AND NATIONALIST REACTION

Nicholas was quite another type of man from his brother. A rough nature of limited understanding, he was conscious of his inferiority and sincerely disliked the idea of becoming tsar. But once he was tsar, he was sure he would be enlightened from above for the accomplishment of his Divine mission and he conceived an exalted idea of his personal dignity and infallibility. But he was no mystic. Cold and reserved, he inspired fear and hatred and he consciously made use of these feelings as the instrument of his power. His aim was to freeze every germ of free thought and independent moral feeling, as disturbing agents of the order of things entrusted by God to his personal care.

Nicholas' reign can be divided in three parts by two European sets of revolutions: those of 1830 and those of 1848. During the first five years (1825–30) he did not feel quite sure of himself and he appealed for help to advisers of Alexander's liberal period, such as Kochubey, Speransky and Kankrin. He even instructed a special committee of Dec. 6 (18), 1826, to collect for him all useful hints about necessary reforms. While punishing severely the decembrists (five of them were hanged; others sent to Siberia) he wished to make use of all their good ideas. But he reserved for himself the control over public opinion, and he confided to Count Benckendorf the organization of a new secret police of gendarmes controlled by the "third section" of his personal chancery. He adopted Alexander's policy of protecting the kings from their peoples; but he made an exception for Turkish Christians (in the first place it was the Greeks). He thus carrie on a war against Turkey (1827–9). By the treaty of Adrianopl Greece was liberated; the "hospodars" of the Danubian Princi palities were to be appointed for life and free from Turkis interference in internal affairs. The Straits and the Black se were to be open.

Nicholas especially attended to education; he wished to clea it of everything politically dangerous and confine it to the uppe class. He abolished the liberal University statutes of Alexande (1804); by the new statutes of 1835 he detached primary educa tion which was intended for the lower classes from the "gym nasiums" and universities where only children of gentry and o officials were to be admitted.

The expulsion of Charles X. of France and the Polish insur rection of 1830-31 determined the "legitimist" tendency o Nicholas' foreign policy: he wished to become a real "policeman' of Europe and at Münchengratz he renewed relations with Metternich. But his excessive interest in the "sick man" in Constantinople finished by rousing Europe against him. In 1833 Nicholas saved the sultan from the Egyptian rebel Mohammed Ali and by the Treaty of Unkiar-Skelessi received for that service free passage for Russian ships to the Mediterranean, while to all other powers the Dardanelles were to be closed during war-time. This concession drew the attention of the European powers and in 1841 all the five great powers agreed that the Dardanelles should be closed to warships of all nations.

"Slavophils" and "Westerners."—In sharp contrast with Nicholas' educational policy, a new generation grew up, which was bred by Russian universities, especially Moscow university, between 1830 and 1848. They were not politicians or liberals of a Franco-English type. They were idealists and students of the philosophy of Schelling, Fichte and Hegel. In Moscow literary salons they did not discuss the form of the government, but dug deep into the very foundations of Russian history and the Russian national mind. Most of them declared that Russia was unlike Europe, and its type of civilization potentially far higher than the European one. They thought to discover Russia's peculiarity in her old peasants' commune (*mir*), which, they said, revealed the socialistic soul of Russia as unlike the individualist western soul. They execrated Peter the Great's europeanisation of Russia as a fatal deviation from the genuine course of Russian history, and they wanted Russia to come back to the forsaken principles of the Eastern Church and State—to orthodoxy and autocracy. The majority of public opinion, led by Herzen, Belinsky, Bakunin, Granovsky and others, revolted against this "slavophil" doctrine. They opposed to it their own doctrine of the "western" origin of Russian civilization. Herzen and Bakunin emigrated from Russia on the approach of the revolutions of 1848. They became the originators of Russian socialism, which however did not frighten Nicholas so much as Russian liberalism—an applied doctrine whose dangers he had experienced at the hands of the "Decembrists," whose movement in December 1825 has already been described.

Nicholas was not insensible to the chief social question in Russia—that of serfdom. How could he be when peasants' uprisings were steadily growing in frequency? They numbered about 41 in the first part of his reign, while in the second there were 378, and 137 during the last seven years. Nicholas formed a series of secret committees which, after many failures, prepared the law of 1842 on "voluntary accords" which abolished personal serfdom and fixed the amount of peasant lots and payments. Owing to Kiselev's energy, the same changes were obligatorily introduced in Poland (1846) and in some western provinces (1847). A real persecution of intellectuals began after the revolutions of 1848. A secret committee, presided over by Buturlin, was founded to punish press offences. Uvarov himself was found too liberal and resigned. His successor prince Shirinsky-Shikhmatov wished to "base all teaching on religious truth"; the chairs of history and philosophy were closed, the number of students limited; many writers arrested, exiled or otherwise punished. The private circle of followers of Petrashevsky, a young socialist, was sent to forced labour in Siberia (including Dostoyevsky) for having read and discussed prohibited literature.

The Crimean War.—Nicholas also wished to dictate his will to Europe. "Submit yourselves, ye peoples, for God is with us": thus ended his manifesto published on March 27, 1848. Nicholas sent his army to subdue Hungary which had revolted against the Habsburgs. A few years later he inadvertently provoked a conflict with Turkey, because of a special question on the distribution of holy places in Jerusalem between Catholic and Orthodox priests which he confounded with the question of the general protectorate of Russia over Christian subjects of the sultan. European powers would not admit this protectorate, and Nicholas found against himself not only Napoleon III. and England, but also "thankless Austria." Turkey attacked the advanced Russian troops on Nov. 4, 1853; France and England declared war on Russia on March 8, 1854. The courage displayed in the defence of Sebastopol proved useless, as the whole fabric of Russian bureaucratic and autocratic government appeared incapable of competing with European technique. Corruption and lack of communication, feeble development of industry and financial deficiency deprived the valiant soldiers of the most necessary means of defence. Nicholas died, from sorrow, on March 2, 1855, feeling that all his system was doomed to destruction. A wholesale change of régime was indicated to his son and successor Alexander II.

II. ALEXANDER II. AND THE "ERA OF GREAT REFORMS"

The reign of the "liberator" of serfs and Bulgarians ended with his assassination by terrorists (1855–1881). His personality partly accounts for this tragic contradiction. Alexander was a man of weak character, but good-natured and well-intentioned. He possessed no steadfast views on politics and during the reign of his father he sometimes surpassed Nicholas in reactionary intentions. But the Crimean War proved too clearly the danger of Nicholas' martinet system and public opinion was too impetuous for Alexander to resist. He swam with the current, and this period coincides with the "great reforms" which made his reign a turning point in Russian history. But Alexander was always conscious of his power as unlimited monarch, and his liberalism ended as soon as his reforms brought with them a revival of political or autonomous tendencies. He then began to waver; the reforms were left unachieved or curtailed. Public opinion grew impatient; extremist tendencies won the ground, and the gap between the Government and advanced opinion finally became insuperable. As a consequence, the original impulse for reform was exhausted as early as 1865. There followed a period of faltering which turned into a sheer reaction as the revolutionary movement grew.

Relief of the Serfs.—The greatest achievement of the era of reforms was the liberation of peasants. It paved the way for all other reforms and made them necessary. It also determined the line of future development of Russia. The chief motive which decided Alexander is clearly expressed in his words to the Moscow gentry: "The present position cannot last, and it is better to abolish serfdom from above than to wait till it begins to be abolished from below." However, Alexander met with passive opposition from the majority of the gentry; their very existence as a class was menaced. The preparatory discussion lasted from 1857 to March 1859 when the "drafting commissions" of the "main committee" were formed, composed of young officials enthusiastically devoted to the work of liberation—such as Milyutin and Soloviev and their Slavophil friends Samarin and Prince Cherkasski. Rostovtsev, an honest but unskilled negotiator, enjoying the full confidence of the emperor, was mediator. The programme of emancipation was very moderate at the beginning, but was gradually extended under the influence of the radical Press and especially Herzen's *Bell*. But Alexander wished that the initiative should belong to the gentry and he exerted his personal influence to persuade reluctant landowners to open committees in all the provinces, while promising to admit their delegates to discussion of the draft law in Petersburg. Not less than 46 provincial committees containing 1,366 representatives of noble proprietors were at work during 18 months preparing their own drafts for emancipation. But they held to the initial programme, which was in contradiction with the more developed one. The delegates from the provincial committees were only permitted—each separately—to offer their opinion before the "drafting committees." Unfortunately, Rostovtsev died in Feb. 1860. Alexander who already feared that he had gone too far in his concessions appointed as his successor Count Panin, a reactionary. Under his influence the proposed allotments of land to peasants were diminished and the rents were increased. However it was impossible to change the main lines of the draft. By the law of Feb. 9 (March 3) 1861 the peasant became personally free at once, without any payment, and his landlord was obliged to grant him his plot for a fixed rent with the possibility of redeeming it at a price to be mutually agreed upon. In that case the Government paid at once to the landowner the whole price (in 5% bonds) and the peasant had to redeem his plot by payments to the exchequer during 49 years. Although the Government bonds fell to 77% and purchase was made voluntary, the great majority of landowners—very often in debt—preferred to get the money at once and to end relations which had become insupportable. By 1880 only 15% of the peasants had not made use of the redemption scheme, and in 1881 it was declared obligatory. The landowners tried, but in vain, to keep their power in local administration. The liberated peasants were organised in "village communities" governed by elected Elders.

Administrative Reform.—After the emancipation of the peasants, the complete reform of local government was necessary. It was accomplished by the law of Jan. 1 (13) 1864, which introduced the district and provincial "zemstvos" (county councils). Land proprietors had a relative majority in these assemblies. They were given (in all Russia) 6,204 seats (48%) while the peasants were entitled to choose only 5,171 delegates and the town inhabitants 1,649 (12%). The competence of zemstvos included roads, hospitals, food, education, medical and veterinary service and public welfare in general. How much was achieved before the end of the century in provinces enjoying zemstvo government as compared with others, can be seen from the following figures:

	Provinces without self-government	With self-government
Inhabitants to each physician	83,000	35,000
Medicine distributed free (in roubles)	2,350	23,300
Yearly salary of a village physician	360	615
Hospitals for each province	7	26·6
Paupers and orphans supported by public charity	4,033	38,291
Inhabitants to each school	7,346	1,919
Buildings insured against fire	1,219	23,436

A third capital reform touched the Law courts. The law of Nov. 20 (Dec. 2), 1864, put an end to secret procedure, venality, dependence on the Government, etc. Russia received an independent court and trial by jury. The judges were irremovable; trials were held in public with oral procedure and trained advocates. Appeals to the senate could take place only in case of irregularities in procedure.

A little later came the reforms of municipal self-government (1870) and of the army (1874). General Dmitri Milyutin (the brother of the other Milyutin) reduced the years of active service from 25 to 16 and made military service obligatory for all classes. The only exemptions admitted were for reasons of education. Military courts and military schools were humanised.

The Revolutionary Wave.—The only branch of public life exempted from reform was the press. The press profited indeed by the new spirit of Alexander's reign. While in the last ten years of Nicholas' reign only six newspapers and 19 (mostly specialist) monthlies, were permitted, during the first ten years of Alexander's there were 66 newspapers and 156 monthlies. The general tendency of the press, very moderate at the beginning, soon became very radical. The leading spirits were the "nihilists"—Chernyshevsky, Dobrolubov, Pisarev; they preached extreme individualism. As early as 1862 "temporary measures" were applied against radical periodicals. Instead of a law on the liberty of the press there appeared in 1865 new "temporary rules" (which however remained in force for fully forty years) compiled from Napoleon

III.'s law of 1852. They set free from "previous censure" books of more than ten sheets, but the censors continued to seize printed books before their issue.

A new wave of revolutionary movement set in. It proceeded from the young generation of university students. They expected an agrarian revolution directly after the liberation of peasants. They were busy preparing for it working men, soldiers and peasants through popular education. Secret circles were formed, proclamations issued and even a revolutionary movement was attempted in connection with the Polish uprising of 1863. Finally, an attempt was made by a student, Karakozov, to assassinate the tsar in April 1866. All these attempts were extremely naïve; a few young revolutionaries were executed or sent to Siberia and the whole movement was stifled in its primary stage. But Alexander was frightened. Gradually he dismissed his liberal advisers, and conservatives took their place. The Home Office was given (1861) to Valuyev, who tried to paralyse the introduction of the Emancipation Law and formally prosecuted its faithful adherents. University troubles brought about the removal of the liberal minister of public instruction, Golovnin, the author of a model university statute of 1863. His successor was a reactionary, Count Dmitri Tolstoy, who found the means of salvation in the classics. The old chief of gendarmes, Prince Dolgoruki, had to give place, after Karakozov's attack, to Peter Shuvalov who became the soul of reaction. General Trepov a police martinet was appointed general governor of Petersburg instead of the humane Suvarov. Zamiatnin, the minister of justice, under whom the reform of tribunals was carried through, fell a victim to his defence of this reform against an imperial whim. He had to yield to an ignorant reactionary, Count Pahlen (1867), who nearly annihilated the reform. The same was done for the press by Timashev who superseded Valuev in 1868. Two radical monthlies *The Contemporary* and *The Russian Word* were closed (1866). Katkov, a European Liberal who now inclined to extreme nationalism and reaction, became the most influential journalist.

All this contributed to uphold and to increase the disaffection of educated public opinion. About 1869 a new young generation appeared which gave expression to that state of mind. Russian emigrants in Switzerland discussed at that time a new revolutionary doctrine which later on received the name of "Populism." Lavrov was giving it a scientific basis, but Bakunin found this too learned and plainly invited the youth to give up the study and go straight to the people with the aim of inducing disorder. He found this very easy, since Russian peasants with their "commune" were born socialists. The youth of Russia, chiefly the young girls who went to study abroad as there were no female institutes of learning in Russia, listened to these discussions in Zürich and, of course, mostly preferred Bakunin's active optimism to Lavrov's learning. In 1873 they were all ordered back to Russia by the Government and they met, when at home, with many student circles which were busy distributing books and revolutionary pamphlets among their provincial branches and working men. Nicholas Tchaikovsky, Prince Peter Kropotkin and Sergius Stepniak were among the leaders of that educational and (later on) revolutionary work. They decided, in the spring of 1874, to "go to the people"—a naïve crusade by inexperienced youth, hardly out of their 'teens, in order both to teach the people and to learn from them their socialistic wisdom. Of course they were not acknowledged by the people, in spite of their peasant attire, and were easily ferreted out by the police: 770 were arrested and 215 sent to prison. They then decided to change their tactics. A regular secret society was founded in 1876 under the name of "Land and Liberty" (or "Will"). They still hoped to provoke a mass uprising according to the "ideals of the people"; but their village settlements proved useless for revolution while in the towns they soon got engaged in a lively conflict with the police. As a result the terrorist side of their activity came to the forefront. In the autumn of 1879 the terrorist group formed their separate party "the People's Will," while the remaining members led by Plekhanov—under the name of "Black Partition" (*i.e.*, agrarian revolution)—remained inactive. A series of terrorist acts now followed, beginning with that of Vera Zasulich, who fired on Trepov for his having flogged a prisoner—and was acquitted by the jury (1878). In 1879 Solovyev fired five shots at the tsar. On Feb. 17, 1880 a young workman, Khalturin, blew up the imperial dining room at the winter palace. The police seemed powerless against the famous "executive committee" which directed the blows. And the government asked the loyal elements of public opinion for support. The answer was given, in the name of the Tchernigov zemstvo, by Ivan Petrunkevich: he said that no co-operation was possible with the government as long as public opinion was stifled. The Tver zemstvo, led by Rodichev, asked the tsar to "give us what he gave to Bulgaria" (*i.e.* constitution and political freedom). After the winter palace explosion a supreme commission was appointed under the chairmanship of General Loris-Melikov, who was given a sort of dictatorial power. Loris-Melikov's design was to isolate revolutionary elements by concessions to the Liberals, and after exterminating the revolutionaries to summon a sort of consultative assembly, thus renewing certain projects of aristocratic landowners in 1861–3. He submitted to the tsar, on Feb. 9, 1881, a proposal to appoint two "drafting committees" for administrative and financial reforms and to submit their drafts to a "general commission," where "experts" chosen by the zemstvos and municipalities should also be heard (two from each of them). The respective laws would be issued in the ordinary way by the council of State, but 15 delegates should be admitted to its session. It did not at all look like a constitution; but it might have served as an introduction to it. Fate decided otherwise: on the very day when Alexander signed Melikov's project, on March 1 (13), 1881, he was blown up by revolutionaries led by Sophie Perovskaya, on his way back home.

Foreign Policy.—Alexander II. was more successful in his foreign policy. He ascended the throne at a moment of great exhaustion and humiliation for Russia. The Paris treaty (1856) substituted European control for a Russian protectorate over Turkish Christians; the Russian fleet in the Black sea ceased to exist; the portion of Bessarabia nearest to the Black sea was given to the Danubian principalities. However, Russia did not permit Napoleon III. to make an international question of the Polish uprising of 1863; Alexander then approached his relative William of Prussia, and helped him against France in the foundation of the German empire. Russia made use of the Franco-Prussian war to repudiate the provisions of the Paris treaty forbidding her to construct naval arsenals and to keep a fleet in the Black Sea (1870). In 1872 the German, Austrian and Russian emperors met at Berlin and concluded a "three emperors' league" (without any formal treaty being signed. *See* EUROPE). However, Russia did not wish to strengthen Germany too much at the expense of France. In 1875 owing to Russia's insistence a Franco-German conflict was averted, to the great dissatisfaction of Bismarck who threatened Gorchakov with revenge. In the same year the Eastern question was reopened by a rising of Christian Slavs in Bosnia and Hercegovina (*see* EUROPE and TURKEY). In 1876 (summer) began the Bulgarian uprising. Russia proposed co-operative action to the powers, but meeting with hidden aid to Turkey from Disraeli, Alexander decided to act alone. When Serbia and Montenegro declared war on Turkey he met Francis Joseph at Reichstadt and on July 8, 1876 concluded an agreement in which all possibilities of defeat, victory or the collapse of Turkey were foreseen. Austria was to receive Bosnia and Hercegovina for "occupation and administration"; Russia was permitted to take back the lost portion of Bessarabia. A last attempt to formulate a European programme of pacification of the Balkans was made by the Powers at the Constantinople conference (Dec. 1876). After its failure Count Ignatiev visited the European capitals to discuss the possibility of war. Austria and England put as conditions of their neutrality: no attack on Constantinople, no Russian territorial acquisitions, no thrusting Serbia into war, Bulgaria, in case of its liberation, not to be under direct Russian control. Thus Russia was in advance deprived of possible gains in case of victory; as a matter of fact Disraeli looked for her defeat. Nevertheless Alexander went to war (*see* RUSSO-TURKISH WARS). Close to the walls of Constantinople the Russian army was stopped by the British fleet, and the Peace of San Stefano (March 3, 1878), favourable to the Bul-

garians, was emasculated at the Berlin conference. Russian public opinion, ignorant of the agreements concluded before the war, was much incensed against Bismarck, "the honest broker." Russia received the lost part of Bessarabia, and Kars, Ardahan and Batum in Transcaucasia. Far more important were the acquisitions of Alexander in Central Asia. From 1864 his generals were active against Kirghiz and Turkoman tribesmen who raided the unprotected frontier of Siberia. Russian soldiers marched up the Syr-Darya, subjugated Bokhara, and from there, through the desert of Khiva reached the Caspian shore. In 1867 the territory between Issyk-Kul and the Aral sea was constituted into a province called Turkestan, and in 1874 another province under the title of Transcaspia was formed of territories betwen the Amu-Darya and the Caspian sea. Russia reached the frontiers of Afghanistan and Chinese Turkestan, while in the Far East by the Treaty of Aigun (1858) she obtained from China territory running east from the rivers Amur and Usuri to the Pacific seaboard, and the naval base of Vladivostok was founded. Japan ceded Sakhalin in 1875 in exchange for two Kurile islands. In 1867 Alaska was sold to the United States, for the ridiculous price of $7,200,000.

Industrial Progress.—Under Alexander II. Russia made decisive steps towards industrialisation. The length of railway increased from 671 versts (1857) to 3,408 (1867) and 16,700 (1876). Factory production grew from 352 (1863) to 909 millions of rubles (1879); number of workingmen from 419,000 to 769,000; export of grain—from 8,859 chetverts (1860–62) to 21,080 (1872–74). In 1850 and 1857 Russia (for the second time since 1819) tried the experiment of free trade; but as it brought with it an excess of imports—a thing unusual in Russia—Reutern, the minister of finance in 1862–1878, returned to the protectionist system of Kankrin (1822–1859). He also favoured the organisation, for the first time in Russia, of private credit institutions. The ten Land Banks which were in existence at the end of the 19th century were all founded in 1871–73; there were also 28 commercial banks (founded 1864–1873), 222 municipal banks (1862–1873) and 71 societies of mutual credit (1877).

XII. ALEXANDER III.'S REACTIONARY REIGN

The thirteen years of the reign of Alexander III. (1881–94) are symbolized by a monument, the work of Paul Trubetskoi, in the square of the old Nicholas railway station in Leningrad. It shows a huge, heavy figure of a man mounting a horse which looks like a hippopotamus and yet is almost crushed by the weight of the rider. Russia overwhelmed by Alexander at the moment of its strength: such is the meaning of the symbol. At first it looked as if Alexander would continue the tradition of his father. The quasi-constitutional scheme of Loris-Melikov was discussed on March 8 in the winter palace but it met with the opposition of Constantine Pobiedonostsev, the former tutor of Alexander and his most trusted adviser. On April 29, 1881, appeared a manifesto written by Pobiedonostsev without the ministers' knowledge, in which the tsar described himself as "chosen to defend" autocratic power. At the same time a promise was made to continue Alexander II.'s reforms. Loris-Melikov with D. Milyutin at once resigned. His place was taken by Nicholas Ignatiev, a friend of the Slavophils, who promised to leave untouched the powers of the zemstvos and municipalities and to alleviate the burdens of the peasants. And indeed, in June and Sept. 1881, Ignatiev summoned the "experts" selected by the Government among liberal zemstvo men. With their help he drafted a scheme for lowering the redemption prices, abolishing the poll-tax, regulating internal colonization and land rents. The new minister of finance Bunge assisted by opening a peasants' bank. He also enacted the first factory acts (1882) and appointed special factory inspectors to enforce their application. A special commission under Kakhanov (1881–84) prepared a reform of peasant self-government based on the principle of the equality of peasants with other social classes. In May 1882 Ignatiev proposed to Alexander to summon a *zemski sobor* in Moscow of about 3,000 representatives from all classes, on the day of the coronation.

Triumph of the Gentry: Religious Persecution.—But here Katkov and Pobiedonostsev won their victory. Ignatiev resigned; Count Dmitri Tolstoy, the reactionary, took his place as home minister. His tool Delyanov enacted in his former ministry a new reactionary statute for the universities (1884). He now became the mouthpiece of the nobility and gentry, a decaying class that tried to preserve as much as possible of their vanishing power and property. In 1885 a special Bank for the Nobility was opened with the aim of preserving the landed property of the gentry from final liquidation (for debt). Then Tolstoy proposed to Pazukhin,—a sworn defender of noble privileges—to revise the zemstvo institution with the avowed aim of making the nobles' influence paramount in the country side. As a result two important laws were published, on July 12, 1889, on "land captains" and on July 12, 1890, on zemstvos. The composition of district assemblies was changed from the figures given above to 5,433 representatives of landed owners (57%), 1,273 municipal representatives (13%) and 2,817 representatives of village communities. However, the chief aim of the government was, rather than favour the gentry, to incorporate both the land captains and the executive boards of the zemstvos in its civil service by making them subordinate to the provincial governors, and destroying their representative character.

A particular feature of Alexander III.'s reign, was an increased persecution of everything dissimilar to the officially accepted national type. Dissenting sects, the Uniate Church and the Lutherans in the western provinces, Lamaist Kalmucks, Buriatts and especially Jews—suffered a systematic persecution. The press was definitely muzzled, revolutionary organizations destroyed and revolutionary movement stifled. Public opinion was silent until the great famine of 1891: from that year symptoms of a revival appeared. The new movement was entirely different from the Populism of the '60's and '70's. The Russian socialists became Marxists. Russia, they argued, was becoming an industrial country and the numbers of the industrial proletariat were speedily increasing. In fact Vyshnegradsky, minister of finance since 1887, not only continued Reutern's policy in developing the railway ($22\frac{1}{2}$ thousand versts at the beginning, $36\frac{1}{2}$ at the end of Alexander's reign) and in protecting industry (prohibitive tariff, 1891), but tried to influence the foreign market and to stabilize the rate of exchange of the Russian ruble. He also resorted to foreign capital. In 1889-94 its influx was 5,300,000 rubles, as compared with 1,500,000 of 37 years before (1851–88). However, the position of the Russian consumer who had to pay about 34% *ad valorem* for imported goods, instead of 13% as before the tariff of 1891, was much worsened. The peasants especially suffered, as the price of grain, their only article for sale, fell from 1·19 ruble per pood (1881) to 0·59 in 1894, while their allotments which had been insufficient at the moment of liberation, further diminished (1861–1900) to 54·2%. As a result their arrears of taxes increased more than five times compared with 1871–80. Vyshnegradsky tried to relieve the Treasury by increasing enormously the customs and excise. In the decade 1883–92 taxation increased 29% while the population increased only 16%. Thus elements of an agrarian crisis were increasing as the 19th century was nearing its end.

Relations with Germany and France.—Alexander III.'s foreign policy was peaceful. He wished to be himself his foreign minister: the old and haughty Gorchakov gave place to a submissive Germanophil Giers. Bismarck profited by this, and in spite of his alliance with Austria (1879) which was avowedly concluded against Russia, contrived to renew, as early as 1881, the "Three Emperors' League" of 1872. In 1884 it was renewed for three following years, and in 1887, as Austria seceded, Bismarck concluded his famous "re-insurance" treaty with Russia. All these treaties fettered Russia in her Balkan policy, but secured her against the opening of the Straits to England and even permitted to her, by a secret protocol, the military occupation of the Straits in case of necessity. As at the same time the Triple Alliance with Italy was concluded (1882), Bismarck's policy proved too complicated for his successor, and in 1890 a Russian proposal to prolong the treaty for the next six years was rejected by Caprivi. Thus the way was opened to a Franco-Russian rapprochement, while Germany was courting England, Russia's competitor in Asia, where Alexander in 1885 took Merv;

thus definitely reaching the frontiers of Afghanistan and India. In 1889 France opened to Russia her market for loans and her factories for armaments; in 1891 a French squadron was enthusiastically received in Kronstadt and the "entente cordiale" was concluded which was followed by a military convention worked out in Aug. 1892 and definitely ratified by the tsar in March 1894.

Alexander III. died on Nov. 1, 1894, in Livadia, 50 years old. His robust constitution had been sapped by constant fear of the revolutionaries, which made him live at Gatchina like a prisoner, surrounded by a cordon of police agents. A new revolutionary movement was indeed in sight which, 23 years later, was to extinguish the dynasty.

XIII. NICHOLAS II. AND THE END

There can hardly be imagined a more tragic contrast than that of the extremely complicated situation inherited by Nicholas II. and the complete nullity of the man who had to solve the problem. Like his father, Nicholas was not prepared to reign; like Alexander III. he would have preferred to live as a private man in his family circle and he hated his exalted avocation which clashed with his modesty and bashfulness. However, like Alexander III., he felt it a duty to bear the burden of autocratic power and, moreover, to preserve autocracy untouched for his successor. He had to wait long for this heir, as his marriage with princess Alix of Hesse (1894) brought him first four daughters, and when finally a son (Alexis) was born (1904), the parents had constantly to tremble for his life, as he inherited from his mother's side the dangerous disease of haemophilia. In their wish to save him at any cost they put their confidence in every kind of quack, beginning with M. Philippe, the spiritist from Lyons, and ending with the famous Rasputin. Intercourse with them finally reduced the nervous Alix to a state of religious exaltation and mystic faith in her predestined mission to save the tsar and her son from evil by obeying the precepts of God's elect.

The Struggle Begins.—Initial hopes that the "leaden coffin lid" of Alexander III.'s reign would be raised by the new tsar were very soon dispelled. When messages of congratulation were brought to the tsar by innumerable deputations on the occasion of his marriage (Jan. 17 [29], 1895) the delegates asked the tsar "that the voice of the people should be heard" and "that the law should henceforth be respected and obeyed not only by the nation but also by the ruling authorities." The tsar, instructed by Pobiedonostsev, answered: "I am aware that in certain zemstvo meetings voices have been lately raised by persons carried away by senseless dreams of the participation of zemstvo representatives in internal Government. Let all know that I intend to defend the principle of autocracy as unswervingly as did my father". The Liberals answered next day in an open letter: " 'Senseless dreams' concerning yourself are no longer possible. If autocracy proclaims itself identical with the omnipotence of bureaucracy, its cause is lost. . . . It digs its own grave. . . . You first began the struggle, and the struggle will come."

The struggle had come. In June 1896 St. Petersburg saw the first strike of 30,000 workingmen. The evolutionary wing of the Marxist socialists triumphed: here at last the "masses" had come forward with purely economic demands. In 1898 the Russian Social Democratic Labour party was formed. However, the old leaders did not approve of this peaceful and legal "economism" of the young generation. In their "orthodox" organ, the *Spark*, published abroad, they defended the political and revolutionary side of Marxism. In 1903, at a conference in London, their tendency, represented by Lenin, obtained the "majority" and "Bolshevism" (Bolsheviki = majoritarians) was created. On the other hand, the "People's Will" party was revived under the name of Social Revolutionaries with a new programme in 1898. They remained true to their two leading ideas; agrarian revolution and terrorism. Agrarian riots began two years later in southern Russia. In 1899 began also student disorders which were answered by the minister of public instruction Bogolepov, by the menace of military service for delinquents. On Feb. 27, 1901, Bogolepov was killed by the student, Karpovich. On April 15 the home minister Sipyagin was killed by Balmashov. Pobiedonostsev recommended Plehve for his successor. Plehve had to struggle not only against the agrarian uprisings, but also against moderate elements—the zemstvo Liberals and the radicals of the liberal professions (professors, lawyers, journalists, engineers, the so-called "third element," officials of the zemstvos, etc.). They formed a secret "Union for Liberation" and from July 1902 published their weekly, *Liberation,* abroad. The number of persons accused of political crime rose from 919 (1894) to 1,884 (1899) and 5,590 (1903). The minister of finance, Witte, tried to oppose Plehve's policy, but was dismissed in Aug. 1903.

The Russo-Japanese War.—Witte's removal proved especially fatal for Russian policy in the Far East. William II. suggested to Nicholas the idea that Russia's true mission was in Asia, not in Europe. The trans-Siberian railway (begun 1891) presented new facilities for penetration, especially when a treaty with Li Hung-Chang (May 1896) secured its extension by the East China railway and in May 1898 a new lease was received to construct a branch through Mukden to Port Arthur which six months before had been occupied by the Russian fleet. A chauvinistic guard officer, Besobrasov, profited by Nicholas' confidence to cover with the tsar's protection his concession for cutting wood on the Yalu river. Many " patriotic" courtiers, grand dukes and the tsar himself acquired the bonds of the "Eastern Asiatic Industrial Society." Japan objected to the occupation of the left bank of the Yalu. As Count Ito received no satisfaction in Petersburg, he went to London and concluded (1902) a five years' alliance with England. Russia was then obliged to withdraw her troops from Manchuria and promised to do so before Oct. 8, 1903. The promise was not fulfilled. The war party, led by Besobrasov and Plehve decided against Witte for war. They knew nothing of Japan's readiness for war and were stupefied by the famous night attack of Feb. 5, 1904, on the Russian fleet in Port Arthur (*see* RUSSO-JAPANESE WAR).

The First Revolution.—The revolutionary movement found new substance in Russian military defeats. Patriotic feeling began to turn against the government. The war grew extremely unpopular. Plehve, who had wished to divert public attention from the internal situation by war, was blown up with his carriage in July 1904. After much wavering Nicholas appointed on Sept. 8, 1904, Prince Sviatopolk-Mirsky as successor to Plehve. Public opinion was delighted. The liberal zemstvo men met in Petersburg, on Nov. 19 (22), 1904, in private and worked out a petition to Nicholas asking for inviolability of the person, freedom of conscience, of speech, of meeting, of press, of association and equal civil rights. The majority also asked for "a regular popular representation in a separate elective body which should participate in legislation, in working out the budget and in controlling the administration. The professional groups (*see* above) organized banquets to support the zemstvo programme. Nicholas still wavered. His ukase of Dec. 12 (25), did not go beyond general promises and kept silence over the representative assembly. The chance of peaceful compromise with moderate constitutionalists was passing by. The revolution began.

On Sunday, Jan. 9 (22), 1905, many thousand working men, led by the priest Gapon, marched with ikons, singing religious songs, to the winter palace to speak to "their tsar." But the tsar was absent; the troops fired on the defenceless crowd and killed about a thousand people. Sviatopolk-Mirsky resigned. Bulighin, a bureaucrat, was appointed his successor. As a reply, Grand Duke Sergius was blown up in the Kremlin of Moscow by the Social Revolutionary Kaliaev. The tsar still wavered. He issued a promise merely to summon "the worthiest persons" to share in the drafting and discussing of laws.

Meanwhile, public excitement was growing, fanned by the news of Tsushima (May 27–28). The constitutional and the revolutionary movements began to separate. Constitutionalists (zemstvo men and "Liberation Union") held their congresses and prepared drafts of constitutional Laws. After Tsushima they sent to Nicholas a deputation which repeated the demands of the November petition of 1904, and received (June 6–19) the answer, that the "tsar's will was unshakable." Two weeks later Nicholas

promised to another delegation of the nobility that he would keep the tradition of the past. On Aug. 6 (19) a law conceded a "*duma* of the empire." But it was to be a consultative chamber, composed of class delegates, representing peasants (43%), landed proprietors (34%) and burgesses (23%). This *duma* was only entitled to prepare drafts of laws for the council of State. This, "Bulighin's constitution," provoked general indignation. Its only result was to give the upper hand to revolutionary elements (the Socialist Parties). There was now no end to meetings, workmen's and students' strikes, agrarian uprisings, which finally, on Oct. 10–14, united in one general strike all over Russia. From railway employees it spread to post and telegraph personnel, factories, shops, business offices and even children in primary schools. Communication with the provinces was interrupted; Nicholas was isolated in his summer residence at Peterhof. On Oct. 14 (27) a soviet (council) of workmen's delegates was formed whose vice-chairman was Trotsky. On Oct. 15 (28) the Constitutionalist Democratic ("Cadet") party was founded, which included the radical wing of the zemstvo men and the moderate elements from the "Liberation Union" and other professional unions. The common aim of the left wing of public opinion was a constituent assembly elected on universal suffrage and leading to parliamentary government.

Nicholas thought of abdication. But he was saved by Witte who had just concluded (Sept. 5) the peace with Japan at Portsmouth and was generally expected to become a peacemaker inside Russia. On Oct. 17 (30) Nicholas signed the famous Manifesto prepared by Witte (now a count) and published it together with Witte's report, in which the necessity of concession was laid down. The Manifesto promised a "real" inviolability of person, freedom of thought, speech, meetings and associations. "No law was to be enacted without consent of the *duma*." But the word "constitution" was not used: the tsar retained his title of "autocrat" (*sanoderjets*). He openly favoured the newly formed reactionary organization of "the Union of the Russian People." Then a wave of absolutist demonstrations and Jewish pogroms organized by the police followed, in a few days, the short-lived outbreak of enthusiasm elicited by the tsar's concessions.

The Decisive Counter Blow.—Witte was made prime minister of a unified cabinet. But he could not persuade liberal leaders to enter his cabinet as the situation remained extremely uncertain. His minister of interior, Durnovo, was a reactionary. Pobiedonostsev resigned (Nov. 1), but General Trepov was retained in near proximity to the tsar. Agrarian troubles reached their height in November, and Count Witte proposed to his minister of agriculture Kutler to prepare a draft of law on the basis of the expropriation of the landowners. It roused against Witte the nobility, who also founded their "Union." On the other hand Witte had to fight against the revolutionary movement which found its headquarters in the Petersburg soviet of workmen's delegates. The soviet published decrees and tried to play the part of a second government. Trotsky, backed by Lenin, preached a "permanent revolution." However the policy of the Socialist Parties definitely alienated the sympathy of the possessing class. On Dec. 3 (16) the Soviet with all its members present was arrested. Its substitutes replied by an armed uprising in Moscow (Dec. 7 [20]). Until the 13th (26th) there was disorderly shooting in the streets; then the guard regiments came down from Petersburg and the rebels were dispersed. There followed the so-called "punitive expeditions" led by Generals Min, Rennenkampf, Möller-Zakomelsky which exterminated with ruthless cruelty what remained of the revolutionary movement in Russia and Siberia.

This decisive blow at the revolution weakened also the constitutional movement. Witte was losing ground. A certain extension of electoral right, especially in the towns (Dec. 11 [24]) was his last success. The predominance of peasant deputies remained untouched as the peasantry was considered more conservative and reliable than the nobility. Witte promised to the tsar a pliant *duma*. He dismissed Kutler, but he refused to promise to dissolve the *duma* if it raised the agrarian question, a measure proposed by his competitor, the former home minister Goremykin. Nicholas was encouraged to resistance by the repression of the revolutionary movement. He assured the deputations of the "Union of Russian People" that "the sun of Truth will shine bright over the Russian land" (Jan. 1906) and that his "autocracy will remain unchanged as it had been of old" (March).

The fate of Witte was sealed when the elections, which he left comparatively free, gave the majority to the Constitutional Democrats (the "Cadets") together with peasants who wanted a radical agrarian reform. The Socialists, who still hoped for a revolution resulting in a real "constituent assembly," decided to boycott the elections. Witte resigned after having rendered the tsar his last service: he concluded a loan in France, which made the tsar free to deal with the *duma* as he liked. Just before the *duma* met (April 27, 1906) new "Fundamental laws" were published which curtailed its power (*see* DUMA) while leaving to the tsar an extensive prerogative and to the council of empire, equal rights in legislation and the budget. The Government preserved the right of extraordinary legislation, without the *duma*, in emergency.

The Dumas.—Under these conditions the struggle was unequal. The dissolution of the *duma* was assured when in its address to the Throne it proposed its own programme of embodying into laws and enlarging the liberal promises of the October manifesto. After much delay Goremykin declared the programme "inadmissible." He received a vote of censure, which was, however, of no consequence. There was an avalanche of questions and interpellations in order to expose and to restrain the arbitrary rule of the bureaucracy—but all in vain. The Government answered by practically boycotting the *duma*. Then, a long debate began on the agrarian project introduced by the Cadets, on the basis of partial expropriation of big landed estates. The Government published a sort of counter project and warned the country not to believe in the *duma's* promises. The *duma* replied by a declaration which was interpreted by the Government as an illegal appeal to the country and served as a pretext for dissolution. On July 9 (22) the delegates found the Taurida palace locked and surrounded by army detachments and artillery. About 200 of them moved to Viborg in Finland in order to protest and to invite the people to passive resistance in case no new *duma* were convoked. On the other hand, the congress of the "United Nobility" demanded the changing for their benefit of the electoral law by the mere will of the tsar, in violation of the "fundamental laws." Stolypin, who had dissolved the first *duma* and took the succession of Goremykin, did not dare to do so. But he tried instead to solve the agrarian question by means of emergency legislation. His scheme was to increase the lots of the well-to-do peasants at the expense of the poorer ones by dividing the communal land at the first request of the former, and thus to avert the danger of expropriating the estates of the nobles (edicts of Oct. 2 and Nov. 22). He also set up field court martials to pronounce death sentences against the remaining revolutionaries (Sept. 1).

The second *duma* was convoked for March, 1907. In spite of all pressure on electors, it turned out much more radical than the first. The Cadets' representation sank from 187 to 123, while the Socialists, who this time took part in the elections, rose from 26 to 83, and the "Labour Group" (mostly peasants) rose from 85 to 97. Both extremist groups of urban and agrarian socialism thus nearly formed the majority, while there were, on the right wing, only 34 Octobrists (a party of landlords and rich merchants, formed soon after the "Cadets" with the Government's connivance—they professed to be constitutionalists) and 63 nationalists and avowed autocratists. However, the new majority was not so confident as had been the first *duma*, and shared the cautious tactics of the Cadets. The "United Nobility" was afraid of that moderation. They now induced Stolypin to prepare a new electoral law and only sought for a pretext to dissolve the *duma*. They found it in the lack of desire of the *duma* to denounce revolutionary terrorism and in the propaganda of the Socialist Democratic Party. On June 3 (16) the *duma* was dissolved and at the same time a new electoral law was published which partly disfranchised the nationalities (especially the Poles) and gave pre-

dominance to the representatives of the gentry.

Extreme pressure was used during the elections to the third *duma* (1907–12), as well as to the fourth one (1912–17). However, the government did not succeed entirely in stifling the opposition groups. The party composition of the two last *dumas* was as follows:

	3rd	4th
Right wing:		
Extreme right	52	65
Nationalists	93	88
	145	153
Centre:		
New (Nationalist) center	..	32
Octobrists	133	98
	133	130
Left wing (opposition):		
Poles and Mussulmans	26	21
Progressives	39	48
Constitutional Democrats (Cadets)	53	59
Labour Group	14	9
Social Democrats	14	15
	146	152

At the beginning of the decade of *duma* activity Stolypin worked with the leading group of Octobrists and their leader Guchkov. By that co-operation Stolypin was able to pass his agrarian laws and the nationalist bills depriving Finland of the last remains of her autonomy. It was the consummation of Nicholas' policy against Finland which had cost the life of his general governor Bobrikov in 1904. Poland was deprived of a part of Kholm territory. Measures were taken against the Ukrainian national movement and against the Jews, with the acquiescence of the *duma*. However, on the questions of the reconstruction of the army and navy Guchkov took a sharp line against the Government and the grand dukes, which incensed the tsar and seemed an attack on his prerogative. It made Stolypin go to the side of the Nationalists—a party newly created with the pecuniary aid of the Government and thus very submissive, led by Count Vladimir Bobrinsky and Paul Krupensky. On the other hand the Octobrists approached somewhat the Cadets and worked together on questions of foreign policy and the budget. An open conflict with Stolypin took place in 1911 over his reckless use of emergency legislation in order to break the opposition of the legislative institutions, including the upper house. As soon as Stolypin lost his credit with the *duma* he was no more needed by the tsar, who still cherished the hope of complete freedom from the *duma*. The assassination of Stolypin (Sept. 14, 1911) by a revolutionary, Bogrov, did not elicit any expression of regret from the tsar and was ascribed by rumour to a police plot.

The elections to the fourth *duma* were so arranged by the Government as to give an overwhelming majority of Nationalists who would then ask for the transformation of the *duma* into a consultative chamber. At the court Rasputin enjoyed already a paramount influence, and the tsarina began to meddle in politics with the aim of strengthening the weak tsar against all risk of concessions to constitutionalism, and also preserving autocracy unimpaired for her son. However, the results of the elections were a disappointment: the opposition increased in number and authority; the right wing of autocratists was merely equal to it; and there was no strong centre to lead the *duma*.

War and Opposition.—The beginning of World War brought nearly all parties together in a patriotic cry for a "sacred union." But the government did not know how to make use of this disposition of mind. It continued its exasperating internal policy and tried to do without the *duma*. Their situation was so much the worse when the Russian retreat began and the army proved unprepared. The war minister, Sukhomlinov, and other reactionary ministers were then dismissed and the *duma* was summoned for Aug. 1, 1915. The *duma* was empowered to control the supply of munitions through their members in a special committee together with the "Union of the Zemstvos" led by Prince Lvov. The *duma* found finally its majority: but it was the majority of a "progressive block" which proposed to the tsar a national coalition government "possessing the confidence of the country" and a programme of reforms necessary to appease the country (Aug.–Sept. 1915). Unhappily there was no Witte to advise the tsar. Goremykin was only a courtier and he made the tsar answer by a prorogation of the *duma* and by the expulsion of all liberal ministers who favoured the idea of a national cabinet (Sept. 16).

Thus the last chance of a peaceful solution was lost. The *duma* could no more lead public opinion, which turned to revolution. The chiefs of the army were this time on the side of the *duma* and public opinion, as they did not believe in the possibility of victory as long as this régime lasted. The universally hated Goremykin had to resign when the *duma* met (Feb. 2, 1916); but his successor—the old master of ceremonies of the court Stürmer, an ignorant and a comic figure, especially when he was made successor of Sazonov in foreign affairs (July), only contributed to discredit the whole system and to demonstrate its weakness. As the tsar had made himself commander-in-chief instead of Grand Duke Nicholas and was absent at headquarters, the tsarina took the lead in Petrograd (the new wartime name of the capital). She surrounded herself with an adventurous crowd of irresponsible advisers, the friends of her great "friend," Rasputin. The *duma* was at last summoned on Nov. 14. She poured her wrath on Sturmer, who had to go, and on Protopopov, her former vice-president who passed through the antechamber of Rasputin to get the post of home minister. Sturmer's successor A. Trepov was hissed by the *duma*. Warning on warning came to the tsar even from grand dukes and foreign diplomatists, insisting on serious concessions to the people in order to prevent revolution. But the tsar, hypnotised by the tsarina, would not listen. On Dec. 17 (30) Rasputin was assassinated by Prince Yussupov, husband of the emperor's niece, and Purishkevich, the leader of the extreme absolutists in the *duma*. Not even that blow could change the obstinacy of Alexandra Feodorovna. Protopopov seemed to wish to provoke an outbreak. In certain circles a scheme for the tsarina's arrest and the tsar's abdication were being discussed. The meeting of the *duma* had been postponed until Feb. 14 (27), 1917. Disorders in Petrograd began during its session, and on Feb. 26 (March 11) the *duma* was prorogued. The following day was the first day of the revolution.

BIBLIOGRAPHY.—*General works.* Good general reviews of Russian history have appeared recently in the chief European languages. Very useful and full of information (extensive bibl.) is Sir Bernard Pares' *A history of Russia* (1926). Karl Stählin's *Geschichte Russlands von den Anfängen bis zur Gegenwart* is based on thorough special study; the exposé is embedded in learned criticism. Vol. 1 (Stuttgart) goes up to Peter's birth: two more volumes are to follow. There is about to appear (1929) in French a *Russian History* in two volumes by Russian historians (Kiesevetter, Miakotin, Miliukov and others). In Italian: *Storia della Russia* by Prof. Eugenio Smurlo (vol. 1, *Dalle origini a Pietro il Grande* 1928). Earlier productions which still preserve their interest are A. Rambaud, *Histoire de la Russie, revue et complétée jusqu' à 1917 par E. Haumant* (1918, good bibl.); V. O. Klyuchevsky, the renowned Moscow historian, *Lectures* (5 vols., in Russian, abridged Eng. tr. by C. J. Hogarth, 1911–13); R. Nisbet Bain's series of well informed books: *Slavonic Europe; a political history of Poland and Russia from 1447 to 1796* (1908 Cambridge historical series); *The First Romanovs, 1613–1725* (1905); *The Pupils of Peter the Great 1697–1740* (1897); *The daughter of Peter the Great 1741–1762* (1899). K. Waliszewski has issued a similar series (brilliant, but sometimes superficial) *Ivan le Terrible; La crise révolutionnaire 1584–1614* (1906), *Le berceau d'une dynastie, les premiers Romanovs 1613–1682* (1909), *Pierre le Grand* (1897), *L'Héritage de Pierre le Grand; La Dernière des Romanov, Le Roman d'une Impératrice* and *Autour d'un trône* (Catherine II.), *Le fils de la Grande Catherine, Paul I.; Alexandre I.* (2 vols.). *See* also the works of Alexander Brückner: *Geschichte Russlands bis zum Ende des 18 Jahrhunderts* (Gotha, 2 vols., 1896–1913; continued by C. Mettig); *Peter der Grosse; Katharina die Zweite* (both in Oncken's *Allgemeine Geschichte*); Schiemann. *Russland, Polen und Liefland bis im XVII. Jahrhunderts* (Oncken's *Allg. Gesch.*) and his *Geschichte Russlands unter Nikolaus I.* (3 vols., 1904–13).

For the history of the 19th and 20th centuries *see* Kornilov, *Modern History of Russia* (good and reliable, New York, 1916); B. Pares, "Reaction and revolution in Russia 1861–1909" (Chapters 12 and 13, Cambridge Modern History); A. Pypin, *Diegeistigen Bewegungen in Russland in der ersten Hälfte des Jahrhunderts* (1894); Skrine, *Expansion of Russia 1815–1900* (Cambridge Historical Series, 1915); Sergius

Korff, *Russia's foreign relations during the last half-century* (N.Y. 1922); Paul Miliukov, *Russia and its Crisis* (Chicago 1905); G. H. Perris, *Russia in revolution* (1905); Rienstock, *Histoire du movement révolutionnaire en Russie,* I. (1920); Alfred von Hedenström, *Geschichte Russlands von 1878 bis 1918* (1922, not quite reliable). O. Hötzsch, *Russland 1904–12* (1913). Excellent general descriptions by Sir Donald Mackenzie Wallace, *Russia* (Rev. ed., 1912); Leroy-Beaulieu, *L'Empire des Tsars* (1881–89 4th ed. rev. and augm. 1897–98, 3 vols.); Masaryk, *The Spirit of Russia* (1915; German edition: *Russland und Europa,* Jena, 1913, 2 vols). P. Miliukov, *Essais sur l'histoire de la civilisation russe* (First vol. only 1901, German ed.: *Skizzen Russischer Kulturgeschichte,* Leipzig).

For the latest events see: *La chute du régime tsariste, Interrogatoires des ministres etc.* (Paris, 1927); Miliukov, *Russia to-day and to-morrow* (N.Y., 1922). German enlarged ed. *Russlands Zusammenbruch* (2 vols. 1925); A. Sack *The Birth of the Russian Democracy* (N.Y. 1918); *Lettres de l'Impératrice Alexandra Feodorovna à l'Empereur Nicolas II.* (Paris 1924); *Documents of Russian History 1914–1917* ed. by Frank Alfred Golder (the Century Historical series 1927) and *Russia* by Nicholas Makeev and Valentine O'Hara (The Modern World series 1925). For memoirs, *see* those of Count Witte (Paris, 1921), Kropotkin (London, 1906), Pobiédonostsev (Paris, 1927, correspondence), Maurice Paléologue (*La Russie des Tsars pendant la grande guerre,* Paris, 3 vols.), Sukhomlinov, Kurlov (*Das Ende der Russischen Kaiserthums,* 1920), Isvolsky (Paris, 1923) etc. (P. M.)

THE RUSSIAN REVOLUTION: MARCH–NOVEMBER 1917

In the case of every great revolution the accretion of legend is bound to precede the work of historical investigation. And the bigger, more fundamental and more dramatic the revolution, the more difficult it is for the historian to brush aside the legend. Finally and definitely to get rid of it is almost impossible. Some elements of it become indeed so popular, so endeared to the imagination that they are almost ineradicable.

Up to quite recent times legend had taken complete control of the Russian Revolution and it is only lately that critical investigation has begun to substitute for it a solid basis of historical facts. Although it is safe to say that every phase of the Revolution has been distorted by passion and prejudice it was the beginning of the great event which suffered most from the mythopoeic principle. Two diametrically contradictory versions of what happened were current. According to one the Revolution was introduced by the enemy (Germany) with the obvious aim of bringing down the already undermined imperial régime and in this way of destroying the war-aims of the Triple Entente. According to the other the Revolution was provoked by the Russian Government itself in order that it might be crushed before it could fully muster its forces. It is sufficient to oppose these two versions; to reject them both as absurdities. To believe in the possibility of importing a revolution even in normal circumstances would be childish enough; but to credit it in time of war, when even to receive a foreign newspaper is almost impossible, would be the very height of absurdity. And yet in the case of the Russian Revolution people for want of a better explanation were ready to accept the theory that the upheaval which in five days swept away the monarchy and secured the allegiance of the entire nation had been organized and staged in Germany. The rival theory, which attributed the outbreak of the Revolution to deliberate provocation on the part of the Government, is equally preposterous, even if all allowances are made for the sinister influence of the hysterical empress and her circle and for the possible madness of the chief minister Protopopov.

The Russian Government at this time was guilty doubtless of the maddest and most unaccountable actions and this criminal incompetence necessarily contributed impetus to the revolutionary movement. The deplorable handling of the food question or the sudden arrest of the Worker representatives on the All-Russian Munition Committees are notorious cases in point. But such blunders as these can hardly be construed as deliberate provocation of Revolution. That the Government had prepared a plan for fighting the Revolution has never been denied. But whatever plan Protopopov had prepared was obviously designed to fight a post-War Revolution; and, madman though he may have been, he scarcely deserves to go down in history as the *agent provocateur* of the Russian Revolution.

The stark historical truth is that nobody either organized or provoked the Revolution. Even when the Revolution was in full swing few persons suspected that it had actually begun. All eye-witnesses of the events of the few days prior to March 11, 1917, when the Petrograd garrison suddenly went over to the side of the people, are unanimous in declaring that its previous movements lacked any semblance of organization or leadership. The strike of the Petrograd workers and the manifestations in the streets were purely elemental in character and merely voiced an aimless expression of dissatisfaction. The same testimony to the unexpectedness of the Revolution is borne by the mass of new documents which have recently been released from the State and Party archives. That the Revolution was neither organized nor expected by any of the existing parties or political groups is now established beyond question. This is the more surprising as not only was the possibility of a Revolution breaking out freely admitted, but it was almost taken for granted that it must break out if the War were lost or if radical constitutional reforms were delayed.

The Duma.—The attack made by the Progressive bloc of the Duma on the autocracy was in fact animated by their conviction of the double danger in which the country stood from defeat in the field and from revolution following on such defeat. They demanded the establishment of a constitutional government, a government "invested with the people's confidence" and their underlying aim was to forestall the Revolution. They were indeed so opposed to any semblance of revolutionary activity on the part of the masses that again and again they refused to countenance strikes or demonstrations which had been organized with the very intention of supporting the Duma's demands. Even a fortnight before the Revolution broke out they seriously quarrelled with their "friends from the left," the leaders of moderate labour opinion, for calling upon the workers to celebrate the re-opening of the Duma on Feb. 27 by making a sympathetic demonstration in front of the Taurida Palace. This aversion to exploiting the collective activities of the workers was not due to any *prima facie* objection to using revolutionary methods but solely to fear lest the masses should get out of hand, it being an axiom among the Russian intelligentsia that the working classes once aroused would make the full plunge to anarchy.

It was this fear of invoking popular support that throughout the War paralysed the efforts of the bourgeois parties in their struggle for power. This was what made the Duma's fight against tsarism so wasteful and ineffective. Reluctant to rely on the support of the masses the bourgeoisie was not strong enough in itself to challenge the Government; while to call in the masses was dangerous as likely to rouse the spirit of mob violence. This was the Duma's dilemma, to steer successfully between the Scylla of autocracy and the Charybdis of anarchy. Ministers accordingly were quick to realise the difficulty in which the Progressive bloc found itself and became less and less afraid of its attacks.

Schemes for a Court Revolution.—By the end of 1916 the attempt to bring down the Government by constitutional means had obviously failed. This failure compelled the more active and impetuous of the Liberal patriots to consider whether it was possible to realise their aims by a military *coup d'état* and a Court revolution. The initiative in this matter was notoriously taken by prominent officers at the front who were in close touch with the headquarters staff. The propaganda in favour of a Court revolution was started by General Krymov, the officer who subsequently commanded the army sent by General Kornilov in Aug. 1917 to suppress the government of Kerensky and to establish a military dictatorship. Only a few of the Liberal leaders seem to have been personally associated with Krymov's scheme; but sufficient documentary evidence exists to prove that the Progressives in the Duma were at least taken into confidence by the conspirators and were considering the formation of a cabinet in case the plot succeeded. Such members of the higher command as Generals Brusilov and Russky were favourably inclined to it and there are indications that even General Alexeyev the chief of the tsar's staff was aware of it. The complete scheme of the Krymov conspiracy was revealed by Nicholas Guchkov the war minister in the Provisional Government, in the evidence which

he gave before the tribunal set up for investigating the criminal record of the ministers of the old régime. The idea according to Guchkov was to seize the tsar as his train was proceeding from headquarters to Tsarskoe-selo, to compel him to abdicate in favour of the tsarevich with the Grand Duke Michael as Regent, to arrest the tsar's ministers with the help of the Preobrazhensky Guards, and then to proclaim the abdication simultaneously with the names of the new Duma ministers. This Court Revolution which was planned to take place in the early months of 1917 was first postponed by the strikes and unrest which prevailed at that time in the capital and was finally rendered abortive by the success of the March Revolution. The Krymov episode shows conclusively indeed that, however impatient moderate parties may have been at the Government's resistance to constitutional reform, they were entirely innocent of any intention to organize the masses for revolutionary action.

The Bolshevik Party.—The only party, in fact, which was and is persistent in claiming credit for a share in the organization of the 1917 Revolution is the Bolshevik party. They are now producing a mass of literature in support of this contention; but in all this mass it is difficult to find the slightest proof of their claim. True, Lenin and other leaders, who were at that time abroad, were formulating views as to the possibilities of revolution which were subsequently acclaimed as prophetic. But these views and the manifestos issued by the Zimmerwald Conferences[1] organized by Lenin could not be propagated in Russia owing to the fact that the Bolshevik members of the Duma and almost all the minor leaders had been arrested and banished to Siberia. Indeed what these writings prove is that the few Bolshevik agitators remaining in Petrograd including Shliapnikov, the representative of the Central Committee of the Party, were as little aware as the Mensheviks or the Liberals that the strikes, started early in March 1917, were likely to bring about the Revolution. On the contrary, as far as they could, they discouraged the idea of a strike as premature and likely to lead to disaster and only gave it their official support when it had actually broken out.

The Strikes.—Of the actual development of the Revolution there is very little to say. Strikes for higher wages at some of the factories had been occurring sporadically for some time; and on March 8 no fewer than 130,000 men are said to have been out. To this number must be added a considerable figure to account for the women workers who were demonstrating on that day (The Women's Day). But though the number of the strikers and of their sympathizers was large and though several bakers' shops were demolished by the mob neither the leaders of the Duma on the one hand nor the Government and the Police on the other gave the matter any particular attention. The only precaution taken by the authorities was to prevent the demonstrators reaching the centre of the city. The next day the strikers were still more numerous and probably amounted to 30% of all the workers in Petrograd. Some sections of the crowd succeeded in reaching the centre of the city and their mood soon became sinister and threatening. On that day too the university students joined the movement, and though the watchword of the strikers remained "bread," it is asserted that a few cries were raised denouncing the autocracy and the war.

The third day (March 10) proved the critical day. The strike became general and the strikers assumed an aggressive demeanour, raiding the police stations in the Viborg (factory) districts and disarming the police. In this quarter the police practically disappeared and the political demonstration began to assume the character of an armed rising. On the same day occurred the decisive factor in the Revolution: the Cossacks who had in the traditional way been patrolling the streets as the bulwark of the autocracy suddenly manifested their neutrality and even their friendliness to the strikers. Next day Khabalov, the military governor of the capital, received a telegram from the tsar, then at the front, ordering him to suppress the strike movement, and Galitzin the prime minister received another empowering him to prorogue the Duma. Acting on the instructions he had received Khabalov tried to disperse the demonstrators by military force, employing in addition to the police cadet formations from the Guard regiments. The crowds in the centre of the city were thus dispersed and about 150 men were shot down. This resort to force on the part of the authorities, though it was not strong enough to crush the strikers, may well have intensified their revolutionary mood and must also have compelled every soldier in the city to consider very seriously what his duty would be were he called out next day (March 12) to shoot them down.

Attitude of the Army.—From this point the sequence of events is very difficult to trace. One thing is certain—that the shooting did not break the strike. And when the news came that the Volynski, Preobrazhenski and other regiments had revolted and joined the demonstrators no one felt any doubt that the Revolution had taken place at last and that the autocracy was doomed. True, Khabalov tried to carry matters with a high hand by sending a force of 1,000 picked men under the command of Col. Kutepov to arrest the mutinous soldiers; but, as he subsequently related, this force, though it was led by a very brave officer, melted, as it were, away. The fate of the Kutepov force is typical of the transformed mentality of the soldier class. Whole regiments, marching obviously with the avowed intention of obeying orders, no sooner came into contact with the demonstrators than they suddenly fraternized and shared their arms with them. The Government then made no more efforts to deal directly with the situation in Petrograd but concentrated on holding out until such time as the troops which the tsar had promised to send from the front could arrive to crush the Petrograd garrison and the revolutionists. But though ministers tried to entrench themselves first at the Winter Palace and then at the Admiralty they could hold neither place and the same evening (March 12) abandoned by the army they went into hiding and were eventually arrested and imprisoned.

The victory of the Revolution in the capital was seemingly complete. But the autocracy still survived and was in possession of sufficient forces to crush the revolt; moreover the revolutionists were so intoxicated by victory and the disorganization at Petrograd was so complete that the dispatch of a small but disciplined body of troops should easily have revindicated the authority of the tsar. But there remained unsolved the great enigma what was the actual mental attitude to the Revolution of the soldiers at the front and their officers. Unable to read this the Duma leaders hesitated to take over the power which the revolted populace urged them to assume. Instead of resorting to bold and still bolder measures, the only safe action in times of revolution, they made frantic efforts to induce the tsar and his generals to compromise with the Revolution and to accept at the eleventh hour their old demand for responsible government. Even after the Duma had allowed itself to be prorogued and the garrison had revolted Rodzianko, the Speaker, not only sent urgent telegrams to the tsar and the leading generals pointing out the necessity of saving the monarchy and the country by conceding the necessary reforms but even held consultations with the very ministers whom he had denounced as treasonable. The vision of the tsar was equally myopic. So blind was he to the real facts of the situation that even at this hour he flatly rejected the appeals of the Duma

[1]The Zimmerwald Manifesto of 1915 is full of momentous declarations. The following are some of them:—

"The war that has produced this chaos is the outcome of Imperialism, of the endeavours of capitalist classes of every nation to satisfy their greed for profit by the exploitation of human labour and the treasures of Nature. . . .

"To raise welfare to a high level was the aim announced at the beginning of the war: misery and privation, unemployment and death, underfeeding and disease are the real outcome. For decades and decades to come the cost of the war will devour the strength of the peoples, imperil the achievements of social reform, and hamper every step on the path of progress. Intellectual and moral desolation, economic disaster, political reaction—such are the blessings of this horrible struggle of nations. . . .

"In this intolerable situation we have met together, we representatives of Socialist parties, of trade unions, or of minorities of them, we Germans, French, Italians, Russians, Poles, Letts, Rumanians, Bulgarians, Swedes, Norwegians, Dutch and Swiss, we who are standing on the basis, not of national solidarity, with the exploiting class, but of the international solidarity of the workers and the class struggle. . . . "

and refused to believe that the strike had culminated in a revolution. When he and his advisers at last learned that the revolt of the Petrograd troops had endangered the existence of the monarchy they immediately ordered a number of regiments from various parts of the front to proceed to the capital.

But the loyalty and discipline of these troops had never been put to the test. The first detachments under General Ivanov were prevented by the railwaymen from approaching Petrograd while the picked regiments were never sent because before they could actually be moved the Revolution had developed such impetus and had gained such support even at the front that the attempt to crush it by military force was recognized as hopeless. The army indeed could no longer be relied on; and it may plausibly be assumed that even if the troops had been despatched they would probably have mutinied and fraternised with the revolutionists. The regiments sent by Kornilov at a later stage to deal with Kerensky and the Soviet never fired a shot and were won over by speeches made by the very people they were commanded to crush.

The Duma Committee.—While the spokesmen of the Duma were marking time and hesitating to take the leadership of the Revolution the representatives of the workers, many of whom had been just released from prison, were taking immediate steps to organize the revolutionary forces and to put themselves at their head. At a later stage a considerable effort was made to prove that the Duma Committee was established prior to the Soviet Committee. Even were this claim well-founded it would not invalidate the fact that while the Soviet Committee was conceived from the first as the organ and general staff of the Revolution the Duma Committee was appointed with the idea of restoring order and establishing relations with existing public administrations and organizations. That this creation of the Duma Committee was not a revolutionary act and was not tantamount to claiming the leadership of the Revolution is seen from the fact that Rodzianko the chairman of this Committee still continued his negotiations with the old régime. It was indeed only late in the early morning of March 13, after prolonged discussions and with considerable reluctance that the members of the Duma Committee made up their minds to constitute a government. Three considerations were obviously instrumental in leading them to this decision, first a clear consciousness of the elemental force of the Revolution, second the apprehension that the Petrograd Soviet might be tempted to assume power, and third the hope that by constituting themselves the ruling authority they might be able to cope with the increasing anarchy and to save the monarchy and even the dynasty.

The Soviet Committee.—Meantime the Soviet and Socialist Committee was developing remarkable energy in organizing its forces. Founded late on the afternoon of March 12 it had succeeded in opening its first plenary sitting the same evening with an attendance of approximately 250 members consisting of Socialist deputies of the Duma, the Worker Group of the Munition Committee, a number of prominent worker leaders representing the various shades of revolutionary opinion, and members of strike committees who had been active during the few previous days. Although this meeting of the Petrograd Soviet was chaotic and interrupted by delegates from more and more revolting regiments, who came to offer greetings and proffer allegiance, it managed to appoint a strong executive committee which immediately took over the business of food supplies and the strategical defence of Petrograd against any possible attack from the autocracy. It also came to the decision to change its constitution by including along with worker deputies army deputies. In this way the Soviet made a palpable bid for real power.

From this very moment, enlisting as it did the support of the workers and of the Petrograd garrison the Soviet Executive Committee was the depository of real power. Its members had been conscious of this fact and probably overestimated rather than underestimated their authority. But they made no overt or covert attempt to constitute a Revolutionary Government; and when the Duma Committee decided at last to assume the responsibility of forming the new Government their decision was unanimously welcomed by the leaders of the Soviet. The attitude which these aspiring politicians took up with regard to the question of government is so surprising as to constitute one of the most intriguing problems of the Russian Revolution. Why the Petrograd Soviet refused immediately to proclaim itself the Government of Revolutionary Russia can only be a matter of surmise. Speaking in the first All-Russian Conference of Soviets, which was held early in April 1917, Steklov, one of the prominent members of its first executive committee, ascribed the refusal to the uncertainty as to the attitude of the army which prevailed at that time. "We were still doubtful," he said, "whether the revolutionary outbreak would succeed in establishing even a bourgeois régime. We were in the dark not only as to the feelings of the troops at the front but even as to that of the regiments stationed at Tsarskoeselo. . . ."

But this explanation scarcely covers the whole of the ground. An orderly government, representing a compromise between the insurgent masses and the bourgeois classes, was obviously the sole bulwark against counter-revolution; and the desire for the establishment of such a government must undoubtedly have constituted the main factor in the unopposed assumption of power by the Duma. Still fear of the outbreak of a counter-revolution cannot be regarded as an adequate explanation of the willingness of the Soviet's leaders to delegate power to the Duma. On the contrary fear of counter-revolution should have induced them to keep the power in their own hands. Their decision to step aside and to leave the formation of a government to the bourgeoisie, the class determined to arrest the onrush of the Revolution, would be unintelligible unless the fact is recalled that most of them were deeply convinced that the aim of the Revolution was solely to establish a democratic régime and that any attempt to associate the movement with Socialistic experiments or the dictatorship of the proletariat would ruin it and so repeat the disastrous failure of 1905.

Among the members of the Soviet's first executive committee were a few Bolsheviks who accepted Lenin's dictum that the Russian Revolution was the vanguard of the World Socialist Revolution. But even they failed at the time to declare that the moment had come for establishing a Socialist and proletarian government in Russia. So unprepared indeed were they for taking action that when Lenin arrived in Petrograd three weeks later he found that his most difficult task was to inspire his own party with the necessary enthusiasm for "deepening the Revolution." But whatever may have been the views held by the Bolsheviks at this time they were in such an insignificant minority both in the Petrograd Soviet and outside that their views could not possibly carry any weight. Moreover their influence in the Soviet, whatever it may have been, was counterbalanced by that of an equally insignificant minority on the Right which denied that the Revolution had any aims other than the establishment of a democratic State and bourgeois liberties.

In fact most members of the executive committee of the Soviet expected and welcomed the advent of the World Revolution and believed in the missionary character of their own. They refused to accept the national victory over the autocracy as the sole aim of the Revolution; and they may have regarded it as merely "the first step." What they never denied was that the bourgeoisie had a part to play in the Revolution and a rightful claim to form the first national government. The assumption of power by the bourgeoisie seemed to them indeed in the natural course of events. Moreover considerations of their own safety operated to induce the leaders of the Soviet to stand aside and to leave the formation of the new Government to the Duma committee. But, while they were prepared to stand aside and to delegate the power to the bourgeoisie they reserved to themselves the right to keep a steady watch on the activities of the new government; for they made no secret of their suspicion that, left to their own devices, these bourgeois ministers might be tempted to abuse their authority by favouring the interests of their own class.

The Provisional Government.—But members of the Duma committee on the other hand, though they had few illusions as to the quarter in which the real power was vested, were not only

willing to form a government with the consent of the Soviet leaders but insisted on the latter issuing an open proclamation of their support. The published programme of the Provisional Government was indeed dictated by the Soviet leaders and was accepted in full by the members of the Duma committee. The status of the government created as a result of this compromise was necessarily precarious in the extreme. Nominally invested with full powers and sovereign authority the Provisional Government was in reality powerless and the mere creature of the Soviet. Its position was bound to be unstable because the basis of the compromise which established it was vague and uncertain. But the revolutionary impetus of the masses and the constant changes in the constitution of the Soviet and in the mentality of its leaders soon combined to render this basis even more unstable. Every day fresh groups joined the Soviet and new leaders replaced old ones with the consequence that new adjustments had constantly to be made and even relative stability became difficult to maintain.

The Royal Family Arrested.—While negotiations between the Soviet and the Duma were still proceeding and before the Provisional Government formally took over the administration (March 14), the extremely delicate question of the position of the tsar and of the dynasty came up for settlement. That the tsar Nicholas could no longer remain autocrat was a foregone conclusion; but the leaders of the Duma dreading the idea of Russia becoming a republic were determined to save the monarchy and even the dynasty. They accordingly dispatched Gouchkov and Shulgin, two Conservative members of the Duma, to the tsar's headquarters at Pskov with the mission of obtaining the tsar's abdication in favour of the tsarevich and the appointment of the Grand Duke Michael as Regent. A few days previously such a solution of the national difficulties would have been regarded as a fantastically successful triumph for the Revolution. But in those few days the revolutionary movement had developed such an impetus that any attempt to save the dynasty was recognized as utterly impossible. The tsar therefore refused to risk the safety of his son and, abdicating both for himself and the tsarevich, proclaimed his brother Michael his successor. But when the terms of abdication became known on the following day even this solution had to be promptly abandoned and the very same members of the Duma committee who had pinned their faith to the dynasty proceeded to the palace of the Grand Duke and strongly urged him to refuse the throne till the Constituent Assembly had definitely drawn up a constitution.

A few days later the question of the dynasty came up again in a dramatic fashion which incidentally demonstrated both the strength of the Soviet and its determination when necessary to use it in defiance of the government. The tsar had requested the new ministers to arrange for the departure of himself and his family to Great Britain, a request which the leaders of the Soviet heard of by mere accident. At once they decided to prevent this departure and called on the Government to put the tsar and his family under arrest. But even before their protest could be dealt with they gave orders to the railwaymen to stop the imperial train and authorized one of their members, supported by a strong detachment of armed workmen, to arrest the tsar. The actual usurpation of power in this instance however proved unnecessary; for the new ministers themselves proceeded to put the Emperor Nicholas and his family under arrest.

The Army and the World War.—Yet, while this and other incidents demonstrated plainly that the Provisional Government was a mere government of caretakers, it was felt that the Soviet could rely only on the workers of the capital and had still to receive the all-important support of the army. The struggle for this support that took place between the Duma and the Soviet was the paramount business of the next few weeks. The battle was fought out in the main on two planes, one the question of the new status of the army, the other the question of continuing or terminating the war. The leaders of the Soviet championed the civil rights now claimed by the soldiers; while the Duma appealed to them in the name of national safety. That the semi-feudal conditions which had hitherto prevailed in the barracks had now to be modified was obvious enough, and Goutchov, the minister of war, himself was preparing an official declaration to this effect. But, while he was for confining the liberties of the soldiers within the strict limits of discipline, the leaders of the Soviet declared that these liberties must be vindicated unconditionally. This resolve to gain the adherence of the soldiers by supporting their claims at all costs was responsible for the issue of the notorious Prikaz (Order) No. 1[1], which has generally been regarded as the origin of the disintegration of the Russian army.

Now that all the relative facts are known many of the interpretations given at the time to this order are discovered to be misleading. Nevertheless the main fact remains that it could only have been issued in an atmosphere of unscrupulous political intrigue. This practice of paying court to the army remained indeed the settled policy of the leaders of the Soviet right down to the outbreak of the Bolshevik revolt in Nov. 1917, when Trotsky gained the unconditional allegiance of the Petrograd garrison by championing its claim to remain idle in the capital.

But despite all the privileges which the Petrograd Soviet had granted to the soldiers the devotion of the army at the front and even at the capital had to be conquered. At first the Provisional Government seemed to be the body which had won the support of the army. When the ministers proclaimed the necessity of a more vigorous prosecution of the war, the army rallied enthusiastically to their support. For about a fortnight regiments stationed at Petrograd as well as delegations sent by those in the provinces and at the front marched to the Duma commanded by their officers, proclaimed their readiness to serve the Revolution, and offered the Government their allegiance and joyful support. The political significance of these demonstrations was very considerable; for the soldiers never failed to warn the Soviet against encroaching on the authority of the Government and against creating a dyarchy in the country. But the army's enthusiasm for prosecuting the war soon began to cool; while the propaganda made by the Soviet for the clarification of the Russian war-aims as a sure promise of terminating hostilities became increasingly popular.

On March 27 the Soviet issued a manifesto to the world declaring that Russia sought no gains from the war and was ready to conclude peace on the basis of "no annexations" and "no indemnities." From this time onward the question of peace terms became the main bone of contention between the Government and the Soviet, the Government adhering to the secret treaties made by the Allies, and the Soviet insisting on the denunciation of these treaties and agreeing to continue the War only for purposes of self defence. The pressure put on the Government to identify itself with the principles laid down in the Soviet's manifesto became at last so strong that ministers felt compelled to make a public declaration (April 9) in which Russia's war-aims were formulated as the establishment of a permanent peace on the basis of the self-determination of the peoples. This declaration was hailed as a great victory by the Soviet, which thereupon demanded that the Provisional Government take "the next step" and should communicate this declaration to the Allied Powers, with a view to their adopting its principles. After some hesitation Miliukov, the foreign minister, made official communication of the declaration; but in the covering letter which he dispatched to the Russian ambassadors he asked them to reassure the Governments to which they were accredited by informing them that Russia's position with regard to the War remained unchanged.

[1]Prikaz No. 1 was composed by a commission of the Petrograd Soviet headed by N. D. Sokolov. In the name of the "Soviet of Workers' and Soldiers' Deputies," it ordered that committees of soldiers were to be formed in all military and naval units in Petrograd, and to send one representative each to the Taurida Palace next morning. In their political actions units were to be subject to their committees and to the Soviet. Orders of the military commission of the Duma were to be obeyed only when they did not contradict those of the Soviet. Arms were to be under the control of the committees and on no account to be given up if demanded by the officers. Strict discipline was to be preserved when on duty. Salutes, etc., when off duty were abolished. Special titles used in addressing officers, "Your excellency" and references to the officer's noble birth, were abolished. Officers were forbidden to use the second person singular in addressing soldiers.

Miliukov's note became known in Russia on May 2, the day succeeding that on which great demonstrations in celebration of Labour Day had been held all over Russia under the official recognition of the Government and with the participation of the garrisons in the towns and of the regiments at the front. The manifestations of national unity which were the striking feature of that great day were now exchanged at the moment for the ugly mood of division and party passion. For two days Russia seemed to be on the brink of civil war, the outbreak of which was finally only prevented by the action of the Soviet, which prohibited all meetings and demonstrations for three days and ordered the garrison to remain in the barracks. The strength and discipline shown by the masses at this time finally convinced the Soviet leaders that the real power was in their hands.

The Soviet Enters the Government.—Discredited and disheartened by this proof of ministerial impotence Prince Lvov, the prime minister, issued a proclamation in which he expressed his conviction that a reconstruction of the Government on a wider basis, that is with the inclusion of Soviet representatives, was essential to the safety of the State. The Soviet at first (May 10) refused to entertain the idea of making a coalition with the bourgeois parties; but, when Guchkov, the war minister, actually resigned (May 12) and the danger of a complete break-up of the Government seemed imminent, it reconsidered its decision and agreed to enter the Government (May 18). In the letter of resignation which he forwarded to the prime minister Guchkov reviewed the political situation as follows. "Our illness," he declared, "consists in an odd divorce of power and responsibility. Some are in full possession of power without a shadow of responsibility; while those who are visibly in full possession of responsibility possess not a shadow of power."

Resolved now to assume its share of responsibility and having solemnly engaged to give the Government its complete support the Soviet was allotted five portfolios in the reconstructed cabinet, those of Justice, Agriculture, Labour, Food Supplies and Post and Telegraphs. The last-mentioned ministry was created specially to make room for Tseretelli a Menshevik member of the second Duma who had been banished to Siberia and was now the most popular and powerful member of the Soviet. To this list of Soviet and Socialist ministers must be added the name of Kerensky, who, though nominally a member of the executive committee of the Soviet, had previously joined the Provisional Government on his own responsibility. He was now promoted from the Ministry of Justice to the all-important Ministry of War; while that wealthy ex-director of the imperial theatres, Tereshchenko, minister of finance in the first Provisional Government, replaced Miliukov as minister for foreign affairs.

The fall of the first Provisional Government was due to two main reasons. The first was its assumption of responsibility without the backing of power. The second was its equivocal foreign policy of balancing between the imperialist war-aims of the Allies, which involved an indefinite prolongation of the War, and the Soviet's policy of limiting the war to a "revolutionary defence" ("No annexations. No indemnities.") which was based on the idea that an honourable peace might at once be concluded. The new Government occupied a more favourable position, for it represented both the bourgeoisie and the masses and thus possessed not only responsibility but actual power. It was confronted however by formidable difficulties; for not only had the crucial question of peace or war to be settled but the growing unrest in the villages and the dissolution of the Empire into separate national units called urgently for solutions which the Government was totally unable to furnish. The consequence was that the coalition lasted only two months and was finally brought down by the resignation of the three Liberal (Kadet) ministers, who adopted this method of protesting against the concessions made to the Ukrainian and Finnish autonomist movement. The new Government crisis coincided with the greatest crisis which the Revolution had so far had to face, the disastrous failure of the offensive in Galicia and the first Bolshevik rising in the capital.

The Russian Offensive.—The origin of the decision to renew the offensive is still obscure. There is reason however to believe that pressure exerted by the Allies was responsible for the adoption of this policy. Many experts were totally opposed to it as likely to fail and thereby to accelerate the disintegration of the army. They pointed out that an offensive, if not strong and decisive enough, would give the Germans who had been inactive since the fight for the Stokhod (April 3) a much-wanted excuse for taking the counter-offensive on a much wider front than the Russians could hold. Sound strategy therefore demanded that while a most determined effort should be made to increase the fighting *moral* of the army, it should not be submitted too early to the test of challenging the enemy. But the offensive which the Kerensky Government so blindly and so enthusiastically adopted was obviously undertaken more for political than for military reasons. The effect of renewing the offensive, it was believed, would be either to prove in case of victory that Russia had still to be taken into account and so to compel the Germans to come forward with the offer of a democratic (that is non-annexation) peace, or, in the event of defeat, to compel the German Socialists definitely to take their stand either in defence of the Russian Revolution or in support of German militarism.

This fateful offensive, the failure of which destroyed the Russian army's last vestige of fighting strength, was undertaken then with a frivolity almost unparalleled. The preparation of it was equally frivolous and fantastic, based as it was on the naïve belief that the army's will to fight could be resuscitated by melodramatic speeches made by the war minister and a group of military and civil idealists. In the speeches which he made to the troops on his theatrical tour of the front Kerensky was fatuous enough to declare that the country expected them to work a miracle. But the effect which his rodomontade had on them was purely transient. They listened to it, applauded it, and even swore to fight and to die for the Revolution. But the moment the war minister left they went back to their barracks and refused to go to the trenches and thereby to relieve the first-line men. Several regiments indeed had to be disbanded for refusal to obey orders. In this atmosphere then the offensive was launched on July 1[1]. At first it proved remarkably successful: the Austrian lines were broken and many prisoners and guns were taken. But in less than a fortnight after operations opened not only were the Russian armies destroyed but Russia had ceased to exist as a great Power.

The Bolsheviks.—Meantime the Bolsheviks were making their first bid for power in the capital. Ever since his arrival from Zürich and his unsuccessful début at the Petrograd Soviet Lenin had been biding his time and maturing his plans. At first he was disposed to despise the Soviet as a petit bourgeois assembly and was determined to organize the proletariat for a single-handed revolt against the bourgeois state. But in April, as a result of witnessing the anti-Miliukov demonstrations, he perceived that this assembly could easily be used as a recruiting ground and rallying point for such a revolt. Accordingly he invented the watchword "All power to the Soviets" and disseminated it widely among the masses. But when the leaders of the Soviet compromised their principles and made a coalition with the representatives of the bourgeoisie he began to fear that the former were very unlikely to show either the courage or the zeal which would enable them to bring about the second or Socialist Revolution. In June therefore, during the sittings of the first all-Russian Congress of Soviets, he obviously returned to his original plan of staging a purely Bolshevik revolt.

A plot was actually formed at this time to call out the Bolshevik adherents among the factory workers and the garrison and a strong detachment of Kronstadt sailors; but news of it leaked out and Lenin, not yet prepared to break with the Soviet, postponed the venture. In three weeks' time, however, he revived it. The July rising was a very strange demonstration, the most marked characteristic of which was its lack of leadership. The members of the Central Committee of the Bolshevik party hesitated to identify themselves with it beforehand for fear it might prove unsuccessful. Ostensibly a demonstration in favour of the transference of power to the Soviet it was in essence an attempt to stampede

[1] Battles of Brzezany (July 1–6) and Zborow (July 19–26).

that assembly, a fact which its leaders were prompt to recognize. For nearly two days the gunmen were in occupation of the capital; but their lack of objective and of leadership perplexed them and paralyzed their efforts. The obvious failure of the rising prevented Lenin and the Central Committee of the Bolshevik party from showing their hands, and they strongly protested their non-complicity in the *émeute*—in which over 400 persons lost their lives.

But these protests were not taken seriously; and it can now be definitely asserted that the whole scheme was inspired by the Bolsheviks, who hoped that they might reap some advantage by fishing in troubled waters. During the two days the rising lasted the Coalition Government was absolutely quiescent. But Kerensky on the very first day proceeded to the front, where he procured picked troops, which arrived in the capital on the day after the movement had fizzled out. Meantime any attempt to renew disturbances was rendered hopeless by the publication of documents which purported to prove that Lenin was a spy and a paid agent of the German General Staff. The result of this publication was the practical suppression of the Bolshevik Party. Lenin and Zinoviev went into hiding, to the considerable dismay of their friends. Trotsky, Kamenev and Lunacharsky were thrown into prison. The "Pravda," the organ of the Party, was suppressed and its machines destroyed by the mob.

Kerensky.—Emboldened by the success of this coup Kerensky now put himself forward as a candidate for the premiership. Prince Lvov was accordingly presented by the Soviet members of the Government with an ultimatum which required him, in accordance with the decisions of the recently held Congress of Soviets, to declare Russia a republic without waiting for the convocation of the Constituent Assembly, to suppress finally the Duma and the Council of State, and to accept the Congress's policy of forbidding any sale of land before the meeting of the Constituent Assembly. The Prince refused to comply with these demands, regarding them as a usurpation of the rights of the Constituent Assembly, and promptly sent in his resignation. The ministry was then reconstructed, Kerensky becoming prime minister as well as minister of war and Tseretelli succeeding Prince Lvov as minister of the interior. With the formation of the new ministry the Russian Revolution entered on a new phase—a phase of inaction. The record of Kerensky is indeed singularly barren. He failed to put new vigour into the prosecution of the war. He left the question of concluding peace just as he found it. He made no attempt to settle the various difficulties involved in the labour question. And he was so indifferent to the agrarian problem that he allowed the peasants to settle it as best they could.

In fact the only achievements of Kerensky's administration were the declaration of Russia as a republic and the convocation at Moscow of a spectacular State Assembly representing all classes in the country and all political groups. The actual purpose which this Assembly was meant to serve is obscure; but its composition and the choice of Moscow for its sittings seem to show that it was convoked with some vague hope of investing Kerensky's Government with that moral authority and sanction which it had hitherto so conspicuously lacked. Nothing remarkable however resulted from its three meetings save a series of hysterical speeches in which the prime minister announced his determination strenuously to support the Revolution and ruthlessly to suppress its enemies, whether they came from the Right or from the Left.

Kornilov.—Meantime the generals at the front and the members of the General Staff in the capital began to think that their time had come. Taking stock of the anarchy prevailing in the country and of the disorganization of the army they began to be more and more inclined to favour the creation of a military dictatorship. By temperament and by position Kerensky was in favour of such an idea and he actually supported General Kornilov the commander-in-chief in the preliminary steps for establishing the dictatorship. He only quarrelled with him when he realised that the general himself was aspiring to become dictator. Suspecting Kornilov's designs he promptly declared him a traitor and an enemy to the Revolution; to which the general replied by sending picked Cossack regiments under the command of General Krymov against Petrograd with the object of intimidating Kerensky, and forcibly suppressing the Soviet. Thereupon, Kerensky, turning his back on the Right, appealed to the Left for support; and the Executive Committee of the Soviet appealed in its turn to the workers to fight the threatened counter-Revolution. The Bolshevik leaders, now released from prison, took up the challenge with enthusiasm, and, recognizing that their opportunity had arisen, proceeded to arm the workers, in anticipation of the arrival of Krymov's troops. But no battle for the capital took place; for deputies from the Petrograd workers and soldiers went to meet the Cossacks and persuaded them that they had been sent on a false errand. And so the plan for setting up a military dictatorship failed, with the result that Kornilov, Denikin his close colleague at the front and three other generals, were arrested and imprisoned and that Krymov shot himself after being interrogated by the prime minister.

Rapid Rise of the Bolsheviks.—Just as the failure of the Bolshevik rising in July proved to be the opportunity of the Right, so now the collapse of Kornilov's raid gave their chance to the extreme Left. Soviet Russia was in a state of feverish activity. It was arming itself physically and morally for a fight against the counter-Revolutionary movement. The first result of this revival of revolutionary fervour was a renewal of the hatred to the officer class; and a new wave of massacre swept over the country, taking peculiarly ugly form in Finland where sailors killed their admirals and officers by throwing them overboard and beating them to death in the water. The All Russian Executive Committee of Soviets was reduced to sending emissaries to stop these outrages; while another sign of the times was that these emissaries had to be chosen from the Bolshevik ranks. The moderates were speedily losing their hold on the masses. Lenin's supporters indeed were now rapidly increasing their forces, so much so that by the middle of September both the Petrograd and the Moscow Soviets passed for the first time Bolshevik resolutions; while the moderate leaders, who had presided over them since their creation, were now replaced by Trotsky at the new and by Nogin at the old capital.

It thus became increasingly evident that the next Congress of Soviets, which was summoned for the end of October, was likely to elect an All Russian Executive Committee on which the Bolsheviks would have a majority, and that this majority would declare in favour of assuming the supreme power in the State. In the circumstances Lenin displayed considerable moderation and political shrewdness when he addressed a letter to the existing Executive Committee in which he called upon them to break away from Kerensky, now autocratic head of a directory, and the bourgeoisie and to declare themselves the Government of the country. The Committee rejected this overture; but, though they still continued unofficially to support Kerensky they withdrew their representatives from his Government. The united front of Soviet Democracy, which had seemingly been re-established by the challenge thrown out by Kornilov, was now finally broken. The Bolsheviks proceeded to declare the Executive Committee traitors to the Revolution and at last worked openly for their overthrow and for that of the bourgeois Government.

THE BOLSHEVIK REVOLUTION

Six months from the beginning of the Revolution the new republic was in a state of rapid disintegration. The Provisional Government was formally invested with full and sovereign power and was responsible neither to the Petrograd Soviet nor to the recently convoked Pre-Parliament. But actually it possessed no power at all and was a government of marionettes. The actual authority, then more than at another time in the Revolution, was held by the Soviets in the capitals and in numerous provincial towns, which openly defied the Government and exercised, each in its area, legislative as well as executive powers. In many of the provincial Soviets as well as in those of Petrograd and Moscow the Bolsheviks now counted on solid majorities; and in most cases the Bolshevik provincial Soviets constituted themselves quasi-independent republics. And not only were Soviet Republics

set up but the various nationalities, which had long been clamouring for autonomy, now began openly to secede from the State and to organize their own armies by withdrawing their nationals from the army under the plea of defending their newly created frontiers and their national flags. The whole country, town and villages alike, was in a state of feverish unrest, which soon developed into riots and anarchy. In the towns bread-riots broke out; and in the villages the demand was for land. To enumerate all the places where bread-riots, arbitrary division of land, expropriation of property and incendiarism took place would be impossible: they ranged practically from Finland to the Caucasus.

The most destructive of these revolts were those of the peasants, who began to solve the land problem in their own way by expropriating the land, driving off the cattle, burning down the landowners' dwellings and barns, demolishing agricultural machinery, felling wood in the forests and wantonly destroying trees in the orchards. In places in which the landowners delayed their flight they were captured, tortured and murdered. Yet the ministers were inactive and helpless. To put down these all-Russian pogroms by force, they lacked the necessary military backing: even the Cossacks refused to obey orders, remembering how they had been repudiated by Kerensky in the Kornilov episode. Reprisals would in any case have proved ineffective: the only measure which might have tranquillized the countryside would have been the speedy convocation of the constituent assembly with a guarantee that it would be invested with full power to solve the land question. But the Government, composed as it was of landlords and capitalists, could not and would not take this step. Closely connected with the peasants' revolt and with the general anarchy prevailing everywhere were the crimes committed by bands of armed soldiers who spread over the whole country robbing and killing, and almost destroying transport.

At the front the army still preserved on the surface a certain degree of discipline; but the mutual distrust and hatred of soldiers and officers was so profound that at any time an open clash might be expected, especially as a shortage of food and supplies, and in some cases actually famine, made the preservation of military subordination increasingly difficult. It became obvious that the army was likely to withdraw from the field either in the autumn or at any rate before the winter had passed. The soldiers discussed this possibility openly, declaring that they cared neither for freedom nor for land but only for peace. Even leading generals like Cheremisov (who held the Northern Command) advised the Government that the army was unreliable and might of its own volition, irrespective of every command to the contrary, withdraw from the field at any time.

Trotsky.—Meantime the Germans had been penetrating further and further into the Baltic provinces. On Oct. 12, with the support of their fleet, they occupied the island of Esel and so secured the command of the Baltic. Petrograd was now obviously menaced and ministers declared their intention of transferring the seat of government to Moscow. This attempt to abandon the capital strengthened enormously the Bolshevik scheme for overthrowing the Government. To dream of continuing the War after abandoning Petrograd, the biggest arsenal in the country, was denounced as sheer treason; and the Bolsheviks had accordingly an easy task in exciting the opposition of the workers to the policy of evacuation. Ministers, realizing their mistake, speedily gave up their intention, but not before the Bolsheviks had denounced them as usurpers and traitors. While their proposal to evacuate Petrograd thus furnished the Bolsheviks with an admirable lever for stirring up the masses, another mistake which ministers made, an attempt to replace the Petrograd garrison by more reliable troops from the front, was used by their enemies as a pretext for openly organizing military forces for an attack on them. Kerensky's declaration that these measures were dictated by the menacing situation in the Baltic was glaringly absurd; for the *moral* of the Petrograd garrison was notoriously low and the withdrawal from the front of troops with a higher *moral* was in sheer contradiction to ministers' declared purpose. The Petrograd Soviet accordingly under Trotsky's command, promptly came forward and countermanded the movement of troops. On Oct. 26, the leaders of the Soviet constituted a military revolutionary committee which declared itself the highest military authority in the capital and province of Petrograd. This step was ostensibly taken for the defence of the capital against the enemy; but actually it was a movement for the creation of a general staff for the Bolshevik Revolution. Regarded from this point of view Oct. 26 should be considered the actual date on which this Revolution occurred. In the 14 days which intervened before Lenin was actually established as the head of the State, a very strange tragi-comedy was enacted, in which Trotsky, figuring as the General Monk of that Revolution, openly organized his forces without meeting with the slightest interference from the Government.

The Bolshevik Revolution was inseparably connected with the convocation of the second Congress of Soviets. The first, which took place in June, elected a Central Executive Committee, which was empowered to convene a second congress not later than the end of September. But, since the majority in most of the Soviets had become Bolshevik, this committee, which consisted entirely of Menshevik and social Revolutionaries, supporters of Kerensky, was reluctant to convene a second congress and postponed doing so from day to day. But when finally the Petrograd Soviet threatened to convene the congress itself the committee fixed Nov. 7 as the date of convocation. It was obvious to everybody that the congress would have a Bolshevik majority and would promptly declare against a Coalition Government and would form one composed exclusively of Soviet representatives. This expectation that the final trial of strength between the parties of the coalition and the adherents of the Soviets would take place at and in connection with the congress made it very easy for Trotsky to pretend that all his preparations were being made with the view of supporting a Soviet Government, which would be established in a constitutional way by the congress. Why, however, the Government should have been so naïve as to accept this explanation remains a mystery. The convocation of the All Russian Congress of Soviets was preceded by the holding of a number of regional congresses, all of which declared for a termination of the Coalition and for the establishment of a Soviet Government, the aim of which would be immediately to propose terms of peace, to give the land to the peasants, to establish a complete workers' control of the factories and to deal with the famine by expropriating the hoards of foodstuffs supposed to have been accumulated by the capitalists and landlords. These resolutions were broadcast all over Russia and Government wireless stations thus being used for the purpose of disseminating Bolshevik propaganda.

Nov. 3–6.—Meantime ministers waited patiently on events, believing that nothing could happen till Nov. 7. But Trotsky, with the instinct of a born strategist, gave battle two or three days before the appointed date. On Nov. 3 he confronted the general staff with a demand that all its orders should be countersigned by the Military Revolutionary Committee. When the general staff refused this demand he ordered the Petrograd garrison to stand at arms in defence of the committee. On Nov. 4 a meeting attended by delegates from all the troops passed a resolution refusing obedience to commands of the general staff and recognizing the committee as the sole organ of power. This resolution was immediately circulated over the Government telephones to all the regiments in the capital.

To these proceedings Kerensky replied on the following day by issuing an ultimatum to the committee requiring them to withdraw the resolution. The ultimatum was ignored by the committee, which promptly called out parts of the garrison and organized worker detachments ("Red Guards") for the defence of the Smolny Palace, the headquarters of the Soviet and of the committee. Kerensky tried to counteract these measures by adopting that traditional method of defence, the raising of the bridges, to prevent communication between the left and right banks of Neva. He then proceeded to the Marian Palace where the Pre-Parliament was holding its sessions, and demanded that it should invest him with dictatorial powers to cope with the Bolshevik revolt. But while he was awaiting their decision, which, after

deliberating all night, they gave against him, preferring to set up a Committee of Public Defence, the Bolsheviks quietly and systematically took over, without firing a shot, the telegraph, the telephone and all other Government offices, with the exception of the Winter Palace and the offices of the general staff. The same night Lenin, who had been in hiding since July, appeared at the meeting of the Petrograd Soviet and in glowing language congratulated the delegates on inaugurating a new era. The new régime, which established the Soviet as the embodiment of supreme power in the State, was thus established one day in advance of the meeting of that Soviet Congress which had been proclaimed by the Bolsheviks as the sole authority competent to make such a decision. This was obviously an irregularity. But nobody present at the meeting of the Soviet seemed to care; for Lenin announced that the first step taken by the new Government would be the offer to all belligerents of a just peace.

Defeat of Krasnov and Flight of Kerensky.—Early in the morning of Nov. 7, Kerensky left for the front, in order to bring back troops to crush the revolt. The other members of the Government decided to await his return at the Winter Palace. But when they were informed that the guns, both of the cruiser "Aurora" and of the Peter and Paul fortress were trained on the Palace, they decided to surrender and told their defenders, a detachment of Cadets and a Woman's battalion, that they might disperse. When next day the Congress of Soviets formally opened, the non-Bolshevik members and the old executive committee registered a vigorous protest against the unconstitutional methods of the Bolsheviks and withdrew from the congress to join the Committee of Public Defence which had its headquarters at the municipal buildings. Kerensky meantime made frantic efforts to move the troops from the front to the capital; but the response he met with both from officers and men was thoroughly discouraging. He succeeded only in persuading the Cossack general Krasnov to move against Petrograd. On Nov. 11 Krasnov's troops were reported outside Gatchina, about 10 m. from the capital.

Encouraged by this news and definitely expecting a crushing defeat of Trotsky's "Red Guards" the Committee of Public Defence gave orders to the cadets of the military schools to arrest the Revolutionary Military Committee and to make a general attack on all the Soviet strongholds. The attack was made in the morning; but by three o'clock in the afternoon the Bolsheviks, supported by some of the cruisers of the Kronstadt fleet, decisively repelled it and occupied the military schools. In the report of the events of the day which he sent to the Petrograd Soviet Trotsky made the following declaration. "We hoped to establish a compromise without bloodshed. But now when blood has been shed there is only one way left, a ruthless fight It would be childish to expect that victory can be achieved by other means. Now is the actual moment. We have shown that we can take the power. We must show that we are able to keep it. I summon you to a ruthless fight." With these words Trotsky proclaimed the approaching Civil War. The same night he proceeded to the Gatchina front. Next day he reported the repulse of Krasnov's advanced detachments; and a day later he announced that the Cossack forces had been completely defeated. Krasnov subsequently surrendered on parole, Kerensky fled, and the Bolshevik régime was now for a time immune from military menace.

(M. FA.)

THE STRUGGLE FOR EXISTENCE, 1917–1920

The Petrograd Revolution of Nov. 7 swept Russia. There were a few days of street fighting in Moscow and sporadic resistance elsewhere, but by the end of the month the Soviets held power throughout the country. In the urban centres the victory was won under the red flag of class warfare, with the watchword "All Power to the Workers' Soviets" The words "land," "bread" and "peace" gave the Bolsheviks the support of the soviets of peasants and soldiers.

The soviets were the only strong political force in a social structure whose disintegration was nearly complete. They were the organs of the proletariat, upon which the Bolsheviks, taught by the Marxist doctrine of revolution, were resolved to build their State. They challenged not only the weakened capitalism of Russia but the capitalist system throughout the world. In the first days of success they exaggerated the effect of war-weariness upon the masses of western Europe and underestimated the effect of war-hatred. Their dream of a new proletarian Utopia and their appeals to fellow-workers of the world to throw off the burdens of Capital and War prepared the way for the conflict that was soon to plunge the new State into a three-year fight for life.

The Soviet Government at Work.—In an all-night session on Nov. 7–8 the Congress of Soviets in Petrograd declared the power of government to be vested in the Council of People's Commissars appointed mainly from the ranks of the Bolshevik Central Committee, with Lenin as premier and Trotsky as commissar of foreign affairs. The new rulers set out immediately to fulfill the promises which had won them popular support. The first act of the Soviet Government on Nov. 8 was to decree that all land belonged to those who worked it, without rent or other payment. This satisfied the peasants, who had been expropriating landlords' estates for several months, and their chief political organization, the Left Social Revolutionary Party, decided to collaborate with the Bolsheviks. Vigorous measures were taken to ensure a supply of food for Petrograd and other urban and industrial centres. To reinforce the victory of the industrial proletariat a universal eight-hour day was instituted on Nov. 11, and the control of the factory soviets over industry was established by successive decrees in the next two months.

The peace campaign began on Nov. 9, when Trotsky sent out a wireless invitation to all the belligerent powers to conclude an immediate armistice. The Allied Governments at once protested, and their representatives in Russia tried to enlist the commander-in-chief of the army, General Dukhonin, against the Council of Commissars. Dukhonin was replaced by Krylenko, a member of the Bolshevik Central Committee, by a Soviet decree of Nov. 22. Soon afterwards the late commander was torn to pieces by a mob of soldiers. That deed showed that Lenin had gauged the temper of the army and that the Allied insistence that Russia should go on fighting would be fruitless. In addition to their natural class hostility to a "Red" government, the Allied Powers seemed convinced that Lenin and his associates were acting in the interests and possibly in the pay of Germany. Washington was at first more friendly, but the American ambassador in Petrograd, Mr. Francis, soon indicated that he shared the view of his Allied colleagues.

The attitude of the German Government was equivocal. It accepted the armistice proposal, but it does not seem to have contemplated such severe conditions as were afterwards embodied in the Treaty of Brest-Litovsk. After brief negotiations within the German lines a ten-day truce was signed on Dec 5, 1917. The Central Powers agreed not to transfer troops from the Eastern Front to the Western, but they moved several divisions to France before the end of the year.

Sabotage and Nationalization.—Meanwhile the Soviet Government was facing serious internal difficulties. The bourgeois classes, at first stunned by the success of the Revolution, began to rally. Instead of armed resistance they used the more dangerous weapon of sabotage, hoping to paralyze the Bolshevik régime. With no civil service, no personnel trained in finance, transport and the management of industry, the new government was suddenly called upon to undertake the administration.

Lenin met the bourgeois offensive with characteristic energy. When the financial powers of Petrograd refused to co-operate, he replied with a decree nationalizing the banks. When representatives of industry tried to sabotage production, a decree nationalized their factories and created a Supreme Economic Council to manage them. Other decrees followed in rapid succession, as one branch after another of the old economic system declared passive war. At first, probably, these were measures of immediate necessity rather than a part of the Bolsheviks' deliberate programme. In a sense they were the beginnings of the later "militant communism," but all of the responsibility for their adoption cannot be laid upon Bolshevik shoulders. Some

form of centralization was necessary to prevent economic collapse, and Lenin had previously published a pamphlet demanding State control over transport and the means of production, such as had been adopted by the western belligerents, not as a form of Socialist expropriation, but to save the country from chaos.

The nationalization of industries was legalized in Dec. 1917. At first it was applied haphazard, to meet sabotage by individual enterprises or groups. No entire industry was nationalized until May 1918, when a department of the Supreme Economic Council was organized to supervise the monopoly production of sugar. The following month oil production was centralized in the same way, and various commodities, such as yarn, matches, tobacco, tea, coffee, spices, were declared State monopolies. It was not until June 28, 1918, that all industrial and commercial enterprises of more than 1,000,000 rubles' capital were declared the property of the State.

The Treaty of Brest-Litovsk.—While the Soviet Government was trying to cope with sabotage and weld local soviets into an administrative machine, relations with Germany were still unsettled. Peace negotiations began on Dec. 22, 1917. On behalf of the Soviet, Trotsky put forward the principles of no annexation or indemnity and self-determination of subject races. At first the Germans seemed willing to accept, with certain reservations. On Dec. 28 they demanded the independence from Russia of Poland, Finland and the Baltic States, and on Jan. 8 the independence of the Ukraine. On Feb. 10 Trotsky announced the Soviet refusal to sign a "peace of annexation," but declared the war between Russia and the Central Powers at an end. A week later the German General Staff ordered an immediate advance. Narva, in northern Estonia, was occupied in order to threaten Petrograd, and German troops drove towards Moscow from the Polish border.

Lenin at once decided for peace, but acceptance of the German terms was not reached without a struggle in the Communist Central Committee. Lenin still believed that a general European revolution, as the result of war exhaustion, was not far distant. His prime object, therefore, was to gain time; a breathing-space, as he called it. His associates argued that to yield was to betray the Revolution. Trotsky remained neutral. He produced an epigrammatic phrase, "Neither Peace nor War!" and proposed to allow the Germans to advance without resistance.

Verbatim reports of this discussion published in Moscow showed that it was only by a threat of resignation that Lenin beat down the adverse majority in the Central Committee. Trotsky was replaced as commissar of foreign affairs by Chicherin, ex-diplomat and noble but a Communist of long standing, who renewed the Brest-Litovsk (*q.v.*) negotiations on Feb. 28, 1918. Chicherin's instructions gave him little scope for the diplomatic subtleties he afterwards displayed. On March 3 he accepted the German terms on behalf of the Soviet Government. The so-called Independent Government of the Ukraine had already signed a separate treaty admitting German suzerainty, and this Chicherin was forced to confirm. The Soviet Government further agreed to pay a large indemnity or its equivalent in raw materials. Poland and the Baltic States were left in the hands of the Germans, and the armies of General von der Goltz and General Mannerheim soon crushed the revolutionaries in Finland.

Lenin had won his breathing-space, but the agricultural and mineral resources of the Ukraine and the oil of the Caucasus were at the disposal of the Germans, and the German General Staff was now free to concentrate its forces against the Allied front in France. On March 5, however, two days after the signature of the treaty, Trotsky proposed to Bruce Lockhart, the British high commissioner, and to Raymond Robins of the American Red Cross, who was acting as liaison between the Soviet Government and the American ambassador, that ratification by the Congress of Soviets in Moscow might be prevented on condition that the Allies and the United States promised aid against Germany and restrained the Japanese from occupying Vladivostok. The British and American representatives appear to have regarded Trotsky's proposal favourably and to have advocated its acceptance in despatches to their respective Governments, but they received evasive replies. The Congress of Soviets ratified the treaty on March 16 by a majority of 523.

Lenin used his breathing-space to patch up the administrative and economic machine and to drill an army to defend the Revolution. The fight against sabotage was not yet won, and the adversaries of the new régime were growing bolder. Trouble was brewing in the Cossack provinces and in Manchuria, where a reactionary army was assembling on Chinese soil. The German threat against Petrograd had driven the Soviet Government in flight to Moscow. The fact that the Allied ambassadors, instead of accompanying the Government, had preferred residence at Vologda, junction of the trunk lines of escape eastward to Siberia and northwest to the coast, was no good omen for future relations with the Powers they represented.

Relations with the Allies.—In the field of foreign affairs the Soviet Government had two severe handicaps. From the first the Allies suspected complicity with Germany, and were inclined to regard the Peace of Brest-Litovsk as a betrayal of the Allied cause. Secondly, neither they nor the Central Powers believed that a Soviet Government in Russia could endure. For many years opportunities for a friendly settlement were lost owing to the conviction that the régime was about to fall. The Allies declined to recognize the Treaty of Brest-Litovsk, which they held responsible for Ludendorff's victory in March. Their missions in Russia reported that trainloads of war supplies, leather, copper, oil and food, were being shipped into Germany. Although the Bolsheviks claimed that this was part of the indemnity imposed by the treaty, the Allies saw it as "aid to the enemy," to be prevented if possible. It was suspected that some of their representatives in Russia co-operated with anti-Bolshevik elements to hamper the transfer of supplies.

The Social Revolutionary Revolt.—The breach between the other political parties in Russia and the Bolsheviks had been widened by the suppression of the Constituent Assembly, which met in Moscow on Jan. 18, 1918. Its membership represented a large majority of Left and Right Social Revolutionaries, with a smaller proportion of "Cadets" or bourgeois representatives. The Bolsheviks had only 40 per cent of the delegates. The election of a Right Social Revolutionary, Chernov, as president, convinced them that they had nothing to gain from the Assembly and it was closed by Red soldiers on Jan. 19.

The Left Social Revolutionaries continued for a time to collaborate with the Soviet Government, but broke away completely after unsuccessful opposition to the ratification of the Brest-Litovsk Treaty. The strength of the Social Revolutionary Party was mainly drawn from the villages, which were growing increasingly restive as the Bolsheviks developed their basic progamme of a workers' government, class warfare and socialism. The peasants had thought that the Revolution gave the land to them. They now found it was the property of the State, and that its surplus produce over their needs was required for State purposes. The bourgeois groups had become more hostile still, as they realized that their very existence was menaced by the new régime.

Differences between the Right and Left Social Revolutionary sections and the bourgeois groups tended to disappear in their common belief that the Bolsheviks had betrayed their country to Germany. Led by Boris Savinkov, Kerensky's former war minister, the Right Social Revolutionaries became the pivot of patriotic and anti-Bolshevik sentiment, eager to co-operate with military representatives of the Allies to nullify the effects of the Treaty of Brest-Litovsk. From attempts to blow up depots of stores, railway bridges and trains carrying supplies westwards, the Social Revolutionaries proceeded to the desperate *coup* of assassinating the German ambassador in Moscow, Count Mirbach, on July 6, 1918, in the hope of provoking Germany to break with the Soviets. The Germans were otherwise occupied and no break occurred. The Social Revolutionaries then tried to incite the country to rebellion.

Savinkov captured the town of Yaroslav, 180 m. north of Moscow on the railway to Vologda and Archangel, with a disciplined force which he had hoped to make the nucleus of an army

of insurrection. The Red troops from Moscow and Petrograd converged on Yaroslav too swiftly, and retook the town after two weeks. Savinkov escaped, but all possibility of overt resistance by the Social Revolutionaries vanished.

The Czechoslovaks.—Meanwhile alarmist rumours agitated London and Paris. It was stated that the Bolsheviks were arming German and Austrian prisoners in Siberia by tens of thousands, to combat the Czechoslovak Legion. Forty-five thousand Czechoslovak deserters from the Austrian forces had been formed into an army to fight for their country's freedom beside the Russians on the Austrian front. When the Russians collapsed they remained a fighting force, and plans were made in Paris to move them round the world to the western front. In early March, 1918, the Soviet Government agreed to provide transport across Russia, but the Czech legionnaires had continual trouble with local soviets over food supplies and right of way for their trains.

By the middle of May the entire force, moving eastward to the Pacific, was strung out in detachments across 5,000 miles of railway from Kazan to Vladivostok, a natural prey to anxiety and rumour. In point of fact, the story of a new German "mobilization" was found by Anglo-American military investigators to have no more justification than the enrolment of some 1,500 ex-soldiers of the Central Powers who had renounced their allegiance to join the Red Army; but the Czechs were in no position to judge. On May 14 one of their detachments met a train-load of Austro-German prisoners being repatriated in accordance with the Treaty of Brest-Litovsk. A *fracas* ensued, with bloodshed which involved the local Red forces.

Moscow at once demanded that the Czechs fulfil their pledge to surrender their arms. They refused, and on May 29 forcibly resisted attempts to carry out the disarmament order. In June they fought the Bolsheviks openly throughout Siberia, and the local soviets were powerless against their disciplined troops. At the end of the month their Vladivostok contingent overthrew the soviet there and set up an anti-Bolshevik Government with the approval of the Allies. By July 31 almost all Siberia was changed from "Red" to "White" and the Czech forces were moving westward to attack the Soviet State.

Death of the Tsar.—The advance of the Czechoslovak and White Russian armies brought death to the ex-Tsar Nicholas II., who with his wife and family had been held under guard for some months at Ekaterinburg in the foothills of the Urals. The local soviet professed to believe that the imperial family was planning to escape to Omsk, where the "White" Admiral Kolchak had established a Counter-Revolutionary Government. Without a trial, the soviet voted to execute "Citizen and Citizeness Romanov, their son and four daughters." The sentence was carried out on July 18, 1918. When the White forces occupied the city a few weeks later no trace of the victims was found. In burnt patches in the woods jewels belonging to the Tsaritsa were said to have been identified. According to the story current in Russia the bodies were stripped and buried in peat-bogs and their clothing, into which the jewels may have been sewn, burnt separately.

Intervention.—The month of August saw intervention in full swing. On the 2nd the British, who had already landed forces at Murmansk to prevent war supplies from falling into German hands, disembarked 2,000 men at Archangel, who overthrew the local soviet and set up a Provisional Government of the North. A few days later British and French contingents landed at Vladivostok, followed by a Japanese division on Aug. 12 and by two American regiments from the Philippines on the 15th and 16th. Western Siberia was already in the hands of the Czechs and a number of anti-Soviet Governments. On Aug. 24, Anglo-Japanese troops crushed Red resistance in the maritime provinces in a battle on the Ussuri River. Chita was captured on Sept. 6, and organized Soviet government beyond the Urals disappeared. The Czechs had seized the chief cities of the northern Volga and an anti-Soviet army was marching from the Cossack provinces of the Don. The British in the north were preparing to move southwards to join the Czechs and the Siberian Whites.

At the beginning of the autumn the tide turned. The Bolsheviks threw back the Czechs at the end of Sept. 1918, and halted the White advance from the Don. As Germany weakened on the western front, the Baltic provinces, Finland and the Ukraine lost her support. Turkey was on the verge of capitulation, and Turkish and German control over the Caucasus was vanishing. Lenin's prediction was coming true; the Central Powers and the Treaty of Brest-Litovsk were crumbling together, and the European Revolution appeared to be at hand. When the German sailors in Kiel raised the red flag on Nov. 9, 1918, the Soviet Government saluted the event with triumph.

The Bolsheviks had still to reckon with the Allies. The autumn of 1918 saw the reinforcement of foreign forces on Russian soil. By the end of the year there were approximately 15,000 British and American troops occupying a fan-shaped area in northern Russia, not less than 70,000 Japanese holding the important strategic points of eastern Siberia and the maritime provinces, 7,000 Americans protecting the Trans-Siberian and Chinese Eastern Railways, and about the same number of British supporting and instructing the armies of Admiral Kolchak, who had become dictator of the so-called "All-Russian Government" of Siberia by a *coup d'état* at Omsk on Nov. 18. The Czechoslovak commander, General Gaida, upheld Kolchak, but the Czechs were disillusioned and soon ceased to be a factor in Russian affairs. The French had occupied Odessa with a powerful fleet and a mixed force from Salonika.

The abandonment of the campaign by the Czechs counterbalanced the accession of foreign anti-Soviet forces, and the Whites were not yet in a position to strike an effective blow. When the new year began neither side could show much gain over November, except that the Revolution had reached the Baltic by the establishment of a Soviet Government at Riga on Dec. 26.

Red Terror.—During these months of pressure the Bolsheviks had hardened. Troops were called up, grain and cattle requisitioned, property confiscated. In the face of danger no compromise was possible and the country was conscripted ruthlessly to war. In the summer of 1918, to external dangers was added a deadlier enemy in their midst. After his defeat at Yaroslav, Boris Savinkov revived against the Soviet the Social Revolutionary terrorist centre which he had formed years before to combat tsardom by assassination. On Aug. 30, 1918, one of his agents, a girl named Kaplan, shot Lenin as he left a workers' meeting in Moscow. He did not die, but the Bolsheviks met Savinkov's terrorism with their own "Red Terror."

The following day Uritsky, chief of the Petrograd Cheka, was shot dead by Social Revolutionaries. The word *Che-ka* was formed from the initials of the Russian words "Extraordinary Commission." The department was organized in Dec., 1917, to deal with sabotage and other "Counter-Revolutionary" manifestations. As internal difficulties increased its activities were extended to cover speculation, smuggling, and political and military counter-espionage. Its power grew, accordingly, to include summary arrest, judgment and execution. It was thus ready to conduct the Terror. In revenge for the wounding of Lenin 500 of the most prominent figures of the old régime were shot that night in Moscow. The killing of Uritsky led to similar reprisals in Petrograd.

Latsis, a high official of the Cheka, defined the principles of the Red Terror, which could be summed up in two phrases: "Strike Quick!" and "Strike Hard!" A third, "Strike Secretly!" might have been added, for arrests were carried out at night, and families of prisoners were rarely given news of them until they were condemned or freed. The very name "Cheka" became a word of terror, and rumour fantastically exaggerated the number of its agents and its victims.

Militant Communism.—The effects of this tragic period are incalculable. On the one hand it stamped deep into the minds of western countries the belief that Russia had relapsed into Mongol savagery. On the other it confirmed the Soviet leaders in their hatred of the non-Bolshevik world.

Intervention gave impetus and coherence to the work of

nationalization, which had been proceeding sporadically. In some cases factories had been nationalized in order to fight sabotage by their owners or managers, in others to "legalize" confiscation already accomplished by the workers. Under the pressure of war the important industries were given control boards, which were not at first radically different from the war-time mechanisms under similar names in England, France and Germany. The attempt to fix prices in a period of acute currency inflation had produced the inevitable "flight" of commodities from the market. As the situation grew more difficult it became necessary to control not only industry and transport but the supply and distribution of food. From that stage the step to the control of all production and distribution was not a long one for a government of Marxian Socialists.

At first, in the early summer of 1918, restrictions were not so harsh as to prevent much private trade and speculation. It happened that the beginning of the Red Terror coincided with the period of greatest food shortage, before the harvest. The extraordinary powers given to the Cheka to suppress internal enemies were quickly directed against speculators seeking for profits.

From the outset an influential section of the Central Committee of the Bolshevik Party had been advocating a full Communist programme rather than Lenin's more cautious policy. Circumstances were now on their side, and by Aug., 1918, the period of "Militant Communism" which lasted nearly three years may be said to have begun. Private buying and selling were prohibited by law and offenders were severely punished. Cash wages were no longer paid. Workers and other employees were given cards for food, clothing and other necessities, free lodging and free transport on trams and railways. All "non-working" elements of the population were disfranchised. The peasants were subjected to requisitions of all their crops save what was needed for their households. They obtained commodity cards in exchange, but the breakdown of distribution and the difficulties of transport in a country ravaged by war progressively diminished their return from their labour. Extreme Communists declared that money would soon be wholly abolished. This hope was perhaps a screen for the conventional motives for inflation and the unavoidable fall in the value of the currency.

Money did not become wholly worthless, and a host of bagmen and hucksters, too numerous and unimportant to be imprisoned, continued private trade. The Government tried to eliminate them by entrusting distribution to the co-operatives, which had had an extensive network in Russia for many years. In spite of these efforts much of the lesser retail trade remained in private hands.

Attempts at Peace.—Representatives of every section of anti-Bolshevik Russians, from the Social Revolutionaries Kerensky and Savinkov to the Grand Duke Nicolai Nicolaievich, ex-commander-in-chief and uncle of the late tsar, went to Paris to enlist the support of the Peace Conference. But the Allies were chiefly concerned with Germany. They feared that circumstances might induce Germany and Russia to make common cause, and their first impulse was to neutralize the Bolshevik danger.

On Jan. 12, 1919, commissar for foreign affairs Chicherin asked the American State Department to open peace negotiations. On Jan. 16, the representatives in Paris of Great Britain, France, Italy and the United States discussed a general truce plan for Russia put forward by Lloyd George. President Wilson suggested that representatives of all Russian groups including the Bolsheviks should hold a meeting on the island of Prinkipo in the Sea of Marmora under the auspices of the Allies. The anti-Bolshevik governments in Russia refused to participate and the project was dropped.

In spite of continued hostility on the part of the French another attempt was made to reach a peaceful settlement. William C. Bullitt, attached to the American delegation in Paris, was sent to Petrograd in March, 1919. After a week's discussion he brought back peace terms which the Soviet Government pledged itself to accept, if the Allies agreed not later than April 10. The most important features of this document were a plan for the pacification of Russia on the basis of the *status quo* of its many Governments, a willingness by the said Governments, including the Soviet, to recognize responsibility for the financial obligations of the former Russian empire, an exchange of official representatives between the Soviet Government and the foreign Powers, and an immediate withdrawal of foreign troops. In spite of warm support by Colonel House and the approval of Lloyd George and Orlando this project also was shelved. Bullitt later expressed the opinion that the chief cause of failure was the rapid advance of Kolchak's army, which once more strengthened the belief that the Soviet Government was doomed to extinction.

Renewed Intervention.—The White armies of Admiral Kolchak in Siberia, General Denikin in southwestern Russia, and General Yudenich in Estonia had been amply supplied by the Allies with money, equipment and instructors. Kolchak threatened Kazan and Samara, on the Volga, in May and planned to reach Moscow before the end of June, but strategic co-ordination was lacking; neither Denikin nor Yudenich was ready. Kolchak could not withstand the full weight of the Red Army, which had now been welded into a competent fighting force. An attempt at diversion by the British in the north came too late to help him.

The next stage of the White campaign was more dangerous. Denikin made rapid progress northwards in the summer, and in mid-October had taken Orel, within 200 m. of Moscow, and was threatening the capital. Simultaneously Yudenich drove at Petrograd. His English tanks broke the weak resistance of the Reds, whose main forces were concentrated against Denikin. Yudenich's advance guard was within 10 miles of Petrograd before the Soviet troops rallied. Then the tide ebbed. Yudenich was thrown back, and Denikin's offensive, heavily repulsed at Orel, fell to pieces. In December he was making a last stand at Novorossiysk in the Kuban and by April he had fled to Constantinople. Kolchak lost his capital, Omsk, in November and he finally resigned command a month later. The Czechs betrayed him to the Red Army at Irkutsk. He was put on trial as a traitor, condemned to death, and shot on Feb. 7, 1920. The bewildering collapse of the White armies was due to the hostility of the masses in the territory they controlled no less than to military defeat.

Kolchak's execution marked the end of the intervention period, although Japanese troops were still in occupation of Vladivostok and the maritime provinces and General Wrangel was re-forming the shattered army of Denikin in the Crimea. Later, during the war with Poland, Wrangel had some successes on the mainland, but the armistice released overwhelming forces against him, and in Nov., 1920, the remnants of his army were transported by the Allied fleet to Constantinople.

The Soviet army had been progressively demobilized as the enemy weakened, but the internal economy of the country was in a chaotic state. The peasants, irritated by requisitions, had reduced the production of grain, and industry, which had been harnessed everywhere to war, must be reconstructed on a peace basis. Trotsky, the commissar for war, proposed that the army should be utilized directly for production. This "labour conscription" or "labour army," as he called it, was opposed by the trade unions. Lenin admitted the scheme had advantages, but questioned its practical working. It was nevertheless adopted. The labour army helped to reorganize transport and some sections of heavy industry but discontent was generated among the workers.

War with Poland.—Before the situation became critical an emergency, war with Poland, settled the problem. The outer world seemed to believe the labour army a device to avoid demobilization and to prepare for an attack on Poland, the bastion of Europe against Bolshevism. Hungary, Austria, Bavaria and Saxony were still influenced by Communism, and the fear of a Russian-German coalition had not ceased to haunt European statesmen.

The Soviet Government proposed peace to Poland in Jan., 1920, on terms similar to those offered Finland and Estonia. The Poles at first seemed willing to agree, but their ambition grew as supplies of war material from France and a food loan of $50,000,000 from the United States strengthened their country. At the end of March they demanded all the territory west of

the Polish frontier of 1772, a large cash indemnity, and the occupation of the Russian town of Smolensk as guarantee. The Bolsheviks refused, and the Polish army occupied Kiev early in May. Within a month the Bolsheviks struck back. The Soviet cavalry retook Kiev in June, while the main force advanced from Smolensk through Vilna and along the German border. The Red armies, marching forward almost without combat, converged upon Warsaw. The Polish retreat became a rout, and by the middle of August the Russians had reached the outskirts of the city.

France and England were appalled. A Sovietized Poland would mean Bolshevism in the heart of Europe. The French sent General Weygand, Foch's brilliant chief of staff, with a small group of officers, to Warsaw. It was impossible to move troops in large numbers across Germany and every moment counted. With the help of Weygand and his staff the service of supply was restored. A full account of the subsequent operations will be found in the article RUSSO-POLISH CAMPAIGNS to which reference should be made. It is sufficient to say here that the counter attacks beginning on August 14 were completely successful and that almost over-night, with little fighting, the Red armies were in retreat. A great part of the troops on the German border gave up their arms. On Oct. 11, after Polish territory had been entirely cleared, an armistice agreement was concluded at Riga. On March 18, 1921, peace was signed on terms favourable to Poland, with a new frontier which placed some 4,000,000 Russians under the Polish flag. Again the Soviet Government had paid a heavy price for peace.

The Peasants.—War Communism pressed heavily upon the peasants. Difficulties of transport and distribution prevented them from receiving manufactured goods in exchange for their requisitioned food products, and although their contribution to the national budget proportionately decreased as the currency emission to cover deficits grew greater, their position showed no corresponding improvement. Administrative confusion, red tape and contradictory instructions made the requisitions more onerous. Gradually the peasants reduced the area sown and concealed the harvested grain.

The following statistics show the agricultural decline under Militant Communism. (League of Nations, *Report on Economic Conditions in Russia,* Geneva, 1922.)

	1909–13 Average	1916	1920	1921
Harvest (millions of poods)	4,078	3,955	1,738	1,617
Area sown (millions of dessiatines)	81·5	82·5	56·8	49·1
Yield per dessiatine (poods)	50	48	30·6	32·6

The total harvest in 1921 was only about 40% of the average yearly harvest in 1909–13, while the area sown had decreased by almost one-half and the yield per dessiatine had decreased by more than one-third. The figures show that the decline was progressive from 1916 to 1921, except that the yield per dessiatine improved slightly in 1921.

The Bolsheviks tried to counter this passive resistance by an extension of class warfare to the villages. They divided the rural population into three categories: Rich Peasants (*kulaks* or exploiters); Middle Peasants, and Poor Peasants. The Poor were their protégés, they said; the Middle their friends, and the Rich their enemies. "Committees of Village Poor" were organized to supervise the grain requisitions and to take the part in village management which had hitherto belonged to the prosperous peasants. It was hoped that by this means kulak opposition would be overcome without antagonizing the Middle Peasants.

Events showed that the rural communities were no favourable *terrain* for class warfare. The ties of family and religion, a common dislike of tax-collectors, towns and townsmen, and a sullen distrust of any central authority which took their young men as soldiers and requisitioned their grain and cattle, proved stronger than categorical distinctions. These distinctions tended to be more arbitrary than real; many of the Middle Peasants were the young relatives of kulaks, whose chief aim was to become kulaks themselves; many of the Poor were dependent, ignorant and shiftless. Bolshevik orators and newspapers spoke only of kulak opposition, but the attempts to apply class warfare and Communism to the villages were resented by the Middle Peasants also.

Peasant delegates to the Eighth and Ninth Congresses of the Communist Party in 1919 and 1920 had expressed the murmurs of the villages, and there were signs that the army, largely recruited from the Middle Peasant class, was growing restive. The Polish War brought a new *élan* of patriotic ardour in which this sentiment was for a time forgotten, but early in 1921 it burst forth. In February the garrison of the naval fortress of Kronstadt, near Leningrad[1], demanded the abolition of the grain monopoly. The flame was fanned by Social Revolutionary agitators, and a mutiny followed, which was suppressed only after heavy fighting. Almost simultaneously the peasants of Tambov, one of the central provinces of Russia, refused to yield their grain to requisition. Troops sent to enforce obedience made common cause with the peasants. Resentment had become revolt.

Lenin realized the danger, and induced the Tenth Communist Congress in March, 1921, to sanction a decree substituting a graduated food tax for the system of requisitions. Commodities demanded by the peasants, kerosene, salt, tools and leather, were rushed to Tambov, to be sold or bartered on a free trading basis. Those measures quickly ended the revolt. The source of trouble had been economic discontent rather than political unrest or counter-revolutionary agitation.

The Famine.—It is significant that both of these mutinies occurred at the end of winter, when climatic conditions had caused a failure of the autumn-sown grain, and the peasants, whose reserves were depleted by requisitions, were beginning to fear one of the famines that have devastated Russia periodically. Their anxiety was well founded. A prolonged drought in the early summer ruined the spring-sown grain throughout the "black earth" districts of the Volga, North Caucasus and Ukraine. By the middle of July a million peasants were in flight from their parched fields towards the centres of urban and river transport, where they were huddled in refugee camps infested with cholera and the epidemics of malnutrition. The crop failure was reckoned to have affected an area inhabited by 20 to 30 million people. Unless help was forthcoming, not less than 10 million seemed doomed to perish from starvation before spring.

In July the Soviet Government permitted an appeal by the writer Maxim Gorki to Herbert Hoover, then chairman of the American Relief Administration (A.R.A.), which had kept alive millions of hungry children in Belgium and northern France during the War, and had been at work later in Central and Eastern Europe. Hoover agreed to help, and a *modus operandi* was soon arranged between the A.R.A. and the Soviet authorities. This example was followed by a number of European charitable organizations, but the brunt of the work was done by the A.R.A., which at the peak of its activity, in March 1922, was giving daily rations to 10 million children and adults. Altogether foreign aid fed probably 12 million persons, and the Soviet Relief Administration maintained at least an equal number.

It was difficult to estimate the famine death roll, owing to the confusion between disease and starvation in the vital statistics. Deaths from actual hunger probably did not exceed half a million. Foreign relief for the famine rendered two other important services. It allayed much of the xenophobia provoked by intervention, and thus paved the way for a renewal of normal relations between Russia and the outer world. It also helped the Soviet to cope with the problem of disease, especially cholera and typhus, which had been epidemic in Russia for centuries. After 1922 there was no widespread recurrence of either pest.

The New Economic Policy.—It is customary to regard the New Economic Policy instituted by Lenin in the spring of 1921 as a more or less temporary abandonment of Communism to mollify the peasants. There is no question that an influential

[1]The name Petrograd was changed to Leningrad on April 22, 1920.

section of the Communist Party saw it in that light. Lenin himself may not have shared this view. He was above all a realist, alive to the practical necessities of the moment. He had shown that he was well aware of the anomaly of an industrial proletarian revolution in a country 85% of whose population were backward peasants. By force of circumstance and the exigencies of war he had been compelled to adopt a programme of Socialist centralization which many of his followers welcomed as the correct and natural policy of a Socialist State. Lenin, himself born and bred in a Russian province, knew better than many of his colleagues the well-worn channels of life on the Russian plains.

Before the Communist Party reached a decision in its protracted discussion of agrarian policy in 1920 and 1921, Lenin found himself advocating not merely a change with regard to requisitions and the grain monopoly, but a general readjustment of the economic framework. Instinctively he felt that Socialist centralization had been pushed too far, that they were stifling the individual initiative without which the country could not recover from the effects of foreign and civil war. The reform of industry for peace purposes would require effort and expenditure which the State was unable to provide, and finance and transport were also in a desperate position.

Lenin's influence and insistence won. His critics had no valid alternative to offer. The New Economic Policy (called "NEP") was confirmed by a decree published Aug. 9, 1921. It permitted freedom of trading within the country, sanctioned overtime and piece work payment for workers, offered encouragement to foreign capitalists and concessionaires, and recognized by implication the rights of private property which had been abolished under Militant Communism. NEP not only made private business legal and possible in Russia, but also opened the door for commercial intercourse with the outer world. To many orthodox Communists this new freedom was a backward step.

New Financial Policies.—During the period of Civil War and Militant Communism the financial tools of capitalist states had been laid aside. Private banks, cheques, securities—all had gone. Money had depreciated rapidly as more and more of the national budget was covered by inflation. Frumkin, vice-commissar of finance, stated that 85% of the 1920 budget was provided by the emission of notes. The remaining 15% came from food requisitions and other sources.

If the New Economic Policy was to succeed it must clearly have banking facilities and a more convenient medium of exchange than commodity cards. The shift of policy was quickly made. The State bank was established in the autumn of 1921 and given the authority to issue banknotes as well as to serve as a credit institution. On Nov. 16, 1921, it began credit operations. By a year from that time the essentials of currency reform had been prepared, and the Bank began to issue notes. The monetary unit chosen for the new banknotes was the *chervonetz,* with a gold value of 10 pre-war roubles, that is, 119·4826 grains of fine gold or $5.146 in United States currency. The rouble was thus given its pre-war gold equivalent. The law provided that the new banknotes should be secured to 25% by precious metals and foreign currencies.

For a time the *chervonetzy* (State bank notes) circulated side by side with the earlier *sovznaky* (Government or "Soviet" notes), whose value was adjusted to the chervonetz from day to day. The State bank notes were strictly controlled, but the sovznaky were printed in great quantities in the succeeding months. The public, especially the peasants, grew to distrust them, and the remaining steps in currency reform were pushed through as quickly as possible. In March 1924, the emission of sovznaky was stopped and in May they passed out of circulation. Small denomination Treasury notes were issued for purposes of convenience, and silver and copper coins were minted. Henceforth the currency system of the Soviet Government was on the same general basis as that of western countries.

The reform of the currency required in turn the establishment of the State budget on a solid foundation, since the Government could no longer print notes to meet the deficits. Agricultural taxation, which had been substituted for requisitions early in 1921, was again revised. In May 1922, a single tax in kind was established by decree, and the peasants were permitted to pay in specified commodities the graduated taxes imposed. In May 1923, a more extensive reform was made. Cumbrous miscellaneous taxes were swept aside, a "Single Agricultural Tax" was provided, and money payments were gradually substituted for commodity payments. Meanwhile urban taxation had been developed by indirect taxes and income and property taxes, so that the peasants, instead of forming the principal tax-paying body of the State, came to furnish only a small fraction of the national tax income.

Changes in Organization.—The most radical change involved in the New Economic Policy was the restoration of the whole internal economy of the country, industry, commerce, transport, housing and employment, to a straight money basis. Instead of the vague system of accounting prevalent under Militant Communism, every state enterprise was compelled to issue a regular balance-sheet and to show profit and loss in the old-fashioned way. Instead of commodity cards, employees received a regular wage paid in cash. Housing committees were entitled to charge rent on a graduated scale in accordance with the social position and earnings of the tenant, and were expected to maintain the premises under their charge in a reasonable state of repair and comfort. The railways and tram companies were allowed to charge fares for passengers and freight to cover expenditure and enable them to maintain an adequate service.

Communist critics of the New Economic Policy were perhaps justified in declaring it a reversion to capitalist methods. In later years there was acrid discussion upon this point, and an attempt was made to resolve ideological doubts by the adoption of the self-contradictory phrase "Socialist Capitalism" to define the precise significance of the policy. The commoner and less anomalous expression "State Capitalism" was probably more accurate. In any case, the Soviet Government could not avoid the process of decentralization which was a phase of post-war reconstruction in all of the belligerent countries. For them, no doubt, war-time centralization and "control boards" were matters of necessity rather than choice. For the Bolsheviks, choice and necessity coincided. But if centralization proved unwieldy in the advanced industrial countries of the west, it was a yet heavier burden upon the backward economy of Russia. Under the New Economic Policy a great many nationalized enterprises were "released," not to former proprietors or private owners, but to face competition in the open market. The financing of such corporations was carried out by the Industrial and Commercial Bank and by other new banking establishments.

As the New Economic Policy developed, industry was divided into "trusts," as they were called, such as the Oil Trust, the Coal Trust and the Flax Trust, at first horizontal in character, but gradually becoming vertical also. With the trusts, which were organs of production, were associated syndicates, organs of sale and purchase, handling both foreign and internal trade. The trusts were later divided into sections; for example, the Oil Trust subdivided into Azneft (Azerbaidjan Oil), Grozneft (Grozny Oil) and Embaneft (Emba Oil). United action and governmental control were secured by an expansion of the Supreme Economic Council to include representatives of the trust sections, so as to form a kind of Industrial General Staff.

The Union of Socialist Soviet Republics.—Since 1917 the vast territory under the Soviet authority had been an inchoate mass whose constituent parts and political character were changing almost from month to month. The time had come to organize a framework of government.

At the end of 1922 the territory governed from Moscow consisted of the Russian Socialist Federal Soviet Republic (the R.S.F.S.R.), White Russia, the Ukraine, the Caucasus and Central Asia. Early in that year Stalin, the general secretary of the Communist Party, was instructed as commissar of nationalities to draw up a plan of federation. In Dec. 1922, the First Congress of Soviet Republics met at Moscow and confirmed the pact for the formation of a Union. Delegations were present from four federations, the Russian, Ukrainian, Caucasian and White Russian. The Far Eastern Republic, a semi-independent buffer state

closely affiliated to the R.S.F.S.R., had been merged with the latter in the preceding November, and a part of Central Asia was also included in the Russian Federation.

The constitution of the new state, the Union of Socialist Soviet Republics, was accepted by the Central Executive Committee on July 6, 1923, and became effective from that date. To the four allied republics two others were added at the end of 1924 by the inclusion of the federations of Uzbekistan and Turkmenistan, which superseded former geographical divisions of Central Asia.

The constitution was framed to express the new Soviet policy of decentralization and freedom for the constituent governments, a plan which might have prevented the breach between the nationalistic Baltic States and Moscow, had it been developed earlier. Under the constitution of 1924 (C. 2, Para. 4) each united republic retained the right of withdrawal from the Union. The sovereignty of the individual republics was carefully guarded, and many of the functions of government were left with them. Each republic had its own Council of Commissars, but the Union reserved for itself the Commissariats of Foreign Affairs, War and Marine, Trade, Transport and Posts and Telegraphs.

Paradoxically, the most important unifying force of the new state, which contained so many races, creeds and languages, was not mentioned in the constitution. The Communist Party, with its rigid discipline and centralized authority, was destined to control each of the constituent states and to cement them more firmly together.

The Changed Position Abroad.—An improvement of relations with the Baltic States followed the collapse of Denikin and Yudenich. In the autumn of 1919 Litvinov was sent by the Soviet to Dorpat in Estonia to negotiate peace with Estonia and Finland. Peace treaties with both States were signed early in the following year on reasonable terms. A settlement with Latvia, whose Soviet Government had been overthrown in May 1919, was delayed by the Lettish claim to the province of Lettgalen. The Letts refused to negotiate and in a three-weeks campaign, Jan. 3–24, 1920, drove the Red troops from the province. It was the only successful campaign against the Red Army in the whole intervention period. Peace with Latvia was signed on Aug. 11, 1920. In the previous January the Allied blockade had been lifted. Anglo-Russian negotiations began in the winter of 1919–20, but were interrupted by the Polish War, and it was not until March 16, 1921, that a trade agreement according *de facto* recognition to the Soviet was signed in London. In the same year similar agreements were made with Germany (May 6), Norway (Sept. 2), Austria (Dec. 7), and Italy (Dec. 26).

The Genoa Conference.—The New Economic Policy stimulated the foreign trend towards commercial rapprochement with the Soviet, and in the spring of 1922 an international conference was held at Genoa, where the Soviet envoys for the first time met foreign statesmen on equal terms. The atmosphere was at first cordial and a proposal was made to provide financial assistance to the Soviet on condition that the debts of the Tsarist Government were recognized. A period of haggling followed, but on April 16, 1922, Germany and the Soviet privately signed an agreement at Rapallo shelving the debt question, affirming mutual friendship, and re-establishing full diplomatic relations. This unexpected event revived fears of a Russo-German combination to upset the Treaty of Versailles, and the Genoa Conference ended without reaching a solution. Although a meeting of experts to discuss financial matters was held in the summer at The Hague, prospects of a settlement were never bright and little was accomplished.

The Soviet Government took the position that the western Powers had tried to enforce a humiliating abandonment of the principle of the repudiation of Tsarist debts and of the monopoly of foreign trade, which it had now come to regard as one of the main pillars of its economic system. If the stability of the new currency was to be maintained, rigid control over exports and imports was imperative. But in the first years of the New Economic Policy foreign trade was somewhat hampered by the attempt to force it all through the bottle-neck of an untrained bureaucratic department. With growing experience there was a tendency to transfer the placing of orders and sales abroad to the State organizations directly concerned, while the Foreign Trade Department continued to act as control. Soviet trading corporations were established in London, Berlin, New York and other centres. French and American business men hesitated to allow long-term credits, but the English and Germans found them possible and the volume of trade steadily increased.

Effects of the New Economic Policy.—The policy of "concessions" to foreign enterprise on Russian soil, though less successful than the Soviet had hoped, brought money into the country and helped to increase the turnover. Important service was rendered by the Russian Union of Co-operatives, whose offices abroad did much to secure the first credits given to the Soviet and conducted a steadily increasing business which was principally in foodstuffs.

The following table shows the development of foreign trade during this period[1]:

Year	(Millions of pre-war gold roubles)		
	Total	Imports	Exports
1921	228	208	20
1922	251	270	81
1923	350	144	206
1923–24	603	234	369

The growth of exports was the most striking change after the introduction of the New Economic Policy. Total trade expanded and imports, following the Soviet policy of rigid control, fluctuated widely; but exports were multiplied two and a half times between 1922 and 1923, and in the newly established fiscal year ending Sept. 30, 1924, they were nearly doubled again.

The first years of NEP showed a corresponding improvement in internal trade and production. The figures below show the increase in turnover of all taxable concerns, State, co-operative and private, in the R.S.F.S.R., White Russia and the Ukraine. Accurate results for internal trade are impossible in any country, even a highly organized industrial one, but the indication that turnover was multiplied by four between the summer of 1922 and the spring of 1924 is probably not far wrong.

	Volume of turnover (Millions of roubles)
July–September, 1922	970
October, 1922–March, 1923	1,342
April–September, 1923	2,902
October, 1923–March, 1924	3,939

The period brought a great change in the outward appearance of the cities. Instead of grass-grown streets, dilapidated houses and closed shops, there was movement of traffic, fresh paint and plaster, and the hum of business. In the villages, discontent and famine gave way before plentiful harvests.

In the autumn of 1923 prices of agricultural products fell to 60% of the pre-war level. Meanwhile, stimulated by the necessity for showing profits which the New Economic Policy required, the trusts and other industrial enterprises had raised the prices of manufactured goods to 80% above that level. The disproportion was so great that the peasants refused to sell grain or buy goods. Warehouses were glutted and industrial stagnation was threatened. Trotsky coined the term "Scissors" to describe the crisis which followed, because the graph illustrating the ratio of industrial and agricultural prices to the pre-war average had the form of opened scissors, with industrial prices forming the upper blade.

To close the scissors was imperative. It was done in six months, by the sale of goods below cost price, which swept away most of the paper profits of the trusts but removed the danger of industrial stagnation, and by the progressive increase in the price of food products. Although this very serious crisis was past, the

[1]The tables showing the development of foreign and domestic trade are summarized from those given in *Ten Years of Soviet Power in Figures*, U.S.S.R. Central Statistical Board (Moscow, 1927), pp. 368, 394–395.

task of keeping the scissors closed remained one of the major problems of the Soviet State.

The comparative liberty given to private trade under the New Economic Policy had produced a host of prosperous "Nepmen," as they were called. They spent money lavishly in the newly revived restaurants, cabarets and gambling rooms, and were no more popular with the mass of their fellow-citizens than the war or "valuta" profiteers in western Europe. They were largely middlemen, retail traders and small manufacturers, for the State continued to hold the principal sources of production and wholesale business in its own hands. They doubtless served their purpose in getting the commercial machine back into running order and furnishing new accumulations of capital; but they were peculiarly repugnant to the extreme Communists and to the organized workers, who saw them as a "new bourgeoisie." Nevertheless their luxuries and greed and gambling were not without value to the community. In the year 1923 gambling rooms, cabarets and restaurants yielded some ten million roubles' revenue to the municipality of Moscow, to be used for the repair of streets, water mains and sewers, and for other public works which greatly improved the condition of the city.

THE STRUGGLE FOR CONTROL, 1924–

By the beginning of 1924 the New Economic Policy may be said to have justified itself as a practical measure. Currency had been restored to a gold basis, production was approaching pre-war standards, and agriculture had recovered from the effects of the famine and civil war. Much of the improvement had been due to the "Nepmen," or private traders, in the towns, and their counterpart, the "kulaks," or richer peasants, in the villages. They formed a new bourgeoisie, whose wealth and influence were steadily increasing.

The outer world seemed ready to believe that Russia had now entered upon an evolutionary process similar to that which followed the French Revolution under the Directory, and was eager to share in the development of the country's vast resources. It failed to reckon, however, with the fanaticism of the Communist Party and the tenacity of their Marxist faith. The Party had accepted the New Economic Policy, not as a *volte-face* but as an expedient. It refused to abandon its ideal of a universal Revolution and a world Socialist State. To that ideal it was determined to hold the Soviet Union, whatever difficulties might result at home or abroad.

Thus began a struggle for control between "Left" and "Right"; that is, between Marxist internationalism and the process of evolution, which raged with growing intensity through the coming years. Had Lenin lived, the struggle might have been less acute or avoided altogether. His authority and sense of realities were so great that it is probable that he could have maintained the New Economic Policy as the delicate adjustment between two opposing forces which he originally conceived it to be. His sudden death on Jan. 21, 1924, destroyed the balance which was gradually being reached.

The Period of Recognition.—The effect of Lenin's death had been discounted abroad because of his long illness and absence from public affairs. The growing prosperity of the Soviet State had stimulated the interest of foreign business men, who were beginning to feel that trade would be improved by the establishment of regular diplomatic and consular relations with Russia. Germany had taken this step two years before. The new Labour Government in England had promised to do the same as one of the means of diminishing unemployment, and the energetic Fascist autocracy of Italy was seeking fresh fields for commercial expansion. France was still preoccupied with the memory of her lost loans to the Tsarist Government and with her own reconstruction problems, but her hostility to the Soviet had to some extent diminished.

On Feb. 1, 1924, the British Government recognized the Soviet *de jure*. Other countries followed in rapid succession, and by the beginning of 1925 all of the Great Powers except the United States and Latin America had established diplomatic relations with the Soviet Union. The order was as follows:

Great Britain	Feb. 1, 1924	Sweden	March 15, 1924
Italy	„ 7, „	Denmark	June 18, „
Norway	„ 13, „	Mexico	Aug. 4, „
Austria	„ 20, „	Hungary	Sept. 18, „
Greece	March 8, „	France	Oct. 28, „
Danzig	„ 13, „	Japan	Jan. 1, 1925

Japanese recognition had been delayed by their claim to compensation for a massacre of Japanese soldiers by Red "partisans" in the Siberian town of Novy Nikolayevsk in May 1920. Although they had evacuated Vladivostok and the mainland in Nov. 1922, they retained northern Sakhalin until their claim should be satisfied. After two failures negotiations were resumed in Aug. 1924, and recognition was granted on Jan. 1, 1925. A supplementary agreement on Jan. 20 pledged the Japanese to withdraw from Sakhalin before the end of May and gave them important oil and coal concessions in the Russian half of the island.

The establishment of normal diplomatic relations led to an increase of foreign trade, but the absence of a settlement of tsarist debts, war debts and private claims prevented any extension of loans to the Soviet. Nevertheless short-term credits were soon arranged in many countries, and the regularity with which Soviet bills were met gradually overcame distrust. A number of important English firms gave terms of credit running from three to five years. In 1925 Germany provided a State-assisted credit of 300,000,000 marks for a period of three years. The French and Americans were more cautious, but heavy annual purchases of cotton in the United States on a short-term credit basis were made possible by longer credits elsewhere and by the general improvement of Russia's economic situation.

The Communist International.—Another factor, however, hampered not only financial but political relations between the Soviet and the rest of the world. It was interference in the internal affairs of foreign countries by the Third or Communist International, known as the "Comintern." The Third International was founded by Lenin in March 1919 as a successor to the First International of Marx. It was pledged to the cause of World Revolution which had, Lenin declared, been betrayed by the Second International of Amsterdam.

The Soviet Government maintained that the choice of Moscow as the headquarters of the Comintern involved no closer connection between it and the Third International than Amsterdam made between the Second International and the Government of the Netherlands. The Comintern was an aggregation of Communist Parties, and in theory, at least, the successful Communist Party of Russia was no more than *primus inter pares*. The avowed purposes of the Comintern to overthrow their régimes and institutions by violence caused foreign Powers to take a different point of view. Declining to regard casuistic distinctions, they considered the Comintern and the Soviet Government as vassals of one lord, the Russian Communist Party. While power in Russia remained in Communist hands, it was impossible for foreigners to reconcile the action of the Comintern in any country with friendly relations between that country and the Soviet Union.

Moreover, the Comintern extended its activities to the colonies of foreign Powers and to semi-colonial countries or spheres of influence, such as China. This caused ill-feeling between Russia and the foremost colonial Power, Great Britain, and in May 1923, Lord Curzon, as foreign secretary of a Conservative Government, addressed to Moscow a note on the subject, so sharply worded as to be the equivalent of an ultimatum. There were a number of points at issue, but the question of Communist "propaganda" in Britain and her colonies was the principal grievance. The Soviet Government acceded to the British demands, under protest; but the propaganda ghost was not laid, and it continued to trouble Anglo-Russian relations.

The British Labour Government of 1924 took steps towards a friendly settlement with the Soviet Union. An agreement was reached in the autumn of 1924 whereby the Soviet promised to repay old debts over a long term of years in return for immediate financial aid. Before the accord could be signed there was a general election in England, in which no small rôle was played by a letter said to have been written by Zinoviev, president of the

Communist International, to a member of the English Communist Party, giving instructions about Communist propaganda in the British Isles. The Labour Party was decisively beaten and the Conservatives returned to power. The agreement with the Soviet was shelved and the new Government accepted the Zinoviev letter, whose authenticity was denied by Moscow, as proof of the "nefarious interference" of the Bolsheviks in British affairs. The stir caused by this incident might have been forgotten but for events in Asia and other colonial regions, where the distinction between Soviet Government policy and Comintern activities at times became a subtle one.

Soviet Policy in Asia.—In 1919 Russia's influence was a negligible factor in Turkey and the Near East, Persia, Afghanistan and China. England, on the contrary, had never held so strong a position, and seemed on the verge of obtaining permanent control over what had formerly been the buffer States between her Empire and the tsar's.

Three years later, however, the Soviet had signed treaties of friendship with Turkey, Persia and Afghanistan as States independent of external influence, and established a virtual protectorate over outer Mongolia. The central Asian principalities of Khiva and Bokhara were firmly under Soviet rule, and the new Russian republic was now ready to challenge Britain in China.

The Soviet Government and the Comintern achieved this result jointly, under Lenin's guidance. The former disavowed unequal treaties, capitulations, treaty ports, protected areas and unilateral tariffs; while the latter devoted its energies to fostering not Communism but nationalism, by virtue of the Leninist doctrine of colonial slaves. This doctrine was Lenin's answer to the question which had long perplexed orthodox Marxists, namely, why the working masses of western Europe had failed to revolt, as Marx had predicted, against their capitalist masters. Lenin argued that the surplus profits from the exploitation of colonies and semi-colonial countries such as China had enabled the European capitalists to maintain their "wage slaves" above the starvation level which would make revolution inevitable. To free such countries from capitalist exploitation would therefore be a long step towards the proletarian world revolution. Lenin thus reconciled three apparently contradictory forces, the nationalist aspirations of colonial and semi-colonial countries, the spirit of Marxist Communism, and the reborn desire of new Russia for expansion, a desire which was expressed in the absorption of Khiva, Bokhara and Outer Mongolia.

The Soviet Government cemented its disavowal of "imperialist" colonial policy by the conclusion of equal treaties and pacts of friendship with the Asiatic countries, as follows:

Persia . .	Feb., 1921	Turkey	March, 1921
Afghanistan .	" "	Outer Mongolia	Nov. "

The Soviet and China.—The Mongolian treaty caused irritation in Peking and had the effect of delaying a full accord between the Soviet and Chinese Governments until May 31, 1924. In a manifesto issued in July 1919, and formally repeated in Sept. 1920, the Soviet had affirmed in the most categorical manner its abstention from previous pacts infringing Chinese sovereignty in any way, its abandonment of all claim to the Boxer indemnity, and its willingness to treat with China on terms of full equality.

The treaty of 1924 put a Soviet ambassador, Karakhan, in the old tsarist embassy in the Legation Quarter of Peking, despite the objection of the foreign diplomatic corps to the presence of a potentially hostile element within the fortress that the Legation Quarter had become after the Boxer Rebellion of 1900. Meanwhile the Communist International was at work in South China, where both Russian and Chinese Communists supported the Nationalist slogan, "China for the Chinese!" As the Nationalists advanced northwards from Canton, the influence of their Russian advisers, Borodin in political affairs and Galen in the army, grew stronger. Neither had an official connection with the Soviet Government, but the foreign Powers, especially England, were convinced that both were acting under Moscow's orders. By March 1927 the Nationalists were masters of South China, including the Yangtse valley, and the native section of the greatest treaty port, Shanghai.

At this moment Chang-Tso-Lin, the anti-Nationalist dictator of Peking, raided the premises of the military attaché in the Soviet embassy there, with the knowledge and permission of the foreign diplomatic corps. A mass of documents were seized and a number of arrests were made, including subordinate members of the Russian staff and Chinese Communists who had sought refuge in the embassy compound.

The documents published immediately showed a financial connection between the Soviet embassy in Peking and the Comintern or unofficial activities of Borodin and Galen in South China. A rupture of relations between Moscow and Peking followed. The foreign Powers, especially England, began to realize the full danger to them of the Leninist doctrine of colonial slaves. Strong military and naval forces enabled the foreigners to retain the treaty ports and the Legation Quarter of Peking, but they were compelled to abandon their privileges at Hankow on the Middle Yangtse, which for a time became the Nationalist headquarters.

Then, in the moment of victory, Russian influence began to wane. Nationalist leaders may have been alarmed by the revelations of the Peking embassy documents, or attracted by the material advantages of friendly relations with foreign Powers. It is also conceivable that Moscow at this time overestimated the revolutionary character of the Chinese Nationalist movement. At any rate, there occurred a split between the "Left" or Russophile section of the Nationalist Party and the "Right," which ended with the victory of the latter, the flight to Russia of Borodin, Galen and their staffs, and a harsh repression of Communism in the territory controlled by the Nationalists.

The Anglo-Soviet Rupture.—Events in China had increased anti-Soviet feeling in England, already aggravated by Russian financial contributions to the British coal-miners on strike in the previous year, and in May 1927 the premises of the Soviet Trading Corporation in London, Arcos, were raided by the police. In this case no seized documents were made public, but the result was similar to that in Peking. Diplomatic relations between England and the Soviet were severed on May 24, 1927. This was the first serious setback the Soviet had met since 1921. It caused a reduction of English credits and imports, and thus affected the internal economic situation, which had now come to depend in no small measure upon smooth relations with foreign capital and business.

Communist Policy at Home.—Lenin's death occurred at a time when the growing prosperity of the "Nepmen" and the new bourgeoisie had begun to raise fears in the minds of many Communists that the New Economic Policy might become a surrender to capitalism. The tremendous demonstration of popular sympathy which accompanied his funeral ceremonies, when three quarters of a million people waited an average of five hours in the arctic cold of 30 degrees below zero, night and day alike, before passing through the hall where Lenin's body lay in state, encouraged his successors to resist the bourgeois trend.

Deprived of Lenin's guidance, the Communist leaders dared take no risks with the internal enemy. The Nepmen had helped to renew commercial activity, but they must not be allowed to gain the upper hand. It was felt, moreover, that the State business organizations were now sufficiently strong to take the place of private enterprise, and the restoration of the currency to a sound basis would permit their being financed by the newly created State banking organizations. In the first half of 1924, therefore, private trade was loaded with heavy taxes and other restrictions. The Nepmen were unpopular with the masses and the measures taken against them were not unwelcome, but the reduction of private enterprise in the towns led the extremist section of the Communist party to demand a similar suppression of "Capitalist elements" in the villages. The struggle between the forces of Capitalism and Socialism thus provoked a sharper struggle within the Communist Party itself.

The Intra-Party Controversy.—There was a tendency abroad to exaggerate the importance of personal rivalries in the long and bitter controversy which followed, and to regard it primarily as a struggle for Lenin's mantle. It is probable that there was a clash

of temperament between Stalin, general secretary of the Communist Party, the Majority leader, and Trotsky, who conducted the Opposition, but the real issues went deeper. In the first part of the controversy, 1925–26, the Opposition tried to force the socializing process, which was the avowed aim of the Communist Party, at too swift a pace.

In the cities the State might now hope to supplant the Nepman without economic disorganization, but in the villages it was still dependent upon the "kulaks" or rich peasants, who produced the grain surplus needed for export and to feed the urban centres. When Trotsky demanded their repression the Majority did not yet see how they could be replaced, and the Communist Party Congress of Dec. 1925, confirmed the rights of "individual peasant producers," despite a screen of anti-kulak phrases to cover this compromise with Marxist principles.

A good crop in the summer of 1926, however, strengthened national food resources and brought forward a demand that the village capitalist be curbed. He was becoming dangerously strong, and the State had begun to feel, as it had about the Nepman two years before, that it could do without him. The Opposition platform, therefore, was in accord with prevailing Communist sentiment, and by 1927 it had attracted such prominent figures of the Bolshevik régime as Zinoviev, the president of the Third International, and Kamenev, one of Lenin's closest associates. But Trotsky's adherents declared that their arguments were perverted in the official press and that they were not given proper opportunity to state their case. They had recourse to underground methods, which the Majority denounced as an attempt to split the Party. The adherents of Trotsky refused to abandon their tactics and after hot discussion at the Communist Party Congress in Dec. 1927, were expelled from the Party. Trotsky and other Opposition leaders were sent into exile. Within a month of their departure from Moscow the victorious Majority had adopted their programme of repression of the "capitalist elements in the villages."

The Peasant Problem.—The immediate reason for this step was the failure in the summer of 1927 of the State grain collections. This was the name given to the system of state purchases of grain to provide for the needs of the urban population and the army, and for export. In the previous year the State had collected approximately 10,000,000 tons of cereals, of which more than 2,000,000 were exported, and it was planned to collect an equal amount in 1927–28. A renewal of the "scissors" disproportion between the prices of grain and manufactured goods caused difficulty. The peasants preferred to keep the grain for themselves and their stock, rather than sell it. Communist sentiment was already prepared for a drive against "anti-Socialist forces" in the villages. During the spring and summer of 1928 vigorous measures, reminiscent of the Militant Communism period, were employed to extract surplus grain from the richer peasants, who were described as "class enemies."

The quota was attained, but the growing needs of the towns left only a small margin for export, which fell to less than half a million tons. This reacted unfavourably upon the foreign trade balance, which had now become most important, because in 1927 the State had embarked upon an ambitious five-year programme of industrialization; that is, an attempt to build up a self-sufficient industrial production which required heavy purchases of machines and raw materials abroad. The enforced collections of grain caused much discontent in the villages, and in July 1928 the Central Committee of the Communist Party announced their abolition and promised they should not be repeated. Once again Communist insistence upon class warfare in the villages had overemphasized the distinction between kulaks and the rest of the peasants.

The Electoral System.—Although the electoral system under the Soviet Constitution of 1923 had been carefully devised to redress the numerical disproportion between the rural and urban populations and to maintain the control of the Communist Party and organized labour over the principal organs of government, the power of self-expression which universal suffrage gave to the villages could not be ignored. However great might be the authority of the Communist Party, it hesitated to pursue any policy counter to the clearly defined will of the rural masses. The Party regarded itself as the guardian of the infant proletarian State, not yet fitted by experience and political development for full adult freedom. The electoral system was a valuable guide to public opinion, but as far as the real exercise of power was concerned, it was little more than a form of education in self-government.

This educational process was reinforced in a number of ways, the first of which was the Communist Party itself, which on Nov. 1, 1928, had 1,500,000 members. The Communist Youth organization had over 2,000,000 members, young persons of both sexes between the ages of 15 and 22. After them came 1,500,000 Young Pioneers (Communist Boy and Girl Scouts), aged 7 to 15. Some 12,000,000 urban workers were enrolled in trade unions, controlled by Communists and sympathetic with their aims. The Soviet Air League (Osoaviakim), a patriotic organization similar to the German Navy League before the World War, had thousands of branches throughout the country and a membership of 3,000,000. The Army and Navy, approximately 600,000 strong on a peace footing, was another forcing-ground for Communism. Only 10% of the recruits were members of the Communist Party or the Communist League of Youth, but at the expiration of service the proportion had increased to 50 per cent. Finally, the whole system of primary and secondary education had been revised to accord with Marxist ideals. On Nov. 1, 1928, there were in the Union 118,000 primary schools and 3,000 secondary schools and universities, all rigorously secular, with an obligatory course in the elementary principles of Socialism.

Foreign Relations.—The rupture with England did not prevent the Soviet from taking part in international disarmament conferences at Geneva in the autumn of 1927 and the spring of 1928. Disarmament had long been advocated by the Soviet Government, which in the winter of 1922–23 had attempted to arrange a scheme of armament limitation in a conference with its neighbours, Poland, Finland and the Baltic States. At Geneva the Soviet Government proposed to begin immediately the progressive reduction of land, sea and air forces. The other European Powers were distrustful and unprepared for such sweeping action, and the conferences ended without result.

Although the Geneva Conferences did little to improve the relations of the Soviet with the leading Powers of western Europe, and although the Soviet was excluded from the number of original signatories to the Kellogg World Pact of Non-Aggression signed at Versailles in the summer of 1928, there were signs in the following autumn that the United States, which had become a reservoir of capital for European post-war reconstruction, was beginning to modify its aloof or even hostile attitude towards the Soviet. For several years the two great international oil groups, the American Standard Oil and the British Royal Dutch Shell, had been laying claim to a large part of the nationalized oil-fields of the Caucasus; Standard as purchaser of the former Nobel interests, and Royal Dutch Shell by virtue of concessions they had formerly controlled. At the Genoa Conference in the spring of 1922 the Soviet seemed willing to discuss the oil question, and at one moment it was reported that it had arranged a *modus operandi* with the British group. This, however, fell through. Subsequent attempts to obtain sales contracts were unsuccessful until the Soviet Oil Syndicate concluded a series of sales contracts with two of the Standard subsidiaries in the winter of 1926–27, on terms advantageous to the Standard.

The hostility of the English group, already aroused by direct Soviet competition in England, France and elsewhere, was increased by this *coup*, which for a time threatened to precipitate a rate war between the English and American oil interests throughout the world. The parent Standard Company, however, had not renounced its claims to the Nobel properties, and in this respect its interests coincided with those of the English group. The rate war was checked, but whereas the British oil interests remained actively hostile to the Soviet, the Americans were passively friendly.

In the autumn of 1928 a contract between the Soviet Trading Corporation in New York and the General Electric Company in

the United States, giving the former five years' credit on purchases, was the first real breach in the "credit blockade," as it was called, which had hampered business relations between Russia and the United States. Hopes were roused in Moscow that the economic tension caused by the rupture with Britain and the absence of grain exports might be eased by financial aid from America.

BIBLIOGRAPHY.—Historical accounts of Soviet Russia cover the period only imperfectly. The works selected below should be supplemented from the files of the Russian newspapers *Isvestia, Pravda,* and *Economic Life,* and from the *New York Times,* contemporary journals, and Soviet official documents.

GENERAL WORKS: N. Bukharin, *Works,* passim; William C. Bullitt, *The Bullitt Mission to Russia* (New York, 1919); George Chicherin, *Two Years of Foreign Policy* (New York, 1920); S. Chase, R. Dunn and R. G. Tugwell, *Soviet Russia in the Second Decade* (New York, 1928); Alfred L. P. Dennis, *The Foreign Policies of Soviet Russia* (New York, 1924); Maurice Dobb, *Russian Economic Development since the Revolution* (London, 1928); Michael Farbman, *After Lenin: the New Phase in Russia* (London, 1924); *Bolshevism in Retreat* (London, 1923); David R. Francis, *Russia from the American Embassy, April 1916—November 1918* (New York, 1921); Heinrich Freund, *Das Zivilrecht Sowjetrusslands* (Mannheim 1924); Maxim Gorki, *Écrits de Revolution* (Paris, 1922); V. I. Lenin, *Works,* passim; V. Marcu, *Lenin* (New York, 1928); J. Mavor, *Economic History of Russia* (London, 1925); P. N. Miliukov, *Geschichte der zweiten russischen Revolution* (Vienna, 1922); Bernard Pares, *A History of Russia* (New York, 1926); Leo Pasvolsky and H. G. Moulton, *Russian Debts and Russian Reconstruction* (New York, 1924); E. Preobrajensky and N. Bukharin, *The A.B.C. of Communism* (Detroit, 1921); E. Preobrajensky, *Works,* passim; A. M. Ransome, *The Crisis in Russia* (1921); A. Rothstein, ed., *The Soviet Constitution* (1923); F. L. Schuman, *American Policy toward Russia since 1917* (1928); L. Trotsky, *Works,* passim; N. O. Winter, *Russia of Today and Yesterday* (rev. ed. 1930); W. H. Chamberlain, *Soviet Russia* (1930).

REPORTS, DOCUMENTS AND YEARBOOKS: The American Relief Administration, *Annual Report of the Executive Committee* (New York, 1923); American Trade Union Delegation, *Russia After Ten Years* (New York, 1927); British Trade Union Delegation, *Report* (London, 1925); International Labour Office, *Industrial Life in Soviet Russia* (Geneva, 1924); League of Nations, *Report on Economic Conditions in Russia* (Geneva, 1922); L. Segal and A. A. Santalov, ed., *Soviet Union Yearbook* (London, 1927). U.S.S.R. Central Statistical Board, *Ten Years of Soviet Power in Figures* (Moscow, 1927). (W. Dy.)

RUSSIA, CAMPAIGN IN NORTH. The campaign in north Russia continued long after the signing of the Armistice in 1918. It must not be regarded as an isolated incident of the World War, but as a definite part of the Allies' plan for the defeat of the Central Powers, and though the direction of the operations was entrusted to the British authorities the campaign was international. Contingents were sent from Great Britain, the United States, France, Italy and Serbia, whilst detachments were also formed from Polish, Finn, Czech, Russian and Chinese refugees.

Position after the Russian Revolution.—The revolution in Russia had brought about the collapse of the Eastern Front, and the separate peace concluded between Germany and the Soviet Government in 1917 had enabled the Germans to transfer large forces from east to west, thereby rendering the position of the Allies in France most difficult. The future attitude of the Soviet Government towards the remaining combatants being uncertain, it was felt by the Allies that the building up of even a portion of the old Russian front might prevent further transfers of German troops to the west. An Allied contingent in north Russia might certainly hope to obtain assistance from all Russian elements dissatisfied with the Soviet rule and the great stores of war material accumulated at Murmansk and Archangel would be saved from falling eventually into the hands of the Germans.

Allied Expeditionary Force.—The original force consisted of 150 British marines who landed at Murmansk in April 1918. They were followed by 370 more at the end of May, with a further reinforcement of infantry and machine-gunners to the number of 600 on June 23. The strength of the forces gradually grew till the maximum strengths reached by the main contingents were as follows: "White" Russians, 20,000; British, 18,400; United States, 5,100; French, 1,800; Italian, 1,200; Serbian, 1,000.

Maj.-Gen. F. C. Poole, the commander-in-chief of the Allied forces in north Russia, arrived at Murmansk on May 24, 1918, and found that the Allies were holding the Kola peninsula with detachments at Kandalaksha. He pushed southwards down the Petrograd railway, and by the end of June had secured Kem and Soroka, the point where the road to Archangel *via* Onega branches eastwards. The ice-free port of Murmansk was thus fully protected against any possible raid by the German forces in Finland and the stores on the quays rendered secure. There could now be no chance of German submarines being sent up by rail for employment against the Allied shipping from a new and dangerously situated base.

Poole then turned his attention to Archangel. Leaving the Murmansk area in charge of Maj.-Gen. C. M. Maynard, he occupied the port on Aug. 3 with a force of 1,500 men under Brig.-Gen. R. G. Finlayson, supported by British and French warships, and a force of Serbs and Russians under Col. Thornhill moving overland *via* Soroka and Onega. The Bolshevik Government in Archangel was overthrown by the local inhabitants and replaced by a provisional Government under M. Tchaikovsky. Columns were at once pushed out to the south to secure adequate protection. Onega, Obozerskaya on the Vologda railway, Bereznik, at the junction of the rivers Dvina and Vaga, and Pinega were occupied in turn. The safety of the port and the town with its many refugees was thus assured.

Although the Bolsheviks had evacuated the town of Archangel hurriedly, they offered an obstinate resistance to Finlayson's troops fighting for elbow-room. Conditions of great heat, myriads of mosquitoes and bottomless bogs in the deep forests followed one another as summer turned to autumn, and by the end of Oct. tropical rains had rendered all movement except by water impossible. Operations had perforce to stop till the coming of the snow. Transport vehicles and river vessels had to be collected in great haste and manned by available volunteers. The difficulties of language were often acute, for in addition to the several tongues of the Allies there was the main language, Russian, to be considered and none of the contingents were anything but poorly equipped with Russian interpreters. Early in Oct. 1918 Gen. Poole proceeded to England, and in Nov. Maj.-Gen. W. E. Ironside, who had been chief general staff officer in north Russia, was appointed to succeed him. The commands of Archangel and Murmansk were then made independent of one another.

The question of the maintenance of the Allied forces in north Russia had been early considered by the authorities. Murmansk, being an ice-free port, could be used all the year round, and the troops based upon it could be withdrawn at any time. But with Archangel the case was different. The port becomes frozen up from early November till late April of each winter, access being at all times difficult and often impossible even with the help of modern ice-breakers. The War in France had not yet come to an end in Oct. 1918, nor could it be said with certainty that it would cease before the spring of 1919. It was of the utmost importance to prevent the resources of Russia becoming available to the Germans, should they be able to continue fighting throughout 1919. The decision was therefore made to remain at Archangel during the winter.

The expedition to north Russia in the summer and autumn of 1918 undoubtedly did much to complicate the plans of the Germans, who feared an overthrow of the Soviet Government and a general reconstruction of the Eastern Front. There is definite evidence that the German military authorities were unable to continue the transference of troops from east to west in the final stages of the World War, despite the urgent demands of Hindenburg and Ludendorff. The original object of the expedition was therefore fully achieved.

Peculiar Difficulties of the Campaign.—The winter campaign in north Russia may well be termed unique in the history of war. Never before had troops been called upon to fight under such severe climatic conditions. The Armistice in Europe also, coming as it did just at the closing of the White sea with ice, could not be acclaimed joyfully as it was on other fronts. For the north Russian force a new campaign was beginning, and all knew that relief could not come for at least six months. The feeling that demobilization was being carried out on all other

fronts had a demoralizing effect upon all ranks of the force. Furthermore, the object of the campaign was obviously no longer the same. Germany as an enemy had disappeared from the scene, and the Allied troops were never again quite clear as to the reasons for the continuance of the fighting. In their efforts to reconstruct the Eastern Front, the Allies had espoused the cause of the White Russians and had called upon the Czech ex-prisoner of war units in Siberia to march westwards to join them. In this action they had come into conflict with the Soviet Government and they could not now abandon the White Russians who had joined them in the campaign. It was thus that the Bolsheviks became the new adversaries of the Allies.

For the British authorities the campaign was a serious responsibility. Food, clothing and munitions had to be unified so far as possible for the simplifying of supply. Each contingent required special items in its ration—rum for the British, wine for the French, coffee for the United States troops, onions for the Italians and a double ration of bread for the Russians. The town of Archangel contained at least three times its normal population owing to the influx of refugees, and it was impossible to let the population starve. Large supplies had to be imported for this purpose.

Winter of 1918–19.—The transition stage from summer to winter proved a difficult period for the Allies. The freezing of the Dvina came unusually late in Nov. 1918 and the Allied gunboats were withdrawn too soon for wintering in Archangel. The Bolshevik gunboats were thus enabled to descend the river from their more closely situated winter quarters and bombarded the Allied positions with their long-range guns with impunity. Many casualties were caused and much damage was done to the carefully prepared winter quarters of the troops. The situation was at one time critical, British and Americans, supported by Canadian artillery, fighting desperately to maintain their positions.

At Archangel during the winter the attitude of the Allies was purely defensive, covering the mobilization and training of the new troops of the North Russian provisional Government. In the Murmansk area their task was to maintain a perpetual threat towards Petrograd and to divert as much of the Bolshevik forces as possible from Archangel. Fighting continued throughout the winter in both areas at irregular intervals, the Bolsheviks growing more efficient and exerting greater and greater pressure on the Allied columns. The intense cold and the continual darkness tried even the stoutest heart. Exposure after a wound meant certain death, and to touch metal with the bare flesh was to brand oneself as with a red-hot iron. The curious noises in the forest in intense cold made sentry duty most trying. Machine guns could only be used in warmed blockhouses, the field of fire of which might be destroyed in a night by a heavy fall of snow. Flying conditions were intolerable, even with electrically heated clothing. Aerodromes were only made possible for starting and landing by marching whole battalions over the snow. Only the strictest discipline could save the troops from heavy casualties through frostbite and sickness.

The war-worn Allied troops may well be proud of their efforts during this critical winter. All the main Archangel positions were maintained intact against the repeated attacks of a superior enemy. In May 1919, when the frost broke, the forces of the provisional Government had been raised in numbers to 20,000 men of all arms, properly clothed, equipped and organized. In the Murmansk area, Gen. Maynard's troops had succeeded in seizing the northern end of Lake Onega, thus making their threat against Petrograd an effective one, and containing a considerable force of active Bolshevik forces.

Arrival of Relieving Force.—The general thaw commenced in the first week of May, and by the 12th the river was free of ice. Two relief brigades under Brig.-Gens. Grogan and Sadlier-Jackson arrived at Archangel on May 26 and June 10 respectively, having had to force their way through the pack-ice of the White sea. Evacuation of all troops which had spent the winter in north Russia commenced at once.

Evacuation of North Russia.—The evacuation of all Allied personnel from north Russia before the arrival of winter in 1919 having been ordered, preparations for this were at once begun. The old contingents were embarked in turn, the British being the last to leave. Then followed those elements of the population which had elected to leave the country. In all, some 17,000 persons were transported from north Russia in British ships at a time when shipping had been much reduced through the German submarine campaign. By the end of July nothing remained but the fighting troops of the relief force and a few necessary administrative services.

It had been hoped to make a junction with Adm. Kolchak's troops advancing from Siberia, but the defeat of the Siberians made this impossible. Nothing remained but to disengage the British troops from their advanced positions with a view to leaving the local Russian troops in the best defensive positions possible. A gradual substitution of Russian for British troops and administration was therefore commenced, the process being accompanied by several outbreaks of mutiny amongst the new troops. The fronts of the various columns were cleared by vigorous action on the part of Brig.-Gens. Graham and Sadlier-Jackson, ably supported by the naval flotilla under Capt. Altham. By Aug. 10 the situation had been made satisfactory to the Russian commanders, and the withdrawal of the British troops to the inner defences of Archangel commenced.

Gen. Lord Rawlinson arrived at Archangel on Aug. 12 and approved of the plans already arranged. Withdrawal continued without a hitch, and on Sept. 27 the last 5,000 men were embarked simultaneously from 13 different points and the evacuation of Archangel was complete. The long withdrawal in the Murmansk area was then completed under the direction of Brig.-Gen. H. C. Jackson, who had replaced Gen. Maynard on Sept. 20 owing to the latter's illness, the last man leaving the port on Oct. 12.

BIBLIOGRAPHY.—B. Heroys, *Lenin's Fighting Force* (1919); J. Pollock, *The Bolshevik Adventure, 1917–19* (1919); British Parliamentary Papers No. 2,246, *The Evacuation of North Russia, 1919* (1920); A. F. Kerensky, *Soviet Russia in 1919* (1920); J. Ward, *With the Die-Hards in Siberia, 1918* (1920). (W. E. I.)

RUSSIA IN ASIA. The greater part of the Asiatic possessions of the former Russian Empire were incorporated under the Soviet system in the Russian Socialist Federated Soviet Republic (R.S.F.S.R.), which is a constituent State of the Union of Socialist Soviet Republics (U.S.S.R.). These territories are divided into Siberia and the Far Eastern Province, which are directly under the Moscow Govt. and the autonomous Socialist-Soviet Republics of Yakutsk, Mongol-Buriats and Kirghizistan, which enjoy considerable local autonomy under the general direction of the R.S.F.S.R. The country known as Russian Turkistan consists of two independent Socialist Soviet Republics, the Turkmen and Uzbek republics, which are constituent States of the U.S.S.R. (*See* SIBERIA; TURKISTAN.)

RUSSIAN ARCHITECTURE. Historically, Russian architecture may be divided into two principal periods: the first, from the 10th to the end of the 17th century; the second, from about 1700 to the present. This chronological division is a consequence of the revolutionary activities of Peter the Great (1689–1725), whose drastic political and social reforms, intended to bring Russia into close contact with western Europe and its civilization, broke with the traditional conservative tendencies of Russian life and in architecture caused a shift from a deeply national style to the forms of western Europe. The architecture of the pre-Christian period was almost exclusively wooden, and, mainly due to the unlimited supply of lumber, the majority of buildings remained of timber during the era immediately following Russia's conversion to Christianity in 988. Typical peculiarities of this early wooden architecture are a horizontal disposition of wall logs and steeply pitched roofs.

Christianity found a fertile soil among the tribes inhabiting the widespread territories of what was to become the Russian empire, and an intensive building of churches set in after the acceptance of the new faith. The rulers of the various feudal principalities into which Russia was divided became defenders and champions of the church, and the building of a church became the central event in the reign of each of the numerous princes who, apart from religious considerations, wished to demonstrate

their power and wealth with splendour eclipsing that of predecessors and neighbours. Russian life centred in these churches; there new leaders were installed; the most important public questions were decided there; the prince kept his treasury in the church; the church was the last haven of refuge from invaders. Until the 17th century religion dominated Russian architecture which, nevertheless, was also closely connected with the fates of rulers and the geographical locations of the centres of political power. During this first period the most important schools of architecture were those of Kiev, Novgorod-Pskov, Vladimir-Suzdal and Moscow.

Early Centres.—The beginning of organized political life found Russia somewhat unified under the rule of the princes of Kiev, a city on the Dnieper river, the first capital of Christianized Russia. The Christian missionaries from the Eastern Church had brought their Byzantine culture with them, and this transplanted Byzantine art (*see* BYZANTINE AND ROMANESQUE ARCHITECTURE; BYZANTINE ART) was the starting point for the development of the new national architecture. In the different parts of Russia, Byzantine art, interpreted in different ways, developed into distinct forms. Sometimes, as in the neighbourhood of Novgorod-Pskoff (in north-western Russia), Byzantine influence is scarcely perceptible; at others it flowered into exquisite forms representing a happy combination of the two cultures, as in the Vladimir district.

The oldest church in Kiev, still existing in part, is the Dessiatinnaya church, begun in 991; it was the reproduction of a Byzantine church, rectangular in plan, with three altar-apsides. The cathedral of St. Sophia in Kiev (1017), with five apsides and crowned by 13 cupolas, is the next in age and the largest built during the first two centuries after conversion; the principal parts of this cathedral are still extant, but later additions have considerably changed its exterior.

The erection of churches in the Novgorod-Pskov district, which was to play an important part in the development of a national Russian architecture, began only a few decades later. An independent and distinctive school of architecture appeared there in the 12th century. Here Byzantine art lost its influence much quicker than in Kiev, where it was applied with only insignificant structural changes. The influence most responsible for the appearance of this deeply national art was that of the thoroughly original local wooden architecture which affected both design and construction. The two-storey cross-shaped church appeared with one-storey lateral additions. The church with only one apsis replaced the church with three apsides. In conformity with climatic conditions, the arched roof became one that sloped. The spherical cupola gave way first to the helmet-shape; then it assumed the characteristic bulb-shape, a form similar to that which had developed centuries before and spread over Asia with the influence of Buddhism. The entrance took the form of a kind of porch; the belfry appeared, first as only an opening for bells on top of the wall, but later as an independent, high tower in which bells were hung in several tiers. The Byzantine cubic form of the church was broken up into a picturesque group of buildings, reflecting, like most of the innovations, national tastes that had been educated on wooden architecture. The rich Byzantine ornamentation either disappeared completely from the austere and simple walls of Novgorod churches, or else gave way to a plainly modelled geometric pattern, accentuating here and there the picturesque smoothness of the walls. The treatment of the stucco shows a characteristic feature. The lines and contours of the architectural forms were finished freehand, and are uneven, as is the surface of the walls, which lends the buildings a singular and effective charm.

In the principalities of Vladimir and Suzdal in the Central part of Russia we find, in the 13th century, not only Byzantine influences but partly Romanesque (*see* BYZANTINE AND ROMANESQUE ARCHITECTURE) brought there from Italy. The former manifests itself in the general form of the churches, the latter mainly in their decoration. The Romanesque arched gallery on the level of the second storey of the church was introduced as a decorative element in the form of an ornament of arches. In general the architecture of Vladimir is characterized by a love for ornamentation that accentuates architectural masses. The walls of St. George in Youryev, wholly covered with ornaments of Romanesque origin, but strongly influenced by motifs of the native wood-sculpture for which Vladimir was famous, are typical. In the native wooden architecture projecting beams were carved, and the whole length of the crest of a building was sometimes ornamented by such beams projecting through. When stone became common in buildings designers drew inspiration from these forms.

Moscow.—The dominance of Moscow's architecture increased gradually with its political ascendancy. Masters from Novgorod and Pskov worked there, and the Russian national architecture reached its highest development in Moscow during the 14th and 15th centuries. The application of the motifs of the wooden architecture to stone building found its best expression in the tented church. As in the wooden, the square plan of the stone church was transformed by a system of little arches of peculiar form (*kokoshniki*) into an octagon, the basis of the tent. This turret-shaped church was frequently used during the 16th and 17th centuries; the tent was also widely applied to the roofs of belfries and towers. The basic elements of the Moscow church architecture took final form in the 16th century, and thereafter attention centred on structural ornamentation, some of which is comparable in richness to the best examples of the Florentine Renaissance. A reaction followed, characterized by pettiness of form and excessive flourishes, and sometimes erroneously regarded as the typical Russian style. One typical feature, however, is evident even in this period of decadence: the grouping of buildings in ensembles in whose composition as well as that of the individual buildings picturesque effects were produced. Many of the old monasteries, which, being surrounded by towered and crenellated walls, frequently resemble little fortresses, are interesting specimens of such ensembles.

In the majority of Russian cities of the period their central part was surrounded by strong walls with towers and battlements and sometimes by embankments and water-filled moats. This was called the Kremlin. It contained the ducal palace, government buildings, houses for the dignitaries and ducal guard and the principal cathedrals and churches. The Kremlin was really a fortress and was usually located on an elevation dominating the surrounding territory. Beginning with the austere lines of the fortress wall and ending with a group of majestic cathedrals whose golden cupolas sparkled in the sun, it generally made an extremely picturesque composition. The Moscow Kremlin is probably the best preserved. Although rebuilt many times it nevertheless presents a true picture of an ancient Kremlin; at the same time having a considerable number of Italian details, it is a good example of the Russianizing of foreign architectural forms.

St. Petersburg.—At the beginning of the 18th century, while Moscow and the rest of Russia continued to live according to tradition, Peter the Great (1689–1725) undertook to build a new capital, St. Petersburg, in the far north of his empire—a move which at once involved extensive and imposing building and a radical change from an isolated political existence to closer contact with western Europe. A new epoch in Russian architecture began. Being an innovator in everything, Peter strove from the first to create a new architecture. Instead of employing Moscow masters, he enlisted an army of architects, engineers and craftsmen from all parts of Europe. Their work resulted in the erection of incongruous buildings in western European forms. A degree of order came into this architectural chaos only after Peter's death, when Russian architects became educated in western European art, and Russian architecture, although it could look back on nearly eight centuries of national traditions, turned toward classicism. Thereafter its evolution was divided into two currents, one characteristic of the new capital, St. Petersburg, the other of Moscow, the old. All subsequent architectural periods and fashions were perceived and developed differently in each. In St. Petersburg, the official capital, which grew rapidly, building progressed on a large scale. Architectural ensembles grew up along whole tracts of streets and quays and around vast squares. Most of the new buildings erected by the Government, its



MOSCOW

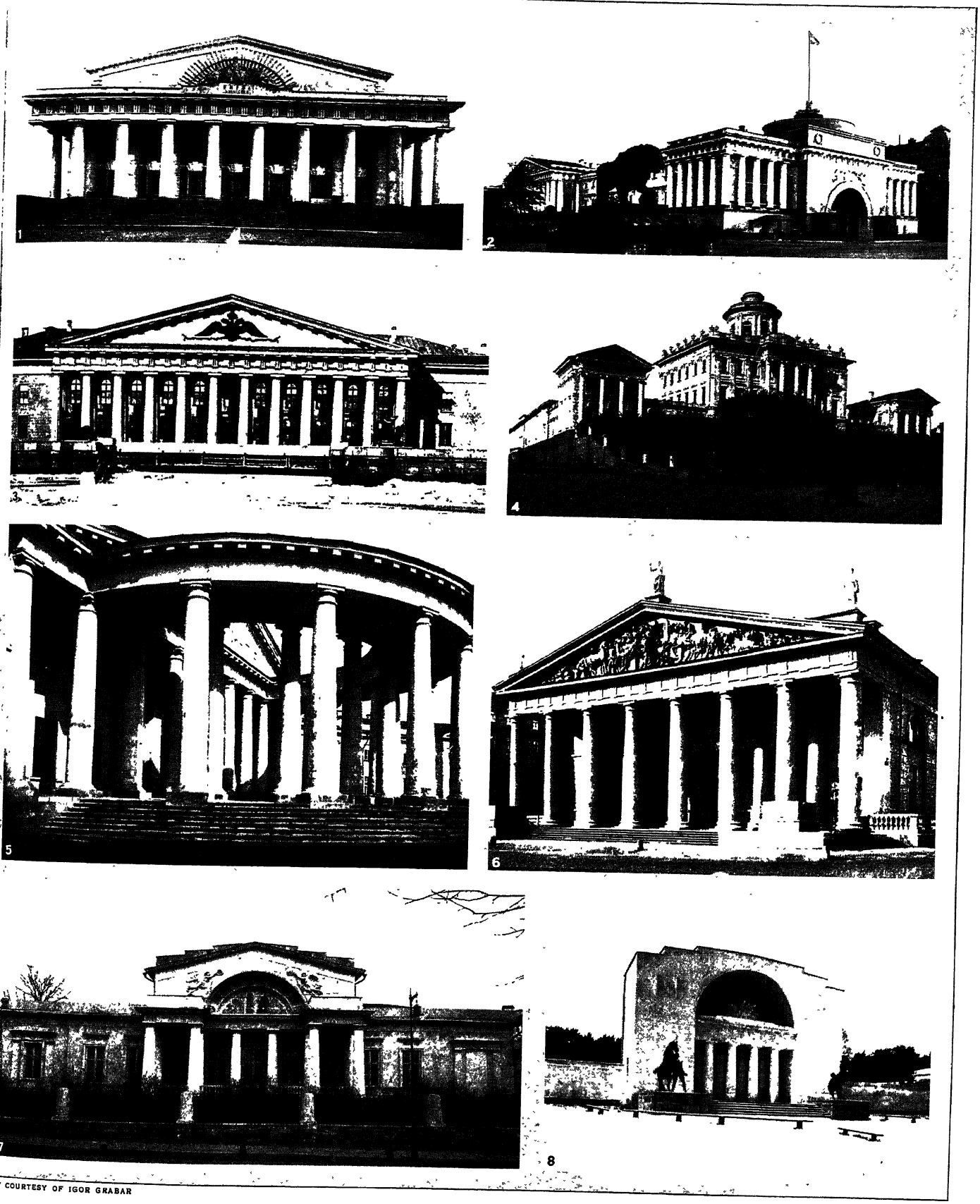
Moscow. From an etching by Anton Schutz which shows the many-coloured and fantastic Cathedral of St. Basil (on the Red Square) to the left and the main entrance to the Kremlin on the right. The etching shows a part of the wide open space which surrounds the enclosure on all sides; a part of the enclosing wall of pink brick and the domes and towers of buildings within the enclosure. The Kremlin (citadel or fortress) was a feature of most mediaeval Russian towns. It is the centre around which Moscow has grown. The tsars and the patriarchs of the Greek Church lived inside its walls until the reign of Peter the Great, when the capital was moved to St. Petersburg. In 1367 the early timber and earth ramparts were replaced by stone walls, and in the latter part of 15th century, Italian architects employed by Ivan III. (Ivan the Great) designed the present roughly triangular walls

RUSSIAN ARCHITECTURE

BY COURTESY OF IGOR GRABAR

RUSSIAN CHURCHES, 12TH–17TH CENTURY

1. Church of the Ascension, 1532, at Kolomenskoie, near Moscow
2. Church of the Intercession of the Holy Virgin, 1165, on the river Nerl near Vladimir
3. Church of St. Nicholas, 1600, at Panilovo on the north Dvina, Government of Archangel
4. Cathedral of the Saviour of the Transfiguration, in Mirozh Monastery, 1156, at Pskov
5. Church of the Intercession of the Holy Virgin, 1693, at Fili near Moscow



BY COURTESY OF IGOR GRABAR

RUSSIAN SECULAR ARCHITECTURE, 18TH AND 19TH CENTURIES

1. Exchange Building, 1806–16, Leningrad
2. Pavilion of the Admiralty Building, 1806–15, Leningrad
3. Mining Institute Building, 1806–11, Leningrad
4. Former Imperial Rumyantzev Museum, 1787, later Lenin State Public Library, Moscow
5. Colonnade and portal of the Sheremetiev Hospital, 1806, Moscow
6. Riding school of the Horse Guards, 1800–04, Leningrad
7. House of Prince V. N. Gagarin, 1817, Moscow
8. Stable on the estate of Prince Golitzin, "Kusminki," 1823, near Moscow

officials and the aristocracy were palatial, solemn and somewhat haughty. In Moscow, which had then dropped out of political life but where the charm of the traditions of a great past still existed, the buildings were simple, noble and showed a certain intimate affability.

The influence of the Renaissance (*see* RENAISSANCE ARCHITECTURE) scarcely reached Russia, but an outgrowth of it, the Baroque (*see* BAROQUE ARCHITECTURE), made a strong and lasting impression on Russian architecture, leaving numerous examples, which were, however, sometimes considerably affected by peculiar local conditions. In Moscow a wonderful specimen in this style is the church of Our Lady in Fili, representing a further evolution of the tented church. Here the tent loses its continuity and consists of several tiers of octagonals diminishing in size and put one above the other. In St. Petersburg and in the provinces the Baroque was widely used by the court architect, Count V. V. Rastrelli, one of the greatest architects of the time, whose talent created an epoch for the development of the Baroque. One of the principal reasons for the great success of the Baroque in Russia was its picturesqueness, a quality after which Russian architecture had always striven.

Catherine the Great.—In all Europe, the middle of the 18th century was a period of reaction against the pretentious forms of the Baroque and of reawakening interest in the austere and noble forms of classic architecture. In Russia, the brilliant reign of Catherine the Great (1762–96) was favourable for the development of this movement and it found an immediate response. A multitude of architects, both Russian and foreign, invited by the court, carried on the beautifying of the new capital, surrounding its vast squares with rows of classic columns, with elegant porticoes and with majestic façades. Catherine's interest in architecture was exceptional. Peter influenced the direction of Russian architecture; she assisted the development of the new school itself. With an energy equal to Peter's, she continued to create the capital, not only personally examining the designs but also, according to contemporaries, giving instructions and even supplying sketches for proposed buildings. During her reign the classic style was so intimately mixed with the creative genius of Russia that it occupied almost the same position as the traditional Russian style prior to the 17th century. An inexhaustible supply of serf labour allowed ambitious building programmes to be carried out. The ruling class, the aristocracy and gentry, living on estates scattered throughout the vast country, kept in close touch with the capital and, anxious to keep abreast of its fashions, built many mansions in the fashionable classic style whose solemnity and austerity fitted the epoch to perfection. Considering the numerous and diverse structures built in the classic style, it would be no exaggeration to call Russia of the 18th and 19th centuries a country of classic architecture.

19th and 20th Centuries.—The beginning of the 19th century inclined to even more austere forms, the Corinthian column gave way to the Doric, Rome seemed not simple and severe enough and early Hellenic forms came into favour. The Temple of Paestum became an ideal for the artist and the so-called Russian Empire style, very different from the dry and formal designs of Persier and Fontaine, appeared. Its characteristic traits are a Paestum-like archaism combined with great flat planes, here and there accentuated by severe but pithy ornamentation. The architecture of this period may be regarded as the climax of the Russian classic style. Under Nicholas I. (1825–55) the character of the building activity in St. Petersburg changed and from the erection of grandiose palaces, turned to more practical and commonplace problems. Porticoes and great wall surfaces with few window-openings which did not respond to the practical requirements gradually lost favour. Petty, unnecessary details were frequently applied with the intention to conceal by their display the shortcomings of a weak composition. Russian architecture, with frequently changing artistic tastes, declined steadily during almost the whole second half of the 19th century. At one time designers turned to the old Russian national style, but inspiration was sought from its most decadent period, the end of the 17th century; fortunately this tendency was of short duration and left no deep traces.

With the end of the 19th and the beginning of the present century the advent of industry introduced a new and rapidly growing factor. A period of active building began and symptoms of a renascence of the best of the old Russian architecture appeared. Aside from current buildings a number of large factories were constructed. Residences no less splendid than the old palaces of the dignitaries of Catherine were built for the new kings of industry. At this time when the modernistic style prevailed in Europe, two more architectural currents were evident—one purely national, traditionally Russian, founded on the early and best sources of Russian art; the other classical, suggested by the severe and elegant architectural forms of Palladio. These two logically reflected the main traditions and the historical development of Russian architecture as though representing its two main courses of development. The World War and the subsequent revolution interrupted building for a whole decade.

(W. OL.)

Post Revolutionary.—Since the World War, many attempts have been made to create a national architecture from existing European styles, but these have been found unsuitable to represent the revolutionary ideas of the nation. All modern fads have been tried—"cubism," "futurism," "new art," "the heroic," but these have gone their way. The form of architecture in favour in 1929 and employed in all the new government buildings is based entirely on what the Russians call "mechanical technical" facts. The aeroplane, motor car and modern battleship are their inspiration, and all decoration other than the "scythe and hammer" the Bolshevik coat of arms, is eliminated. As Ladovski, the professor of the department of "modern architecture" at the Moscow academy has stated, "The future belongs to those who have remarkably little talent for the Fine Arts." Their desire is to create a new form of architecture devoid of any traditional inspiration, one which is essentially practical and suitable for its purpose. In other words they design the plan according to the requirements of the building on a purely constructional basis, and consider the result will produce its own beauty.

Lack of capital is another determining factor in this new form of architecture. Reinforced concrete has replaced stone and granite and everything is being designed and carried out with the greatest economy and simplicity. Russia prides itself in being a nation of workers and considers that its factories and business buildings should look like "work shops" and not like the mansions and palaces of an aristocracy. While the need for economy is evident in all modern Russian buildings, it is commendable that the new Government has not allowed the ancient buildings to fall into decay. Domed palaces and minarets have been painted and regilded. Mansions, now the headquarters of Government departments or of bakeries and other commercial industries, have been redecorated as originally designed. Churches of artistic merit have been repaired, and theatres, the pride of the people, receive particular attention.

Construction is of reinforced concrete throughout, painted in revolutionary red and grey. Walls are reduced to a minimum sufficient only for constructional purposes, while enormous glass areas are introduced to give the maximum window space to the workers. Flat roofs and balconies for the recreation of the workers are also considered essential. These new conditions produce their own problems in a country where the temperature is often 30° F below zero and the snow-fall great. To overcome the cold in winter elaborate heating systems have to be introduced. The windows are covered with a network of heating pipes placed behind the glazing bars, while double glazing is provided for all windows to keep out the cold. The greatest problem is that of the flat roof, as during winter the roof with its parapet walls forms a tank for the snow, with the resultant danger from leakages and burst pipes when thaw sets in. There are various methods of roof construction but the best is that in which a double concrete slab is used with an air space between.

Russia is still in a state of transition. Lack of materials and skilled craftsmen makes it difficult for their advanced dreamers and architects to carry out their conceptions. Nitski, one of the

ablest Bolshevik art critics, has said that the dreams of Lenin could not be realized for at least 100 years. Some of the most recent buildings carried out in the modern manner are: the Centrosoyus warehouse; the new Telephone building; the Telegraph building and the Gostorg State building. (T. S. T.)

BIBLIOGRAPHY.—W. Souslow, *Monuments de l'ancienne architecture russe*, 2 vols. (St. Petersburg, 1895–1901); L. Hautecoeur, *L'architecture classique à Saint Petersbourg à la fin du XVIII. siècle* (Paris, 1912); R. H. Newmarch, *The Russian Arts* (New York, 1916); A. Eliasberg, *Russische Baukunst* (München, 1922); W. H. Ward, "Russian Architecture," in *Journal of the Royal Institute of British Architects*, ser. 3, vol. xxix, pp. 261–268 (London, 1922); G. K. Lukomski, *Alt-Russland, Architektur und Kunstgewerke* (München, 1923); *The Russian Art Exhibition*, foreword by C. Brinton, introduction and catalogue by I. Grabar (New York, 1924) and *Die Freskomalersi der Dimitry Kathedrale in Wladimir* (Berlin, 1925).

RUSSIAN ART. A comprehensive essay on the art of Russia implies a survey of the art of many races, beginning from remote antiquity. This article, therefore, deals with those artistic activities that have been manifested in Russia proper since her appearance as an organised and independent state under St. Vladimir (972–1015).

Premongolian and Mongolian Period.—As with their religion, the Russians took their art from Byzantium and up to the 14th century they preserved in their icons all the austerity and simplicity of design and also the economy of colouring of the Byzantine frescoes of the 11th and 12th centuries. The centres of activity during this period were at Kiev, Novgorod and Suzdal, and in all probability a great number of artists were Greeks. A very fine example from this period is the Odiguitry Madonna (12th century) in the Riabushinsky collection at Moscow.

Novgorod School.—The 14th century marks the beginning of a new style and icon-painting at that time flourished in Novgorod. The new elements may be due to a fresh influx of Greek and perhaps Serbian painters, for there are certain characteristics in the Russian icons and frescos of this period which are common to the 14th century frescos both at Mistra (Greece) and in Serbia. However, in such works as the "Ascension" (1363) at Volotovo there is a sense for line and a simplicity of rendering not present in the Greek and Serbian frescos. In this work and also in the St. Theodore Stratilatos (1370) and the "Nativity" in the same monastery, can be clearly discerned all the great qualities which distinguish the Novgorod school in the following century. At the end of the 14th century (1378–1405) a Greek painter referred to by Russian chroniclers as "Philosopher Theophanos the Greek" did works in various churches and monasteries in Moscow and Novgorod.

The golden age of Russian art, the 15th century, is marked by so much grace that some scholars attempt to ascribe it to Italian influence. The chief means by which this elegance is obtained is continuity of outline of the design and either rhythmical linear repetition or symmetrical linear opposition of the movement, imposed on the central figure by the artist's interpretation of the action in the subject. The colouring too shows improvement. Instead of slightly tinted drawings as were the earlier icons, we have icons with clear and harmonious colouring distributed in flat surfaces and emphasised by lines marking the light. The most accomplished master of this period—and indeed in the whole history of Russian art—is Andrea Rublyov (1370–1430), probably a pupil of "Philosopher Theophanos the Greek," one of whose very few preserved works is the Holy Trinity (1408) in the Troitza Cathedral of the Troitza-Sergios monastery near Moscow (even the authenticity of this example is doubted by Kandakov). Another master whose name is frequently mentioned in old records together with Rublyov is Dionysios who worked at the Theraponte monastery. Some fine examples of the icons from this period are in the collections of B. E. Chanenko at Kiev and E. S. Ostruchov and S. P. Riabushinsky at Moscow.

Moscow and Stroganovsky Schools.—After the inclusion by Ivan the Terrible of Novgorod province into the Russian Empire the centre of artistic activity shifts to the capital of the new Empire, Moscow. Design in icons loses simplicity and the figures lose their dignified proportions. Colouring becomes dull and practically identical in all icons, and even their sizes tend towards standardisation. The Byzantine architectural motives i the backgrounds of icons are supplanted by Russian ones, an even the type of faces bears a strong national character. In shor the Moscow school abandoned the high standards of its prede cessor and came into closer touch with national life. Graduall icon-painting turned into more a manufacture of devotion objects than art. Meanwhile between the end of the 16th and th beginning of the 17th century sprung up the Stroganovsky scho which combined to some extent some of the elements of bot its predecessors. The craftsmanship is certainly of a very hig grade, but the harshness of design, the somewhat exotic brilliand of colour, the lack of relationship between the national architec tural forms in the background and the semi-Byzantine figures the insistence on detail and finally—especially so in the late stages—the presence of undigested Western influence makes thi school very inferior to the Novgorod school. However, it foun great favour among the upper classes and became the mos appreciated school in Russia. A great number of icons from thi school are preserved; an inferior example is hung at the Nationa Gallery. The best known masters from this school are Istom and Nikiphor Savin, Procopy Tchirin, Ivan Prokopiev and Spiri dion Timoviev.

The efforts of Peter the Great to introduce Western civilisatio into Russia gradually brought to an end an art which had flour ished for over six centuries and Western influence became para mount. Among the first artists of the new era are S. Ushakov, Th. Abrosimov, Ivan Bezmin and Saltanov.

THE NEW ERA

The 18th and the first half of the 19th centuries form an epoch of foreigners in Russia. Just as in the beginnings of Russian religious art the Byzantine artists were predominant, so now Italian, French, Dutch and German artists were working for the Russian court and were laying the foundations of Russian secular painting. Among the great number of foreign painters were four English artists, Walker, Atkinson, Miles and Richard Brompton. While foreign artists were well treated, the conditions under which most of the native artists worked were lamentable. The land owners were closely imitating the Court and had their own architects and painters. These were conscripted from their serfs and remained serfs. It was not unusual for an artist to be flogged because his master was not satisfied with his work. The artist had also to perform other duties, such as valeting, kitchen work, farm work, etc. In spite of this, native artists quickly attained the standards of their European teachers, but strictly speaking, we must acknowledge that Russian art as such was dead and that since the beginning of the 18th century art in Russia was nothing more than a minor branch of European art. Thus we have the various European schools, *e.g.*, Classical, Romantic, Realistic. The most prominent artists of the Classical school are Akimov, Ugrumov, Egorov and Shebuev. Among the Romantics are Kiprensky, Tropinin, Brullov, Prince Gagarin, Alexander Ivanov, Vasnetzov and Vrubel, and among the Realistics are Venetzianov, Vereshchagin, and Repine. The best known landscape painters are Lebedev, Ayvazovsky, Levitan and Syerov. Naturally, as soon as modern art arose in Europe, Russia followed suit. The most important modern artists are V. Kandinsky, Roerich, Larionov, Gontsharova, Chagal, Ostrumova, Punin, Iacovlev and Anrep.

Sculpture.—Sculpture never flourished in Russia owing to the fact that the Orthodox Church does not allow sculpture in churches. There are very few examples of ancient carving extant. Probably the best that can be seen is at Yuryev Polsky on St. George's Cathedral. Among modern sculptors the best-known are Prince Troubetskoy, Orlov, Archipenko, Lipshitz, and Zadkin.

Minor Arts.—Among the lesser arts silver-work was turned out for centuries at Novgorod and Tula. From the 18th century onwards there has been a flourishing porcelain industry in many places in Russia, the most important factories being the Imperial Factory, Garder and Popov. (*See* RUSSIAN ARCHITECTURE.)

BIBLIOGRAPHY.—N. P. Kondakov, *The Russian Icon*, 1927. A BENYA: Исторія Русской Живописи въ XIX вѣкѣ, 1901–02.

(S. PE.)

RUSSIAN CO-OPERATIVE ORGANIZATIONS.

Soviet Russian Co-operation is the largest co-operative movement in the world in the number of its members and in the scale and variety of its operations. The chief types of societies are consumers, agricultural, productive and housing. Each of these groups has its own special organisation, central and local, but all participate through their central organisations in the All-Russian Co-operative Bank (*Vsecobank*), which through its central office and its local branches serves the whole system. The Consumers is by far the largest in numbers and resources. Great progress has also been made recently in the development of specialised agricultural societies.

Consumers Societies.—These began to be formed about the 'sixties of the last century following English examples. Progress for a time was slow, but the traditions of the *mir* or village community helped the development. In 1898 there was formed the Moscow Union of Consumers Societies which later developed into the All-Russian Central Union of Consumers Societies known generally now as *Centrosoyus*. By 1914 there were about 11,000 Societies with 1,500,000 members, with a total capital of £3,000,000 sterling and a turnover of £30,000,000 sterling per annum, in the Russian Empire, including Poland, Lithuania, Latvia and Esthonia. The War assisted the movement to grow more rapidly. Later, during the Revolution and the Provisional Government, the co-operative system was the only trading organisation which continued to function. In the early days of the Soviet Government it was regarded with some suspicion for many of the co-operative leaders at that time were Menshevists. But there was no other organisation capable of supplying the urban population, and for a time the authorities used the societies as the Government rationing agency. When the blockade ended and the new economic policy was introduced in 1921, the movement was relieved of its special functions and restored to its previous autonomy. During all this troubled period, however, the rules, constitution and trading organisation of *Centrosoyus* and of many leading societies had been retained intact and there had been no break in legal continuity.

Since that date the progress of the movement has been remarkable. There was at first a big drop in nominal membership when the voluntary basis was restored. But the figures below show the subsequent growth in membership and in the number of societies and capital:

Year	Societies	Membership	Share (in mill. roubles)
1924	22,621	7,103,000	15·9
1926	28,731	12,406,000	49·2
1928	28,616	20,000,000*	172·0

*Approximate.

The Soviet authorities regard the Consumers Co-operative Movement as the appropriate machinery for the distributive trade, both urban and rural. Private trade has played relatively a less important rôle each year as the Societies have become better organised. In 1923–24, it was officially estimated that the retail trade of the country was as to 11% in Government hands; 30% in Co-operative hands and 59% in private hands; in 1926–27 with a trading turnover which had increased three fold, the shares of Government, of Co-operative and of private trade were respectively 16%, 51%, 33%. In 1926–27 the whole trade in tea, both import and distribution; 71·8% of the whole distribution of textiles; 73·2% of sugar; 60·7% of salt; 61·5% of tobacco were in Co-operative hands. In the great cities 70% or over of the trade in bread is co-operative.

The Consumers Movement through the many village societies collects a considerable portion of grain, eggs, poultry, etc., and markets it on its own account or on commission for the peasant through the urban societies as well as abroad. *Centrosoyus* and the societies also possess a considerable number of flour mills, bread factories, food-canning and preserving plants; tea-packing factories, etc.

Organization of Consumers Societies.—The unit is the local primary co-operative society, of which there are three types: (1) the village society; (2) the urban society with a chain of co-operative shops and in some cases central departmental stores; (3) special transport workers societies. The rules of all the societies follow the Rochdale principles. Business is managed by officials responsible to periodical meetings of members. Each member whatever his shareholding is entitled to one vote only. The trading surplus, after paying fixed interest obligations is used for building up capital reserves, for social and educational activities, and for distribution to members in proportion to their business with the society. In comparison with English societies, proportionately far larger sums are put to capital account and dividends are much smaller. About 15% of surpluses on the average are used for educational and social purposes. On the average there are 14 stores to every town and two to every village society. There are over 400,000 employees.

The societies are combined in regional and district Unions, each of which acts as a wholesale organisation for its area. The relation between the Unions and the Societies is in principle the same as that between societies and their members. The district and regional Unions in their turn are combined in the *Centrosoyus* for the R.S.F.S.R. and similar organisations for each of the other Republics, the most important being the *Vukopspilka* for the Ukraine and *Zaksoyus* for the Transcaucasian Republic. In 1928, in addition, a U.S.S.R. *Centrosoyus* was constituted for general co-ordination of the whole organisation and for dealing with special trade problems especially import and export, storage of agricultural products and raw materials, and general agreements with industry on behalf of the whole system.

Agricultural Co-operative Societies.—These unite peasants as producers for the joint sale of their produce and for the purchase of machinery, etc.

The most important of them are the *Khlebocentre* for grain and oilseeds; *Maslocentre, i.e.*, the All-Russian Union of Butter-making co-operatives; *Linocentre, i.e.*, the All-Russian Central Union of Flax Growers; *Zhivotnovodsoyus, i.e.*, the All-Russian Central Union of Agricultural Co-operatives for the manufacture and sale of animal products; *Soyuskartoffel, i.e.*, Central Union of Potato Growers Co-operatives. In addition, the *Selskosoyus, i.e.*, the All-Russian Union of Agricultural Co-operatives, imports and supplies the various agricultural unions with machinery and implements, building materials, metals, insecticides, fertilisers, etc.

The Agricultural Union of Unions exists for the consideration of common aims and interests and for negotiation with the Government, and with the Consumers Co-operatives, and for general co-ordination of the various types of agricultural co-operatives. It has no executive or trading functions.

From the foreign point of view, the most important at present of the Agricultural Co-operatives is the *Maslocentre* which handles the whole export of Siberian butter and has its agents, in London and other European capitals. The total number of co-operatives in 1927 was 64,573 and they had a total membership of 9,468,200. In 1926–27 the agricultural produce sold totalled 878,000,000 roubles in value.

The Industrial Co-operatives.—The Societies of handicraft workers and artisans, are linked together in the All-Russian Union of Industrial Co-operatives, known as *Vsekopromsoyus*. At the end of 1927 it consisted of 4,534 industrial artels and of 102 local unions of industrial credit co-operatives with about 600,000 members in all.

The members of the *Vsekopromsoyus* are peasants engaged in wood-working, textile, knitting, metal, lace-making, embroidery, etc.

The Housing Co-operatives.—These are of two types: (a) tenant co-operative societies, in which the tenants of a new apartment house or a new housing estate erected with money advanced by the State or Municipality undertake joint ownership and supervision of the whole estate and the repayment of loans; (b) Building Societies for the actual building of houses. By 1927, the former had under their control accommodation for about 3,500,000 persons, and the latter had built houses for 100,000 persons.

(E. F. Wi.)

RUSSIAN LANGUAGE AND LITERATURE. The Russian language is the Slavonic language of Russia. Understood in the widest sense, *i.e.*, including also Little Russian or Ukrainian and White Russian, Russian forms the Eastern group of the Slavonic languages. In philological works the term Great Russian is generally used to designate the language which the world at large calls Russian, and, except where expressly stated, Russian in the course of this article stands for Great Russian—the language of Tolstoi and the other great writers so well known to Western Europe.

The main phonetic characteristics of Russian are:—I. Common Slav (C.S.) half vowels *ŭ* and *ĭ* have disappeared as such: *ŭ*, which was written at the end of words until the recent Bolshevik orthographical reform, was mute and served but to show that the foregoing consonant was not palatalized. Where a vowel was indispensable to facilitate the pronunciation of a group of consonants, *ŭ* and *ĭ* have been replaced by *o* or *e*, but these vowels sometimes appear without such justification (e.g., *ogonĭ*, Lat. *ignis*); *ĭ* when so needed becomes *e*, otherwise it disappears or else leaves a trace in the palatal quality of the preceding consonant, in which case it is still written: C.S. *sŭnŭ*, "sleep" and *dĭnĭ*, "day"; R. *son, denĭ (d'en')*.

II. C.S. *y*—a sound not unlike the *y* in "rhythm"—has survived, as also in Polish. After gutturals it has become *i*.

III. Treatment of liquids: retention of *r'* and of hard *l* (not unlike English *l* in "wall"); helping out of sonant *r* and *l* by a vowel put in before the *r* or *l*; especially the so-called full vocalism, by which, *e.g.*, C.S. *gordŭ*, "town," and *melko*, "milk," became *gorod* and *moloko*.

IV. C.S. nasal vowels: *ǫ* and *ę* (like French *on* and *in*) became *u and 'a:* C.S. *pǫtĭ*, "way"; *pętĭ*, "five"; R. *putĭ, p'atĭ*.

V. Palatalization (or softening): C.S. *tj, dj* gave R. *č, ž*, C.S. *světja*, "candle"; *medja*, "boundary"; R. *svěča, m'eža*. C.S. *pj, bj, vj, mj* gave R. *pl', bl', vl', ml'*, e.g., R. *z'eml'a* "land." Before C.S. soft vowels *e, ě, ę, i, ĭ* consonants were affected, the tongue being raised in anticipation of the narrow vowel, and so not making so clean a contact with the palate. Then what amounted to a new *j* developed in R., as *ĭ* became practically *j*; *e* and *ě* came to sound as *je, ę* as *ja* at the beginning of a syllable, and all together with *i* began very much to soften the preceding consonant in literary R.; however, this new *j* never broke down the consonant into a palatalized sibilant or affricate, though it had this effect in White Russian (Wh.R.) and Polish.

The result is that almost every consonant in Russian can be pronounced "hard" or "soft," a distinction which is very difficult for a foreigner to make, as his tendency is to overdo the softness and pronounce a full *j* after the consonant, instead of the palatal element melting into it. A soft consonant in its turn narrows the vowel before it, *e.g.*, the vowel in *jelĭ*, "fir," is like *a* in "Yale"; that in *jělŭ*, "ate," like *e* in "yell."

VI. Great Russian has kept *g* where Little Russian and Wh.R., like Czech and High Sorb, now have *h*.

VII. A specially Russian point is that *je* and *ju* beginning a word, appear in R. as *o* and *u*; C.S. *jezero*, "lake"; *jutro*, "morning"; R. *ozero, utro*.

VIII. Russian has lost the distinctions of quantity which survive in Czech and S. Slav., but its accent is free as in S. Slav. The accent is extremely capricious, often falling differently in different cases of the same noun, or persons of the same tense, also it is an expiratory accent, so strong that the unaccented syllables are much slurred over and their vowels dulled.

The above phonetic peculiarities mark Russian as far back as we can trace it. In the earliest documents it appears with an apparatus of grammatical forms practically identical with that ascribed to primitive Slavonic. The history of the language is not so much that of its phonetic decay as that of its morphological simplification and syntactic development. The tracing of this process is rendered difficult by the fact that Old Bulgarian was the ecclesiastical and literary language until the 17th century, and though in the end the O.B. texts suffer modifications, producing the Russian form of Church Slavonic, the Russian forms appear in them only by accident. Russian is better represented in additions made by the scribe, as in the colophon of the Ostromir gospel (A.D. 1056–57), the oldest dated ecclesiastical ms. In a certain number of legal documents dating from the 12th century onwards Russian forms definitely predominate, but the subject-matter is too limited to offer much material.

Borrowings.—The effect of the Church language upon Russian has been very strong, comparable to that of Latin upon French or English: O.B. forms of words and suffixes, betrayed by their phonetic peculiarities though pronounced more or less *à la russe*, have in some cases ousted the native forms, in other cases the two exist side by side; the old Slav. form generally has the more dignified or metaphorical, the Russian the simpler and more direct sense: even some of the grammatical terminations (*e.g.*, pres. part. act.; certain forms of the adj., etc.) are Slavonic; but speakers are quite unconscious of using anything that is not Russian, and not till the 18th century did even grammarians understand the difference. Less important elements have been the Tatar, which gave names for many Oriental things such as weapons, jewels, stuffs, garments and some terms concerned with government, and the Polish, which during the 17th century supplied many terms needed to express European things and ideas. In the 18th century such importations were made from Latin and all the Western European languages, in Peter's time mostly from German and Dutch (for nautical terms, English supplied some), in Catherine's rather from French, which had become the language of the aristocracy. During the first quarter of the 19th century modern Russian found itself and discarded superfluous Slavonic and European borrowings alike. Since then fresh loan-words have mostly belonged to the international quasi-Greek terminology, though like German R. sometimes prefers analogous compounds made from its own roots.

Literary Russian as spoken by educated people is the Moscow dialect (*see* p. 751) modified by these influences. It is still a highly inflected language, comparable in that respect rather to Latin and Greek than to the languages of western Europe, though during historic time it has lost many of the grammatical forms whose full development we can study in O.B., and whose presence we can assert in the scanty remains of Old R. This process has relieved it of the dual number, save for certain survivals; in the nouns, of the vocative case (save for certain ecclesiastical forms), and many of the distinctions between the declensions, especially in the plural, the oblique cases of the simple, and the more cumbrous forms of the compound, adjective; in the verbs, of the supine, the imperfect, the aorist and the conditional (now reduced to a particle); but this simplification leaves it with six cases, Nom., Acc., Gen., Dat., Instrumental and Locative, three genders, three substantival declensions, *-a, -o, -i*, and traces of *-u* and consonantal stems, a special pronominal declension with many tricky forms, an adjective which takes its place between them, and a system of numerals in which a compromise between grammar and logic has produced a kind of maze. The forms of the verb are easier, as only the present indic. has three persons, the imperat. has but the 2nd, and the past is a participle, which, having discarded the copula, distinguishes only gender and number. The infinitive and four participles offer no special difficulty, but the gerundives or verbal adverbs, from the old masc. nom. sing., are troublesome. The curious mechanism by which these few verbal forms are by means of the aspects made to express most of our tenses and other shades of meaning of which even English is incapable, is briefly explained under SLAVONIC LANGUAGES. On the whole the syntax is simple, the periods which imitation of Latin and German once brought into fashion having given place to the shorter sentences of French and English models.

Dialects.—The dialects of Great Russian fall into two main divisions, which do not greatly differ from each other, Russian being an amazingly uniform language when the vast extent over which it is spoken is considered. These dialect groups are the northern or *o* group and the southern or *a* group. The line between them runs roughly E.S.E. from Pskov to the Oka and then eastwards to the Urals. The northern group is the more conservative and pronounces very nearly according to the spelling, unaccented *o* remaining *o*, but *o* is in general rather like *u*, while *e*

before hard consonants is apt to be *jo* and before soft consonants *i*. The southern part of this group, comprising most of the governments of Vladímir and Yaroslávl with adjoining parts of Tver and Kostromá, are alone free from a further peculiarity, a tendency to mix up *c* and *č* which can be traced in the ancient documents of Nóvgorod and has spread with the Nóvgorod colonists across the whole of N. Russia to the Urals and Siberia. These distant dialects have adopted many words from the Ugro-Finnish natives. The southern or *a* group of dialects pronounces unaccented *o, e* and even *i* as *a* or *ja;* with this goes a tendency to pronounce *g* as *h*, and to mix up *u* and *v*.

The Moscow dialect, which is the foundation of the literary language, really covers a very small area, not even the whole of the government of Moscow, but political causes have made it the language of the governing classes and hence of literature. It is a border dialect, having the southern pronunciation of unaccented *o* as *a*, but in the *jo* for accented *e* before a hard consonant it is akin to the North and it has also kept the northern pronunciation of *g* instead of the southern *h*. So too unaccented *e* sounds like *i* or *ji*.

White Russian.—The present literary language arose in the 14th century and is based on one of the central dialects. The tendency of some modern writers to break with the earlier tradition and make their language different from Great and Little Russian has introduced into the vocabulary many foreign elements which have no real existence in the popular dialects. The language presents certain features which occur also in Ukrainian but in general character it agrees more closely with South Great Russian (being an *a*, not an *o* dialect, and distinguishing *y* from *i*, etc.). It is spoken in the whole or parts of the governments of Grodno, Suvalki, Vilna, Minsk, Vitebsk, Mogilev, Smolensk and in the N.W. part of Chernigov.

Little Russian or Ukrainian.—The literary language arose towards the end of the 18th century and has no genetic connection either with the ecclesiastical language of the S. Russian writers of the previous period or with the attempts of the preceding three centuries to write in Lit.R. The language is founded on the western dialects and the earlier writers avoided the use of such words as did not there occur. During the last quarter of the 19th century Lit.R. was persecuted in Russia and the Austro-Hungarian government seized the opportunity to encourage it in Galicia. Lwów (Lemberg) became a recognized literary centre and the refuge of writers who were expelled from Russia. The character of the literary language soon changed considerably and a number of Polonisms were adopted. After 1906, when the oppressive measures against the language in Russia were removed, the tide turned and the foreign elements were held in check. As a result of these conflicting tendencies the literary language is not yet stabilized.

Phonetically, Little Russian is characterized by itacism; for original *y* and original *i* have coincided in a sound between *i* and *y* not unlike the Eng. short *i*, and original *ě*, also *e* and even *o* after having been lengthened in compensation for lost semi-vowels are now represented by *i*.

Further, Little Russian has reduced the common Russian softening, only keeping it before *a* and *o* and *i* for *ě* and *o*, and hardening the consonant before *e* and original *i*. In common with Wh.R. it has *h* for *g*, a vocative case, gutturals made sibilant before *i* (for *ě*) in oblique cases, 3rd sing. generally without the *t*, 3rd plur. in *-tĭ*, 1st plur. in *-mo* and *-me* instead of *-mŭ*, *m* for *nj*, *ll* for *lj*, *tt* for *tj*, *w* for *u*, *v* and hard *l*, but all these occur more or less throughout S. Russian and only tend to a superficial resemblance.

These phonetic peculiarities are not universal, but the presence of the narrowed *ě*, *e* and *o* is sufficient to mark a dialect as Little Russian. The Russian alphabet is modified for Little Russian use as ґ = *h* and hence г = *g;* є is used for the *e* which does not soften the preceding vowel, ы for the thick and *i* for the pure *i*.

BIBLIOGRAPHY.—DICTIONARIES: *Dict. of the R. Language*, published by the Second Section of the Academy of Sciences (St. Petersburg, 1895, etc.; four vols. have so far appeared reaching to the letter L); V. I. Dal', *Explanatory Dict. of Living Great R. Language* (4 vols., St. Petersburg—Moscow, 1903–09); I. I. Sreznevski, *Materials for a Dict. of Old R. Language* (3 vols. St. Petersburg, 1893–1912); A. Alexandrow, *R.-Eng. and Eng.-R. Dict.* (2 vols.); J. Pawlowsky, *R.-Deutsches Wörterbuch* (Riga, 1911). The standard, but not quite completed, etymological dictionary is that by A. Preobraženski (Moscow, 1910–1917).

LITTLE RUSSIAN DICTIONARIES: E. Zelechowski, *Ruthenisch-Deutsches Wörterbuch* (Lemberg); B. Hrinčenko, *Slovar' ukr. movy* etc. (Kiev, 1908–09).

GRAMMARS: Historical—N. Durnovo, *Sketch of the Hist. of R. Lang.* (in Russian, Moscow, 1924); A. Šachmatov, *Sketch of the earlier period of the Hist. of R. Lang.* (in R., St. Petersburg, 1915); A. Sobolevskij, *Lectures on the Hist. of R. Lang.* (in R., 4th edit., St. Petersburg, 1908); K. M. Meyer, *Hist. Gram. der russ. Sprache* (Bonn, 1923). Descriptive and Practical—the best in English is the *Russian Grammar* by N. Forbes. The *Russ. Grammatik* by E. Berneker and M. Vasmer (1927), though short, is excellent. For Little Russian consult S. Smal' Stockyj and F. Gartner (*Gram. d. ruth. Sprache*, Vienna, 1913) and Smal' Stockyj's *Ruth. Gram.* in the Sammlung Göschen. For miscellaneous information concerning the White Russians and their language the authoritative work is by E. Karskij—*Bělorussy* (3 vols., 1903 etc.), which also gives a map of the White Russian territory.

DIALECTS: The *Attempt at a Dial. Map of the Russ. Lang. in Europe* etc. (Moscow 1915) by Durnovo, Sokolov and Usakov is most complete.

RUSSIAN PRONUNCIATION: M. V. Trofimov and D. Jones, *The Pron. of Russian* (1923).

RECENT LINGUISTIC DEVELOPMENTS: A. M. Seliščev, *The Lang. of Revolutionary Russia* (Moscow, 1928) is useful. (N. B. J.)

LITERATURE

The literature begins in the 11th century, about 50 years after introduction of Christianity into Russia, as an offshoot of the "Church Slavonic" literature of the Balkans. The "Church Slavonic" language, created in the 9th century by St. Cyril and Methodius, became the literary language of Russia. Though based on a Bulgarian dialect it was from the first used almost exclusively for translations from the Greek and is thus permeated with Greek syntactic and lexical influence. The overwhelming majority of Russian-Slavonic writings consists of translations of Christian books from the Greek. The secular literature of the Greeks remained practically untranslated. There was no literary contact with the West till much later. Original writings form only a small minority of the Old Russian mss. preserved. Printing was introduced in Moscow in 1564, but did not come into general use till the 18th century.

The first cultural and literary centre was Kiev, which retained its leading rôle till about 1200. The most important of the ecclesiastical writers of the period were the sacred orators, Ilarion, metropolitan of Kiev (d. 1053) and Cyril, bishop of Turov (later 12th century), brilliant and imaginative disciples of the Byzantine school. Of secular writings the most extensive are the Chronicles (*Letopisi*). They are anonymous and have been preserved only in later compilations. The contemporary entries go back to about 1040. The account of the preceding period is based partly on oral tradition, but consists partly of the conjectures of a learned monk of about 1100. Besides its invaluable historical importance the chronicle possesses considerable literary merits. The story of the blinding of Vasilko (1096) and the account of the years 1146–54 are particularly noteworthy, as well as the Galician chronicle of the 13th century. Imaginative literature is represented by an isolated masterpiece, the *Discourse* (*Slovo*) *of the Campaign of Igor*, an anonymous political prose-poem on an unsuccessful campaign of one of the border kings against the Cumans (1185). It was discovered in 1795, and first published in 1800. Its poetical qualities, magnificent diction and rich imagery give it a unique place in Old Russian literature. Only insignificant fragments of works in a similar style have been preserved from the 12th and 13th centuries, but its influence is clearly apparent in later works such as the stories of the battle of Kulikovo (1380).

After the middle of the 13th century north-eastern Russia was politically and culturally separated from the south and west. From the end of the 14th century Moscow became the leading centre of the north. Literature became more exclusively ecclesiastical and more Byzantine in spirit. A new style of standardized and impersonal rhetoric becomes obligatory and is extensively cultivated in the numerous lives of saints and in the now official,

chronicles. By the side of these we find also more personal writings, polemical and historical. Of the former we may mention the correspondence exchanged between the oligarchic politician Prince Andrew Kurbsky (1528–83) and the Tsar Ivan the Terrible (1530–84), who was a pamphleteer of genius. The greatest of all Muscovite writers was the Archpriest Avvakum (*c.* 1620–81), the leader of the schism of the Old Believers (*see* RUSSIA: *History*). He wrote several epistles denouncing religious and cultural innovations, and encouraging his followers to resistance, and a *Life of Himself* (1673, Eng. trans. by Jane Harrison and Hope Mirrlees, 1924), which reveal a powerful personality. He was the first writer to reject literary Slavonic, and to use the vernacular for literary purposes. He remains unsurpassed in the wonderful use he made of it.

The later Muscovite period saw the beginnings of Russian fiction which developed from several distinct roots,—legendary and didactic stories related to the lives of the saints; romances imported from East and West, but which received free fairy-tale treatment; and picaresque tales of Muscovite manners.

Folk Literature.—The "oral literature" of the Great Russian people is rich and varied. The so-called *byliny* are narrative poems in unrhymed, unstanzaed stress-verse, intoned (not sung) by specially trained reciters. Their subject-matter is either historical, referring to events that go back to the taking of Kazan (1552); or legendary, dealing with the exploits of heroes (*bogatyri*), who are usually represented as grouped round the figure of Prince Vladimir. Their exploits are partly of the fairy-tale, partly of the *fabliau* type. The oldest texts of *byliny* (all on historical subjects) were written down in 1620 for the Englishman, Richard James (ms. in the Bodleian library). Next in antiquity comes the large collection ascribed to Kirsha Danilov, made in the mid-18th century in Siberia, and first published in 1804 (later, and more critical editions 1818 and 1901). In the later 19th century the *byliny* were discovered to be still extensively preserved in northern Russia, especially among the fishing population of lake Onego and Pechora. Large collections of them were published by Rybnikov (1861–67), Hilferding (1873), Markov (1901), Onchukov (1904) and Grigoriev (1904–10). Other poems surviving in the north of Russia are the laments for the dead, recited by professional wailing-women (collection by Barsov, 1872). Related in style to the *byliny* are the so-called *Spiritual Verses* (*Dukhovnye Stikhi*) recited by wandering mendicants. Their subject-matter is strongly influenced by Byzantine apocryphal literature. Among the Old Believers and mystical dissenters there developed a very remarkable lyrical poetry, devotional and mystical, often of great beauty. The lyrical, elegiac and choric songs are numerous and varied (principal collection by Sobolevsky, 1895–1902). Within the last decades a new type of improvised song, the *chastushka* (usually consisting of four rhymed lines), has received an extraordinary development among the peasants and working class. Of the prose forms of folklore *charms* can probably claim the greatest antiquity. *Folk-tales* cover a great variety of subject-matter, and display marked originality of treatment (collections by Afanasiev 1870, Onchukov 1903). An interesting branch of folklore is the popular drama. It goes back to 17th and 18th century literary sources, but the treatment, based mainly on wordplay, is characteristic (collection by Onchukov, 1913).

Beginning of Western Influence.—About 1650 Ukrainian and White Russian scholars and clerics began to introduce their new latinized scholasticism to Muscovy (*see* UKRAINIAN LITERATURE). Symeon of Polotsk was the first to publish books of rhymed didactic verse in Moscow. In the reign of Peter the Great two prelates of Ukrainian extraction and education, St. Demetrius Tuptalo, metropolitan of Rostov (1651–1709), and Theophan Prokopovich, archbishop of Novgorod (1680–1736), were prominent men of letters. Both wrote plays and possessed real poetical talent; Prokopovich was famous as the greatest orator of his day. His oratory like that of his successors in the reign of Elizabeth is markedly italianate and *baroque*.

Parallel to the Latin-Ukrainian invasion, another current, coming from Germany, brought a new secular literature. Plays from the repertory of the German strolling actors were performed before Tsar Alexis as early as 1672. From 1675 onwards numerous translations of Latin romances were made and circulated in ms. and by the end of the century the writing of amorous verses had become the fashion among the young Muscovites. The reforms of Peter the Great confirmed the conquest of the Russian upper classes by the West. Culture was secularized. "Church Slavonic" was replaced by a clumsy Russian, larded with indigested bits of every kind of European idiom. The romances, plays and songs of the first 30 years of the 18th century, however interesting as symptoms of a great cultural revolution, can hardly be described as literature. Modern Russian literature begins only with the birth of the direct influence of the metropolitan literature of Europe, that of France. Parallel to the French-influenced literature of the upper classes there existed, however, throughout the 18th century a curious popular literature. It includes, besides a variety of narrative chap-books, an interesting series of inscriptions in rhymed doggerel, on cheap woodcuts (collection by Rovinsky, 1881).

The Age of Classicism.—The first pioneers of French classicism were Prince Antioch Cantemir (1708–44) (*q.v.*), whose Horatian satires mark the advent of conscious artistic realism into Russian literature, and Vasili Trediakovsky (1703–69), whose reputation as the type of the poetaster should not overshadow his real services in the reformation and study of Russian prosody. The actual founder of modern Russian literature was Michael Lomonosov (*c.* 1711–65) (*q.v.*). He was a man of encyclopaedic genius; in letters, his influence as lawgiver of the literary language and founder of the new prosody cannot be exaggerated. A minor pioneering figure by his side was Alexander Sumarokov (1717–74) who created the Russian dramatic repertoire, and was the first literary critic and the most gifted song-writer of the century. The hierarchy of literary *genres*, as established by Lomonosov, placed tragedy, the heroic poem, and the solemn ode uppermost. In the first two *genres* nothing was produced of lasting value, although Sumarokov pretended to the title of a "Russian Racine," and Michael Kheraskov's (1733–1807) epic *Rossiada* (1775) earned him, for a generation, that of the "Russian Homer." The ode proved a more vigorous growth. Lomonosov's odes are still almost unrivalled in the language for solemn majesty and mightiness of diction. Gabriel Derzhavin (1743–1816) equalled Lomonosov in the gift of lyrical oratory, but his originality and the visual splendour of his imagery make him an even greater poet. Often harsh and rugged, his poetry is full of untamed vitality, and his classicism is the classicism of a barbarian.

In the "lower" *genres* classicism was above all a school in which Russian literature could develop what later became its most characteristic virtue. The burlesque epics of Vasili Maykov (1728–78), the fables of Ivan Khemnitser (1744–84), the comic operas and comedies of Alexander Ablesimov (1742–1823), Yakov Knyazhnin (1742–93), and Vasili Kapnist (1757–1823) display a rough and unrefined, but vigorous and lively realism, and are more interesting than the clumsy rococo graces of the once enormously popular adaptation of La Fontaine's *Psyché*, by Ippolit Bogdanovich (1742–1803). The same realism, with a higher degree of talent, is seen in the famous comedies of Denis Fonvizin (1744–92). The *Minor* (1782), especially, a clever satire of the boorish provincial squires, contains the first great character creation in Russian literature. The classical-realist tradition culminated in the work of the great fabulist Ivan Krylov (1768–1844) (*q.v.*), whose first book of *Fables* appeared in 1809.

In prose, satirical journals started in 1769 in imitation of Steele and Addison present the same kind of realism. Those edited by Nicolas Novikov (1744–1816) were marked by a high degree of public-spiritedness and contain much courageous criticism of existing social conditions. They were suppressed in 1773 by Catherine II. Novikov, who was a freemason and a pietist, represents the right wing of Enlightenment. Its left wing is represented by Alexander Radishchev (1749–1802), a disciple of Rousseau. His *Journey from Petersburg to Moscow* (1790, burnt by the hangman) is a powerful, if over-rhetorical, vindication of freedom against both serfdom and autocracy.

The movement started about 1791 by Nicolas Karamzin (1766–1826) (*q.v.*) continued the secularizing and enlightening work of the 18th century. Karamzin's reform of the literary language consisted in an extensive elimination of such "Church-Slavonic" as had been preserved by Lomonosov, in the wholesale translation from French of new words to denote modern ideas and feelings, and in a general tendency to follow French syntactic and stylistic models. The Karamzinian movement was also a reaction against the roughness and ruder force of the age of Derzhavin in favour of the "middle" literary *genres* and of a softer and more fluent style. Finally Karamzin was the pioneer of the "new sensibility" of Rousseau, and of the early forms of the romantic revival. He was opposed by a group of literary conservatives, the enemies of French influence and of "soft" poetry. Their leader was Admiral Alexander Shishkov (1754–1841). His followers, Semen Bobrov (*c.* 1767–1810) and Prince Sergius Shirinsky-Shikhmatov (1783–1837), were devotional and metaphysical poets of talent, but their archaistic manner was against the grain of the time. Of the followers of Karamzin the most gifted were Vasili Zhukovsky (1783–1852) and Constantine Batyushkov (1787–1855). Batyushkov was a pupil of the French and Latin elegiac poets and of Tasso. His elegies are classical and sensuous with few traces of sentimentality. Zhukovsky was imbued with German and English influences. He wrote little original verse though some of his lyrics are among the purest gems of Russian poetry. As a translator he has few equals in any language. Up to about 1825 he translated modern, chiefly pre-romantic poets; in his old age he turned to the great epics, Indian, Persian and Greek. His complete version of the *Odyssey* appeared in 1847. A no less excellent version of the *Iliad,* by Nicolas Gnedich (1784–1833), had preceded it in 1830.

PUSHKIN AND HIS SUCCESSORS

Pushkin.—Zhukovsky and Batyushkov were the immediate forerunners of Pushkin (1799–1837) (*q.v.*), whose apprenticeship was passed in the French and anti-Slavonic school of the Karamzinists. Later he freed himself from French influence, but his style always remained lucid and classical. His greatest popularity lasted from the appearance of his first "Byronic" poem in 1822 to about 1830. The work of his later years in which, discarding his earlier fluency and softness, he aimed at a severer and more impersonal style, met with little contemporary recognition. Only his tragic death reinstated him in public opinion and made him a national classic. He has since become to Russia what Dante is to Italy and Goethe to the Germans. The cult rendered to him has not always been kept this side of idolatry, and has tended to obscure the fact that he is an end rather than a beginning. His work is the culminating achievement of the period of the cultural ascendancy of the serf-owning nobility, rather than the fountainhead of later Russian literature. Of all his work only the "novel in verse" *Eugene Onegin* (1823–31) with its central characters of Onegin and Tatiana had a considerable influence on the writers of the following age.

Pushkin was surrounded by a whole galaxy of poets, usually referred to as "The Pushkin Pleiad." The most notable of them were Eugene Baratynsky (1800–44), a philosophical poet of profound and noble originality, second only to Pushkin himself as a master of words, and Nicolas Yazykov (1803–46), whose verse his contemporaries liked to compare to champagne, and who possessed a poetical momentum of exceptional force. Other remarkable poets were Denis Davydov (1784–1839), a hero of the Napoleonic wars, and the author of some sincere and vigorous lyrics of war and love; Prince Peter Vyazemsky (1792–1878), a master of poetical wit, and one of the most influential critics of the '20s; Baron Antony Delvig (1798–1831), an exquisite artist in classical and antique forms; the revolutionary Kondrati Ryleyev (1795–1826, hanged as the head of the Decembrist conspiracy), who in his civic verse continued the noble oratorical tradition of Lomonosov; Dmitri Venevitinov (1805–27), whose early death was a great loss to the generation; and Theodore Glinka (1788–1880), a devotional poet who combined striking and effective simplicity with elevated mysticism. The movement of which Pushkin and Vyazensky were the recognized heads began by calling itself romantic, but was in reality much rather classical in spirit. Though they rejected the authority of Boileau they remained entirely free from romantic vagueness, from all "intercourse with the infinite," and from all aspirations after the unknown. The most general characteristic of even the minor poets of this Golden Age is a complete mastery of technique and a perfect adequacy of form to content.

After 1830 poetry begins to lose the sense of words, and to degenerate into untransformed emotion or shrill rhetoric. This is already the case with Alexander Polezhaev (1805–38), a pupil of Hugo and Byron and the direct forerunner of Lermontov in the passionate rhetoric of revolt. Lermontov himself (1814–41) (*q.v.*) was often merely a gushing emotionalist, or a thundering rhetorician. But at his highest moments of inspiration he reached summits of romantic vision that stand isolated in Russian poetry, while towards the close of his tragically ended life he was well on the way towards forming a sober and realistic style of great distinction and force. The general decline of poetry is not reflected in the work of Theodore Tyutchev (1803–73) whose compact and concentrated lyrics, though most of the best appeared as early as 1836, were not fully appreciated till much later. His poetry combines a penetrating pantheistic vision of the universe with the severe discipline of 18th century classicism. He has come to be generally regarded as Russia's second greatest poet. An interesting by-current was the artificial folk-song. It was cultivated already in the 18th century, but reached its highest development in the work of Alexis Koltsov (1808–42), the most famous of the Russian "uneducated poets." For all their artificial and literary antecedents his songs breathe a genuinely popular spirit.

The Russian drama of the first third of the century, though often quite competent for production on the stage, possesses small literary significance. Quite apart from the common run of plays stands the one comedy of Alexander Griboyedov (1795–1829) (*q.v.*), *Gorë ot Uma* (*Woe from Wit,* 1825), one of the major classics of Russian literature. Historically it forms a connecting link between the classical realistic tradition that culminated in Fonvizin and Krylov, and the social realism of the later 19th century.

Russian prose-fiction remained for a long time without much vigour or originality. The only early novelist worth mentioning except Karamzin is Vasili Narezhny (1780–1825), a robust realist in the tradition of Le Sage and Smollett. From the end of the '20s the writing of fiction became more intense, though remaining largely imitative. Romances of Russian history in the manner of Scott by Michael Zagoskin (1792–1853) and Ivan Lazhechnikov (1792–1869) were particularly popular. The "Byronic" romanticism and smartness of Alexander Bestuzhev (pseud. Marlinsky, 1797–1837) also had a great success. The more refined forms of German romanticism were cultivated by Prince Vladimir Odoevsky (1804–69) and by Alexis Weltmann (1800–69), a gifted disciple of Jean-Paul. Pushkin himself, after 1830, began to pay more attention to prose than to poetry, elaborating a prose style that avoided all unnecessary ornament, and a narrative technique that discarded all that was not strictly relevant to the story. Lermontov's one masterpiece, *A Hero of our Times* (1840), links the Russian psychological novel to the French analytical novel, while one of the stories included in it contains, *in nuce,* all the short-story technique of Chekhov.

The years 1832–45 are swayed by the genius of Gogol (1809–52) (*q.v.*). Much of his best work is distinctly romantic, and in a certain sense Gogol even marks the high-water mark of romanticism in Russia. But he was also a realist by his extraordinary power of visual convincingness, and in the way he opened to literature large regions of the vulgar and the ugly that had been taboo. Psychologically, he was not a social satirist—the grotesquely lifelike creations of his imagination were exteriorizations of his own inner fauna. But the state of the nascent Russian intelligentsia in the later '30s was such that it could only accept Gogol's work as a satirical criticism of contemporary Russia. His comedy *The Inspector-General* (*Revizor,* 1836) and his comic "epic" *The Dead Souls* (1842) became the main landmarks in the awakening of

Russian society from the political torpor it had been plunged into after the suppression of the Decembrist rebellion (1825).

The Intellectual Revolution.—The great intellectual revolution that led to the formation of the "intelligentsia," as we now understand the term, began outside the political sphere in an awakened interest in general and philosophical ideas. The generation of 1825–40 was intoxicated with the metaphysics of Schelling and Hegel. At the same time, in spite of a savage censorship, journalism began to aspire to the leadership of opinion. *The Moscow Telegraph,* the organ of advanced romanticism edited from 1825 to 1834 by Nicolas Polevoy (1796–1846), is particularly noteworthy in this connection. Towards the end of the '30s the intellectual fermentation began to take on a political and social colouring and to express itself in a general disapproval of existing conditions. By 1840 the intellectuals had formed themselves into two camps: the Slavophils who criticized contemporary Russia for abandoning those of their ideals they discovered in Old Russia and in the religious traditions of the people; and the Westernizers whose faith was in rational progress on European lines. The most notable of the former were Alexis Khomyakov (1804–60), a man of brilliant gifts, a devotional and religious poet of talent, and the greatest theologian ever produced by Russia; and the brothers Aksakov, Constantine (1817–61) and Ivan (1823–86). The influence of the Westernizers was stronger. Their chief leaders were the literary critic Vissarion Belinsky (1811–48) and Alexander Herzen (or Gertsen, 1812–70, *see* HERTZEN). The former started his career as a romantic and aesthetic idealist. After 1840 he began to place social problems foremost and to demand a social significance of all literary work. His critiques became enormously influential, and he may be considered as the spiritual father of Russian Radicalism. The activity of Herzen, who emigrated in 1847, was chiefly political. In literature he owes his high standing to such work as *From the Other Shore,* a series of dialogues and essays in which he gave expression to his disillusionment in the revolution of '48, and *My Past and Thoughts* which is a great autobiography.

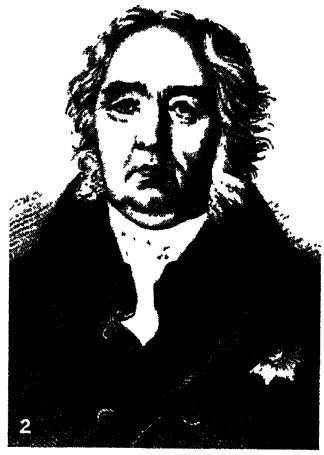
After the general political awakening of the country that followed the Crimean War the tradition of Belinsky was carried on by Nicolas Chernyshevsky (1828–89), Nicolas Dobrolyubov (1836–61) and Dmitri Pisarev (1840–68). They still further identified literary criticism with social politics. They rejected all non-utilitarian values, while Pisarev even condemned all art that was not directly and simply useful. About 1870 Russian Radicalism entered on a new phase, less rationalistic and more ethical, which proclaimed service to the people in atonement for the sins of serfdom, the only way of virtue open to the educated classes. These Radicals are known as the *narodniks* (populists). Their chief spokesman was Nicolas Mikhaylovsky (1842–1904), whose influence over the Radical intelligentsia was for about 20 years almost unlimited. The other camp was less influential (except in the purely political sphere where the brilliant journalism of Ivan Aksakov was a great power) but richer in original and independent personalities. The critic Apollon Grigoriev (1822–64) was excessively prolific and hot-headed, but at his rare best he displayed an imaginative understanding of the highest order. He is also the author of a few songs of strange and poignant beauty. A no less striking personality was that of Constantine Leontiev (1831–91), whose political philosophy of extreme conservatism is a curious amalgam of religious, aesthetic and biological considerations, that presents certain affinities with Nietzsche. Nicolas Strakhov (1828–96), was a good critic but a personality of less significance.

Rise of the Realistic Novel.—The Russian realistic novel grew up under the presiding influences of Gogol and of the idealistic social realism of French writers, especially of George Sand. The note of social revolt, echoed from France, is first heard in the *Three Tales* (1835) of Nicolas Pavlov (1805–64), and in the naïve and sincere work of Elena Hahn (pseud. Zinaida R-va, 1814–43). The influence of Gogol dominates the work of Yakov Butkov (*c.* 1815–56) and of Count Vladimir Sollogub (1814–82). These first gropings were followed by the great creative outburst of 1846–47, when in the course of a few months Turgenev, Dostoyevsky, Goncharov and others gave the world their first works. The main characteristics of the new school were: the realistic rendering of contemporary Russian life; an interest concentrated on social problems; a critical attitude to existing social conditions; an avoidance of all extremes of the grotesque and the romantic; and an endeavour to write as simply and "transparently" as possible, so that words should be only a reflection of things. In these two latter points they distinctly broke away from Gogol, whose disciples they otherwise claimed to be. The most successful novelists during the first 15 years of the movement were Ivan Goncharov (1812–1891) (*q.v.*) and especially Ivan Turgenev (1818–1883) (*q.v.*). The former in his second novel, *Oblomov* (1858) achieved one of the greatest masterpieces of social realism; the figure of Oblomov is at once strictly realistic and immensely symbolical, the imaginative quintessence of a characteristic aspect of the serf-owning intelligentsia. Turgenev is, of all his contemporaries, most closely related to Pushkin: most of his characters are developments of Onegin and Tatiana, the weak man and the strong woman. His novels, from *Rudin* (1856) to *Fathers and Sons* (1862), realize the perfect type of the "social" novel that is at once relevant to the solution of social problems and full of human significance. His style, realistic without rudeness, and poetical without emphasis, answered to perfection to the aesthetic ideal of the age, and was proclaimed the exemplar of Russian prose.

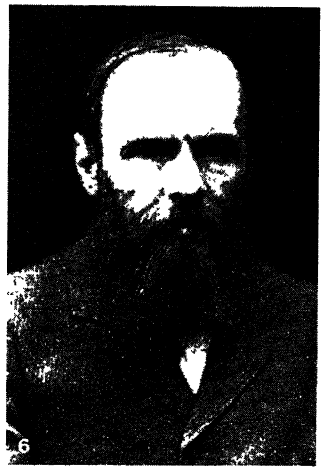
A different literary type is presented by the "philanthropic" fiction that sought to awaken sympathy with the poor and oppressed. Some writers (including the young Dostoyevsky) took their subject matter from the life of the poorer urban classes, the "poor clerk" being a particularly favourite character; others devoted themselves to the peasant. The unquestionable masterpiece of the latter group is Turgenev's *A Sportsman's Sketches* (1847–52). Other writers of peasant fiction were Dmitri Grigorovich (1822–1900), whose first novels were among the literary events of 1846–47; and Marko-Vovchok (pseud. of Mme. Markovich, née Velinsky, 1834–1907), whose best work was done in Ukrainian (*see* UKRAINIAN LITERATURE). Another group of novelists chose the uneducated classes for their heroes, not as objects of compassion, but as the depositories of characteristic Russian qualities and of a moral strength that had been forfeited by the gentry. The best stories of this kind were written by Alexis Pisemsky (1820–81), especially *The Petersburgher* (1853). His novels of "genteel" life (*e.g., A Thousand Souls,* 1858) are full of a bitter contempt for the educated classes. His characters are powerfully drawn and there is more masculine vigour in his narrative art than in that of any of his contemporaries. The novels of Nicolas Melnikov (pseud. A. Pechersky, 1819–83) contain more valuable ethnographical information than literary merits. Sentimentality, tempered by humour, marks the stories of Mme. Sokhansky (pseud. Nadezhda Kokhanovsky, 1825–84) who took her material from the life of the provincial squiredom of the back-steppes.

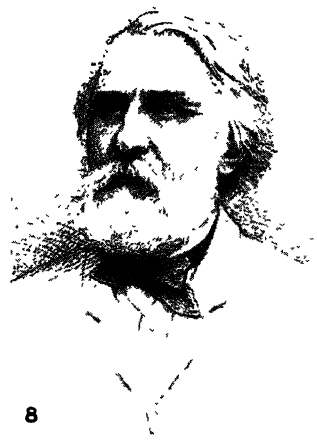
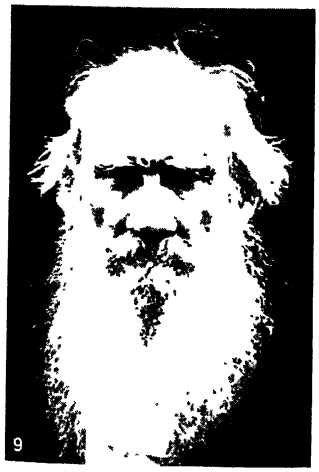
Sergey Aksakov, a much older man (1791–1859), realized his possibilities only under the influence of Gogol and of the new realism. After several books on sport and animal life he published *A Family Chronicle* (1856), describing with extraordinary objectivity and vividness the life of the East Russian squires in the 18th century. It was followed by *Years of Childhood of Bagrov-grandson* (1858) where he tells the story of his first eight years with a minuteness of convincing detail that has been rivalled only by Proust. Aksakov's Russian is remarkable for its purity and plasticity. His works have been admirably translated into English by J. C. Duff.

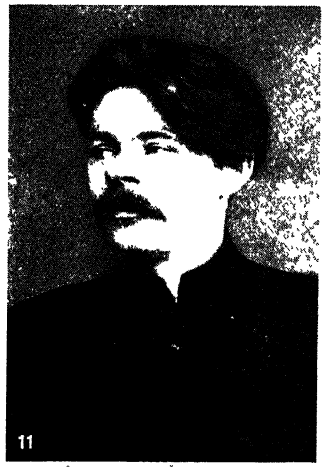
The two novelists now unquestionably classed as the greatest of their age, Tolstoy (*q.v.*) and Dostoyevsky (*q.v.*), produced their chief work between 1864 and 1880. Both are somewhat unrepresentative of their time in that their interest was in the permanent entities of the soul rather than in current social problems. Dostoyevsky was moreover unlike his contemporaries in the dramatic power and sense of tragedy revealed in his great novels. But Tolstoy's *War and Peace* may be regarded as the fulfilment of an ideal common to all the Russian realists: a form of fiction








BY COURTESY OF (10) GEORGE H. DORAN, DOUBLEDAY, DORAN AND CO ; PHOTOGRAPHS, (2, 4) F. BRUCKMANN, (5, 6, 8) RISCHGITZ, (7) PHOTOGRAPHISCHE GESELLSCHAFT, (9) JAMES'S PRESS AGENCY, (11) KEYSTONE VIEW CO., (12) UNDERWOOD AND UNDERWOOD

REPRESENTATIVE RUSSIAN WRITERS, 18TH–20TH CENTURIES

1. Michael Lomonosov (*c.* 1711–65)
2. Ivan Krylov (1768–1844)
3. Michael Lermontov (1814–41)
4. Alexander Pushkin (1799–1837)
5. Nicolas Gogol (1809–52)
6. Theodore Dostoyevsky (1821–81)
7. Nicolas Nekrasov (1821–77)
8. Ivan Turgenev (1818–83)
9. Leo Tolstoy (1828–1910)
10. Anton Chekhov (1860–1904)
11. Maxim Gorky (Alexey Peshkov, 1868–
12. Dmitri Merezhkovsky (1866–)

freed from artificial trammels, and adequate to the vast movements of life itself.

The '60s and '70s.—Tolstoy and especially Dostoyevsky were at first underestimated. The limelight between 1863 and 1880 was occupied by novelists of less genius, but greater conformity with definite parties. The bulk of this party-fiction is valueless. But Michael Saltykov (pseud. N. Shchedrin, 1826–89) stands out on the Radical side as a figure of greater importance. The humour of his satirical sketches, at one time immensely popular, has worn out, but his novel *The Golovlev Family* (1876) is a powerful picture of the brutishness of the provincial gentry, a social novel equal in significance to *Oblomov*. The Radical generation of the '60s produced a whole galaxy of young men of humble birth and great promise, who succumbed to adverse circumstances and failed to do all they might have done. They include the stern and unsentimental realists, Nicolas Pomyalovsky (1835–1863) and Theodore Reshetnikov (1841–1871); the lyrical humorist Alexander Levitov (1835–1877); Gleb Uspensky (1840–1902), a conscience-stricken intellectual obsessed by a complex of social guilt; the unsuccessful revolutionary Andrew Novodvorsky (1853–82); and the Siberian Nicolas Kushchevsky (1847–76), whose only novel *Nicolas Negorev* (1871) gives him a unique place among the minor novelists so great are its qualities of character-drawing, of humour and of pathos.

The only man of the generation who achieved what he was intended to achieve, and has ultimately been recognized as a classic is Nicolas Leskov (1831–95). He failed to fit into the party divisions of the time and in consequence remained an outcast till the end of his life. His best work includes *Cathedral Folk* (1872, Eng. trans.), a humorous chronicle of provincial life; stories from the lives of the saints (after 1890); and a great number of short stories of Russian life. His rapid and packed narrative; his Russian, full of Rabelaisian resource and inventiveness; and his sharply drawn characters of strong men, saints and cranks, with their inextricable mixture of the heroic and the comical, stand in striking contrast to the usual methods of his contemporaries.

The drama followed the lead of the novel. The leading dramatists sought to reduce the element of plot and "artificiality" and to break away from the French school of Scribe. This is already apparent in the dramatic work (1847–52) of Turgenev, which sometimes anticipates the manner of Chekhov. The greatest dramatist of the realistic age, Alexander Ostrovsky (1823–86) (*q.v.*), also avoided all the artificialities of plot and effect, but created a new type of stagecraft, based on characters, which provided admirable "parts" for more than one generation of actors. A more dynamic type of play was cultivated by Alexander Sukhovo-Kobylin (1817–1903) whose three comedies (1855 *seq.*) are masterpieces of dramatic construction and savage satire. Pisemsky was also a more "dramatic" dramatist; his "popular tragedy" *A Hard Lot* (1858) remains the greatest realistic tragedy of the Russian repertory. Another type of play cultivated in the '60s and '70s was the historical play in blank verse. It produced nothing of first rate importance, but *Tsar Theodore* (1868) by Count Alexis Tolstoy (1817–1875) possesses merits that have made it deservedly popular on the stage.

The poets of the period were obsessed by the necessity of finding a compromise between the rights of the imagination and the demands of modern life. The more notable of these eclectics were Apollon Maykov (1821–97); Yakov Polonsky (1819–98), who had a genuine gift of romantic song; and Count Alexis Tolstoy, who is perhaps best remembered under his own name as well as in the invented character of Kosma Prutkov, as the greatest Russian nonsense poet. Other poets, like Ivan Nikitin (1824–61), cultivated a more realistic type of poetry. The greatest of the poetic realists was Nicolas Nekrasov (1821–77). He was a Radical and for many years the editor of a leading review. His work includes biting satire, poignant personal elegies, poems on the sufferings of the peasant, and narrative poems (*The Pedlars*, 1863; *Who can be happy in Russia*, 1873–76, Eng. trans. 1917), in which alone of all Russian poets he created poetry, truly collective and popular in spirit. The poetry of Afanasi Fet (1820–92) stands at the opposite extreme. His early lyrics are as incorporeal and ethereal as Verlaine's, while in those of his last years he attained a degree of concentration reminiscent of Chinese poetry. The generation born after 1830 was singularly poor in poetic talent. The only exceptions were Constantine Sluchevsky (1837–1904), a metaphysical poet of great originality and real profundity, badly handicapped by the low poetic culture of his age; and the philosopher Vladimir Soloviev (*see* p. 756) whose lyrics are a record of his mystical experience.

The '80s.—The '80s were a period of gloom and reaction in the political and social sphere. There was a feeble renascence of aesthetic values and of poetry, but the verse of the favourite poets of those years, Semen Nadson (1862–87) and Alexey Apukhtin (1841–93), which well reflects the general atmosphere of depression, is of very mediocre quality. The novelists of the '80s had many estimable qualities but little creative originality. The most notable are Vladimir Korolenko (1853–1921), a clean, optimistic idealist with a sense of poetry and a gift of humour; Alexander Ertel (1856–1908), whose novel *The Gardenins* is an admirable piece of sober and vivid realism; and N. Garin (pseud. N. G. Mikhaylevsky, 1852–1906), the author of a deservedly popular trilogy recounting the childhood and youth of a typical intellectual. Vsevolod Garshin (1855–88) was a more disturbed and metaphysically inclined spirit strongly influenced by Tolstoy. As a writer of short stories he is the immediate forerunner of Anton Chekhov (1860–1904) (*q.v.*). The atmosphere of Chekhov's best work is eminently representative of the gloom and depression of the disillusioned and unemployed intelligentsia. His narrative technique has its roots in the older tradition, but he carried it to that flawless perfection which has made him the favourite of the English intelligentsia. His influence on literature was small. He has had imitators, but no creative followers.

The tremendous figure of the old Tolstoy overshadows all the younger generation of the '80s. His new ethical Christianity, it is true, affected the following generation almost exclusively by its negative attitude to all cultural values. But the indirect influence of that great personality cannot be exaggerated. The works in which he embodied his religious experience, *The Confession* and *The Death of Ivan Ilyich*, have nothing to compare with them for essential religious quality in modern literature. While his new narrative style, which rejected all "superfluous detail" and concentrated on the most generally human problems meant the end of the rule of purely "social" realism.

The '90s.—Soon after 1890 the depression of the '80s was followed by a general reawakening of life. In politics a new spirit was introduced by the advent of Marxism, and a general rise of revolutionary optimism. In literature the meteoric appearance of Maxim Gorky (pseud. of Alexey Peshkov, b. 1869, *see* GORKY), was the greatest event of the later '90s. Other writers by his side continued the old tradition, among whom we may mention Alexander Kuprin (b. 1870), the author of *The Duel* (1905), a "social" novel of army life, and of a number of well-told short stories. Gorky's successor in the popular favour was Leonid Andreyev (1871–1919) (*q.v.*), whose work shows an obsession with the vanity and emptiness of all human values and pursuits. His best stories, problem-stories of death and sex are modelled on Tolstoy's, but he early succumbed to a crude "modernism" and his style degenerated into a succession of insincere clichés. Andreyev's outlook was shared by many writers who came into prominence about the time of the failure of the first revolution (1906–07). The most famous of these was Michael Artsybashev (1878–1926), the author of the notorious *Sanin* (1907, Eng. trans. 1915), a drearily didactic novel that preached the gospel of complete obedience to sexual impulses, in a style unintelligently aped from Tolstoy. S. Sergeyev-Tsensky (b. 1878), another pessimist, is a much more genuine writer, and the master of an individual style. His novel *Movements* (1910) is one of the most powerful stories of dying and death written since *Ivan Ilyich*. Ivan Bunin (b. 1870) (*q.v.*) may also be classed with the pessimists. His most important works, *The Village* and especially *Sukhodol* (1912), give an impressive picture of the spiritual decay and cultural poverty of the peasantry and provincial gentry of central Russia

before the Revolution. Numerous novelists practising a more or less "modernized" realism came up in the years preceding the World War. Two deserve mention: Ivan Shmelev (b. 1875), whose story *That which happened* (1921, Eng. trans. 1926) is perhaps the best Russian story inspired by the War; and Boris Savinkov (pseud. V. Ropshin, 1879–1925), author of *The Pale Horse* 1909, Eng. trans. 1915), a striking revelation of the terrorist mentality.

Chekhov's innovations in dramatic technique carried to its logical end the anti-artificial and "anti-theatrical" realism of Turgenev and Ostrovsky. Gorky and Andreyev attempted to imitate his plays, but failed to master their inner, "musical," construction which alone makes them what they are. Andreyev also wrote "modernist" plays which are nothing but a succession of rhetorical clichés, and crude symbolism.

The "religious-philosophic" movement had its roots in the Christianity of Dostoyevsky and in the gnostic idealism of Vladimir Soloviev (1853–1900). Soloviev, a brilliant dialectician and polemist, was not a creative philosopher, but his influence was very great. As a writer he is best remembered, apart from his mystical poetry, for his last work, *Three Dialogues on War, Progress and the End of the History* (1900, Eng. trans. 1915), an apocalyptic treatise in the form of a brilliantly witty society conversation. Of his numerous followers we need only mention Father Paul Florensky, a writer of extraordinary subtlety and sophistication, and Nicolas Berdyaev (b. 1874), an impulsive thinker, more stimulating than profound. A very different kind of philosopher was Vasili Rozanov (1856–1919), one of the greatest masters of modern Russian prose. By rejecting what he called the "Gutenberg" style he made his Russian as flexible and spontaneous as spoken language. He was a convinced enemy of Reason, in theory as well as in practice. His religion was mainly a religion of sex and procreation, but he had a deep emotional sympathy with the traditions of Russian Christianity. One of his most characteristic books, *Solitaria* (1912), has been translated into English (1927). Leo Shestov (b. 1866) is also an irrationalist, but in his war on Reason he uses the weapons of his enemy with consummate skill. He has an intimate affinity with Dostoyevsky and Tolstoy (Eng. trans. *Anton Chekhov,* 1916; *All Things are possible,* 1920).

Symbolist Poetry.—The literary movement of the '90s, dubbed "modernism" by its opponents, had for its principal components aestheticism and individualism. Dmitri Merezhkóvskiy (b. 1866) (*q.v.*) was one of the earliest and most influential mouthpieces of "modernism." He did excellent work at first as the interpreter of foreign values. But his historical novels reveal no creative originality, and as a religious thinker he is a long-exploded nonentity. The most important literary expression of the "modernist" movement was the poetry of the Symbolists. In the first stages their poetry was largely derivative from foreign sources. The work of Constantine Balmont (b. 1867) (*q.v.*) and Valeri Bryusov (1873–1924) (*q.v.*) has a translated and un-Russian flavour. But they contributed a great deal to raising the standards of poetic workmanship and the general level of literary culture. Other poets more creatively original and at the same time more organically rooted in the Russian tradition were Theodore Sologub (1863–1927) (*q.v.*); Zinaida Hippius (b. 1867) (*q.v.*), an intellectual poet of great technical originality; Innocent Annensky (1856–1909), whose small posthumous book *The Cypress Chest* (1910) contains lyrics of the most quintessential beauty; and Vyacheslav Ivanov (b. 1866), a gnostical metaphysician, a classical scholar, saturated with culture, the master of a magnificently ornate, Alexandrine style (*Cor Ardens,* 1911), as well as a splendid writer of ornate prose. The younger generation of Symbolists produced the greatest poet of the movement in Alexander Blok (1880–1921) (*q.v.*). His early mystical lyrics were purely musical and immaterial. Later when he lost his mystical visions, his poetry became more full-blooded and realistic. It is romantic in substance, but instinct with a grim and hopeless irony. His last poem, *The Twelve,* written immediately after the October Revolution, is a sublime symphony made out of realistic dirt. Blok's contemporary Andrey Bely (pseud. of Boris Bugaev, b. 1880, *see* BYELUY) is the most original and "advanced" of the younger Symbolist poets. His poetry is mystical in content, experimental in form and often humorous in tone. Of the minor and later Symbolists we may mention Maximilian Voloshin (b. 1877), and Vladimir Khodasevich (b. 1886). The exclusively metaphysical character of Symbolism produced a reaction towards more concrete and less sophisticated poetry. Michael Kuzmin (b. 1875) was its first herald. About 1912 it crystallized into a movement whose leader was Nicolas Gumilev (1886–1921). His poetry is a strange mixture of gaudy aestheticism and manly romanticism. The poetry of Anna Akhmatova (Eng. trans. *Twenty-Seven Love Poems,* 1927) is also an assertion of human and concrete emotion as against the mysticism and metaphysics of Symbolism. Osip Mandelstam (*The Stone,* 1916) is more concerned with cultural than with sentimental values. His technique is a curious combination of classical eloquence with an illogical associationism akin to that of the *surréalistes.*

The Symbolist Novel.—Of the elder Symbolists who attempted prose fiction Sologub (*q.v.*) is easily first. *The Little Demon* (1907) is one of the greatest Russian novels since Dostoyevsky. Superficially it is a story of Russian provincial life, in the realistic tradition, but its symbolism has a metaphysical rather than a social significance. Other poets like Bryusov and Kuzmin tried to renovate Russian prose by adopting old and foreign styles. Bryusov's romance of witchcraft, *The Fire Angel* (1907), for instance, imitates the manner of a 16th century German memoirist. Russian prose was revolutionized by Andrey Bely (*see* above) and Alexis Remizrov (b. 1877) (*q.v.*). They aimed at the maximum of verbal expressiveness, thus reviving the true tradition of Gogol and continuing the work of Leskov. Bely achieves this by a variety of means, among which rhythm, bold metaphor and verbal creation are most prominent. His novels, from the first, *The Silver Dove* (1909), to the not yet completed *Moscow* (first parts 1926), reveal a creative genius of a very rare order. Remizov's Russian is more colloquial; he continues the work of Avvakum and Rozanov of "de-latinizing" the language. His writings present an enormous variety of kind and subject. But most important of all are his stories of provincial life (*The Story of Stratilatov,* 1909, and *The Fifth Pestilence,* Eng. trans. 1927) which introduced a new type of grotesque realism and a new technique. They had a considerable influence on the rise of a new realism which used Russian life not as a peg on which to hang social or metaphysical problems, but as purely aesthetic material. Alexis N. Tolstoy (b. 1882) is the most popular and lively of these writers, the master of an admirable narrative manner, free from any kind of sophistication. His masterpiece is *The Childhood of Nikita* (1922). Michael Prishvin (b. 1873) is the author of the best animal stories in the language (*The Beast of Krutoyarsk,* 1913). Eugene Zamyatin (b. 1884) began as a disciple of Remizov, but later developed a complicated expressionist manner of his own.

The War and the Revolution.—The World War did not very profoundly affect Russian literature. The intellectual classes kept aloof from it. The Revolution of March 1917 remained almost equally alien to the Russian imagination, but not the Bolshevik Revolution of eight months later, or the ensuing civil wars. Their external result was the division of intellectual Russia into two hostile camps, which after 1920–21 became a geographical division between those who have remained in U.S.S.R. and the *émigrés.* The older generation of writers is pretty equally divided between the two sides. But the young generation of *émigrés* have produced no valuable work with the possible exception of the historical novelist, Mark Aldanov (*q.v.*). In the literature of ideas the *émigrés* have however given birth to the vigorous movement of the "Eurasians" whose leaders are Peter Suvchinsky and Prince Nicolas Trubetskoy. Of the Bolsheviks, Lenin was an orator and a political writer of exceptional genius. Trotsky is a brilliant pamphleteer and his book, *Literature and Revolution* (Eng. trans. 1925), discussing the literary policy of the Communist party is of considerable interest. But the strictly literary men of the party are very second-rate. Anatoli Lunacharsky is a conspicuous mediocrity, and Demian Bedny (pseud. of E. A.

Pridvorov, b. 1883), the Communist poet laureate, is no more than an able and sometimes witty writer of rhymed propaganda.

During the years of civil war and blockade (1918–21) Russian prose writers almost ceased from production and poetry ruled supreme. Of the "advanced" poetical groups, the Futurists were the most prominent. The Futurist movement began about 1912 as a revolt against the hieratic mysticism of the Symbolists. It united several fundamentally different tendencies, and there is little in common between its two principal representatives, Victor Khlebnikov (1885–1922) and Vladimir Mayakovsky (b. 1893), besides the common desire to give poetry a more rugged and virile accent and to tear it away from the withering hold of traditional poetical associations. Khlebnikov was a recluse and a stammerer, a mole who lived, as it were, at the linguistic roots of poetry. His work is caviare to the general public, but highly appreciated by fellow poets. Mayakovsky is an open-air orator. Much of his verse is revolutionary propaganda. Though totally lacking in the "finer touch," it is intensely original and highly craftsmanlike. Boris Pasternak (b. 1890), unquestionably the greatest living Russian poet (principal book of lyrics, *My Sister, Life*, written 1917, published 1922) is externally connected with some aspects of Futurism, but in substance he is nearer to the traditions of Tyutchev and Fet. His poetry is marked by an absolute freshness of perception and diction combined with a tensity of lyrical emotion that is to found only in the greatest. His prose (*Tales*, 1925) is also of the highest order, and being concerned with the realities of the soul stands apart from that of his contemporaries. Next to Pasternak the most significant recent poet is Marina Tsvetayeva (an *émigrée* since 1922), whose poetry is marked by an exceptional variety and richness of rhythmical imagination, and an exuberant vitality. Sergey Esenin (1895–1925) (*q.v.*), the favourite poet of the post-revolutionary intelligentsia, was at one time connected with "advanced" movements, but in reality he is a poet of sentiment of an essentially "19th century" type. After 1921 poetry began to lose its ascendancy. None of the poets who have come forward since then are of any very great significance, though the "proletarian poet" Vasili Kazin has a genuine gift of song, and Nicolas Tikhonov and Ilya Selvinsky are consummate and original masters of technique.

Post-Revolutionary Prose.—The period of the "New Economic Policy" (inaugurated 1921) saw the rise of a whole host of prose-writers who, while remaining outside the pale of party Communism, sympathized with the Communist Revolution. They have been given the name of *poputchiki*, which means "fellow-travellers up to a certain point." The first of the *poputchiki* were strongly under the influence of the "ornamental" style of Bely and Remizov, and of the "formalist" school of criticism, which insisted on the complete reduction of all literary facts to form. The most prominent of the "formalists" was Victor Shklovsky (b. 1893), a vivacious and clever critic, and the author of a very remarkable book of reminiscences of the War and the Revolution (*A Sentimental Journey*, 1923). The young "ornamental" novelists laid all their emphasis on style and formal originality, almost abandoning all pretence of narrative. The spirit of the Revolution expressed itself in their work in their treatment of mass movements. In the early novels of Boris Pilnyak (b. 1893) (*q.v.*) and of Vsevolod Ivanov (b. 1895) there are no individual characters, only vast movements of masses, crowds or peoples. Ivanov has overcome the limitations of "dynamism" and his later stories show more grit. The tales of Isaac Babel (b. 1894) are "intensified anecdotes" with a maximum of artistic concentration. He is a supreme master in the imaginative treatment of slang and mongrel dialects, and the most perfect artist of the younger generation. His best stories are about the Polish War of 1920. Leonid Leonov (b. 1899) is a more old-fashioned writer, related in tone and subject-matter to earlier masters, and full of sympathy for the underdogs of the Revolution. Other novelists tried to remedy the lack of narrative interest inherent in "ornamental" and "dynamic" fiction. Ilya Erenburg (b. 1891), who had been made famous by *The Adventures of Julio Jurenito* (1922), a satire of Capitalist Europe, won still greater fame by crude novels of melodrama and adventure. Constantine Fedin (b. 1892) is a more serious writer; his novel *Cities and Years* (1924), a powerful story of War and Revolution, restored to a place of honour the ethical conception of human conduct, as opposed to the elemental dynamics of the masses. Since about 1925 "Soviet workdays" have replaced the civil war as the chief subject of fiction. Most of this new fiction of "Soviet manners" is not above the level of good journalism. Among those who represent Soviet life in a humorous or satirical light the most popular is Michael Zoshchenko, but Sergey Zayaitsky is the only writer of this description to have shown real imaginative power. Other writers like Lydia Seyfullina (b. 1889), in a curious type of best-seller, try to answer the Soviet typist's demand for "uplift." Recently there has grown up a great interest in the historical novel. Those by Yuri Tymyanov and by Olga Forsch (b. 1879) are works of real and solid merit.

By the side of the *poputchiki*, the "proletarian" novelists at first cut a rather inferior figure. The work of Yuri Libedinsky (b. 1898; *The Week*, Eng. trans. 1923), of Theodore Gladkov (b. 1883; *Cement*, 1926) and of D. Furmanov (d. 1926) is hardly literature, but it is interesting as reflecting the optimistic energy of the men who won the civil war and shouldered the work of reconstruction after it. The younger proletarian generation has produced writers of real talent. Artem Vesely (b. 1898) carried the "dynamic" novel to its highest perfection (*My Native Land*, 1926), infusing into it a vitality and cheerfulness entirely alien to its *poputchiki* initiators. A. Fadeyev and Sergey Semenov, on the other hand, are more interested in individual and ethical man. Fadeyev's *The Defeat* (1927) and Semenov's *Natalia Tarpova* (1927) are works of great merit and still greater promise.

The drama, in spite of the continued vitality of the theatre, has produced little of importance. The realistic tradition has been abandoned. The plays of Nicolas Evreinov (b. 1879), a leading theatrical producer, have many points in common with Pirandello's. The Futurists at one time attempted to create a high-standard, boldly Aristophanesque propaganda play; but the only successful venture was Mayakovsky's *A Mystery-Bouffe* (1918). The dominant type of drama is a kind of conventional puppet-play with characters stripped of all reality and humanity. Such are the crude and mediocre plays of Lunacharsky (Eng. trans. *Three Plays*, 1923). Only the plays of the regretted Leo Lunts (1901–24) are on a much higher level. They are simplified tragedies of pure action, full of a genuine heroical spirit.

Historians.—Modern Russian historiography begins with V. N. Tatishchev (1686–1750); his history of Russia is a laborious but uncritical compilation from the chronicles. Gerhard Friedrich Müller (1705–83), a German member of the Petersburg academy and a pioneer in many fields, was the first to open up the jungle of official acts and records. A critical spirit was first introduced by another German, August Ludwig v. Schloezer, and by the amateur historian I. N. Boltin (1735–92). Karamzin's (*q.v.*) *History of the Russian State* (12 vol., 1818–26) summed up the work of the 18th century, to which it essentially belongs: it is moralizing and rhetorical, and devoid of all "sense of period." Its conception of autocracy as the only constructive and beneficent force in the Russian past made it the bible of official and conservative Russia. But before Karamzin was dead new ideas were abroad; and acquaintance with Niebuhr and Hegel demanded a new approach to Russian history. Nicolas Polevoy (*see* p. 754) in his *History of the Russian People* (1830–33) attempted to supply the demand, but being no more than a journalist, failed. Michael Pagodin (1800–75), who did much to advance a critical and detailed knowledge of Russia's past, was prevented from achieving a synthesis by the provincial conservatism of his outlook. The younger Slavophils were more imaginative, and being convinced that the chief hero of history was the People and not the State, concentrated their attention on the history of the masses. Their best historian was I. D. Belyaev (1810–73). The same predilection for social history and for the masses marks the work of the Radical historians, N. I. Kostomarov (1817–85) the most "literary" and widely read historian of the time, and A. P. Shchapov (1830–76), who tried to apply to Russian history the

methods of Buckle. The moderate and Liberal Westernizers, on the contrary, devoted themselves to the history of the State, which appeared to them as the only civilizing force, and of its legislation. The most industrious of them, S. M. Soloviev (1820–79), compiled what is the most complete detailed history of Russia (29 vol., 1851–79). It is little more than a transcript of the sources, interspersed with a few historical discussions, reflecting the ideas of Hegel. Russian historiography was freed from philosophy and party bias by K. N. Bestuzhev-Ryumin (1829–97) and V. O. Klyuchevsky (1841–1911). Klyuchevsky, especially, introduced a more intimate study of the sources, resulting in a more general reconstruction of the past; and his monographs on the pre-Muscovite and Muscovite period have become classics. His *Course of Russian History* (4 vol., 1904) has charmed many readers by its literary form, but is handicapped by the absence of a sincerely considered point of view. Bestuzhev-Ryumin became the master of a whole school of historians, among whom S. Th. Platonov (b. 1860) is the most eminent. His work on *The Time of Troubles* (1899) is a masterpiece of knowledge and presentation. Apart from the main schools stand V. I. Sergeyevich (1838–1909), whose *Antiquities of Russian Law* is a brilliant work of criticism, written in a concise and trenchant style; and E. E. Golubinsky (1834–1912), whose *History of the Russian Church* presents a strange mixture of great critical acumen and quaint stolidity. The old Westernizing tendency survives in the work of P. N. Milyukov (b. 1859; *Studies in the History of Russian Civilization*), whose leading idea is to prove the poverty and inferiority of old Russian civilization. N. P. Pavlov-Silvansky (1869–1908) was a Westernizer of a different type, who tried to prove the essential similarity of the historical process in Russia and the West. The rise of Marxism has led to the rise of a school of Marxist historians, who aim at reducing Russian history to universally applicable methods of dialectic materialism. Their patriarch, M. N. Pokrovsky, is a historian of great gifts whose treatment of historical problems has done much to renovate our ideas of the Russian past.

The Study of Literature.—The study of literature began in the 18th century in the form of biographical compilations and bibliographical indexes, Novikov being the principal pioneer. Towards 1830 literary studies came under the influence of German philosophical idealism. Stepan Shevyrev (1806–64), a highly cultured critic and a right-wing Slavophil, was the first to attempt, without much success, a scholarly presentation of Russian literature. The journalistic surveys of Belinsky were much more influential in establishing a generally accepted *vulgate* of literary history. In the second half of the 19th century Russian folklore attracted considerable learned attention, almost invariably influenced by the romantic theories of Grimm. An extreme form of such romanticism is apparent in the work of Orest Miller (1838–89). Theodore Buslayev (1818–97) was a more circumspect idealist, and the first to attempt to bring together the study of old Russian literature and old Russian art. In the following generation A. A. Potebnya (1835–91) tried to place the study of folklore on a broad basis of linguistic psychology. Alexander Veselovsky (1838–1906) directed his efforts towards a strictly scientific study of comparative literature. Old Russian literature remained in the hands of philologists and its study was conducted on somewhat narrowly academic lines. The foremost representatives of this line of study to-day are V. N. Peretts and V. M. Istrin, whose history of Kiev literature (1922) is the most convenient and authoritative survey of the period. Less moderate is the work of A. M. Pypin (1833–1904) whose *History of Russian Literature* is a scholarly and industrious attempt to represent old Russian civilization in the poorest possible light. The work of most historians of modern Russian literature is marked by a strong party bias and an absence of literary understanding. *The History of Russian Literature after 1848*, by A. M. Skabichevsky (1838–1910), and the writings of S. A. Vengerov (1855–1920), literary editor of the Brockhaus-Efron Encyclopaedia (1890–1907) and of numerous other publications, are best known and most frequently utilized. The Marxists introduced a fresh note by subordinating the study of literature to that of economics. Of the early Marxists, the gifted Eugene Soloviev (pseud. Andreyevich, 1863–1905) wrote a *Philosophy of Russian Literary History* (1905) which is certainly worth reading. The canons of Marxist literary history were established by G. V. Plekhanov (1856–1918). Since 1917 Marxism is the official doctrine in literary history. The opposition is provided by the "formalists," whose influence on literary development has already been alluded to. Their most notable workers in the field of literary history are Boris Eichenbaum and Yuri Tynyanov. On the whole, Russian literary history is in a far from satisfactory state, and there is no single adequate presentation of it. For the ancient period (including the 18th century) the student will be best guided by such collections of extracts as the *Chrestomathy* of Brodsky, Mendelson and Sidorov (3 parts, Moscow 1922–23). For the 19th century and later he will have to find his own way with the aid of existing bibliographies.

BIBLIOGRAPHY.—Works in Russian: Mezier, *Russian Literature, 11th to 19th century* (2 parts, 1899, 1902); Peretts, *Short Outline of Methodology of Russian Literature* (1922); Vladislavlev, *Russian Writers of the 19th and 20th centuries* (4th ed. 1924); Piksanov, *Two Centuries of Russian Literature* (18th and 19th centuries) (2nd ed. 1925).

Works in English: M. de Vogüé, *Le Roman Russe* (1885; Eng. trans. 1900); A. Waliszewski, *A History of Russian Literature* (Eng. trans. from French, (1900); Prince P. Kropotkin, *Russian Literature* (1905; 2nd ed. 1916); A. Brückner, *A Literary History of Russia* (Eng. trans. from German, 1908); M. Baring, *Landmarks in Russian Literature* (1910) and *An Outline of Russian Literature* (Home University Library, 1915); Mme. N. Jarintzov, *Russian Poets and Poems* (1917); Prince D. S. Mirsky, *Modern Russian Literature* (The World's Manuals, 1925), *Contemporary Russian Literature* (after 1881) (1926), and *A History of Russian Literature* (to 1881) (1926); L. Wiener, *The Contemporary Drama of Russia* (Boston, 1924); J. Lavrin, *Russian Literature* (1927).

Anthologies: J. Bowring, *Specimens of the Russian Poets* (2 parts, 1821, 23); L. Wiener, *Anthology of Russian Literature* (2 parts, 1902–03); Deutsch, Babette and Yarmolinsky, *Modern Russian Poetry* (1922); *The Oxford Book of Russian Verse*, Russian text, ed. with introd. by Maurice Baring (1925).

White-Russian Literature.—White-Russian was, by the side of Latin, the official language of the Grand Duchy of Lithuania from the 14th century to its absorption by Poland, but apart from a few chronicles and a few translated romances it produced no literature. In the 19th century White-Russian literature did not rise above the level of provincial amateurishness. But in the present century a literary movement of which the chief names are Yanko Kupalo (b. 1882) and Michael Bagdanovich (Bogdanovich, 1892–1917) has resulted in the formation of a national literature. White-Russian folklore is less varied than either great Russian or Ukrainian, and has no narrative poetry. Its lyrical song however is rich, and some of it presents archaic features. White-Russian studies are now centred in the White-Russian State university at Minsk (founded 1921).

See N. Karsky, *The White-Russians* (in Russian, Warsaw, 1903 etc.); M. Haretsky (Goretsky), *History of White-Russian Literature* (in White-Russian, Minsk, 1926). For Ukrainian (or Little-Russian, or Ruthenian) literature *see* UKRAINIAN LITERATURE. (D. S. M.)

RUSSKY, NIKOLAI (1854–1918), Russian general, was educated at the infantry military school in St. Petersburg, graduated from the academy of the general staff in 1881, and by 1896 had reached general's rank. During the war with Japan (1904–5) he was the head of the staff of the II. Army, and planned the offensive carried out by General Grippenberg which led to the prematurely abandoned offensive of Sandepu. In 1914 he commanded the III. Army which attacked in Galicia, and advanced to Lvov (Lemberg) through which it passed in the further advance to the San-Dniester line. The dramatic entry of the III. Army into Lvov created for General Russky a prestige out of proportion to the real importance of his success. In Oct. 1914 he was appointed commander-in-chief of the north-western and afterwards of the northern armies. He continued to hold the command in spite of ill-health, and it was at his headquarters that the final scenes of Nicholas II.'s reign and his abdication took place in March 1917.

Soon after the Revolution General Russky retired, and in 1918 he was reported killed by the Bolsheviks.

RUSSO-JAPANESE WAR (1904–5). The seizure by Russia of the Chinese fortress of Port Arthur, which she had a few years previously, in concert with other Powers, compelled Japan to relinquish, was from the Russian point of view the logical outcome of her eastward expansion and her need for an ice-free harbour on the Pacific. The extension of the Trans-Siberian railway through Manchuria to Port Arthur and a large measure of influence in Manchuria followed equally naturally. But the whole course of this expansion had been watched with suspicion by Japan, from the time of the Saghalien incident of 1875—when the island power, then barely emerging from the feudal age, had to cede her half of the island to Russia—to the Shimonoseki treaty of 1895, when the Powers compelled her to forego the profits of her victory over China. The subsequent occupation of Port Arthur and other Chinese harbours by European Powers, and the evident intention of consolidating Russian influence in Manchuria, were again and again the subject of Japanese representations at St. Petersburg (Leningrad), and these representations became more vigorous when, in 1903, Russia seemed to be about to extend her Manchurian policy into Korea. No less than ten draft treaties were discussed in vain between Aug. 1903 and Feb. 1904, and finally negotiations were broken off on Feb. 5.[1] On the 4th Japan had already decided to use force, and her military and naval preparations, unlike those of Russia, kept pace with her diplomacy.

This was in fact an eventuality which had been foreseen and on which the naval and military policy of Japan had been based for ten years. She, too, had her projects of expansion and hegemony, and by the Chino-Japanese War she had gained a start over her rival. The reply of the Western Powers was first to compel the victor to maintain the territorial integrity of China, and then within two years to establish themselves in Chinese harbours. From that moment Japanese policy was directed towards establishing her own hegemony and meeting the advance of Russia with a *fait accompli*. But her armaments were not then adequate to give effect to a strong-handed policy, so that for some years thereafter the Government had both to impose heavy burdens on the people and to pursue a foreign policy of marking time, and endured the fiercest criticism on both counts, for the idea of war with Russia was as popular as the taxes necessary to that object were detested. But as the army and the navy grew year by year, the tone of Japanese policy became firmer. In 1902 her position was strengthened by the alliance with England; in 1903 her army, though in the event it proved almost too small, was considered by the military authorities as sufficiently numerous and well prepared, and the arguments of the Japanese diplomatists stiffened with menaces. Russia, on the other hand, was divided in policy and consequently in military intentions and preparations. In some quarters the force of the new Japanese army was well understood, and the estimates of the balance of military power formed by the minister of war, Kuropatkin, coincided so remarkably with the facts that at the end of the summer of 1903 he saw that the moment had come when the preponderance was on the side of the Japanese. He therefore proposed to abandon Russian projects in southern Manchuria and the Port Arthur region and to restore Port Arthur to China in return for considerable concessions on the side of Vladivostok.

His plan was accepted, but "a lateral influence suddenly made itself felt, and the completely unexpected result was war." Large commercial interests were in fact involved in the forward policy, "the period of heavy capital expenditure was over, that of profits about to commence," and the power and intentions of Japan were ignored or misunderstood. Thus Russia entered upon the war unprepared in a military sense. To the guards and patrols of the Manchurian railway and the garrisons of Port Arthur and Vladivostok, 80,000 in all, Japan could, in consequence of her recruiting law of 1896, oppose a first-line army of some 270,000 trained men. Behind these, however, there were scarcely 200,000 trained men of the older classes, and at the other end of the long Trans-Siberian railway Russia had almost limitless resources.[2] The strategical problem for Japan was, how to strike a blow sufficiently decisive to secure her object before the at present insignificant forces of the East Siberian army were augmented to the point of being unassailable. It turned, therefore, principally upon the efficiency of the Trans-Siberian railway and in calculating this the Japanese made a serious under-estimate. In consequence, far from applying the "universal service" principle to its full extent, they trained only one-fifth of the annual contingent of men found fit for service. The quality of the army, thus composed of picked men (a point which is often forgotten), approximated to that of a professional force; but this policy had the result that, as there was no adequate second-line army, parts of the first-line had to be reserved, instead of being employed at the front. And when for want of these active troops the first great victory proved indecisive, half-trained elements had to be sent to the front in considerable numbers—indeed, the ration strength of the army was actually trebled.

Objects of Japanese Attack.—The aim of the war, "limited" in so far that the Japanese never deluded themselves with dreams of attacking Russia at home, was to win such victories as would establish the integrity of Japan herself and place her hegemony in the Far East beyond challenge. Now the integrity of Japan was worth little if the Russians could hope ultimately to invade her in superior force, and as Port Arthur was the station of the fleet that might convoy an invasion, as well as the symbol of the longed-for hegemony, the fortress was necessarily the army's first objective, a convincing Sedan was the next. For the navy, which had materially only a narrow margin of superiority over the Russian Pacific squadron, the object was to keep the two halves of that squadron at Port Arthur and Vladivostok respectively separate and to destroy them in detail. But in February weather these objects could not be pursued simultaneously. Prior to the break-up of the ice, the army could only disembark at Chemulpo, far from the objective, or at Dalny under the very eyes of its defenders. The army could therefore, for the moment, only occupy Korea and try to draw upon itself hostile forces that would otherwise be available to assist Port Arthur when the land attack opened. For the navy, instant action was imperative.

On Feb. 8, the main battle-fleet, commanded by Vice-Admiral Togo, was on the way to Port Arthur. During the night his torpedo-boats surprised the Russian squadron in harbour and inflicted serious losses, and later in the day the battleships engaged the coast batteries. Repulsed in this attempt, the Japanese established a stringent blockade, which tried the endurance of the ships and the men to the utmost. From time to time the torpedo-craft tried to run in past the batteries, several attempts were made to block the harbour entrance by sinking vessels in the fairway, and free and deadly use was made by both sides of submarine mines. But, though not destroyed, the Port Arthur squadron was paralysed by the instantaneous assertion of naval superiority.

Alexeiev and Makárov.—Admiral Alexeiev, the tsar's viceroy in the Far East and the evil genius of the war, was at Port Arthur and forbade the navy to take the risks of proceeding to sea.[3] For a time, when, in place of Admiral Starck (who was held responsible for the surprise of February), Admiral Makárov, an officer of European reputation, commanded the fleet this lethargy was shaken off. The new commander took his ships to sea every day. But his energetic leadership was soon ended by a tragedy. A field of electro-mechanical mines was laid by the Japanese in the night of April 12–13, and on the following day the Japanese cruisers stood inshore to tempt the enemy on to the mine-field. Makárov, however, crossed it without accident, and pursued the cruisers until Togo's battle-fleet appeared, whereupon he went about and steamed for port. In doing so he recrossed the mine-field, and this time the mines were effectual. The flagship "Petropavlovsk" was struck and went down with the admiral and 600 men, and another battleship was seriously injured. Then the advocates of passivity regained the upper hand and kept the squadron in harbour, and henceforward for many months the Japanese navy lay unchallenged off Port Arthur, engaging in minor oper-

[1] Belated declarations of war appeared on Feb. 10.

[2] The total Russian army on a *peace* footing was almost 1,000,000 strong.

[3] A vivid picture of the state of affairs in the navy at this period is given in Semenov's *Rasplata* (Eng. trans.)

ations, covering the transport of troops to the mainland, and watching for the moment when the advance of the army should force the Russian fleet to come out. Meantime seven Japanese cruisers under Vice-Admiral Kaimamura went in search of the Russian Vladivostok squadron; this, however, evaded them for some months, and inflicted some damage on the Japanese mercantile marine and transports.

Landing of Japanese 1st Army.—The Japanese had not waited to gain command of the sea before beginning the sea transport of that part of their troops allotted to Korea. The roads of that country were so poor that the landing had to be made not on the straits of Tsushima, but as far north as possible. Chemulpo, nearer by 50m. to Port Arthur than to Japan, was selected. On the first day of hostilities Rear-Admiral Uriu disembarked troops at Chemulpo under the eyes of the Russian cruiser "Variag," and next day he attacked and destroyed the "Variag" and some smaller war-vessels in the harbour, and the rest of the 1st Army (Gen. Kuroki) was gradually brought over during February and March in spite of an unbeaten and, under Makárov's régime, an enterprising hostile navy. But owing to the thaw and the subsequent break-up of the miserable Korean roads, six weeks passed before the columns of the army (Guard, 2nd and 12th Divisions), strung out along the "Mandarin road" to a total depth of six days' march, closed upon the head at Wiju, the frontier town on the Yalu. Opposite to them they found a large Russian force of all arms.

The Russian commanders, at this stage at least, had not and could not have any definite objective. Both by sea and by land their policy was to mass their resources, repulsing meantime the attacks of the Japanese with as much damage to the enemy and as little to themselves as possible. Their strategy was to gain time without immobilizing themselves so far that the Japanese could impose a decisive action at the moment that suited them best. Both by sea and by land such strategy was an exceedingly difficult game to play. But afloat, had Makárov survived, it would have been played to the end, and Togo's fleet would have been steadily used up. One day, indeed (May 15), two of Japan's largest battleships, the "Hatsuse" and the "Yashima," came in contact with free mines and were sunk. One of them went to the bottom with 500 souls. But the admiral was not on-board. The Russian sailors said, when Makárov's fate was made known, "It is not the loss of a battleship. The Japanese are welcome to two of them. It is *he*." Not only the skill, but the force of character required for playing with fire was wanting to Makárov's successors.

Plans of Kuropatkin.—It was much the same on land. Kuropatkin, who had taken command of the army, saw from the first that he would have to gain three months, and disposed his forces as they came on the scene, unit by unit, in perfect accord with the necessities of the case. His expressed intention was to fight no battle until superiority in numbers was on his side. He could have gained his respite by concentrating at Harbin or even at Moukden or at Liao-Yang. But he had to reckon with the fleet[1] at Port Arthur. He knew that the defences of that place were defective, and that if the fleet were destroyed whilst that of Togo kept the sea there would be no Russian offensive. He therefore chose Liao-Yang as the point of concentration, and having thus to gain time by force instead of by distance he pushed out a strong covering detachment towards the Yalu. But little by little he succumbed to his *milieu*, the atmosphere of false confidence and passivity created around him by Alexeiev. After he had minutely arranged the eastern detachment in a series of rearguard positions, so that each fraction of it could contribute a little to the game of delaying the enemy before retiring on the positions next in rear, the commander of the detachment, Zasulich, told him that "it was not the custom of a knight of the Order of St. George to retreat," and Kuropatkin did not use his authority to recall the general, who, whether competent or not, obviously misunderstood his mission. Thus, whilst the detachment was still disposed as a series of rearguards, the foremost fractions of it stood to fight on the Yalu, against odds of four to one.

[1]Not, as is often assumed, the fortress itself.

Battle of the Yalu.—The Japanese 1st Army was carefully concealed about Wiju until it was ready to strike. Determined that in this first battle against a white nation they would show their mettle, the Japanese lavished both time and forethought on the minutest preparations. Forethought was still busy when, in accordance with instructions from Tokio, Kuroki on April 30 ordered the attack to begin at daybreak on May 1. For several miles above Antung the rivers Yalu and Aiho are parallel and connected by numerous channels. The majority of the islands thus formed were held and had been bridged by the Japanese. The points of passage were commanded by high ground a little farther up where the valleys definitely diverge, and beyond the flank of the ill-concealed positions of the defence. The first task of the right division (12th) was to cross the upper Yalu and seize this. To the Guard and 2nd Divisions was assigned the frontal attack on the Chiuliencheng position, where the Russians had about one-half of their forces under Maj.-Gen. Kashtalinski. On April 30, Inouye's 12th Division accomplished its task of clearing the high ground up to the Aiho. The Russians, though well aware that the force in their front was an army, neither retired nor concentrated. Zasulich's mediaeval generalship had been modified so far that he intended to retreat when he had taught the Japanese a lesson, and therefore Kuropatkin's original arrangements were not sensibly modified. So it came about that the combined attack of the 2nd and Guard Divisions against the front, and Inouye on the left flank and rear, found Kashtalinski without support. After a rather ineffective artillery bombardment the Japanese advanced in full force, without hesitation or finesse, and plunging into the river stormed forward under a heavy fire. A few moments afterwards Zasulich ordered the retreat. But the pressure was far too close now. Broken up by superior numbers the Russian line parted into groups, each of which, after resisting bravely for a time, was driven back. Then the frontal attack stopped and both divisions abandoned themselves to the intoxication of victory. Meanwhile, the right attack (12th Division) encountering no very serious resistance, crossed the Aiho and began to move on the left rear of the Russians. On the side of the defence, each colonel had been left to retire as best he could, and thus certain fractions of the retreating Russians encountered Inouye's advancing troops and were destroyed after a most gallant resistance. The rearguard itself, at Hamatan, was almost entirely sacrificed, owing to the wrong direction taken in retreating by its left flankguard. Fresh attempts were made by subordinates to form rearguards, but Zasulich made no stand even at Fêng-hwang-chêng, and the Japanese occupied that town unopposed on May 5. The Japanese losses were 1,100 out of over 40,000 present, the Russian (chiefly in the retreat) at least 2,500 out of some 7,000 engaged.

The Yalu, like Valmy, was a moment in the world's history. It mattered little that the Russians had escaped or that they had been in inferior numbers. The serious fact was that they had been beaten.

Distribution of Russian Forces.—The general distribution of the Russian forces was now as follows: The main army under Kuropatkin was forming, by successive brigades, in two groups—1st Siberian Corps (Stakelberg), Niu-chwang and Kaiping; 2nd Siberian Corps, Liao-Yang. Zasulich (3rd Corps and various other units) had still 21,000. In the Port Arthur "fortified rayon," under Lieut.-Gen. Stössel (4th Corps), were 27,000 men, and Gen. Linievich around Vladivostok had 23,000. These are, however, paper strengths only, and the actual number for duty cannot have been higher than 110,000 in all. The Trans-Siberian railway was the only line of communication with Europe and western Siberia, and its calculated output of men was 40,000 a month in the summer. In October 1904, therefore, supposing the Japanese to have used part of their forces against Port Arthur, and setting this off against the absence of Linievich and Stössel, Kuropatkin could expect to have a sufficient superiority in numbers to take the offensive. His policy was still, "No battle before we are in superior force."

Landing of Japanese 2nd Army.—For the moment it was equally Japan's interest to mark time in Manchuria. Still intent upon the Russian Port Arthur squadron, she had embarked her

2nd Army (Gen. Oku, 1st, 3rd, 4th and 5th Divisions) during April, and sent it to Chinampo whence, as soon as the ice melted and Kuroki's victory cleared the air, it sailed to the selected landing-place near Pitszewo. Here, under the protection of a continuous chain of war-vessels between the Elliot islands and the mainland, Oku began to disembark on May 5. But the difficulties of the coast were such that it took three weeks to disembark the whole and to extend across the peninsula to Port Adams. Oku then, leaving the 5th Division behind, moved down with the rest towards Kinchow, and after storming that place found himself face to face with a position of enormous strength, Nanshan hill, at the narrowest part of the peninsula, where part of a Russian division (3,000 only out of 12,000 were actually engaged) had fortified itself with extreme care. On May 26 took place the battle of Nanshan. The Japanese attack was convergent, but there was no room for envelopment; the Russian position moreover was "all-round" and presented no flanks, and except for the enfilade fire of the Japanese and Russian gunboats in the shallow bays on either side the battle was locally at every point a frontal attack and defence. The first rush of the assailants carried them up to the wire and other obstacles, but they were for many hours unable to advance a step farther. But the resolute Oku attacked time after time, and at last the 4th Division, on his right, assisted by its gunboats, forced its way into the Russian position. The Russians had just begun to retreat, in accordance with orders from higher authorities. But it was a second undeniable victory. It was, moreover, a preface to those furious assaults on Port Arthur which, because they were the expression of a need that every soldier felt, and not merely of a tactical method, transcend all cool-blooded criticism. The Japanese losses were 4,500 out of 30,000 engaged, or 15%, that of the Russians fully half of the 3,000 engaged. The victors captured many guns, but were too exhausted to pursue the Russians, whose retirement was not made in the best order.

The transports were now conveying the 6th and 11th Divisions to Pitszewo; these were to form the 3rd Army (Nogi) for operations against Port Arthur. Oku exchanged his 1st Division for the 6th. The 2nd Army then turned northward (3rd, 4th, 5th and 6th Divisions). The 10th Division, forming the nucleus of the 4th Army, had begun to land at Takusham on May 19. The 2nd and 4th Armies were the left wing of a widespread converging movement on Liao-Yang. Oku had the greatest distance to march, Kuroki the smallest. The latter therefore had to stand fast in the face of the Russian eastern detachment, which was three days' march at most from Fêng-hwang-chêng and could be supported in three more days by Kuropatkin's main body, whereas the pressure of Oku's advance would not begin to be felt by the Russian southern detachment until the twelfth day at earliest. It was necessary therefore for the first objective to make a slight concession to the second. Oku had to start at the earliest possible moment, even though operations against Port Arthur were thereby delayed for a week or two. In fact, Oku's march began on June 13, Kuroki's on June 24; the moves of the intermediate forces at various dates within this time.

Meanwhile Kuropatkin, assembling the main army week by week, was in a difficult position. His policy of gaining time had received a severe blow in the failure of his executive officer to realize it, and that officer, though his unpursued troops quickly regained their *moral*, had himself completely lost confidence. On the news of the battle (coupled with that of a fresh army appearing on the Korean coast)[1], Kuropatkin instantly sent off part of his embryo central mass to bar the mountain passes of Fenshuiling and Motienling against the imagined relentless pursuit of the victors, and prepared to shift his centre of concentration back to Moukden. The subsidiary protective forces on either flank of Zasulich had promptly abandoned their look-out positions and fallen back to join him. But the commander-in-chief, soon realizing that the Japanese were not pursuing, reasserted himself, sent the protective troops back to their posts, and cancelled all orders for the evacuation of Liao-Yang. From this time forward Kuropatkin allowed his subordinates little or no initiative. A few days later, Zasulich's persistent requests to be allowed to retreat and the still uncertain movements of the 2nd Army induced him once more to prepare a concentration on Moukden. But on May 6 he learned that the Japanese 1st Army had again halted at Fêng-hwang-chêng and that the 2nd Army was disembarking at Pitszewo, and he resumed (though less confidently) his original idea. The eastern protective detachment, now strengthened and placed under the orders of Count Keller, was disposed with a view to countering any advance on Liao-Yang from the east by a combination of manoeuvre and fighting.

[1] This was the 2nd Army, waiting in the port of Chinampo for the moment to sail for Pitszewo.

Alexeiev and Kuropatkin.—It was at this moment of doubt that Alexeiev, leaving Port Arthur just in time and profoundly impressed with the precarious state of affairs in the fleet and the fortress, gave the order, as commander-in-chief by land and sea, for an "active" policy (May 19). Kuropatkin, thus required to abandon his own plan, had only to choose between attacking the 1st Army and turning upon Oku. He did not yield at once; a second letter from the viceroy, the news of Nanshan, and above all a signed order from the tsar himself, "Inform General Kuropatkin that I impose upon him all the responsibility for the fate of Port Arthur," were needed to induce him to execute a scheme which in his heart he knew to be perilous. The path of duty for a general saddled with a plan which he disapproves is not easily discoverable. Napoleon in like case refused, at the risk of enforced resignation, and so did Moreau; the generality of lesser men have obeyed.

Stakelberg's 1st Siberian Corps was therefore reinforced towards the end of May up to a strength of above 35,000. But it remained a detachment only. The Liao-Yang central mass was still held in hand, for the landing of the 4th Army—really only a division at present—at Takushan and the wrong placing of another Japanese division supposed to be with Kuroki (really intended for Nogi) had aroused Kuropatkin's fears for the holding capacity of Keller's detachment. Moreover, disliking the whole enterprise, he was most unwilling to use up his army in it. The Russians, then, at the beginning of June, were divided into three groups, the southern, or offensive group (35,000), in the triangle Neuchwang-Haicheng-Kaiping; the eastern or defensive group (30,000), the main body of it guarding the passes right and left of the Wiju-Liao-Yang road, the left (Cossacks) in the roadless hills of the upper Aiho and Yalu valleys; the right (Mishchenko's Cossacks and infantry supports) guarding Fenshuiling pass and the road from Takushan; the reserve (42,000) with Kuropatkin at Liao-Yang; the "Ussuri Army" about Vladivostok; and Stössel's two divisions in the Kwantung peninsula.

On the other side the 1st Army was at Fêng-hwang-chêng with one brigade detached on the roads on either hand, the left being therefore in front of the Takushan division and facing the Fenshuiling. Oku's 2nd Army (four divisions or 60,000 combatants) was about Port Adams. This last was the objective of the attack of Stakelberg's 35,000. Kuropatkin's orders to his subordinate were a compromise between his own plan and Alexeiev's. Stakelberg was to crush by a rapid and energetic advance the covering forces of the enemy met with, and his object was "the capture of the Nanshan position and thereafter an advance on Port Arthur." Yet another object was given him, to "relieve the pressure on Port Arthur by drawing upon himself the bulk of the enemy's forces," and he was not to allow himself to be drawn into a decisive action against superior numbers. Lastly, on June 7, while Stakelberg was proceeding southward on his ill-defined errand, Kuropatkin, imposed upon by the advance of the Takushan column to Siu-yen, forbade him to concentrate to the front, only removing the veto when he learned that the 4th Army had halted and entrenched at Siu-yen.

Battle of Telissu.—On the 14th, all his arrangements for supply and transport being at last complete, Oku moved north. Although he was still short of part of the 6th Division, he was in superior force. He had, moreover, the perfectly definite purpose of fighting his way north, and at Telissu or Wafangkou on June 14, as he expected, he came upon Stakelberg's detachment in an entrenched position. On the 14th and 15th, attacking sharply on

the Russian front and lapping round both its flanks, Oku won an important and handsome victory, at a cost of 1,200 men out of 35,000 engaged, while the Russians, with a loss of at least 3,600 out of about 25,000 engaged, retired in disorder. Thus swiftly and disastrously ended the southern expedition. Meantime, except for the movement on Siu-yen already mentioned[1], and various reconnaissances in force by Keller's main body and by Rennenkampf's Cossacks farther inland, all was quiet along the Motienling front. Kuroki entrenched himself carefully about Fêng-hwang-chêng, intending, if attacked by the Russian main army, to defend to the last extremity the ground and the prestige gained on May 1.

From this point to the culmination of the advance at Liao-Yang, the situation of the Japanese closely resembles that of the Prussians in 1866. Haicheng represents Münchengrätz, Liao-Yang Gitschin, and the passes east of Liao-Yang Nachod and Trautenau. The concentration of the various Japanese armies on one battlefield was to be made, not along the circumference of the long arc they occupied, but towards the centre. Similarly, Kuropatkin was in the position of Benedek. He possessed the interior lines and the central reserve which enables interior lines to be utilized, and a stroke of good fortune prolonged the period in which he could command the situation, for on June 23 an unexpected sortie of the Russian Port Arthur squadron paralysed the Japanese land offensive. In the squadron were seen the battleships damaged in the February attacks, and the balance of force was now against Togo, who had lost the "Yashima" and the "Hatsuse." The squadron nevertheless, tamely returned to harbour, Togo resumed the blockade and Nogi began his advance from Nanshan, but the 2nd and 4th Armies came to a standstill at once (naval escort for their seaborne supplies being no longer available), and the 1st Army, whose turn to advance had just arrived, only pushed ahead a few miles to cover a larger supply area. On July 1 the Vladivostok squadron appeared in the Tsushima straits, and then vanished to an unknown destination, and whether this intensified the anxiety of the Japanese or not, it is the fact that the 2nd Army halted for 11 days at Kaiping, bringing the next on its right, 4th Army, to a standstill likewise. Its next advance brought it to the fortified position of Tashichiao, where Kuropatkin had, by drawing heavily upon his central reserve and even on the eastern detachment, massed about two army corps.

Tashichiao.—On the 24th Oku attacked, but the Russian general, Zarubayev, handled his troops very skilfully, and the Japanese were repulsed with a loss of 1,200 men. Zarubayev, who had used only about half his forces in the battle, nevertheless retired in the night, fearing to be cut off by a descent of the approaching 4th Army on Haicheng, and well content to have broken the spell of defeat. Oku renewed the attack next day, but found only a rearguard in front of him, and without following up the retiring Russians he again halted for six days before proceeding to Haicheng to effect a junction with the 4th Army (Nozu), which meantime had won a number of minor actions and forced the passage of the mountains at Fenshuiling South[2].

The 1st Army, after its long halt at Fêng-hwang-chêng, which was employed in minutely organizing the supply service—a task of exceptional difficulty in these roadless mountains—reopened the campaign on June 24, but only tentatively on account of the discouraging news from Port Arthur. A tremendous rainstorm imposed further delays, for the coolies and the native transport that had been laboriously collected scattered in all directions. The Motienling pass, however, had been seized without difficulty, and Keller's power of counter-attack had been reduced to nothing by the dispatch of most of his forces to the concentration at Tashichiao. But Oku's 2nd Army was now at a standstill at Kaiping, and until he was further advanced the 1st Army could not press forward. The captured passes were therefore fortified (as Fêng-hwang-chêng had been) for passive resistance. This, and the movements of the 4th Army, which had set its face towards Haicheng and no longer seemed to be part of a threat on Liao-Yang, led to the idea being entertained at Kuropatkin's headquarters that the centre of gravity was shifting to the south. To clear up the situation Keller's force was augmented and ordered to attack Kuroki. It was repulsed with a loss of nearly 1,000 men in the action at the Motienling (July 17), but it was at least ascertained that considerable forces were still on the Japanese right, and upon the arrival of a fresh army corps from Europe, Kuropatkin announced his intention of attacking Kuroki. And in effect he succeeded in concentrating the equivalent of an army corps, in addition to Keller's force, opposite to Kuroki's right. But having secured this advantage he stood still for five days, and Kuroki had ample time to make his arrangements. The Japanese general occupied some 20m. of front in two halves, separated by 6m. of impassable mountain, and knowing well the danger of a "cordon" defensive, he met the crisis in another and a bolder fashion. Calling in the brigade detached to the assistance of Nozu as well as all other available fractions of his scattered army, he himself attacked on July 31 all along the line. It was little more than an assertion of his will to conquer, but it was effectual. On his left wing the attacks of the Guard and 2nd Divisions (action of Yang-tzu-ling) on the Russian front and flank failed—the frontal attack because of the resolute defence, the flank attack from sheer fatigue of the troops. Count Keller was killed in the defence. Meantime on the Japanese right the 12th Division attacked the large bodies of troops that Kuropatkin had massed (Yu-shu-ling) equally in vain. But one marked success was achieved by the Japanese. The Russian 35th and 36th Regiments (10th European Corps) were caught between two advancing columns, and, thanks to the initiative of one of the column leaders, Okasaki, destroyed. At night, discouraged on each wing by the fall of Count Keller and the fate of the 35th and 36th, the whole Russian force retired on Anping, with a loss of 2,400 to the Japanese 1,000 men.

Russian Retirement on Liao-Yang.—This was the only manifestation of the offensive spirit on Kuropatkin's part during the six months of marking time. It was for defence, sometimes partial and elastic, sometimes rigid and "at-all-costs," that he had made his dispositions throughout. His policy now was to retire on Liao-Yang as slowly as possible and to defend himself in a series of concentric prepared positions. In his orders for the battle around his stronghold there is no word of counter-attack, and his central mass, the special weapon of the commander-in-chief, he gave over to Bilderling and to Zarubayev to strengthen the defence in their respective sections or posted for the protection of his line of retreat. Nevertheless he had every intention of delivering a heavy and decisive counterstroke when the right moment should come, and meantime his defensive tactics would certainly have full play on this prearranged battlefield with its elaborate redoubts, bomb-proofs and obstacles, and its garrison of a strength obviously equal (and in reality superior) to that of the assailants. The Japanese, too, had effected their object, and as they converged on their objective the inner flanks of the three armies had connected and the supreme commander Marshal Oyama had taken command of the whole. But instead of boldly pushing out the 1st Army to such a distance that it could manoeuvre, as Moltke did in 1866 and 1870, he attached it to the general line of battle. It was not in two or three powerful groups but in one long chain of seven deployed divisions that the advance was made.

Battle of Liao-Yang.—On Aug. 25 the 2nd and 4th Armies from Haicheng and the 1st Army from the Yin-tsu-ling and Yu-shu-ling began the last stage of their convergent advance. The Russian first position extended in a semicircle from Anshantien (on the Liao-Yang-Hai-cheng railway) into the hills at Anping, and thence to the Taitse river above Liao-Yang; both sides had mixed detachments farther out on the flanks. The first step in the Japanese plan was the advance of Kuroki's army to Anping. Throughout the 25th, night of the 25th-26th, and the 26th of August, Kuroki advanced, fighting heavily all along the line, until on the night of the 26th the defenders gave up the contested ground at Anping. Hitherto there had only been skirmishing on a

[1] The occupation of Siu-yen was chiefly the work of the brigade pushed out to his left by Kuroki. Only a portion of the 16th Division from Takushan helped to drive away Mishchenko's Cossacks.

[2] The 5th Division of the 2nd Army had been sent to join the 10th as the latter approached Hsimucheng. The Guard brigade of Kuroki's army which had served with Nozu in the advance had now returned to Fêng-hwang chêng.

large scale on the side of Hai-cheng. Kuropatkin having already drawn in his line of defence on the south side towards Liao-Yang, the 2nd and 4th Japanese Armies delivered what was practically a blow in the air. But on the 27th there was a marked change in the Japanese plan. The right of the 1st Army, when about to continue the advance west on Liao-Yang, was diverted northward by Oyama's orders and ordered to prepare to cross the Taitszeho. The retirement of the Russian southern force into its entrenchments emboldened the Japanese commander-in-chief to imitate Moltke's method to the full. On the 28th, however, the 1st Army made scarcely any progress. The right (12th) division reached the upper Taitszeho, but the divisions that were to come up on its left were held fast by their opponents. The 29th was an uneventful day, on which both sides prepared for the next phase.

The Russians' semicircle, now contracted, rested on the Taitszeho above and below the town, and their forces were massed most closely on either side of the "Mandarin" road that the 1st Army had followed. Opposite this portion of the line was the Guard and the 4th Army. Oku was astride the railway, Kuroki extending towards his proposed crossing-points just beyond Kuropatkin's extreme left (the latter was behind the river). On the 30th the attack was renewed. The Guard, the 4th Army and the 2nd Army were completely repulsed.

On the night of the 30th the first Japanese troops crossed the Taitszeho near Lien-Tao-Wun, and during the 31st three brigades were deployed north of Kwan-tun, facing west. The Russian left wing observed the movement all day, and within its limited local resources made dispositions to meet it. Kuropatkin's opportunity was now come. The remainder of the Japanese 2nd Division was following the 12th, leaving a nine-mile gap between Kuroki and Nozu, as well as the river. It was not into this gap, but upon the isolated divisions of the 1st Army that the Russian general proposed to launch his counterstroke. Reorganizing his southern defences on a shorter front, so as to regain possession of the reserves he had so liberally given away to his subordinates, he began to collect large bodies of troops opposite Kuroki, while Stakelberg and Zarubayev, before withdrawing silently into the lines or rather the fortress of Liao-Yang, again repulsed Oku's determined attacks on the south side. But it was not in confidence of victory that Kuropatkin began the execution of the new plan—rather as a desperate expedient to avoid being cut off by the 1st Army, whose strength he greatly overestimated

On the morning of Sept. 1—the anniversary of Sedan, as the Japanese officers told their men—Oyama, whose intentions the active Kuroki had somewhat outrun, delivered a last attack with the 2nd and 4th Armies and the Guard on the south front, in the hope of keeping the main body of the Russians occupied and so assisting Kuroki, but the assailants encountered no resistance, Zarubayev having already retired into the fortress. North of the Taitszeho the crisis was approaching. Kuroki's left, near the river, vigorously attacked a hill called Manjuyama which formed part of the line of defence of the 17th Corps from Europe. But the right of the 1st Army (12th Division) was threatened by the gathering storm of the counterstroke from the side of Yentai mines, and had it not been that the resolute Okasaki continued the attack on Manjuyama alone the Japanese offensive would have come to a standstill. Manjuyama, thanks to the courage of the army commander and of a single brigadier, was at last carried after nightfall, and the dislodged Russians made two counter-attacks in the dark before they would acknowledge themselves beaten. Next morning, when Kuroki (who had conceived the mistaken idea of a general retreat of the Russians on Mukden) was preparing to pursue, the storm broke. Kuropatkin had drawn together seven divisions on the left rear of the 17th Corps, the strength of the whole being about 90,000. On the extreme left was Orlov's brigade of all arms at Yentai mines, then came the 1st Siberian Corps (Stakelberg), the 10th Corps, and finally the 17th. But Orlov, perplexed by conflicting instructions and caught in an unfavourable situation by a brigade of the 12th Division which was executing the proposed "pursuit," gave way—part of his force in actual rout—and the cavalry that was with him was driven back by the Kobi (reserve army) brigade of the Guard. The fugitives of Orlov's command disordered the on-coming corps of Stakelberg, and the outer flank of the great counterstroke that was to have rolled up Kuroki's thin line came to an entire standstill. Meantime the 10th Corps furiously attacked Okasaki on the Manjuyama, and though its first assault drove in a portion of Okasaki's line, a second and a third, made in the night, failed to shake the constancy of the 15th Brigade Misunderstandings and movements at cross-purposes multiplied on the Russian side, and at midnight Kuropatkin at last obtained information of events on the side of Yentai mines. This was to the effect that Orlov was routed, Stakelberg's command much shaken, and at the same time Zarubayev in Liao-Yang, upon whom Oku and Nozu had pressed a last furious attack, reported that he had only a handful of troops still in reserve. Then Kuropatkin's resolution collapsed, although about three divisions were still intact, and he gave the order to retreat on Mukden.

Russian Retreat on Mukden.—Thus the Japanese had won their great victory with inferior forces, thanks "in the first instance to the defeat of Gen. Orlov. But at least as large a share in the ruin of the Russian operations must be attributed to the steadfast gallantry of the 15th Brigade on Manjuyama." The losses of the Japanese totalled 23,000, those of the Russians 19,000. Coming, as it did, at a moment when the first attacks on Port Arthur had been repulsed with heavy losses, this successful climax of the four months' campaign more than restored the balance. But it was not the expected Sedan. Had the two divisions still kept in Japan been present Kuroki would have had the balance of force on his side, the Russian retreat would have been confused, if not actually a rout, and the war might have been ended on Japan's own terms. As it was, Kuropatkin drew off the whole of his forces in safety, sharply repulsing an attempt at pursuit made by part of the 12th Division on Sept. 4. The railway still delivered 30,000 men a month at Mukden, and Japan had for a time outrun her resources. At St. Petersburg the talk was not of peace but of victory, and after a period of reorganization the Russians advanced afresh to a new trial of strength. But the remainder of the Manchurian campaign proved little more than a series of violent and resultless encounters of huge armies—armies far larger than those which had fought out the real struggle for supremacy at Liao-Yang.

Naval Actions.—At this time the siege of Port Arthur had progressed only so far that the besiegers were able to realize the difficulties before them. Their exertions and sacrifices were not crowned with success until the year had run its full course, and meantime the repeated frustration of their hopes had a moral reaction on the main struggle in Manchuria, apart from keeping one of their armies away from the decisive theatre. At sea, however, the Japanese navy scored two important successes. After months of blockade and minor fighting, the Russian Port Arthur squadron had been brought to action on Aug. 10. Admiral Vitheft, Makárov's successor, had put to sea shortly after the appearance of the 3rd Army on the land front of Port Arthur. The battle opened about noon, 20m. south of the harbour; the forces engaged on each side varied somewhat, but Togo finally had a superiority. As the Russians became gradually weaker, the Japanese closed in to within 3m. range, and Prince Ukhtomsky (who succeeded to the command on Vitheft being killed) gave up the struggle at nightfall. The Russians scattered, some vessels heading southward, the majority with the admiral making for Port Arthur, whence they did not again emerge. All the rest were either forced into neutral ports (where they were interned) or destroyed, among the latter being the third-class cruiser "Novik," which had already earned a brilliant reputation for daring, and now steamed half round Japan before she was brought to action and run ashore. The victors blockaded Port Arthur, until near the close of the siege when, after going ashore and examining the remnant of the Russian fleet from 203-Metre hill, Togo concluded that it would be safe to return to Japan and give his ships a complete refit. Kaimura's squadrons, after various adventures, at last succeeded on Aug. 14 in engaging and defeating the Russian Vladivostok squadron (Admiral Jessen). Thus the Russian flag disappeared from the Pacific, and thenceforward only the Baltic

fleet could hope seriously to challenge the supremacy of the Japanese navy.

The remainder of the war on land, although it included two battles on a large scale and numerous minor operations, was principally a test of endurance. After Liao-Yang there were no widely extended operations, the area of conflict being confined to the plain of the coast side of the Hun-ho and the fringe of the mountains. Japan had partially accomplished her task, but had employed all her trained men in this partial accomplishment. It was questionable, even in Oct. 1904, whether she could endure the drain of men and money if it were prolonged much further. On the other hand, in Russia opposition to the war, which had never been popular, gradually became the central feature of a widespread movement against irresponsible government. Thus, while the armies in Manchuria faced one another with every appearance of confidence, behind them the situation was exceedingly grave for both parties. A state of equilibrium was established, only momentarily disturbed by Kuropatkin's offensive on the Sha-ho in October, and by the Sandepu incident in the winter, until at last Oyama fought a battle on a grand scale and won it. Even then, however, the results fell far short of anticipation, and the armies settled down into equilibrium again.

Battle of the Sha-ho.—After the battle of Liao-Yang Kuropatkin reverted for a moment to the plan of a concentration to the rear at Tieling. Politically, however, it was important to hold Mukden, the Manchurian capital, and as the Japanese, as on previous occasions, reorganized instead of pursuing, he decided to stand his ground, a resolution which had an excellent effect on his army. Moreover, growing in strength day by day, and aware that the Japanese had outrun their powers, he resolved, in spite of the despondency of many of his senior officers, to take the offensive. He disposed of about 200,000 men, the Japanese had about 170,000. The latter lay entrenched north of Liao-Yang, from a point 9m. west of the railway, through Yentai station and Yentai mines, to the hills farther east. There had been a good deal of rain, and the ground was heavy. Kuropatkin's intention was to work round the Japanese right on the hills with his eastern wing (Stakelberg), to move his western wing (Bilderling) slowly southwards, entrenching each strip of ground gained, and finally with the centre—*i.e.*, Bilderling's left— and Stakelberg, to envelop and crush the 1st Army, which formed the Japanese right, keeping the 4th Army (Nozu) and the 2nd Army (Oku) fixed by means of Bilderling's main body. The manoeuvre began on Oct. 5, and by the evening of the 10th, after four days of advanced-guard fighting, Stakelberg was in his assigned position in the mountainous country, facing west towards Liao-Yang, with his left on the Taitszeho. The advance of Bilderling, however, necessarily methodical and slow in any case, had taken more time than was anticipated. Still, Bilderling crossed the Sha-ho and made some progress towards Yentai, and the demonstration was so far effectual that Kuroki's warnings were almost disregarded by the Japanese headquarters. The commander of the 1st Army, however, took his measures well, and Stakelberg found the greatest trouble in deploying his forces for action in this difficult country. Oyama became convinced of the truth on the 9th and 10th, and prepared a great counterattack. Kuroki, with only a portion of the 1st Army, was left to defend at least 15m. of front, and the entire 2nd and 4th Armies and the general reserves were to be thrown upon Bilderling. On the 11th the real battle opened. Kuroki displayed the greatest skill, but he was of course pressed back by the four-to-one superiority of the Russians. Still the result of Stakelberg's attack, for which he was unable to deploy his whole force, was disappointing, but the main Japanese attack on Bilderling was not much more satisfactory, for the Russians had entrenched every step of their previous advance and fought splendidly. The Russian commander-in-chief states in his work on the war that Bilderling became engaged *à fond* instead of gradually withdrawing as Kuropatkin intended, and at any rate it is unquestioned that in consequence of the serious position of affairs on the western wing, not only did Stakelberg use his reserves to support Bilderling, when the 12th Division of Kuroki's army was almost at its last gasp and must have yielded to fresh pressure, but Kuropatkin himself suspended the general offensive on Oct. 13. In the fighting of Oct. 13–16 the Russians gradually gave back as far as the line of Sha-ho, the Japanese following until the armies faced roughly north and south on parallel fronts. The fighting, irregular but severe, continued. Kuropatkin was so far averse to retreat that he ordered a new offensive, which had fair success on the 16th–17th. Kuropatkin wished to continue the offensive, but his corps commanders offered so much opposition to a further offensive that he at last gave up the idea. The positions of the rival armies from Oct. 18, the close of the battle of the Sha-ho, to Jan. 26, 1905, the opening of the battle of Sandepu (Heikoutai)—a period almost entirely devoid of incident—may be described by the old-fashioned term "winter quarters."

In Jan. 1905 the Russians, 300,000 strong, were now organized in three armies, commanded by Generals Linievich, Grippenberg and Kaulbars; the total strength of the Japanese 1st, 2nd and 4th Armies and reserve was estimated by the Russians at 220,000. Towards the end of January Kuropatkin took the offensive. He wished to inflict a severe blow before the enemy could be reinforced by the late besiegers of Port Arthur, and sent Grippenberg with seven divisions against Oku's two on the Japanese left. The battle of Sandepu (Heikoutai), fought in a terrible snowstorm on Jan. 26 and 27, 1905, came near to being a great Russian victory. But after two days' severe fighting, although Grippenberg had not been checked, Kuropatkin, in face of a counterattack by Oyama, decided to abandon the attempt.

Battle of Mukden.—Both sides stood fast in the old positions up to the verge of the last and greatest battle. Kuropatkin was reinforced, and appointed Kaulbars to succeed Grippenberg and Bilderling to the command of the 3rd Army vacated by Kaulbars. On the other hand, Nogi's 3rd Army, released by the fall of Port Arthur, was brought up on the Japanese left, and a new army under Kawamura (5th), formed of one of the Port Arthur and two reserve divisions, was working from the upper Yalu through the mountains towards the Russian left rear. The Russian line covering Mukden was 47m. long, the armies from right to left being 2nd (Kaulbars), 3rd (Bilderling) and 1st (Linievich); a general reserve was at Mukden. On the other side from left to right, on a line 40m. long, were Oku (2nd Army), Nozu (4th), Kuroki (1st) and Kawamura (5th), the general reserve in rear of the centre at Yentai and the 3rd Army in rear of Oku. Each side had about 310,000 men present. The entire front of both armies was heavily entrenched. The Russians had another offensive in contemplation when the Japanese forestalled them by advancing on Feb. 21. The 5th Army gradually drove in Kuropatkin's small detachments in the mountains, and came up in line with Kuroki, threatening to envelop the Russian left. The events on this side and misleading information induced Kuropatkin to pay particular attention to his left. The Japanese 1st and 5th Armies were now engaged (Feb. 25), and elsewhere all was quiet. But on the 27th the fighting spread to the centre, and Nogi (originally behind Oku) was on the march to envelop the Russian right. He was held under observation throughout by Russian cavalry, but it seems that little attention was paid to their reports by Kuropatkin, who was still occupied with Kuroki and Kawamura, and even denuded his right of its reserves to reinforce his left. With a battle-front exceeding two days' marches the wrong distribution of reserves by both sides was a grave misfortune. Kuropatkin was at last convinced, on Feb. 28, of the danger from the west, and did all in his power to form a solid line of defence on the west side of Mukden. Nogi's first attack (March 1–2) had not much success, and a heavy counterstroke was delivered on the 2nd. Fighting for localities and alterations in the interior distribution of the opposing forces occupied much time, and by the 3rd, though the battle had become severe, Kuropatkin had merely drawn in his right and right centre (now facing west and south-west respectively) a little nearer Mukden. His centre on the Sha-ho held firm, Kuroki and Kawamura made but slight progress against his left in the mountains. Nogi and Oyama were equally impressed with the strength of the new (west) Russian front, and, like Grant at Petersburg in 1864,

extended farther and farther to the outer flank, the Russians following suit. The Japanese marshal now sent up his army reserve, which had been kept far to the rear at Yentai, to help Nogi. It was not before the evening of March 6 that it came up with the 3rd Army and was placed in position opposite the centre of the Russian west front. On the rest of the line severe local fighting had continued, but the Russian positions were quite unshaken and Kuropatkin's reserves—which would have been invaluable in backing up the counter-attack of March 2—had belatedly returned to face Nogi. He had organized another counterstroke for the 6th, to be led by Kaulbars, but this collapsed unexpectedly after a brief but severe fight.

Russian Retreat on Tieling.—Kuropatkin now decided to draw in his centre and left towards Mukden. On the 7th, the various columns executed their movement to the Hun-ho with complete success, thanks to good staff work. The Japanese followed up only slowly. Nogi and Kaulbars stood fast, facing each other on the west front; after the arrival of the general reserve, Nogi was able to prolong his line to the north and eventually to bend it inwards towards the Russian line of retreat. On the 8th the fighting between Nogi and Kaulbars was very severe, and Kuropatkin now made up his mind to retreat towards Tieling. On the 9th, by Oyama's orders, Nogi extended northward instead of further swinging in south-eastward, Oku now occupied all the original line of the 3rd Army, Nozu alone was left on the south front, and Kuroki and Kawamura began to engage Linievich seriously. But Nogi had not yet reached the Mukden-Tieling railway when, on the night of the 9th, every preparation having been made, Kuropatkin's retreat began. On the 10th, covered by Kaulbars, who held off Nogi, and by strong rearguards at and east of Mukden, the movement continued, and though confusion was prevalent and the rearguards suffered very heavily, the Russians managed to draw off in safety to the northward. On the evening of the 10th, after all their long and hardly contested enveloping marches, Nogi's left and Kawamura's right met north of Mukden. The circle was complete, but there were no Russians in the centre, and a map of the positions of the Japanese on the evening of the 10th shows the 17 divisions thoroughly mixed up and pointing in every direction but that of the enemy. Thus the further pursuit of the Russians could be undertaken only after an interval of reorganization by the northernmost troops of the 5th and 3rd Armies. But the material loss inflicted on the Russians was far heavier than it had ever been before. It is generally estimated that the Russian losses were no less than 97,000, and the Japanese between 40,000 and 50,000. Japan had had to put forth her supreme effort for the battle, while of Russia's whole strength not one-tenth had been used. But Russia's strength in Europe, with but one line whereby it could be brought to bear in the Far East, was immaterial, and on the theatre of war a quarter of the Russian field forces had been killed, wounded or taken.

Rozhestvenski's Voyage.—It remains to narrate briefly the tragic career of the Russian Baltic fleet. Leaving Libau on Oct. 13–15, 1904, the fleet steamed down the North sea, expecting every night to be attacked by torpedo-boats. On the 21st, in their excitement, they opened fire on a fleet of British trawlers on the Dogger Bank (*q.v.*), and several fishermen were killed. This incident provoked the wildest indignation, and threatened for some days to bring Russia into conflict with England. A British fleet "shadowed" Rozhestvenski for some time, but eventually the Russians were allowed to proceed. On reaching Madagascar, Rozhestvenski heard of the fall of Port Arthur, and the question of returning to Russia arose. But a reinforcement under Rear-Admiral Nebogatov was despatched from the Baltic via Suez early in March 1905, and the armada proceeded by the Straits of Malacca, Nebogatov joining at Kamranh bay in Cochin China. The united fleet was formidable rather in number than in quality; the battleships were of very unequal value, and the faster vessels were tied to the movements of many "lame ducks." Rozhestvenski had, moreover, numerous store-ships, colliers, etc. Nevertheless, the Japanese viewed his approach with considerable anxiety, and braced themselves for a final struggle. Of the various courses open to him, Togo prudently chose that of awaiting Rozhestvenski in home waters. The Russians left Kamranh on May 14, and for a time disappeared into the Pacific. It was assumed that they were making for Vladivostok either via Tsushima strait or by the Pacific. Rozhestvenski chose the former course, and on May 27 the fleets met near Tsushima. By superior speed and handling the Japanese gained an increasing advantage, and by the following day the whole Russian fleet, with few exceptions, had been captured or sunk. (*See* TSUSHIMA for battle.)

The Peace of Portsmouth.—After the disasters of Mukden and Tsushima, and being threatened with internal disorder in European Russia, the tsar, early in June, accepted the mediation of the president of the United States, and *pourparlers* were set on foot. The war, meanwhile, drifted on through May, June and July. Linievich, who succeeded Kuropatkin shortly after the battle of Mukden, retired slowly northward, reorganizing his forces and receiving fresh reinforcements from Europe. A Japanese expedition occupied Saghalien (July 8–30), and another, under General Hasegawa, advanced through Korea towards Vladivostok. But the fighting was desultory. The peace negotiations were opened at Portsmouth (N.H.), on Aug. 9, and by the end of the month the belligerents had agreed as to the main points at issue—that Russia should cede the half of Saghalien, annexed in 1875, surrender her lease of the Kwangtung peninsula and Port Arthur, evacuate Manchuria, and recognize Japan's sphere of influence in Korea. The treaty of peace was signed on Aug. 23, 1905.

BIBLIOGRAPHY.—Among the first-hand narratives the most important are: Ian Hamilton, *A Staff Officer's Scrap Book;* and the *British Officers' Reports,* War Office, 1908. Also *Reports of Military Observers,* General Staff U.S.A.; Major v. Tettau's *18 Monate beim Heere Russlands;* von Schwarz, *Zehn Monate beim Heere Kuropatkins,* and Kuropatkin's own work (part of which has been translated into English). Of detailed military histories the principal are the semi-official series of narratives and monographs produced by the Austrian military journal "Streffleur" (*Einzelschriften über den russ.-japanischen Krieg*); the volumes of lectures delivered at the Russian staff college after the war, French translation (*Conférences sur la guerre russo-japonaise faites à l'Académie Nicolas*); British official *History of the Russo-Japanese War;* German official *Russisch-japanischer Krieg* (Eng. trans. by K. von Donat); Löffler, *Der russisch-japanische Krieg* (Leipzig, 1907; French trans.); L. Gianni Trapani, *La Guerra russo-giapponese* (1908); E. Bujac, *La Guerre russo-japonaise* (1909). Of critical studies one of the most important is Culmann, *Étude sur les caractères généraux de la guerre en extrême-orient* (1909). One naval narrative of absorbing interest has appeared, Semenov's *Rasplata* (Eng. trans.).

RUSSO-POLISH CAMPAIGN. This campaign, of 1920, which resulted in the defeat and rout of the Soviet Army when it was within sight of the Polish capital, is full of dramatic incident. Organization of command, staff and administration was lacking on both sides, but above all it was the want of a proper system of supply which accounted for the sudden collapse of troops engaged in a victorious advance. The thinly populated territory lying between the Niemen in the north and the Dniester in the south was incapable of supporting large bodies of troops, and as both sides attempted to live on the country during their advances the failure of their operations followed quickly each success.

Cause of the War.—During the course of 1919 and early 1920, the Soviet Government had succeeded in clearing their territory of the White Russian armies under Kolchak, Denikin and Yudenich. They were thus at liberty to examine the situation on their frontiers. With such a mixture of races living side by side in the disputed regions no delimitation of frontier would have suited all parties, and in the absence of authority to enforce a decision, trouble quickly arose between the Soviet and the newly formed Polish State. Poland was determined to maintain her new liberty and had called up fresh levies to support the various legions which had been repatriated from the fronts upon which they had been fighting in the World War. The Soviet began to concentrate their troops towards the west. Inflammatory speeches in Moscow and a fierce propaganda amongst the Polish working people brought Polish public opinion to a fever heat. From seven divisions in January the Soviet had, by March, increased the number of their

troops facing the Poles to 20 divisions, with three cavalry divisions. Poland decided that she could not wait quietly for the inevitable Soviet attack by which she would certainly be destroyed, and that she must act at once.

Polish Offensive.—Strategically, the territory in dispute may be divided into two separate areas: White Russia in the north and Volhynia and Podolia in the south. The marshes of the Pripet divide one area from the other. Acting in collusion with Petlura, the Hetman of the Ukraine, who had promised to raise his country against the Soviet, the Poles advanced in April as far as Kiev. By the beginning of May the Polish-Soviet front ran from Dvinsk in the north along the course of the Dnieper to Kiev and thence to the Dniester near Kamenets. No sooner were the Poles established in Kiev than the Soviet northern army began to advance. The Poles were able to transfer troops from the south and counter-attacked the Soviet forces which had already penetrated as far west as Lida and Baranoicze. By the end of May the line held at the beginning of the month had been restored. Operations had been most ably carried out by the Polish minister of war, Gen. Sosnkowski, but there were indications that the Soviet were transferring more and more troops to the west and that a renewal of their attacks might be expected.

At the beginning of June, in the southern area there appeared a new Soviet cavalry leader, Budenny, who completely altered the situation. Budenny had been a non-commissioned officer in the old Russian Army and soon proved himself a man of action. Within a month he had driven back the Poles a distance of 200m. until their line in the south ran just east of Pinsk and Równe (Rovno) to the junction of the Dniester and Siret (Sereth).

Russian Success.—Fighting in the northern area continued intermittently during the month of June, preventing the Poles from transferring troops to the hard-pressed south. Despite the operations in the south it was clear that the main Soviet attack was coming in the north. On July 4 the blow fell. The whole Polish line gave way. Wilno (Vilna) and Minsk were lost in the first week. Grodno fell on July 20 and Bialystok on July 25. By the end of July the Soviet advance guards had reached the Bug. In 25 days the Poles had lost 300m. of territory. The main cause of the collapse was their failure to constitute reserves. In their desire to protect their new territory they had been led into a linear defence on a front of nearly 800m., where they were strong nowhere.

Disposition of Troops.—The Polish situation was now critical. With the help of the French military mission, under Gen. Weygand, a plan for a great counter-attack was evolved on Aug. 6. The situation of the opposing sides on that date was as follows:—

Soviet: (1) Northern group. Four armies—4th, 15th, 3rd and 16th, with a cavalry corps on the extreme north aiming to outflank the Polish left.

(2) Southern group. Two armies—12th and 14th with Budenny's cavalry, along a line from Kowel through Brody to Tarnupol. The men of the Soviet army were unfed and worn out with a month's marching.

Poles: (1) A Northern group formed of units which had been retreating for over a month, strengthened by reinforcements thrown in hastily as they came up. Much material had been lost and the men were tired and hungry, but the approach to the line of the Vistula was beginning to simplify the supply of food and munitions.

(2) Southern group. Three armies—6th, 3rd and 4th—facing the Soviet southern group. Here pressure from the enemy had been by no means so severe as in the north and many of the divisions still retained their original fighting value.

Polish Plan of Attack.—The Polish plan was to withdraw all but a minimum of force from the southern area and to attack the Soviet northern group with the greatest possible strength. The operation bears a close resemblance to Ludendorff's manoeuvre at Tannenberg. In many respects the situation was similar. The Russians were advancing in two main groups divided by the Pripet marshes instead of the Masurian lakes. Here the Soviet southern group was advancing slowly like Rennenkampf's army in 1914. The situation would become critical as soon as the two Soviet groups converged upon the Polish Army. No time was to be lost. Would the commander of the Soviet armies in the south allow himself to be deceived in the same manner as Rennenkampf?

On August 6 orders for the following fresh groupings were issued from Polish headquarters:—

(1) Three armies—2nd, 1st and 5th—under Gen. Joseph Haller, were to withdraw slowly to the line of the Vistula from Dęblin to Modlin, with the 5th Army pushed well forward on the left to prevent any outflanking of the Polish left between Warsaw and the East Prussian frontier.

(2) Two armies, 3rd and 4th—were to concentrate behind the Wieprz between Chelm and Dęblin, ready to strike due north; the advance of these two armies to commence on Aug. 16.

(3) One army, 6th—would withdraw as necessity arose in the direction of Lemberg, tempting the Soviet southern group away from the critical point in the north.

By Aug. 12 all the armies, with the exception of the two on each flank, had reached their assigned positions without incident. In the south the 3rd had found the 12th Soviet army advancing and had been forced to throw out a detachment on its right flank to cover its concentration. It had been delayed in consequence. In the north, the 5th had been driven back by overwhelming strength and had been unable to prevent the enemy outflanking movement.

Enthusiasm in the Polish army had risen surprisingly in the days since the momentous decision to attack had been taken. The chief of the Polish State, Marshal Pilsudski, had himself taken command of the 3rd and 4th Armies. With the help of Weygand and his staff the service of supply had been restored. New bodies of reinforcements were moved forward from the depôts in Western Poland and the depleted units began to raise their heads again. National optimism returned. The enemy in the south made no determined move and appeared to have no inkling of what was afoot. Every hour that he delayed meant more chance of success for the Polish plan.

Polish Advance.—Gen. Sikorski's 5th Army in the north was the first to move. The Soviet movement round his left had assumed alarming proportions and had to be stopped. On Aug. 14 he pressed forward from his defensive position at Modlin and at once encountered the Soviet 15th Army advancing to the attack. Sikorski persisted in his attacks all through Aug. 15 and 16, his men fighting with determination. Not even the appearance of elements of the Soviet 4th Army in his left rear turned him from his purpose. Throwing out covering detachments to watch his rear, he attacked again on Aug. 17. His determination reaped its reward, for the enemy gave way in front of him, their retreat rapidly developing into a rout.

In the south Pilsudski's armies made good progress. The blow against the left of the Soviet 16th Army came as a complete surprise and they offered little resistance. During Aug. 16 and 17 the Poles covered over 50 miles. By Aug. 18 the 3rd Soviet Army, which lay between the 15th destroyed by Sikorski, and the 16th broken by Pilsudski, turned also in hopeless confusion.

On the extreme Soviet right their 4th Army, containing some of the picked Communist regiments, together with the cavalry corps, had reached the Vistula between Torun and Plock in their great turning movement when Sikorski suddenly advanced. Had they advanced resolutely even then, all might have been well, but they hesitated and were lost. Their half-hearted attacks against Sikorski's left had little effect. It was not till Aug. 20 that the order for a general retreat reached them. On Aug. 22, at Mława, and Aug. 23 at Chorzele they were successful in cutting themselves a passage, but on Aug. 24 at Kovno they ran up against Pilsudski's 4th Army blocking the way. Almost without making an effort to attack they passed ignominiously over the East Prussian border to internment.

The pace of the Polish pursuit was remarkable. From Aug. 16 to Aug. 25 the advanced units of the 2nd army had covered 200m. as the crow flies. The 4th Army averaged 25m. a day in their advance. The service of supply was left far behind. The troops existed as they could upon the exhausted country. Luckily

the Soviet resistance was so completely broken that there was no further fear of counter-attack and the Polish units had ample time in which to reorganize.

Conclusion.—The results of the battle of Warsaw, as it has been named, are only exceeded by those of Tannenberg. The Poles captured 70,000 prisoners, 200 guns and 1,000 machine-guns. From 50,000 to 100,000 Soviet troops passed over into East Prussia. The victory of the Poles was due to the adoption of a determined offensive based upon a sound plan. The raising of the *morale* of the beaten troops by the Polish authorities, roused to enthusiasm themselves by the inspiring presence of Gen. Weygand, is little short of miraculous. The crisis of the battle was undoubtedly Aug. 15–16, when Sikorski's 5th army cleared its front. If it was Pilsudski's force which completed the Soviet defeat, it was undoubtedly the magnificent fighting of Sikorski and his men which made victory possible.

BIBLIOGRAPHY.—H. Fenner, *Die Rote Armee, 1920* (1920); S. Szpotsanski, *La Pologne nouvelle et Pilsudski* (1920); M. Pernot, *L'épreuve de la Pologne* (1921). (W. E. I.)

RUSSO-TURKISH WARS. The Greek insurrection in 1824 gave England, France and Russia occasion to press demands upon Turkey, which the Porte refused to accede to, rejecting besides the London Protocol of July 1827. Hostilities broke out in Oct. 1827, when the allied fleet under Admiral Codrington defeated the Turkish flotilla off Navarino. This victory greatly facilitated the eventual Russian operations against Turkey as the Russian army supported and provisioned by her own fleet could march along the coast by the shortest road to Adrianople and thence towards the Turkish capital.

Towards the end of April 1828 the Russian army consisting of three army corps stood between the Pruth-Dniester 69,000 strong, war having been formally declared on April 28. Turkey, whose army was being reorganized at the time, decided to resist the enemy in the quadrilateral, Ruschuk, Silistria, Varna and Shumla, for which purpose she assembled about 80,000 men. One corps of the invading army invested Braila, which was captured on June 17; another Russian corps crossed at the mouth of the Danube on June 11, while a third drove back the garrisons of Ruschuk and Widdin into these fortresses from which they had emerged. The first two Russian corps now advanced on Shumen but finding the Turks to be stronger than they supposed, they fell back on Yenibazar. A Russian force was thrown forward towards Varna but only on the arrival of the Russian guard corps could the idea be entertained of investing it. The siege began on Sept. 10 and a month later Varna surrendered. The Russians owing to numerical weakness retired into winter quarters in Moldavia and Wallachia, leaving two corps in the vicinity of Varna, Pravodi and Bazardjik. The fortress of Silistria was still in Turkish hands and it now became on the resumption of hostilities the principal Russian objective. Sizopol at the entrance to the harbour of Burgas was captured providing the Russians with a base for their operations south of the Danube. Silistria being invested fell on June 29. Meanwhile Reschid Pasha advanced from Shumla against Pravodi hoping to recapture Varna but was beaten off. General Diebitch, who had replaced Wittgenstein as Russian commander-in-chief, defeated Reschid Pasha at Tchervna on June 11. Diebitch now decided to advance south of the Balkans. Reschid attempted to hinder his march but was vanquished at Sliven on Aug. 12. Adrianople was entered Aug. 20, but as Diebitch had only 15,000 men and pestilence was ravaging his ranks he deemed it wiser to conclude a treaty in September before Turkey became aware of the state of his army. Success crowned the Russian arms in Asia, Paskevitch gaining two important victories on June 1 and 2 at Erivan, his advance coming to a close by terms of the treaty arranged in Europe. A conference held in London proclaimed the independence of Greece, Russia receiving the islands at the mouth of the Danube, while Moldavia and Wallachia were to be no longer provinces of Turkey, but only under her protectorate.

The War of 1877–78.—The oppression of the Christian subjects of the Sultan had made hostilities in 1877 between Turkey and Russia inevitable. After the Crimean War Turkey promised to grant reforms, thereby bettering the treatment of the Christian population, but the following years brought no material change. In 1875 an insurrection broke out in Hercegovina and Montenegro, to be followed by Serbia openly taking up arms against Turkey. Russia, whose sympathies by reason of race and religion, were wholly on the side of the Slavs, could not remain a silent onlooker of the events in the Balkans. Russian volunteers flocked in great numbers to join the Serbians and General Chernyaeff was entrusted with their command. Disparity of numbers however, went against the Serbians, the Turks gaining several successes, which culminated in their victory at Djunis on Oct. 29, 1876. Alexander II. then stepped forward and insisted on hostilities ceasing, to which Turkey hurriedly assented. A conference now assembled at Constantinople, but after months of deliberation, it failed to come to an agreement, Turkey taking advantage of the divergent views of the Great Powers. She became as time progressed less willing to make concessions. To prepare for all eventualities and to bring greater weight to her influence at the conference Russia mobilized six army corps in Nov. They consisted of the VII., VIII., IX., X., XI. and XII., corps and were concentrated on the southern frontier, on the Rumanian borders. Mobilization arrangements were not worked effectively nor the deployment of the forces. It must be borne in mind that conscription had been only enforced in Jan. 1874 and there was consequently a lack of well trained officers and reserves. Another great obstacle that hindered Russia from dealing a quick blow at Turkey was the lack of a fleet in the Black sea, though this restriction was removed in 1871. Knowing the unprepared state of the forces several experts, among them General Todleben, the world famous defender of Sevastopol in the Crimean War (*q.v.*), were opposed to Russia undertaking an active campaign, but the Pan-Slav movement which was general in Russia, forced the Tsar to declare war April 24. Having underrated her foe Russia began hostilities with insufficient forces, sending 257,000 men into Rumania and 70,000 each to the Caucasus and to the Austrian frontier. The Grand Duke Nicholas, the Tsar's brother, was in command of the forces and orders were instantly given to cross the Rumanian frontier; this state having proclaimed her independence of Turkey afforded every facility to the Russians to move their army to the Danube. Early in June the Russian army was assembled around Bucharest; it consisted of the VIII., IX. and XII. corps, with detachments thrown forward to the Danube. The XI. corps was guarding the region from the river Argis to the river Yalomniza, further east towards the Pruth stood the XIV. corps while the XIII. was expected by the middle of June and the IV. a month later. The Russian army was armed indifferently and tactically was ill trained, which was due to the men being unused to handling their new weapons. The Russian forces in the middle of June which intended crossing the Danube numbered 257,000 men, but one must deduct those guarding the railway line through Rumania.

The Turks numbered 135,000 men north of the Balkans who were distributed in the following manner: 80,000 in the quadrilateral, 23,000 around Vidin, 10,000 in Nicopol, 8,000 in Dobrudja, 3,000 in Tirnovo, 4,000 in Sistovo, 2,000 at Lom Palanka and 5,000 at Rahoff. Forty thousand men were grouped around Adrianople and Constantinople and some 80,000 in Bosnia, Montenegro and Epirus. The Turks besides disposed of another 120,000 men in Asia Minor.

Political and military reasons forced Turkey to remain on the defensive while Russia was bent on the swiftest possible offensive—bordering on rashness. Rumania having allowed the Russians to traverse her territory greatly aided their initial concentration towards the Danube. She was even prepared in the middle of June to join the Russians against the Turks with her force of 32,000 infantry and 5,000 cavalry, but the Russians, feeling certain of an easy victory, declined her proffered help. Two months later they were only too glad to avail themselves of this assistance which would have been of inestimable value in their first operations south of the Danube. To cross this river was their primary object, but this was impeded by the Turkish flotilla which patrolled the Danube and prevented them bridging

it. The Russians by means of steam launches, batteries, mines and torpedoes drove the Turkish ironclads into Sulina harbour, one being destroyed, while the smaller vessels were obliged to seek refuge in Silistria and Ruschuk. Mines were laid across the Danube, bridging now being made possible. Hearing of the hostile approach, Abdul Kerim, the Turkish leader, decided not to make a resolute defence against the enemy crossing the Danube, but to attack him, when advancing to besiege Ruschuk and Shumla. The distribution of the Turkish troops remained little changed by the middle of June; the detachments guarding the Danube were generally too weak to offer any serious resistance to the invader.

The Russians began crossing the river in boats at Zimniza early on June 23 and the following day the VIII. corps was across, standing on the southern bank of the Danube. The same day a bridge 1,300 yards long was begun to be constructed at Nicopol, which was ready by July 1, a second one being ready by Aug. 1. The other Russian corps, the XII. and XIII., commanded by the Tsarevitch, having crossed the Danube moved to the Lom and Yantra facing Ruschuk with the object of laying siege to it while the IX. corps made for Nicopol. Gourko's advance guard entered Tirnova July 7, the VIII. corps following it five days later. The Grand Duke Nicholas wished to cross the Balkans with two corps while guarding his right flank with the IX. corps, and watching Ruschuk fortress with the XII. and XIII. corps, but Alexander II. would not sanction this, rightly considering this plan too risky. Gourko left Tirnova July 12 hearing the Shipka Pass was defended by only 3,000 men. He made for the Hainkioi Pass intending to turn the Shipka Pass (*q.v.*), while a Russian detachment attacked the Pass from the north. Gourko having been delayed 24 hours, was repulsed by the Turks when attacking the Pass; the same fate befell the Russians advancing north of Shipka. Nevertheless next day Gourko again pressed forward, when the Turks offered to negotiate terms of capitulation. While they were being drawn up the Turks evacuated all their positions and retreated to Philipopolis. Gourko's capture of Shipka gave the advantage to the Russians for a short time only, though he hastened to put it in a state of defence and it remained in their hands up to the end of the war. Alarmed by the incursion of the Russians, the Turks recalled Suleiman Pasha from Montenegro with his army 30,000 strong and having transported it by sea to the mouth of Maritza pushed it forward without delay on July 23 between Hermanli and Karabunar. After several engagements against greatly superior forces Gourko received orders Aug. 5 from the Headquarters to return north of the Balkans. The passes being deemed of great importance the Russians decided to defend them with the 9th Division, 4th Rifle Brigade and a Bulgarian contingent.

Meanwhile Nicopol fell July 17, the IX. corps capturing 8,000 men and it now received orders to advance to Plevna. General Krudener, its commander, detached one division under Schilder-Schuldner, which without any preliminary reconnaissance attacked the Turks July 20, only to be thrown back with heavy losses by Osman Pasha's much superior force, which had marched from Vidin unperceived by the Russians. Though the Rumanians had warned them of the hostile approach no serious attention was given by the Russian military authorities, for which they had to pay dearly. But even now the Russians thought this to be a momentary check and gave orders to make a fresh effort to capture Plevna, for which purpose they detailed 40,000 men. Osman Pasha had meanwhile entrenched himself round Plevna and had occupied Lovcha on the 26th, thereby securing the direct road to Sofia. The second attempt to capture the town, July 31, failed as the first and the Russians at last began to realize that their forces were inadequate to vanquish the enemy. The Tsar, by an Imperial Ukaze called up the Guard and Grenadier Corps, 24th and 26th Infantry Divisions, also the 2nd and 3rd Infantry Divisions with the 3rd Rifle Brigade which had already left Moscow for Bulgaria. Valuable assistance was also forthcoming from the Rumanian forces, which now joined the Russians. The Russian plan of campaign, which was faulty to a degree, now became absolutely impossible, there being no longer any question of moving south of the Balkans, whilst Osman from Plevna might threaten not only their right flank, but the bridges across the Danube. Every effort was to be made to vanquish the Turkish force defending Plevna, now greatly strengthened by field works.

At the end of July, Abdul Kerim, the Turkish commander-in-chief was superseded by Mohammed Ali, who decided to attack the Russian forces under the Tsarevitch (XI., XII. and XIII. corps) on the river Lom. Mohammed Ali had two army corps for his offensive, not to mention five divisions at Shumla and two at Ruschuk, but he carried out his movement with little skill, sending his left wing against the Russians standing on the Yantra, which brought about two engagements at Ayazla on Aug. 22 and 23. The Russians retreated slightly, and a week later the XIII. corps was attacked at Karahassankioi, but no serious result was gained by this move. On Sept. 5, another engagement occurred, but though the Russians retired across the Lom the Turks were unable to march further west. The intended plan to unite the forces of Mohammed Ali with those of Suleiman at Trnova failed, his advance producing no effect on the Russian forces assembled around Plevna, which were by that time considerably reinforced (two Russian and three Rumanian infantry divisions, together with a Russian rifle brigade). On the Rumanians joining the Russians, it was agreed that Prince Charles of Rumania should be in nominal command of the forces grouped around Plevna, which were now known as the Western army. But the authority vested in Prince Charles was small, as the Commander-in-Chief, the Grand Duke Nicholas, was living in the vicinity, not to mention the Tsar himself and General Milutin, the War Minister. By this time the Russians had mobilized a huge army.

Meantime Suleiman Pasha was ordered to join Osman, but he was instructed firstly to capture the Shipka Pass which he attempted to do Aug. 21. Severe fighting took place for several days, but Radetsky, being reinforced, maintained his position, beating off every hostile attack. Suleiman in five days having lost 10,000 men, a quarter of his effective strength, decided to fall back on Kazanlik, leaving detachments by the pass. Hearing that Suleiman had been forced to give up momentarily the attempt to capture the Shipka Pass, the Russians began to fear that he might endeavour, by using the Rosalita and Trojan Passes, not only to turn the Shipka Pass, but by moving via Lovcha to get into communication with Osman Pasha, who might at any moment make for Tirnova. For this purpose Prince Imeretinsky was ordered to drive a Turkish detachment from Lovcha, which he forced to retire into Plevna. Leaving a brigade to guard the town, Imeretinsky fell back on Bogot. The Allies now decided to assault Plevna again, for which purpose they assembled about 100,000 men. Three Rumanian divisions were to advance from Grivitza, four Russian from Radishevo, and a division, having a brigade in reserve under Skobeleff, facing the Green Hills. A long artillery preparation took place Sept. 7–11, but the allies failed to make any proper reconnaissance, for which they had to pay a severe penalty, thousands of lives being sacrificed in vain. They advanced on the 11th, but failed to break the Turkish circle of defence. The Rumanians captured a redoubt at Grivitza, but were held up at Radishevo; Skobeleff on his part established himself on the Green Hills, but was thrown back the next day by Osman Pasha, who used his reserves for the counter attack. A serious crisis now arose among the Allies and a council of war was held. Many of the members, including Milutin, the War minister, urged that the army should recross the Danube and renew the advance the following spring with increased forces. This opinion was over-ruled, the Tsar showing great determination, and it was decided to invest Plevna, entrusting all operations to General Todleben, the heroic defender of Sevastopol during the Crimean War. With his arrival, the Russians gained confidence and renewed energy, one and all feeling they were at last being led by a masterly head, that chaos was replaced by order. The Guard Corps, on arriving from Russia, was sent to cut the Turkish communications and the enemy was driven out of Gorni Dubniak and Telish by General Gourko, Plevna being thus cut off from the outer world In the middle of Nov. the Russians stood as follows: 12 divisions around Plevna, 6 on the Lom; 3 by the Shipka Pass;

2½ on the Plevna-Orhanie road.

Suleiman, now commanding the main Turkish army, took the offensive, crossed the Lom and attacked the Russians at Mechka and Tristenik Nov. 19 and 26, but both times sustained a repulse. Vessil Pasha, who now in place of Suleiman stood facing the Shipka Pass, had been considerably weakened through sending reinforcements to aid Mohammed Ali near Sofia, and he could only muster 20,000 men. Meanwhile Gourko, hearing of Mohammed's preparations to relieve Plevna, urged that the Russians should advance boldly on Sofia, thereby depriving the enemy of the initiative. This plan being agreed to, Gourko, at the head of 30,000 men, drove the Turks out of Entropol, forcing Mohammed to retreat to Araba Konak Nov. 23. Gourko disposed of too small a force to be able to pursue the enemy, and so took up a position near Orhanie. Meantime in Plevna Osman's provisions were getting shorter every day, and ultimately he attempted a sortie, hoping to cut his way through Berkovitza to Sofia. After several hours severe fighting, however, Osman was convinced of the impossibility of breaking through, and surrendered with his whole army, about 40,000 men, on Dec. 10.

The Russians now decided to move on Sofia, cross the Balkans, relieve Shipka from the south and attack Vessil Pasha, the Tsarevitch with his 70,000 men being left to guard the communications. Gourko on Dec. 25 advanced with 5½ divisions against the Turks but on reaching Toshkesen he found that the Turks had already retreated. The Russians, after occupying Sofia, followed the enemy, who was making for Tatar Bazardjik. There Suleiman assumed command, having collected a force 50,000 strong, including reinforcements from Shumen. Radetsky began his attack on Jan. 5 at Shipka, being aided by two columns coming on his left and right; the western, Skobeleff with 17,000; the eastern, Prince Imeretinsky with 19,000 men. The Prince's advance was held up; while Skobeleff, delayed, came on the scene only the following day, when they together captured the Turkish entrenched camp two miles south of the Pass, forcing Vessil Pasha to capitulate with 36,000 men. Suleiman, on hearing of Vessil Pasha's surrender, made for Philipopolis, Gourko following in direct pursuit, while Radetsky cut off his retreat from Adrianople, entering the town with his advanced guard on Jan. 16. After several minor actions near the town Suleiman retreated to the south over the Rhodope Mountains direct to the coast reaching Enos on Jan. 28. His forces were then shipped to Constantinople. The Russians advanced rapidly towards the Turkish capital, reaching the Chataldja lines on Jan. 30. Next day an armistice was concluded, the terms being greatly modified at the Berlin conference which took place the following July, when Russia was deprived of many important concessions, which greatly irritated both the nation and the army. Bulgaria now became an independent principality, while Eastern Roumelia was to be under the protectorate of Turkey.

While these events were taking place in Europe military operations were simultaneously being carried on in the Caucasus. The Grand Duke Michael, the Tsar's brother, commanded the Russian forces which were 65,000 strong. The Turks numbered 70,000 men under Mukhtar Pasha. The same mistake was committed in the Caucasus as had been done in Europe—the Russian army finding itself too weak was obliged to await reinforcements, which arrived by the end of August when they began their advance. The first serious battle occurred on Oct. 15, at Aladja Dagh, when the Turks were defeated, a part of their forces hurriedly making for Kars, which was an important fortress, while the other portion fled to Erzeroum. Kars was now invested. A month later on Nov. 18, the Russians stormed and captured it. This was a brilliant feat of arms, perhaps the finest Russian exploit throughout this war. Their communications now being assured, the Russians moved rapidly towards Erzeroum, but the severe winter weather and the strength of the fortifications prevented them capturing it as quickly as they had hoped. When the armistice was concluded Erzeroum was still holding out, but the Turks were now forced to evacuate it under the terms of the armistice. The Russo-Turkish War amply proved the truth of the military maxim that to wage war with insufficient forces is highly risky. The Russians were many times on the brink of disaster, which would most certainly have occurred had they been faced by abler Turkish leaders and more efficiently trained troops. (A. SMI.)

RUST, a term usually applied to the reddish deposit formed on iron and having the approximate chemical composition $2Fe_2O_3,3H_2O$. For the rusting of iron three things must be present, viz., water, oxygen and a so-called "impurity"; ordinarily this impurity is provided by the carbon dioxide present in air or by the numerous elements present in small quantities in commercial varieties of iron, such as carbon, sulphur, phosphorus, etc., but if iron, air (or oxygen) and water are all highly purified, no rusting takes place. The action of the impurity is presumably to provide a feebly conducting solution with the water and so set up an electrolytic effect whereby salts of iron (*e.g.*, the sulphate or carbonate) are first formed and then decomposed by the oxygen. (*See* also CORROSION.)

RUSTICATION, in architecture, a form of masonry in which the stones have their edges cut back to a careful plane surface, but with the central portion of the stone face either left rough or projecting markedly. (*See* DRAFTED MASONRY.) Rusticated masonry is found in the platform of the tomb of Cyrus at Pasargadae in Persia (560 B.C.) and is common in certain types of Greek and Hellenistic work such as retaining walls and the like. It was similarly used for terrace and retaining walls by the Romans, who also realized its decorative value and employed it not only for such utilitarian works as the Pont du Gard at Nîmes, France (*c.* 150) and the aqueduct at Segovia, Spain (*c.* 109), but also decoratively as in the Porta Maggiore at Rome (time of Claudius), where the rustication is very rough, and the walls of the temple of Augustus at Vienne, France (*c.* 41), in which the rustication is carefully finished, the faces of the stone cut to a plane and the edges very delicately sunk.

The early Renaissance architects developed this tradition still further, and in the 15th century palaces in Florence used it with magnificent effect. Thus in the Pitti palace, by Brunelleschi (1458), the Riccardi, by Michelozzo (1444–52), and the Strozzi, by Benedetto da Maiano (1489), the carefully studied rustication forms the chief element in the design, and in the Rucellai, from designs by Alberti (1446–51), the wall surfaces between the pilasters are delicately rusticated. During the Baroque period rustication assumed great importance in garden and villa design and all sorts of fantastic surfaces were employed on the projecting portions of the stones, such as vermiculated work, in which the surface is covered with wavy and serpentine sinkages like worm-eaten wood, or treated with vertical dripping forms like lime deposits from dripping water. Sometimes the stones had sides bevelled and brought to a point or ridge in the centre.

The use of rustication was introduced into England by Inigo Jones, as in the gate of the Botanic Gardens at Oxford (1632), and became a dominant feature in much English Renaissance work. In American colonial work this influence is seen in the occasional shaping of outside sheathing boards to imitate rusticated masonry, as in portions of the Morris-Jumel house in New York (1765). Quoins (*q.v.*), or corner blocks are, in many styles, rusticated, where the face of the wall is left smooth.

RUSTLESS STEEL. The simplest and cheapest rustless steels are ordinary mild steels containing chromium. Resistance of the steel to rusting depends on the amount of chromium it contains. The addition of 10% of chromium to pure iron suppresses its solubility in water; the resulting pure chromium-iron might be regarded as a satisfactory rust-resisting metal. But such pure chromium irons cannot be produced commercially. Commercial rustless steels contain carbon, even when little, causing rustings. Between 1912–14, a series of steels containing between 9 and 16% of chromium was investigated by Brearley (*see* U.S.A. patent 1197256/16), who concluded that with the stipulated amounts of chromium and not more than ·70% of carbon, rustless steel articles could be produced providing they were submitted to suitable hardening operations. From this series of rustless steels developed by Brearley the familiar "stainless" cutlery is made.

The resistance of chromium steels to rusting is increased by

adding chromium and decreased by adding carbon. Small amounts of carbon are always unavoidably present but definite amounts are also added with the object of producing required degrees of hardness, resistance to wear or ability to cut. The useful extent to which chromium alone can be added to iron is limited because such comparatively pure chromium irons are brittle.

Steels containing more than 9% chromium were made as early as 1892. Their rust-resisting properties were not realized because at that time the resistance of steel to general corrosion was estimated by its measured resistance to solubility in dilute sulphuric acid. Since the solubility of high chromium steels in dilute sulphuric acid is greater than that of ordinary steel, the quest was directed away from and not towards chromium.

Up to the year 1912 the least corrodible steels then in general use were nickel steels. The more nickel they contained the less they were supposed to corrode. Steels containing 25% nickel were held in high regard, as they were notably resistant to dilute sulphuric acid, an active corrosive agent in industrial towns or under special conditions as in chemical works or mines.

The addition of nickel to steels which already contain chromium produces useful results: (1) conferring a certain degree of resistance to the corroding effect of cold sulphuric acids, whether in the liquid or vapour form; (2) making those higher chromium alloys tough which, without the nickel, would be brittle, and (3) making homogeneity comparatively easy without submitting the alloy to special forms of heat treatment. Materials of this class were investigated by Strauss in Germany 1912–14 (English patents, 13414/13 and 13415/13). Strauss appears to regard the presence of nickel as an indispensable constituent of rustless steels, and Krupp, with whom he is associated, has devoted most attention to a steel containing about 20% chromium and 6% nickel. Steels of this composition cannot be hardened by the usual heat-treatment processes. They are hardened by cold-working, as are all metals and alloys (*see* METALLURGY).

If scaling at high temperatures be regarded as a form of corrosion, then the work of Marsh must be noticed. Looking for some substitute for platinum wire or strip to wind resistance coils, Marsh found what he required in an alloy of nickel and chromium. This material, alloyed with more or less iron, is familiar as the coiled filament of heated metal in office and bedroom radiators. Its value for that purpose, apart from its electrical properties, is that it does not scale when it becomes red hot, but neither Marsh nor anyone else appears to have connected its resistance to scaling at red heat with its possible value as a rustless alloy. Haynes, who is reputed to have made the first motor-car in America, worked with cobalt-chromium alloys. From his observations and experiments arose the well-known cutting tool material called "stellite" and a similar material in a malleable form from which Haynes made pocket-knife blades.

The rustless chromium steels were first used for table cutlery and aero-engine exhaust valves. When the valves were requiring to offer great resistance to scaling, silicon was added with good effect. When valves were required to be as hard at red heat as ordinary structural steel is at ordinary temperatures, 12 to 30% of nickel was added. To resist other specific conditions, molybdenum, tungsten, manganese and copper have been added.

The development of rustless steel is hampered by two difficulties. The first relates to its adaptability to existing manufacturing processes. This difficulty starts with the actual making of the steel and is met in every hot-working and cold-working process. The second difficulty relates to the smelting of the ore. The ferro-chromium alloy can be produced cheaply by smelting chrome-iron ore in the blast furnace but it is useless for making rustless steel because it contains too much carbon. For soft varieties of rustless steel the steel maker requires ferro-chromium alloys containing practically no carbon. It is still not known how to adapt cheap smelting operations to chromium ore without contaminating the product with carbon, though much progress in this respect has been made during the past few years.

With introduction of rustless steels special causes of corrosion have been more sharply separated and defined. The most notable causes of corrosion, apart from direct solubility, are due to distortion and contact. A piece of rustless steel used for stainless knives and containing, say, 13% chromium, will remain bright if exposed in a country garden providing it has been suitably heat-treated. If, however, a piece of the same material be machined in a lathe the machined surface and the turnings themselves will rust, for they are distorted and to some extent their adjacent parts are distorted unequally. If the surface be smoothly ground and polished it will not rust. The polished surface does not offer easy lodgment for casual dirt but otherwise polishing in itself does not appear to exert a great restraint upon rusting. A piece of the same 13% chromium steel, for example, in the form of cold-drawn wire which has simply been highly polished after cold drawing rusts with surprising readiness (*see* also CORROSION).

BIBLIOGRAPHY.—Sir R. A. Hadfield, "On the Alloys of Iron and Chromium," *Jour. Iron and Steel Inst.*, vol. 2 (1892), with a good bibliography of early work; F. G. Bell, "Stainless Steel," *Iron and Coal Trades Review* (Aug. 10, 1923); J. H. G. Monypenny, "Stainless Steel, with particular Reference to the Milder Varieties," *Trans. Amer. Inst. Mining and Met. Engineers* (Feb. 1924); W. H. Hatfield, "Stainless and Similar Corrosion Resisting Steels in the Chemical and Allied Industries," *The Industrial Chemist* (March, 1925); "Chromium-Nickel Rustless Steels," *The Metallurgist*, supplement to *The Engineer* (Oct. 30, 1925); J. H. G. Monypenny, *Stainless Iron and Steel* (1926).

(H. B.)

RUTACEAE, a family of dicotyledonous plants, mostly shrubs and trees, comprising about 100 genera and 800 species found in temperate and tropical regions, and especially abundant in Australia and South Africa. *Ruta graveoleus* is rue (*q.v.*). *Citrus* includes the grapefruit, orange, lemon (*qq.v.*), etc. *Chloroxylon Swietenia* is satinwood (*q.v.*). *Ptelea trifoliata* is the shrubby trefoil or wafer-ash (*q.v.*); Zanthoxylum americanum is the prickly-ash (*q.v.*).

RUTBA WELLS, a post and watering place in the Syrian desert, in 33° N. and 40° E. The post, which is the headquarters of part of the desert police is the most westerly occupied place in Iraq. A wireless station was established here in 1926 in communication with Basra and the Royal Air Force at Baghdad, Amman and Gaza. Westwards from this point Buxton found considerable traces in the desert of palaeolithic remains.

See L. H. D. Buxton, *Antiquaries Journal* (1926).

RUTEBEUF or **RUSTEBUEF** (*fl.* 1245–1285), French *trouvère,* was born in the first half of the 13th century. His name is nowhere mentioned by his contemporaries. He frequently plays in his verse on the word Rutebeuf, which was probably a pseudonym. Some of his poems have autobiographical value. In *Le Mariage de Rutebeuf* he says that on Jan. 2, 1261, he married a woman old and ugly, with neither dowry nor amiability. In the *Complainte de Rutebeuf* he details a series of misfortunes which have reduced him to abject destitution. In these circumstances he addresses himself to Alphonse, comte de Poitiers, brother of Louis IX., for relief. His distress could not be due to lack of patrons, for his metrical life of Saint Elizabeth of Hungary was written by request of Erard de Valéry, who wished to present it to Isabel, queen of Navarre; and he wrote elegies on the deaths of Anceau de l'Isle Adam, the third of the name, who died about 1251, Eude, comte de Nevers (d. 1267), Thibaut V. of Navarre (d. 1270), and Alphonse, comte de Poitiers (d. 1271), which were probably paid for by the families of the personages celebrated. In the *Pauvreté de Rutebeuf* he addresses Louis IX. himself.

The piece which is most obviously intended for popular recitation is the *Dit de l'Herberie,* a dramatic monologue in prose and verse supposed to be delivered by a quack doctor. Rutebeuf was also a master in the verse *conte,* and the five of his *fabliaux* that have come down to us are gay and amusing. The adventures of *Frère Denyse le cordelier,* and of *"la dame qui alla trois fois autour du moûtier,"* find a place in the *Cent Nouvelles nouvelles.*

Rutebeuf's serious work as a satirist probably dates from about 1260. His chief topics are the iniquities of the friars, and the defence of the secular clergy of the university of Paris against their encroachments; and he delivered a series of eloquent and insistent poems (1262, 1263, 1268, 1274) exhorting princes and people to take part in the crusades. He was a redoubtable champion of the university of Paris in its quarrel with the religious orders, and he boldly defended Guillaume de Saint-Amour when he was

driven into exile. The libels, indecent songs and rhymes condemned by the pope to be burnt together with the *Périls des derniers temps* attributed to Saint-Amour, were probably the work of Rutebeuf. The satire of *Renart le Bestourné,* which borrows from the Reynard cycle little but the names under which the characters are disguised, was directed, according to Paulin Paris, against Philip the Bold. To his later years belong his religious poems, and also the *Voie de Paradis,* the description of a dream, in the manner of the *Roman de la Rose.*

The best work of Rutebeuf is to be found in his satires and verse *contes.* A miracle play of his, *Le Miracle de Théophile,* is one of the earliest dramatic pieces extant in French.

The *Oeuvres* of Rutebeuf were edited by Achille Jubinal in 1839 (new edition, 1874); a more critical edition is by Dr. Adolf Kressner (*Rustebuef's Gedichte;* Wolfenbüttel, 1885). *See* also the article by Paulin Paris in *Hist. litt. de la France* (1842), vol. xx. pp. 719–783, and *Rutebeuf* (1891), by M. Léon Clédat, in the *Grands Écrivains français* Series.

RUTH, BOOK OF, in the Old Testament. The story of Ruth, the Moabitess, great-grandmother of David, is one of the Old Testament Hagiographa (*see* BIBLE, *Old Testament, Canon*). On the other hand, it follows Judges in the Septuagint, the Vulgate and the English version. But although a *late* rearrangement might transfer Ruth from the Hagiographa to the historical books, and place it between Judges and Samuel, no motive can be suggested for the opposite change, unless it had been placed in the last part of the Jewish canon after the second (with the historical books) had been definitely closed. Moreover, the book is untouched by the "prophetic" or "Deuteronomic" editing, which helped to give the "Former Prophets" (Joshua–Kings) their present shape after the fall of the kingdom of Judah. Nor has the narrative any affinity with the view that the history of Israel was a series of examples of divine justice and mercy in the successive rebellions and repentances of the people of God. Finally, if the book had been known when Joshua–Kings was edited it could hardly have been excluded, since David's ancestry (iv. 17, 18–22) was of greater interest than that of Saul (given in 1 Sam. ix. 1), whereas the old history names no ancestor of David beyond his father Jesse.

Date.—The book of Ruth deals with a distant past (Ruth i. 1), and delights in depicting details of antique life and obsolete usages (iv. 7). It views the stormy period before the kingship through the softening atmosphere of time, in contrast to the harsher colours of the old narratives of the book of Judges. It has been argued that, as the author seems to take no offence at the marriage of Israelites with Moabite women, he must have lived before the time of Ezra and Nehemiah (Ezra ix.; Neh. xiii.); but the same argument would prove that the book of Esther was written before Ezra. The very designation of a period of Hebrew history as "the days of the judges" is based on the exilic "Deuteronomic" parts of the book of Judges (ii. 16 *sqq.*), and although the language sometimes recalls the narratives in Samuel and Kings, it can be assumed, either that the book is the work of a late author acquainted with the earlier literature, or that an old narrative was rewritten. The fact that the language is in contrast to that of Chronicles, Ezra, Nehemiah, etc., has no force since writings evidently more or less contemporary did not necessarily share the same characteristics (observe, for example, the prose parts of Job).

Purpose.—Like the stories appended to Judges, the book of Ruth connects itself with Bethlehem, the birthplace of David. Some connection between Bethlehem and Moab has been found in 1 Chron. iv. 22 (where the Targum and rabbinical exegesis discover references to the story of Ruth), and is explicitly suggested by the isolated 1 Sam. xxii. 3 *seq.*, which knows of some relationship between Moab and David. Next, the writer claims the sympathy of his readers for Ruth, upon whose Moabite origin he insists, and this is noteworthy in view of the aversion with which intermarriage was regarded at a certain period (Deut. xxiii. 3; Neh. xiii.; Ezra ix. *seq.*). The independent evidence for the present late form of the book has led many scholars to the conclusion that it was directed against the drastic steps associated with the reforms of Ezra and Nehemiah, which, as is known, were not everywhere acceptable. Thus, not only have we a beautiful portrait of a woman of Moabite origin, but she becomes the ancestress of David himself; and in the days of these measures the simple story would raise the question whether the exclusiveness of Judaism was being carried too far.

BIBLIOGRAPHY.—*See* S. R. Driver, *Lit. of the Old, Text.;* C. F. Kent, *Beginnings of Heb. Hist.* p. 310 *seq.;* Cannon, *Theology* vol. xvi. pp. 310–319, all of whom favour a pre-exilic origin. W. Robertson Smith's art. in the *Ency. Brit.* 9th and 11th ed. (portions of which are here retained) was revised and supplemented by T. K. Cheyne in *Ency. Bib.* (S. A. C.)

RUTHENIA or **CARPATHIAN RUTHENIA,** is a province of Czechoslovakia, covering an area of 4,886 sq.m. Its northern frontier is the old boundary between Hungary and Galicia, following the ridge of the Carpathians, while the remaining frontiers are artificial, those with Hungary and Rumania having been delimited by the treaties of Trianon and Sèvres respectively (1920). Much of the province is mountainous, lying mainly in the Flysch zone, with gentle rounded contours, rising to about 4,250 ft. in the west but above 6,500 ft. in the Cerna Hora to the east (Hoverla, 6,730 ft.) where traces of old glaciation may be observed. The southern edge of the highland is made up of eruptive rocks, associated with the faulting and sinking that has originated in the plain beyond, never rising above 5,250 ft., often standing out as isolated buttes whose strategic value in a lowland is proved by the ruined fortresses which crown their summits. The mountain zone is deeply dissected by incised valleys which often open into broad, fertile basins in their upper courses, *e.g.*, on the Latorica, and is heavily forested with beech on its lower levels and conifers on the higher.

But the plain, largely the drainage basin of the upper Tisa and its tributaries, is the important region. Sheltered from the cold winds of the north and north-east it receives the full benefit of the moist south-westerly currents and, despite extremes, during about eight months of the year field work is possible and the climate is ideal for cereal and vine cultivation. The great disadvantage is the danger of floods, still critical although dams in the upper valleys and dikes along the lower courses of the rivers have reduced the risks. On the plain, maize, oats, wheat and potatoes, in the order of importance named, occupy the greatest acreage followed by rye, tobacco and barley, while the lower slopes are devoted to vineyards and orchards of plum and apple trees. Agricultural methods, however, are backward and yields are poor, only one-third to one-half those of Bohemia. On the meadows and rough pasture—about 28% of the surface—large numbers of cattle and horses are reared but pasture is poor and ill tended. The centuries of servitude endured by the Ruthenian peasants have sapped their initiative while frontier modifications have robbed various regions of their markets and introduced difficulties of tariffs and transport; the same facts hold for forestry. Industrial activity is small and confined to the production of wood-alcohol, spirits, matches, timber and pig-iron for treatment in Silesia. Here again the difficulties of establishing normal relations with neighbouring states handicap progress.

The population, numbering 606,568 (1921), is very mixed, 61·8% Ruthenian, 17·2% Magyar, 13·4% Jewish and 3·3% Czechoslovak. Germans, Magyars and Jews live mainly in the towns but the Ruthenian is essentially a peasant, generally poor and illiterate (80%) and Uniate in faith. The Ruthenian language has several dialects. Czechoslovakia has granted a large measure of autonomy to the province under the direction of a governor, though it sends one member to the national Chamber of Deputies and one to the Senate.

See also Czechoslovakia; Dalmay, *La Ruthenie tchécoslovaquie,* Annales de Géog. (Paris, 1927) and *Geograficka Bibliografie Podkarpatske Rusi,* Travaux Geographiques Tchéques (Prague, 1923).

RUTHENIANS, a name also applied to those Ukrainians, or Little Russians, who were formerly Austrian subjects. The name is simply a Latinized form of "Russian," the terms "Red Russian," etc., being due to false derivations. When, however, the early Ruthene states lost their independence, the term "Russia" was monopolized by the Muscovite state which, anxious to deny to the Ruthenes a national individuality, gave them the name of

"Little Russians." The Ruthenes themselves adopted the distinguishing title of "Ukrainians," *i.e.*, inhabitants of the Turko-Tatar frontier in S. Russia. The name Ruthene survived among the subjects of Poland and Lithuania, and later, Austria. The Ruthenians are thus neither more nor less than Ukrainians, and their linguistic and ethnographical features are described under that head. Yet they can be distinguished from the Ukrainians of Russia, both by their separate history (*see* POLAND, GALICIA) and by their religion. After Galicia and Volhynia came under Polish and Lithuanian rule in the 14th century, their upper classes were soon assimilated into the conquering nations, whose language and Catholic faith they adopted. The peasants sank into a state of great degeneracy, which was largely due to the decadence of their own Orthodox priests; recognizing which, they themselves proposed union with Rome. This was proclaimed by the Pope and accepted by the Ruthenes at the Union of Brest-Litovsk, Oct. 6–10, 1596. Under this new "Uniate Church," the Ruthenes retained their Slavonic liturgy and most of the outward forms of the Greek Orthodox Church, while acknowledging the spiritual supremacy of the Pope. Although the two liturgies were nominally entitled to equal treatment in Poland, actually the Uniate was always treated as inferior, and its adherents sank into a lamentable state of ignorance and poverty, due partly to the exactions of their feudal masters, partly to national oppression, partly to their portentous capacity for consuming fiery liquor, their habit of keeping the holidays of both Julian and Gregorian calendars (in 1860 16 districts in Galicia kept 160–200 days annually as holidays) and their superstitions (in 1807 a current method of exorcising cattle plague was to place the carcasses of the stricken animals in the wells, pastures and stables of uninfected districts).

On the partition of Poland, a number of Ruthenes passed back under Russian rule. Many of them were quickly reconverted to the orthodox faith, and every effort was made to Russify them. The orthodox propaganda was extended to Galicia (*see* PANSLAVISM) but the results were more sensational than practical. The Russian Government systematically discouraged Ruthenian nationalism until after the revolution of 1905, when some relaxation was made in the oppressive regulations. Similar efforts were made by the Poles of Galicia, and winked at by the Austrian Government, but here something was done for the Ruthenes. A metropolitan bishopric was founded at Lemberg in 1806, and suffragates added at Przemysl and Stanislaw. In 1877 a Ruthenian chair was established at Lemberg University, but Austria never granted a separate Ruthenian university, in spite of agitation.

After the war the largest body of Ruthenes, those in East Galicia, claimed the right of self-determination, but their short-lived state was soon absorbed in Poland (*see* GALICIA). The Ruthenes in the N.E. Carpathians were attributed to Czechoslovakia, special guarantees being laid down for their national autonomy. They were formed into the province of Sub-Carpathian Russia (*see* Czechoslovakia). The Ruthenes of Bessarabia and the Bukovina came under Rumanian rule (where the State religion was orthodox), with the protection of the Rumanian Minorities Treaty. In 1928 the estimated number of Ruthenes (excluding the Ukrainians of the U.S.S.R.) was: in Poland 3,883,000; in Czechoslovakia, 461,849; in Rumania, 792,000; in the U.S.A., 750,000; in Canada, 500,000 (where they formed the largest national group, after English and French); and small groups in Hungary and Yugoslavia. These figures are conservative estimates; the real numbers were probably much greater. None of these groups enjoyed complete independence. *See* UKRAINE, POLAND, RUSSIA, etc. Also the publications of the League for Ukrainian national independence (Geneva 1919–22).

(C. A. M.)

RUTHENIUM, the last of the six platinum metals to be identified, occurs in small amount only in ores from South America, and was hence overlooked by Wollaston and Tennant in 1803–04 (symbol Ru, atomic number 45, atomic weight, 101·7). The first indication of the existence of ruthenium was due to Osann (1828), who was working on platinum ore from the Ural mountains. He first announced the discovery of three new platinum metals, one of which he called ruthenium after Ruthenia, a name for Russia, but subsequently withdrew his claim to discovery as regards one of them. The matter was not fully investigated till 1845 when Claus confirmed the existence of a new metal and retained for it the name suggested by Osann. The metal is best obtained from osmiridium by the method of Deville and Debray. After a preliminary separation of osmium and iridium (*see* OSMIUM), a residue is left containing most of the ruthenium which is washed with aqueous ammonium chloride to remove the remainder of the osmium. The final residue containing iridium and ruthenium is fused with caustic potash and nitre in a silver basin; the melt is extracted with water yielding an orange solution of potassium ruthenate, K_2RuO_4, which is decolorized by addition of nitric acid, when an oxide of ruthenium gradually separates. This oxide dried and fused in a graphite crucible gives a button of impure ruthenium. Alternately, the aqueous solution of potassium ruthenate is saturated with chlorine and the solution distilled on a water-bath in a stream of chlorine when pure ruthenium tetroxide, RuO_4, distils over. This tetroxide is dissolved in caustic potash, reduced by alcohol to Ru_2O_3, which on ignition with reducing agents gives pure ruthenium (Gutbier and Trenkner, 1905).

Ruthenium in the massive state is a greyish-white metal similar in appearance to platinum, but as no important use has been found for it or any of its compounds, its properties are at present of purely scientific interest. Its specific gravity is 12·063 and its melting point is about 1,950° C. It is not readily attacked by acids but is comparatively easily oxidized, as simply heating in air causes it to be covered with a film of oxide. If strongly heated in a current of air, or preferably oxygen, it undergoes complete oxidation, the oxide RuO_2 being deposited some distance from the metal; this oxide, *per se,* is not volatile, however, but results from the decomposition of the volatile oxide, RuO_4. Ruthenium is practically insoluble in all acids, but is readily attacked by chlorine, and in a finely divided state it dissolves easily in solutions of alkaline hypochlorites.

Ruthenium has at various times been credited with forming at least 7 different oxides, but as the existence of some of these is doubtful and as others are known only in combination, those of undoubted authenticity will alone be mentioned here. *Ruthenium sesquioxide,* Ru_2O_3, is produced when finely divided ruthenium is heated in air or, together with potassium ruthenate, K_2RuO_4, when the oxide RuO_2 is fused with caustic potash; it is a dark blue powder insoluble in acids. *Ruthenium dioxide,* RuO_2, prepared either by igniting the sulphate in air or by burning the metal in a stream of air or oxygen, forms hard quadratic pyramids possessing a green metallic lustre. *Ruthenium tetroxide,* RuO_4, obtained by distilling a solution of K_2RuO_4 in chlorine on the water-bath, forms golden-yellow crystals which melt at 40° and distil at about 100°. It possesses an odour resembling ozone and, unless heated very carefully is liable to decompose with explosive violence. It blackens on exposure either to moisture or light, and is insoluble in water which slowly decomposes it with evolution of oxygen. The halogen salts of ruthenium are unimportant; chlorides such as $RuCl_2$, $RuCl_3$, and $RuCl_4$ are known either in the free state or in the form of double chlorides, such as potassium ruthenochloride, K_3RuCl_5, and potassium ruthenichloride, K_2RuCl_6; an aqueous solution of the former gives a black precipitate of ruthenous iodide, RuI_3, on addition of potassium iodide. *Ruthenium sesquisulphide,* Ru_2S_3, occurs in the mineral laurite, generally associated with other platinum ores and can be prepared by precipitating solutions of soluble ruthenium salts with sulphuretted hydrogen. This compound on treatment with nitric acid is converted into ruthenium sulphate, $Ru(SO_4)_2$, obtained on evaporation to dryness as a yellow, deliquescent, amorphous mass. A double cyanide, *potassium ruthenocyanide,* $K_4Ru(CN)_6,3H_2O$, is interesting as being isomorphous with yellow prussiate of potash, $K_4Fe(CN)_6$; the free acid $H_4Ru(CN)_6$ is also known in the solid state (*see* PRUSSIC ACID). The curious basic ammoniacal compound, $Ru(OH)_2Cl_4(NH_4)_7$, known as *ruthenium red,* is produced by the action of ammonia on a solution of $RuCl_3$ at 40° C; it dyes silk in a beautiful permanent yellow shade, but its use as a dye has been abandoned on account of cost.

Ruthenium in the tetrad condition gives a dark violet coloration in solution with potassium thiocyanate which distinguishes it from other metals of this group. Sulphuretted hydrogen gives first a blue coloration and then a brown precipitate insoluble in ammonium sulphide. Ruthenium or its compounds fused with caustic potash and nitre give a green mass which on extraction gives an orange solution of K_2RuO_4, and this on acidification gives a dark brown or black precipitate. Except for ruthenium red, no practical use for ruthenium or any of its compounds has been found. If present in anything but the smallest quantity, it has a deleterious effect upon the properties of the other platinum metals, and hence these should be freed from ruthenium as far as possible. A practical use for ruthenium or some of its compounds is very desirable as large stocks of the metal have accumulated in the course of years and these are at present useless. (F. E. M.)

RUTHERFORD, SIR ERNEST (1871–), British physicist, was born at Nelson, New Zealand, on Aug. 30, 1871, and studied at the University of New Zealand. After a period of research at the Cavendish Laboratory, Cambridge, he became in 1898 Macdonald professor of physics in McGill university, Montreal; in 1907, Langworthy professor of physics at Manchester university; and in 1919 Cavendish professor of experimental physics in the University of Cambridge, accepting, in addition, in 1920, the professorship of physics at the Royal Institution, London. His brilliant researches established the existence and nature of radio-active transformations, the electrical structure of matter, and the nuclear nature of the atom. He was elected F.R.S. in 1903, and was knighted in 1914. Many British and foreign degrees and honours were bestowed upon him. He was awarded the Nobel Prize for chemistry in 1908, and the O.M. in 1925 and was president of the British Association in 1923, and of the Royal Society in 1925.

His works include *Radio-activity* (1904), *Radioactive Transformations* (1906); *Radioactive Substances and their Radiations* (1912), and numerous papers in *The Transactions of the Royal Society, The Philosophical Magazine,* etc.

RUTHERFORD, MARK, the pen-name of William Hale White (1829–1913), English author, born at Bedford. His father, William White, a member of the Nonconformist community of the Bunyan Meeting, removed to London, where he was well known as a doorkeeper of the House of Commons; he wrote sketches of parliamentary life for the *Illustrated Times,* papers afterwards collected by his son as *The Inner Life of the House of Commons* (1897). The son was educated at Cheshunt and New College for the Congregational ministry, but the development of his views prevented his taking up that career, and he became a clerk in the admiralty. He had already served an apprenticeship to journalism before he made his name as a novelist by the three books "edited by Reuben Shapcott," *The Autobiography of Mark Rutherford* (1881), *Mark Rutherford's Deliverance* (1885), and *The Revolution in Tanner's Lane* (1887). Under his own name he translated Spinoza's *Ethics* (1883: new ed. 1894). Later books are *Miriam's Schooling, and other Papers* (1890), *Catherine Furze* (2 vols., 1893), *Clara Hopgood* (1896), *Pages from a Journal, with other Papers* (1900), *John Bunyan* (1905), *More Pages from a Journal* (1910), and *Last Pages* (1915), which was edited by his wife. Though for a long time little appreciated by the public, his novels—particularly the earlier ones—have a power and style which must always give his works a place of their own in the literary history of their time. He died at Groombridge, Sussex, on March 14, 1913.

See A. E. Taylor, "The Novels of Mark Rutherford" in *Essays and Studies* by members of the English Association (1913–14).

RUTHERFORD, a borough of Bergen county, New Jersey, U.S.A., on the Erie railroad, midway between Jersey City and Paterson. Pop. (1920) 9,497 (83% native white); in 1930, 14,915. The combined population of Rutherford and the adjoining borough of East Rutherford (5,463 in 1920 and 7,080 in 1930) was 21,995 in 1930. Both boroughs are primarily residential communities, with little manufacturing.

RUTHERFURD or **RUTHERFORD, SAMUEL** (*c.* 600–1661), Scottish divine, was born at Nisbet, Roxburghshire, and studied at Edinburgh, where he became professor of the humanities in 1623. He was dismissed in 1626 for an alleged indiscretion before his marriage, but in 1627 became minister of Anwoth, Kircudbrightshire. He was prosecuted by the bishop, Thomas Sydserf, in 1636, on account of the severe Calvinism of his first book, *Exercitationes, Apologeticae pro Divina Gratia* (Amsterdam, 1636), and sentenced to confinement in Aberdeen. Most of his famous *Letters* belong to this period of banishment. At the Glasgow assembly of 1638 he was restored to his parish. In 1639 he became professor of divinity at St. Mary's college, St. Andrews, and in 1643 was sent to London as one of the eight Scottish commissioners to the Westminster assembly. His *Lex Rex, a Dispute for the Just Prerogative of King and People* (1644) gives him a recognized place among the early writers on constitutional law. In 1647 he became principal of the New college at St. Andrews. After the Restoration in 1660 his *Lex Rex* was ordered to be burnt. He was deprived of his office and charged with high treason. His health broke down, and after drawing up a *Testimony* (Feb. 26, 1661, posthumously published), he died on March 23, 1661.

Rutherford's *Letters,* first published in 1664, anonymously, by M. Ward, an amanuensis, as *Joshua Redivivus, or Mr. Rutherfoord's Letters,* have frequently been reprinted. The best edition (365 letters) is by Rev. A. A. Bonar (1848, with a sketch of his life).

See also a short *Life* by Rev. Dr. Andrew Thomson (1884); Dr. A. B. Grosart in *Representative Nonconformists;* Dr. Alexander Whyte, *Samuel Rutherford and some of his Correspondents* (1894); Rev. R. Gilmour, *Samuel Rutherford* (1904).

RUTHERGLEN (locally pronounced *Rŭglen*), royal municipal and police burgh of Lanarkshire, Scotland. Pop. of royal burgh (1931) 25,157. It is situated on the left bank of the Clyde, 2½ m. by the L.M.S. railway S.E. of Glasgow, with the east of which it is connected by a bridge. The parish church stands near the spire of the ancient church where, according to tradition, the treaty was made in 1297 with Edward I., by which Sir John Menteith undertook to betray Wallace to the English. The industries include collieries, chemical works, dye-works, paper-mills, chair-making, tube-making, pottery, rope- and twine-works.

Rutherglen was erected into a royal burgh by David I. in 1126. It then included a portion of Glasgow, but in 1226 the boundaries were rectified so as to exclude the whole of the city, and Rutherglen has continued to resist incorporation with Glasgow. In early times it had a castle, which was taken by Robert Bruce from the English in 1313. It was kept in good repair till after the battle of Langside (1568), when it was burnt by order of the regent Moray. In 1679 the Covenanters published their "Declaration and Testimony" at Rutherglen prior to the battles of Drumclog and Bothwell Brig (1679).

RUTHIN, market town and municipal borough, Denbigh parliamentary division, Denbighshire, Wales, 215 m. N.W. of London by the G.W. railway. Pop. (1931) 2,912. Ruthin (*Rhuddin,* "red fortress"), stands on a hill above the river Clwyd. Apart from legends of Arthur, the first fact of note is its connection with the Grey de Ruthyn family (1353). Owen Glendower attacked the castle in 1400; it was later sold to Henry VII., and Elizabeth gave it to the earl of Warwick. In 1646, it was dismantled by the Parliamentarians but later a new castle was built on the site. The church of St. Peter has nearly 500 panels of carved oak.

RUTHVEN (rĭv'ĕn), name of a noble Scottish family tracing descent from a certain Thor, who settled in Scotland during the reign of David I. In 1488 one of its members, Sir William Ruthven (d. 1528), was created a lord of parliament as Lord Ruthven. Patrick, 3rd Lord Ruthven (*c.* 1520–1566), played an important part in the political intrigues of the 16th century as a strong Protestant and a supporter of the lords of the congregation. He favoured the marriage of Mary with Darnley, and was the leader of the band which murdered Rizzio. This event was followed by his flight into England, where he died. Ruthven wrote for Queen Elizabeth a *Relation* of the murder, which is preserved in mss. in the British Museum.

A descendant of the 1st Lord Ruthven in a collateral line, also named Patrick Ruthven (*c.* 1573–1651), distinguished himself in the service of Sweden, which he entered about 1606. After leaving the Swedish service he was employed by Charles I. in Scotland. He defended Edinburgh castle for the king in 1640, and when the Civil War broke out he joined Charles at Shrewsbury. He led the left wing at the battle of Edgehill, and after this engagement was appointed general-in-chief of the Royalist army. For his services he was created Lord Ruthven of Ettrick in 1639, earl of Forth in 1642 and earl of Brentford in 1644. The earl compelled Essex to surrender Lostwithiel, and was wounded at both battles of Newbury. In 1644 he was superseded in his command by Prince Rupert. After visiting Sweden on a mission for Charles II., Brentford died at Dundee on Feb. 2, 1651. He left no sons and his titles became extinct.

Patrick, 3rd Lord Ruthven, was succeeded as 4th lord by his son William (*c.* 1541–1584), who like his father was prominent in the political intrigues of the period and was also concerned in the Rizzio murder. In 1582 he devised the plot to seize King James VI., known as the raid of Ruthven, and he was the last-known custodian of the famous silver casket containing the letters alleged to have been written by Mary, queen of Scots, to Bothwell. In 1581 he was created earl of Gowrie, but all his honours were forfeited when he was attainted and executed in May 1584. (*See* GOWRIE, 3RD EARL OF.)

In 1853 the barony descended to Mary Elizabeth Thornton (*c.* 1784–1864), the wife of Walter Hore (d. 1878). She and her husband took the name of Hore-Ruthven, borne by later barons.

See the *Ruthven Correspondence,* edited with introduction by the Rev. W. D. Macray (1868); J. H. Round, "The Barony of Ruthven of Freeland" in Joseph Foster's *Collectanea Genealogica* (1881–85); and Sir R. Douglas, *The Peerage of Scotland* (new ed. by Sir J. B. Paul).

RUTILE, the most abundant of the three native forms of titanium dioxide, TiO_2; the others being anatase and brookite (*qq.v.*). Like anatase, it crystallizes in the tetragonal system, but with different angles and cleavages, it being crystallographically related to cassiterite, with which it is isomorphous. The crystals resemble cassiterite in their prismatic habit and terminal pyramid planes and also in the twinning; the prism planes are striated vertically. Acicular crystals are sometimes twinned together to form reticulated skeletal plates to which the name "sagenite" (Gr. σαγήνη a net), is applied. At the same time, the colour is usually reddish-brown, though yellowish in the very fine needles, and black in the ferruginous varieties ("nigrine" and "ilmenorutile"); the streak is pale brown. The name rutile, given by A. G. Werner in 1803, refers to the colour (Lat. *rutilus,* red). Crystals are transparent to opaque, and have a brilliant metallic-adamantine lustre. The hardness is 6·5; specific gravity 4·2, ranging up to 5·2 in varieties containing 10% of ferric oxide.

Rutile occurs as a primary constituent in eruptive rocks, but more frequently in schistose rocks. As delicate acicular crystals it is often enclosed in mica and quartz; in mica (*q.v.*) it gives rise to the phenomenon of asterism; and clear transparent quartz (rock-crystal) enclosing rutile is often cut as a gem under the name of "Venus' hair stone" (Pliny's *Veneris crinis*). As a secondary mineral rutile in the form of minute needles is of wide distribution in various sedimentary rocks, especially clays and slates. As rounded grains it is often met with in auriferous sands and gravels. The mineral has little economic value; it has been used for imparting a yellow colour to glass and porcelain, and for this purpose is mined at Risör and other places in Norway.

(L. J. S.)

RUTILIUS CLAUDIUS NAMATIANUS, Roman poet, flourished at the beginning of the 5th century A.D. He was the author of a Latin poem, *De Reditu Suo,* in elegiac metre, describing a coast voyage from Rome to Gaul in A.D. 416. The literary excellence of the work, and the flashes of light which it throws across a momentous but dark epoch of history, combine to give it exceptional importance among the relics of late Roman literature. The poem was in two books; the exordium of the first and the greater part of the second have been lost. What remains consists of about seven hundred lines.

The author is a native of S. Gaul (Toulouse or perhaps Poitiers), and belonged, like Sidonius, to one of the great governing families of the Gaulish provinces. His father was an imperial official with a distinguished career, and Rutilius himself was secretary of State and *praefectus urbi.* After reaching manhood, he passed through the tempestuous period between the death of Theodosius (395) and the fall of the usurper Attalus, which occurred near the date when his poem was written. Undoubtedly the sympathies of Rutilius were with those who during this period dissented from and, when they could, opposed the general tendencies of the imperial policy. We know from himself that he was the intimate of those who belonged to the circle of the great orator Symmachus—men who scouted Stilicho's compact with the Goths, and led the Roman senate to support the pretenders Eugenius and Attalus in the vain hope of reinstating the gods whom Julian had failed to save.

Perhaps the most interesting lines in the whole poem are those in which Rutilius assails the memory of "dire Stilicho," as he names him. Stilicho, "fearing to suffer all that had caused himself to be feared," planted the cruel Goths, his "skin-clad" minions in the very sanctuary of the empire. May Nero rest from all the torments of the damned, that they may seize on Stilicho; for Nero smote his own mother, but Stilicho the mother of the world!

We shall not err in supposing that we have here (what we find nowhere else) an authentic expression of the feeling entertained by a majority of the Roman senate concerning Stilicho. He had but imitated the policy of Theodosius with regard to the barbarians; but even that great emperor had met with passive opposition from the old Roman families. It is noteworthy that Rutilius speaks of the crime of Stilicho in terms far different from those used by Orosius and the historians of the lower empire. They believed that Stilicho was plotting to make his son emperor, and that he called in the Goths in order to climb higher. Rutilius holds that he used the barbarians merely to save himself from impending ruin. The Christian historians assert that Stilicho designed to restore paganism. To Rutilius he is the most uncompromising foe of paganism.

With regard to the form of the poem, Rutilius handles the elegiac couplet with great metrical purity and freedom, and betrays many signs of long study in the elegiac poetry of the Augustan era. The Latin is unusually clean for the times, and is generally fairly classical both in vocabulary and construction. The taste of Rutilius, too, is comparatively pure. It is common to call Claudian the last of the Roman poets. That title might fairly be claimed for Rutilius, unless it be reserved for Merobaudes. At any rate, in passing from Rutilius to Sidonius no reader can fail to feel that he has left the region of Latin poetry for the region of Latin verse.

BIBLIOGRAPHY.—All existing mss. of Rutilius are later than 1494, and are copies from a lost copy of an ancient ms. once at the monastery of Bobio, which disappeared about 1700. The *editio princeps* is that by J. B. Pius (Bologna, 1520), and the principal editions since have been those by Barth (1623), P. Burman (1731, in his edition of the minor Latin poets), Wernsdorf (1778, part of a similar collection), Zumpt (1840), and the critical edition by Lucian Müller (Teubner. Leipzig, 1870), and another by Vessereau (1904); also an annotated edition by Keene, with a translation by G. F. Savage-Armstrong (1906). Müller writes the poet's name as Claudius Rutilius Namatianus, instead of the usual Rutilius Claudius Namatianus; but if the identification of the poet's father with the Claudius mentioned in the Theodosian Code (2, 4, 5) be correct, Müller is probably wrong. Rutilius receives more or less attention from all writers on the history or literature of the times, but a lucid chapter in Beugnot, *Histoire de la destruction du Paganisme en Occident* (1835), may be especially mentioned, and one in Pichon's *Derniers écrivains profanes* (1906). *See* also O. Schissel von Fleschenberg, *Rutilius Namatianus* (Vienna and Leipzig, 1920).

(J. S. R.)

RUTLAND, EARLS AND DUKES OF. The 1st earl of Rutland was Edward Plantagenet (1373–1415), son of Edmund, duke of York, and grandson of King Edward III. In 1390 he was created earl of Rutland, but was to hold the title only during the lifetime of his father, on whose death in 1402 the earldom accordingly became extinct, the earl then becoming duke of York. The title earl of Rutland seems to have been assumed subsequently by different members of the house of York, though it does not appear that any of them had a legal right to it. One of these

was the 1st earl's nephew, Richard Plantagenet, duke of York, father of King Edward IV. Richard's daughter Anne married for her second husband Sir Thomas St. Leger, and their daughter Anne married George Manners, 12th Baron Ros, or Roos (d. 1513). Their son, Thomas Manners (d. 1543), was therefore great-grandson of Richard Plantagenet, who had styled himself earl of Rutland among other titles. In 1525 Thomas Manners was created earl of Rutland, and his descendants have held this title to the present day.

Thomas was a favourite of Henry VIII., who conferred on him many offices and extensive grants of land, including Belvoir Castle, in Leicestershire, which became henceforth the chief residence of his family. He was succeeded in the earldom by his son Henry (*c.* 1516–1563); and his second son, Sir John Manners, acquired Haddon Hall, Derbyshire, by his marriage with Dorothy, daughter of Sir George Vernon, called "the king of the Peak." Henry, the 2nd earl, was an admiral of the fleet in the reign of Queen Mary, and later enjoyed the favour of Queen Elizabeth.

John, 9th earl (1638–1711), a partisan of the Revolution of 1688, received the Princess Anne at Belvoir Castle on her flight from London; after the accession of Anne to the throne she created him marquess of Granby and duke of Rutland in 1703. The 1st duke was three times married; the divorce in 1670, while he was still known as Lord Ros, of his first wife, Anne, daughter of the marquess of Dorchester, was a very celebrated legal case, being the first instance of divorce *a vinculo* by act of parliament, a divorce *a mensa et thoro* having previously been granted by the ecclesiastical courts. His grandson John, the 3rd duke (1696–1779), was the father of John Manners, marquess of Granby (*q.v.*), a distinguished soldier, whose son Charles, 4th duke of Rutland (1754–1787), succeeded his grandfather. When marquess of Granby he represented Cambridge university in the House of Commons, and hotly opposed the policy that led to war with the American colonies. He helped to procure the entrance of the younger Pitt to the House of Commons, and remained through life Pitt's intimate friend. After succeeding to the dukedom in 1779, he sat in the cabinets of Shelburne and of Pitt, and became lord lieutenant of Ireland in 1784.

He was one of the earliest to advocate a legislative union between Ireland and Great Britain, which he recommended in a letter to Pitt in June 1784. The poet Crabbe was for some time private chaplain to the duke at Belvoir. His wife, Mary Isabella (1756–1831), "the beautiful duchess," whose portrait was four times painted by Sir Joshua Reynolds, was a daughter of the 4th duke of Beaufort. His eldest son, John Henry, 5th duke (1778–1857), was "the duke" in Disraeli's *Coningsby;* the latter's two sons, who succeeded in turn to the dukedom, the marquess of Granby and Lord John Manners, figuring in the same novel as "the marquis of Beaumanoir" and "Lord Henry Sidney" respectively. The 7th duke is noticed separately.

RUTLAND, JOHN JAMES ROBERT MANNERS, 7TH DUKE OF (1818–1906), English statesman, was born at Belvoir Castle on Dec. 13, 1818, the younger son of the 5th duke of Rutland by Lady Elizabeth Howard, daughter of the 5th earl of Carlisle. Lord John Manners, as he then was, was educated at Eton and Trinity College, Cambridge. In 1841 he was returned for Newark in the Tory interest, along with W. E. Gladstone, and sat for that borough until 1847. Subsequently he sat for Colchester, 1850–57; for North Leicestershire, 1857–85; and for East Leicestershire from 1885 until in 1888 he took his seat in the House of Lords upon succeeding to the dukedom.

In 1841 Manners definitely associated himself with the "Young England" party, under the leadership of Disraeli. This party sought to extinguish the predominance of the middle-class *bourgeoisie,* and to re-create the political prestige of the aristocracy by resolutely proving its capacity to ameliorate the social, intellectual, and material condition of the peasantry and the labouring classes. Manners made an extensive tour of inspection in the industrial parts of N. England, in the course of which he and his friend Smythe expounded their views with a brilliancy which frequently extorted compliments from the leaders of the Manchester school. In 1843 he supported Lord Grey's motion for an inquiry into the condition of England, the serious disaffection of the working classes of the north being a subject to which he was constantly drawing the attention of parliament. Among other measures that he urged were the disestablishment of the Irish Church, the modification of the Mortmain Acts, and the resumption of regular diplomatic relations with the Vatican. In the same year he issued in pamphlet form a strong *Plea for National Holydays.* In 1844 Lord John vigorously supported the Ten-hours Bill, which, though strongly opposed by Bright, Cobden, and other members of the Manchester school, was passed in May 1847.

Manners figured as "Lord Henry Sidney" in Disraeli's *Coningsby,* and not a few of his ideas are represented as those of Egremont in *Sybil* and Waldershare in *Endymion.* But the disruption of the Young England party was already impending. Lord John's support to Peel's decision to increase the Maynooth grant in 1845 led to a difference with Disraeli. Divergences of opinion with regard to Newman's secession from the English Church produced further defections in the ranks, and the rupture was completed by Smythe acquiescing in Peel's conversion to Free Trade. Lord John produced another volume of verse, known as *English Ballads,* chiefly patriotic and historical, in 1850. During the three short administrations of Lord Derby (1851, 1858 and 1866) he sat in the cabinet as first commissioner of the office of works. On the return of the Conservatives to power in 1874 he became postmaster-general in Disraeli's administration, and was made G.C.B. on his retirement in 1880. He was again postmaster-general in Lord Salisbury's administration, 1885–86, and was head of the department when sixpenny telegrams were introduced. Finally, in the Conservative government of 1886–92 he was chancellor of the duchy of Lancaster. He had succeeded to the dukedom of Rutland in March 1888, upon the death of his elder brother. He died on Aug. 4, 1906 at Belvoir Castle.

RUTLAND, a midland county of England, bounded north and east by Lincolnshire, north and west by Leicestershire, and south-east by Northamptonshire. It is the smallest county in England, having an area of 152 sq. miles. The western portion is formed of the Jurassic beds, including Lias, inferior Oolites and great Oolites, which form the high ground. They dip gently to the east and are interrupted in places by faults, as in the Welland valley between Ketton and Duddington. The lower Lias occupies but a very small part in the extreme north-west. The middle Lias includes marlstone and ferruginous limestone yielding iron in workable quantities and forming the productive soil of the Catmose valley. The upper Lias forms the steep slopes below the Oolitic scarps, and furnishes materials for bricks and tiles. The inferior Oolite limestones and sands form the highland of the west and the dip slope to the east, where, in the north-east, they are overlain by great Oolite. All these deposits are covered with glacial deposits.

Rutland is drained by the tributaries of the Welland, which flows along its eastern boundary.

History.—Ancient stone implements have been found in the Oakham district and along the river Wash, and small late Bronze age hoards. At the time of the Roman invasion, this region was inhabited by a scanty population of the Coritani tribe. This is inferred by the absence of finds, although Ermine street passes through its eastern portion. Rutland was forested in pre-Norman days and only a few early settlements occurred, which were found on the belt of Northampton sands at its junction with the Lias clays, where dry sites could be found near springs, with pastures on the clay beds. These sites were occupied by a tribe of the Middle Angles in the 6th and 7th centuries, and the whole region was absorbed subsequently in the kingdom of Mercia.

Although mentioned by name in the will of Edward the Confessor, who bequeathed it to his queen Edith for life, with remainder to Westminster abbey, Rutland did not rank as a county at the time of the Domesday survey in which the term Rutland is applied only to that portion assessed under Nottinghamshire, while the south-east portion of the modern county is surveyed under Northamptonshire, where it appears as the wapentake of Wiceslea. Rutland is first mentioned as a distinct county under the administration of a separate sheriff in the pipe roll

of 1159, but as late as the 14th century it is designated "Rutland Soke," and the connection with Nottinghamshire, a county which does not adjoin it at any point, was maintained up to the reign of Henry III., when the sheriff of Nottingham was by statute appointed also escheator in Rutland.

Rutland was included in the diocese of Lincoln, and in 1291 it became a new rural deanery, within the archdeaconry of Northampton; but on the elevation of Peterborough to an episcopal see by Henry VIII., in 1541, the archdeaconry of Northampton, with the deanery of Rutland, was transferred to that diocese. In 1876 the deanery of Rutland was placed within the newly-founded archdeaconry of Oakham.

The Norman Walkelin de Ferrers was connected with this county, and founded Oakham castle in the 12th century. The castle was subsequently bestowed by Richard II., together with the earldom of Rutland, on Edward, son of Edmond, duke of York. Essendine (Essenden, or Essingdon) was purchased in 1545 by Richard Cecil of Burleigh, and the title of baron of Essenden bestowed on his grandson is retained by the earls of Salisbury. Burley-on-the-hill was held by Henry Despenser, the warlike bishop of Norwich, in the reign of Richard II., and was purchased by George Villiers, duke of Buckingham, who there entertained James I. During the Civil War, Rutland was on the side of the parliament.

Two members were returned to parliament for the county of Rutland from 1295 until under the Redistribution of Seats Act of 1885 the representation was reduced to one member.

Agriculture and Trade.—Rutland has always been mainly an agricultural county. The Domesday survey mentions numerous mills in Rutland, and a fishery at Ayston rendered 325 eels. In the 14th century the county exported wool. Stilton cheese has long been made in Leyfield forest and the vale of Catmose, and limestone is dug in many parts of the county. The development of the economic resources of Rutland was helped in 1793 by the extension of the Melton Mowbray canal to Oakham.

In the east and south-east districts of Rutland the soil is light and shallow, whilst in other districts it is a fertile loam, and in the vale of Catmose the soil is either clay or loam or a mixture of the two. The east part of the county is chiefly under tillage and the west in grass. Over 90% of the whole area, or 88,447 ac., was under cultivation in 1926; of this 31,245 ac. was arable land. Clover and rotation grasses for hay occupied 3,601 acres. The chief crops in 1926 were, in order of acreage occupied: barley, wheat, oats, turnips and swedes, beans and mangolds. Many sheep (Leicesters and Southdowns) and cattle, mainly Shorthorns, were reared. Large quantities of cheese are manufactured and sold as Stilton. Agriculture is practically the only industry of importance, but there is some quarrying and bootmaking. The region producing iron is continued from Northampton into Rutland, and the working of the iron ore forms one of the industries of the county.

The main line of the L.N.E. railway intersects the north-eastern corner of the county, and branches of that system, and of the L.M.S. railway, serve the remainder of the county.

Population and Administration.—The area of the ancient and administrative county is 97,273 ac., with a population in 1931 of 17,397. The county contains five hundreds. There is one urban district, namely Oakham. The county town is Oakham, population (1931), 3,191. The county is in the Midland circuit, and assizes are held at Oakham. It has one court of quarter sessions, but is not divided for petty sessional purposes. The county is in the diocese of Peterborough, and now forms part of the Rutland and Stamford parliamentary division and returns one member.

See *Victoria County History, Rutland;* James Wright, *History and Antiquities of the County of Rutland* (London, 1684); T. Blore, *History and Antiquities of the County of Rutland,* vol. i. pt. 2 (containing the East hundred and including the hundred of Casterton Parva; Stamford, 1811); C. G. Smith, *A Translation of that portion of Domesday Book which relates to Lincolnshire and Rutland* (London, 1870).

RUTLAND, a city of Vermont, U.S.A., the county seat of Rutland county; on Otter creek, 85 m. N.E. of Albany (New York). It is served by the Delaware and Hudson and the Rutland railways. Pop. (1920) 14,954 (90% native white); 1930 Federal census 17,315. Rutland has a beautiful site, 600 ft. above sea-level, encircled by the Green mountains. Twenty peaks can be seen from the city hall, and there are 20 lakes within 20 miles. It is a summer resort and touring centre. The famous Rutland marble (used for the memorial in Arlington National cemetery and for many public buildings throughout the country) is quarried in West Rutland and in Proctor (6 m. N.W.), where there is an exquisite marble bridge over the Otter. Some of the underground quarries are 300 ft. below the surface. The manufacturing industries of the city (with an output in 1927 valued at $6,118,927) include marble and monument works, and factories making stone-working machinery, maple-sugar products and utensils and scales. Its morning newspaper, the *Herald,* was established in 1794. Rutland was settled in 1770, and from 1784 to 1804 it was one of the capitals of Vermont. The capitol (1784) is the second oldest building in the State. The village was incorporated in 1847, and in 1892 a part of the town (including the village) was chartered as a city. Plymouth, a village 30 m. S.E. of Rutland, was the birthplace of Calvin Coolidge.

RUTLEDGE, JOHN (1739–1800), American jurist and politician, was born in Charleston (S.C.) in 1739. He studied law in London, and began to practise in Charleston in 1761. He was a delegate to the stamp act Congress in 1765 and to the Continental Congress in 1774–77 and 1782–83; he was chairman of the committee which framed the State Constitution of 1776, and the first "president" (governor) of South Carolina in 1776–78. He resigned in 1778, but was elected governor in the following year, and served until 1782. In the Constitutional Convention of 1787 he urged that the president and the Federal judges be chosen by the national legislature. He was associate justice of the U.S. Supreme Court in 1789–91, and chief justice of the supreme court of South Carolina in 1791–95. Nominated chief justice of the Supreme Court of the U.S. in 1795, he presided during the August term, but the Senate refused to confirm the nomination, apparently because of his opposition to the Jay treaty. He died in Charleston July 23, 1800.

His brother, EDWARD RUTLEDGE (1749–1800), a signatory of the Declaration of Independence, was born in Charleston on Nov. 23, 1749. He studied law in his brother's office, and in London in 1769–73, and practised in Charleston. He served in the Continental Congress in 1774–77, and was sent with John Adams and Benjamin Franklin to confer on terms of peace with Lord Howe on Staten Island in Sept. 1776. As captain of artillery and as lieutenant colonel he served against the British in South Carolina. He was a member of the State legislature from 1782 to 1798, and in 1791 drafted the act which abolished primogeniture in South Carolina. From 1798 until his death Jan. 23, 1800, he was governor of South Carolina.

RUTULI, a people of ancient Italy inhabiting Ardea and the district round it on the coast of Latium, at no very great distance from Aricia, and just west of the territory of the Volsci. They are ranked by the form of their name with the Siculi and Appuli (Apuli), probably also with the Itali, whose real Italic name would probably have been Vituli (*see* ITALY). This suggests that they belong to a fairly early stratum of the Indo-European population of Italy.

RUVIGNY, HENRI DE MASSUE, MARQUIS DE, afterwards EARL OF GALWAY (1648–1720), was born in Paris on April 9, 1648, the son of the 1st Marquis de Ruvigny. He saw service under Turenne, who thought very highly of him. He had English connections, and was selected in 1678 by Louis XIV. to carry out the secret negotiations for a compact with Charles II., a mission which he executed with great skill. Succeeding his father as "general of the Huguenots," he refused Louis's offer, at the revocation of the Edict of Nantes, to retain him in that office, and in 1690, having gone into exile with his fellow Huguenots, he entered the service of William III. of England as a major-general, forfeiting thereby his French estates. In July 1691 he distinguished himself at the battle of Aughrim, and in 1692 he was for a time commander-in-chief in Ireland. He was created Viscount Galway and Baron Portarlington, and received a large grant of forfeited

estates in Ireland.

In 1693 Ruvigny fought at Neerwinden and was wounded, and in 1694, with the rank of lieutenant-general, he was sent to command a force in English pay which was to assist the duke of Savoy against the French, and at the same time to relieve the distressed Vaudois. But in 1695 the duke changed sides, the Italian peninsula was neutralized, and Galway's force was withdrawn to the Netherlands. From 1697 to 1701, a critical period of Irish history, the Earl of Galway (he was advanced to that rank in 1697) was practically in control of Irish affairs as lord justice of Ireland. After some years spent in retirement, he was appointed in 1704 to command the allied forces in Portugal, a post which he sustained with honour and success until the battle of Almanza in 1707, in which Galway, in spite of care and skill on his own part, was decisively defeated. But he scraped together a fresh army, and, although infirm, served in one more campaign. His last service was rendered in 1715, when he was sent as one of the lords justices to Ireland during the Jacobite insurrection. He died on Sept. 3, 1720.

RUVO DI PUGLIA, a town and episcopal see of Apulia, Italy, in the province of Bari, 21 m. W. of the city of that name by steam tramway, 853 ft. above sea-level. Pop. (1921) 27,086. The cathedral, a splendid basilica with a very lofty nave and two aisles, has three apses, a square campanile and a rich façade with three portals. It belongs to the early 13th century. The interior has a fine triforium. Ruvo occupies the site of the ancient Rubi.

RUWENZORI, also known as Runsoro or Kokora, a mountain range of Central Africa, 65 m. long and with a maximum breadth of 30 m., trending a little east of north, lying just north of the equator between lakes Edward and Albert. The range falls steeply on the west to the central African rift-valley traversed by the Semliki, the western head-stream of the Nile, while on the east the fall is somewhat more gradual towards the western Uganda uplands. The upper parts are separated by fairly low passes into six groups of snowy summits, lying a little west of the central line, rising in each case above 15,000 ft. and reaching, in the culminating point of the western group (Mount Stanley), about 16,800 ft.

The origin of the range seems connected with that of the rift-valley on the west. Ruwenzori is a fault block of the Archaean floor of the continent, bounded east and west by lines of fracture, and having a general dip from west to east. A further upheaval produced an ellipsoidal anticline, causing the strata to dip outwards at a high angle. Traces of volcanic action are almost non-existent. Composed in its outer parts of Archaean gneisses and mica-schists offering no great resistance to denudation, in its centre the range consists of much more refractory rocks (amphibolites, diorites, diabases, etc.), to which fact, coupled with the existence of vertical fractures, the persistence and separation of the higher summits is probably due. The snow-clad area does not now extend more than ten miles in any direction; the snow-line is 13,450 ft. but there is evidence of a former extension to as low as 4,600 ft.

The upper region is almost entirely enveloped by day in thick cloud, which descends on the east to about 9,000 ft., and lower still on the west. As a result, the climate is excessively humid, the northern slopes having a rainfall of 200 inches a year giving extremely damp conditions on the mountain. The rivers are raging torrents and have cut deep valleys between the outer spurs. From the innermost recesses between Mounts Stanley, Speke and Baker, the main branches of the Mobuku descend to the east, while the four principal streams on the west unite to form the Butagu, the drainage on both sides ultimately finding its way to the Semliki, either directly or through lakes George and Edward.

The vegetation displays well-marked zones, varying with the altitude; but owing to the lower level to which the cloud descends on the west the limits of the several zones reach a lower level on the west than on the east. They have been defined as follows by Mr. R. B. Woosnam (1907), as follows, the figures in brackets being the upper limit on the east side:—grass (6,500 ft.), forest (8,500), bamboos (10,000), tree heaths (12,500) and lobelias and senecios (14,500), above which is the summit region of snow and bare rock. The boundaries between the zones merely indicate the levels between which the respective forms are specially characteristic. The forest zone is the best marked, but on the west it merges in part with the low-lying forest of the Semliki valley. Mosses, hepaticae and lichens are prevalent in several of the zones, while bogs, vaccinium and other low-growing plants, are common above the forest zone. Helichrysums are abundant in the zone immediately below the snow. The larger mammals are found chiefly on the lower slopes, but bushbuck, pigs, leopards, monkeys, a hyrax and a serval cat occur at higher altitudes. The birds include kites, buzzards, ravens, sun-birds, touracos, a large swift, and various warblers and other small kinds. The upper limit of human settlement, with cultivation of colocasia and beans, has been placed at 6,700 ft.

In modern times the existence of a snowy range in this part of Africa was first made known by Sir Henry Stanley during the Emin Pasha relief expedition of 1887–89. Stanley named the main mass Ruwenzori, and outlying eastern peaks he called Mt. Gordon Bennett, Mt. Lawson, Mt. Edwin Arnold, etc.—the last named lying north-east of Lake George. Subsequently Stanley's own name was given to the chief summit. One of Stanley's officers, Lieut. Stairs, ascended the western slopes to over 10,000 ft. in 1889, and partial ascents were afterwards made by Dr. Stuhlmann, Mr. Scott-Elliot, Mr. J. E. S. Moore, Sir Harry Johnston, Mr. Douglas Freshfield, and others. Early in 1906 some of the secondary ridges above the snow-line were scaled by Messrs. Grauer, Tegart and Maddox, and by Dr. Wollaston and other members of the British Museum expedition, while later in the year the duke of Abruzzi led a well-equipped expedition to the upper parts of the range and ascended all the principal snow-clad peaks. The expedition produced for the first time a detailed map of the upper region, and threw much light on the geology and natural history of the range.

BIBLIOGRAPHY.—Sir H. M. Stanley, *In Darkest Africa* (London, 1890); G. F. Scott-Elliot, *A Naturalist in Mid-Africa* (London, 1896); J. E. S. Moore, "Tanganyika," etc., *Geog. Jnl.* (January 1901); *To the Mountains of the Moon* (London, 1901); Sir H. H. Johnston, *The Uganda Protectorate* (London, 1902); The Duke of the Abruzzi, in *Geog. Jnl.* (February 1907); R. B. Woosnam, *ibid.* (December 1907); F. de Filippi, *Ruwenzori* (London, 1908), the general account of the Abruzzi expedition, and *Il Ruwenzori, Parte scientifica* (2 vols., Milan, 1909); A. R. F. Wollaston, *From Ruwenzori to the Congo* (London, 1908); R. G. T. Bright, "The Uganda-Congo Boundary," *Geog. Jnl.* (1909); J. W. Gregory, *The Rift Valleys and Geology of East Africa* (1921).

RUYSBROEK or **RUYSBROECK, JAN VAN** (1293–1381), Dutch mystic, was born at Ruysbroek, near Brussels, in 1293. In 1317 he was ordained priest and became vicar of St. Gudule, Brussels. When 60 years of age he withdrew with a few companions to the monastery of Groenendael, near Waterloo, giving himself to meditation and mystical writing, and to a full share of the practical tasks of the society. He was known as the "Ecstatic Teacher," and formed a link between the Friends of God and the Brothers of the Common Life, sects which helped to bring about the Reformation. Ruysbroek insisted that "the soul finds God in its own depths," and noted three stages of progress in what he called "the spiritual ladder" of Christian attainment: (1) the active life, (2) the inward life, (3) the contemplative life. He did not teach the fusion of the self in God, but held that at the summit of the ascent the soul still preserves its identity. His works, of which the most important were *De vera contemplatione* and *De septem gradibus amoris,* were published in 1848 at Hanover; also *Reflections from the Mirror of a Mystic* (1906) and *Die Zierde der geistlichen Hochzeit* (1901).

BIBLIOGRAPHY.—A new edition of his works, *Alle de werken van J. van Ruysbroec de Wonderbare, etc.,* was published at Bussum in 1912 *seq.* A translation of his works into French was begun by the Benedictines of St. Paul de Wisques in 1920 *seq.* The following single works have been translated: *The Book of the Twelve Béguines* (1913); *The Adornment of the Spiritual Marriage,* etc., trans. by C. A. Wynschenk, ed. with introd. and notes by E. Underhill (1916). *See* also R. M. Jones, *Studies in Mystical Religion,* pp. 308–14 (1909); M. Maeterlinck, *Ruysbroek and the Mystics, with selections from The Adornment of the Spiritual Marriage* (trans. by J. T. Stoddart, 1894); V. Scully, *A Mediaeval Mystic* (1910); E. Underhill, *Ruys-*

broeck (1915); Wautier d'Aygalliers, *Ruysbroeck l'admirable* (1923, Eng. trans. 1925).

RUYSDAEL (or RUISDAEL), JACOB VAN (*c.* 1628–1682), the most celebrated of the Dutch landscapists, was born at Haarlem. It is not known where he studied. His father, Isaak, was a framemaker, who also painted and it is suggested that Jacob studied first under him and that he was then under his uncle Solomon Ruisdael (*c.* 1600–1670) an able landscapist. The influence of Cornelisy Vroom, another Haarlem landscapist, has also been traced in his early work; other authorities make him the pupil of Albert van Everdingen. The earliest date that appears on his paintings and etchings is 1646. Two years later he was admitted a member of the gild of St. Luke in Haarlem; in 1659 he obtained the freedom of the city of Amsterdam, and in 1668 his name appears there as a witness to the marriage of Hobbema. During his lifetime his works were little appreciated, and he seems to have suffered from poverty. In 1681 the sect of the Mennonites obtained his admission into the almshouse of the town, where he died on March 14, 1682.

The works of Ruysdael may be studied in the Louvre and the National Gallery, London, and in the collections at The Hague, Amsterdam, Berlin, and Dresden and Leningrad. His favourite subjects are simple woodland scenes, similar to those of Van Everdingen and Hobbema. He is especially noted as a painter of trees, and his rendering of foliage is characterized by the greatest spirit and precision. His views of distant cities, such as that of Haarlem in the possession of the marquess of Bute, and that of Katwijk in the Glasgow Corporation galleries, clearly indicate the influence of Rembrandt. He frequently paints coast-scenes and sea-pieces, but it is in his rendering of lonely forest glades (such as "The Pool in the Wood" at Leningrad) that we find him at his best. The subjects of certain of his mountain scenes seem to be taken from Norway, and have led to the supposition that he had travelled in that country. We have, however, no record of such a journey, and the works in question are probably merely adaptations from the landscapes of Van Everdingen, whose manner he copied at one period. Otto Beit owns a magnificent view of the "Castle of Bentheim" (1653) from which it may be concluded that his wanderings extended to Germany, where he may have made studies for the waterfalls and torrents which appear in many of his pictures. Only a single architectural subject from his brush is known—an admirable interior of the New Church, Amsterdam, in the possession of the marquess of Bute. The prevailing hue of his landscapes is a full rich green, which, however, has darkened with time, while a clear grey tone is characteristic of his sea-pieces. The art of Ruysdael, while it shows little of the scientific knowledge of later landscapists, is sensitive and poetic in sentiment, and direct and skilful in technique. Figures are sparingly introduced into his compositions, and are believed to be from the brush of Adrian Vandevelde, Philip Wouwerman, Nikolaas Berchem, Eglon van der Neer, Ostade and Jan Lingelbach.

Unlike the other great Dutch landscape painters, Ruysdael did not aim at a pictorial record of particular scenes, but he carefully thought out and arranged his compositions. He particularly excels in the painting of cloudy skies which are spanned domelike over the landscape. A romantic and sometimes deeply poetic sentiment is expressed in his work, as in "The Jewish Burial Ground" at Dresden which is regarded as one of the greatest landscapes ever painted. The "Cornfield" and the "Travellers," etchings, are also significant expressions of landscape art.

See Hofstede de Groot, *Catalogue of Dutch Painters* (1912).

RYAN, JOHN DENIS (1864–), American capitalist, was born at Hancock, Mich., on Oct. 10, 1864. In 1889 he went to Denver, where he was employed as a salesman of lubricating oils. In 1901 he secured an interest in a bank at Butte. In 1904 he was made manager of the Amalgamated Copper Company in Montana, becoming president in 1908. He had been elected president of the Anaconda Copper Mining Company in 1905, and after the merging of the Amalgamated interests in the Anaconda in 1910 he continued as president of the latter until 1918. He developed large water powers in Montana, and in 1913 electrified the railway between Butte and Anaconda (100m.), the success of which led to a wide expansion of railway electrification. During 1917–18 Ryan was an executive of the American Red Cross. He was appointed, in April 1918, head of the aircraft board of the committee of national defence, and in August was appointed second assistant secretary of war and director of air service of the U.S. Army, which position he resigned in November. In 1919 he was elected chairman of the Anaconda Copper Mining Company.

RYAZAN, a province of the Russian S.F.S.R., surrounded by those of Moscow, Vladimir, Nizhegorod, Penza, Tambov and Tula, and not coinciding with the pre-1917 province of the same name. Area 39,967 sq.km. Pop. (1926) 2,429,117, mainly Great Russians, with some Tatars, Poles and Jews in the towns. The province is drained by the Oka and its tributaries, the Pronya and Pra, and small lakes are numerous in the wide depression of the Oka. Forests cover about a fifth of the area, conifers, especially pines, prevailing in the more forested north, and deciduous forest with birch, ash and oak appearing in scattered patches in the south. North of the Oka is grey forest soil of little value for agriculture, but south of that river the fertile black earth of the steppe begins. The climate is extreme, average February temperature 3·2° F, July 67° F, rainfall 16 to 18 in. per annum.

Industries.—The province is essentially agricultural, except for a coal mining belt extending along the railway west from Ryazhsk. Dairying is not much developed, as the land is not suitable for pasture, but grain growing gives a good guarantee for the peasant and the villages are large, averaging 534 inhabitants. There are some collective agricultural artels. The chief crops are rye (50%), oats (19%), millet (11·2%) and potatoes (10%). Buckwheat, grass, hemp and sunflower seed are sown. Orchard fruits, especially apples, and cucumbers, cabbages, onions and other vegetables are cultivated in the valley of the Oka. Sheep, working and milch cattle, horses, pigs and a few goats are bred.

Koustar (peasant) textile industries are widespread, as is the making of leather and felt footwear, and the district was once famous for its lace making and leather embroidery. The northern region has small industries of this type, including the making of wooden vessels, sledges and boats, the preparation of pitch and tar and basketwork from the reeds in the marshy northern areas which occupy 6% of the province. The electric plant of Ryazan works on peat fuel from these bog areas, and also on the local coal. Marshy areas near the Oka river have been successfully drained and are now pasture lands.

There is a comparatively good railway net and 57% of the rivers are available for steam navigation; a good deal of transit trade goes on throughout the province.

RYAZAN, chief town of the above province, situated on the elevated right bank of the Trubezh, a mile above its confluence with the Oka in 54° 40′ N., 39° 43′ E. Pop. (1926) 49,044. A wide prairie dotted with large villages, the bottom of a former lake, spreads out from the base of the crag on which Ryazan stands, and actually has the aspect of an immense lake when it is inundated in the spring. The town manufactures agricultural machinery, boots, shoes and leather goods, and bricks, and has a distilling industry. It is an important trading centre, on a navigable river, with four railways radiating from it and a good main road linking it with Moscow. The Krestovozdvizhensk church contains tombs of the princes of the 15th and 16th centuries.

The capital of Ryazan principality was Ryazan—now Old Ryazan, a village close to Spask, also on the Oka. It is mentioned in annals as early as 1097, but continued to be the chief town of the principality only until the 14th century. In the 11th century one of the Kiev princes founded, on the banks of a small lake, a fort which received the name of Pereyaslav-Ryazanskiy. In 1294 (or in 1335) the bishop of Murom, compelled to leave his own town, settled in Pereyaslav-Ryazanskiy. The princes of Ryazan followed his example, and by and by completely abandoned the old republican town of Ryazan. In 1300 a congress of Russian princes was held there, and in the following year the town was taken by the Moscow prince. It continued, however, to be the residence of the Ryazan princes until 1517.

RYAZHSK, a town and railway junction south of Ryazan, in 53° 42′ N., 40° 3′ E., on the Khupta river. Pop. (1926) 16,164. It is a grain collecting centre with an elevator, and manufactures *makhorka* tobacco and spirits.

RYBINSK, a town of Russia in the province of Yaroslavl, in 58° 3′ N., 38° 47′ E., on the navigable Volga, opposite to the mouth of the Sheksna, which connects the Volga system with Lake Ladoga. Pop. (1926) 53,870. Here goods are transhipped from the large Volga boats to the smaller ones of the Marii system linking with Leningrad. There are ship yards, wiredrawing mills, nail, metal and match factories, flourmills, leather works and a brewery.

(2) A small settlement of Asiatic Russia on a left bank tributary of the Irtysh in 56° 5′ N., 72° 30′ E.

(3) A small town of Asiatic Russia south of the trans-Siberian railway, lying between Krasnoyarsk and Kansk, in 55° 55′ N., 94° 55′ E.

RYDBERG, ABRAHAM VIKTOR (1828–1895), Swedish author and publicist, was born in Jönköping on Dec. 18, 1828. In 1855 he joined the staff of the *Göteborgs Handels-och sjöfartstidning,* in which his romances successively appeared; he was editorially connected with it until 1876. *The Freebooter on the Baltic* (1857) and *The Last of the Athenians* (1859) gave Rydberg a place in the front rank of contemporary novelists. It was a surprise to his admirers to see him presently turn to theology, but with *The Bible's Teaching about Christ* (1862), in which the aspects of modern Biblical criticism were first placed before Swedish readers, he enjoyed a vast success. He was not elected to the Swedish Academy until 1877, when he had long been the first living author of Sweden. *Roman Days* is a series of archaeological essays on Italy (1876). He collected his poems in 1882; his version of *Faust* dates from 1876. In 1884 he was appointed professor of ecclesiastical history at Stockholm. He died, after a short illness, on Sept. 22, 1895. Rydberg was an idealist of the Romantic type which Sweden had known for three-quarters of a century; he was the last of that race, and, as a writer, perhaps the greatest.

See C. Warburg, *Victor Rydberg, hans levnad och diktning* (1913); L. Lundh, *Viktor Rydberg* (Stockholm, 1918); V. Svanberg, *Rydbergs Singoalla* (Uppsala, 1923).

RYDBERG, PER AXEL (1860–), American botanist, was born at Odh, Sweden, on July 6, 1860. He graduated at the gymnasium in Skara, in 1881, and soon after went to the United States, where he continued further study at the University of Nebraska (B.S., 1891; M.S., 1895) and at Columbia (Ph.D., 1898). In the period 1884–98 he also taught natural sciences in several Swedish-American institutions, and during summers in 1891–96 he was field agent for the divisions of botany and agrostology of the U.S. Department of Agriculture. In 1899 he was made curator at the New York Botanical Garden. He made extensive taxonomic studies of the seed-plants of the Great Plains and the Rocky Mountain region.

He published *Catalogue of the Flora of Montana and the Yellowstone National Park* (1900), *Flora of Colorado* (1906), *Flora of the Rocky Mountains and Adjacent Plains* (1917; 2nd ed., 1922). He also wrote monographs on Saxifragaceae, Rosaceae, Carduaceae and other plant groups, and various contributions to botanical journals.

RYDE, a municipal borough and watering place in the Isle of Wight, England, 5 m. S.W. of Portsmouth. Pop. (1931) 10,519. Beautifully situated on rising ground on the north-east coast, overlooking Spithead, it is on the site of a village called La Rye or La Riche, which was destroyed by the French in the reign of Edward II. At the close of the 18th century it was a small fishing hamlet, but it rapidly grew as a watering-place. Ryde is connected by rail with the other towns in the island, and also by boat with Portsmouth, Southampton, Southsea, Portsea and Stoke's bay. The pier is half a mile in length. The principal buildings are All Saints church, the market house and town hall, the Royal Victoria Yacht club-house, the theatre and the Royal Isle of Wight Infirmary. There are golf links near the town. The town was incorporated in 1868.

RYDER, ALBERT PINKHAM (1847–1917), American artist, was born at New Bedford, Mass., on March 19, 1847. He was a pupil of William E. Marshall and of the schools of the National Academy of Design. Among his better known paintings are: "Temple of the Mind," "Jonah and the Whale," "Christ appearing unto Mary," "The Flying Dutchman," "Charity" and "The Little Maid of Arcadie." He became a member of the Society of American Artists in 1878, and a National Academician in 1906. He died at Elmhurst, Long Island, N.Y., on March 28, 1917. In 1918 the Metropolitan Museum held a memorial exhibit of his work.

RYE, a market town and municipal borough in Sussex, England, 11 m. N.E. by E. from Hastings, on the S.R. Pop. (1931) 3,947. In the time of Edward the Confessor, Rye (Ria, Ryerot, La Rie) was a fishing village and, as part of the manor of "Rameslie," was granted by the king to the abbot and convent of Fécamp, by whom it was retained until Henry III. resumed it. By 1086 Rye was probably a port, and a charter of Richard I. shows that by the reign of Henry II. it had been added to the Cinque Ports. The fluctuations of the sea and attacks of the French caused its decline in the 13th and 14th centuries, and the walls were built during the reign of Edward III. The decay of Winchelsea contributed to the partial revival of Rye in the 15th and 16th centuries, when it was a chief port of passage. Towards the end of the 16th century the decay of the port began, and notwithstanding frequent attempts to improve the harbour it never recovered its ancient prosperity. Rye was incorporated under a mayor and jurats by the beginning of the 14th century, but possesses no charter distinct from the Cinque Ports. As a member of the Cinque Ports, which were summoned from 1322 onwards, Rye returned two representatives to parliament from 1366 until 1832; after that date one only until 1885. In 1290 the barons of the royal port of Rye were granted a three days' fair in September, altered in 1305 to March. The mayor and commonalty evidently held weekly markets on Wednesday and Friday before 1405, as in that year the Friday market was changed to Saturday. Shipbuilding began here as early as the 13th century. The town is situated above the south of Romney marsh, which within historic times was an inlet of the English Channel. The sea began to recede in the 16th century, and now the river Rother forms a small estuary with its mouth 2 m. from the town; this serves as a small harbour with a depth of 10 ft. at high tide, and there is some trade in coal, grain, timber, stones and manure. Fishing and shipbuilding are carried on, and there is a market for sheep (which are pastured in great numbers on the marshes), wool, grain and hops.

RYE, a village of Westchester county, New York, U.S.A., on Long Island sound, 24 m. N.E. of New York city; served by the New York, New Haven and Hartford and electric railways. Pop. 1930, 8,712 Federal census. It is a residential village, with several yacht and country clubs and a number of 18th century houses. The municipal hall is an old inn (Haviland) where Washington and Lafayette were entertained. "Kirby's tide-mill," built before the Revolution, still stands. Rye was the home of John Jay, and his grave is here, in the family burying-ground. At Rye Beach there is a seaside playground of 214 ac., owned and operated by the county. The village was incorporated in 1904.

RYE. This cereal, known botanically as *Secale cereale,* is supposed to be the cultivated form of *S. montanum,* a wild perennial species occurring in the more elevated districts of parts of the Mediterranean region, and west to central Asia. Its cultivation does not appear to have been practised at a very early date, relatively speaking. A. de Candolle, who collected the evidence on this point, draws attention to the fact that no traces of this cereal have hitherto been found in Egyptian monuments, or in the earlier Swiss dwellings, though seeds have been found in association with weapons of the Bronze period at Olmütz. The absence of any special name for it in the Semitic, Chinese and Sanskrit languages is also adduced as an indication of its comparatively recent culture. On the other hand, the general occurrence of the name in the more modern languages of northern Europe, under various modifications, points to the cultivation of the plant then, as now, in those regions. Rye is a tall-growing annual grass, with fibrous roots, flat, narrow, ribbon-like bluish-green

leaves, and erect or decurved cylindrical slender spikes like those of barley. The spikelets contain two or three flowers, of which one is usually imperfect. The outer glumes are acute and glabrous, the flowering glumes lance-shaped, with a comb-like keel at the back, and the outer or lower one prolonged at the apex into a very long bristly awn. Within these are three stamens surrounding a compressed ovary, with two feathery stigmas. When ripe, the grain is of an elongated oval form, free from the glumes and longer than a wheat grain. When the ovaries of the plant become affected with a peculiar fungus (*Claviceps purpurea*) they become blackened and distorted, constituting ergot (*q.v.*).

In the south of Great Britain rye is chiefly or solely cultivated as a forage-plant for cattle and horses, being usually sown in autumn for spring use, after the crop of roots, turnips, etc., is exhausted, and before the clover and lucerne are ready. For forage purposes it is best to cut early, before the leaves and haulms have been exhausted of their supplies to benefit the grain. In northern Europe, and more especially in Scandinavia, Russia and parts of north Germany, rye is the principal bread-corn; and in nutritive value, as measured by the amount of nitrogenous material it contains, it stands next to wheat, a fact which furnishes the explanation of its culture in northern latitudes ill-suited for the growth of wheat. It is one of the hardiest of cereals. The straw, which is prized on account of its length, is used for making hats and in the manufacture of paper. The bran is utilised for cattle-food, and the grain in the distillery. No well marked races of rye are found and the number of fixed varieties is small. Rye is uniform over a very large area.



BY COURTESY OF THE BRITISH MUSEUM (NATURAL HISTORY)

RYE (SECALE CEREALE), SHOWING GENERAL HABIT OF GROWTH AND SINGLE FLOWER (RIGHT), ENLARGED

For further details *see* W. W. Robbins, *The Botany of Crop Plants* (Philadelphia, 1924), and R. Percival, *Agricultural Botany* (1926).

(X.)

CULTIVATION AND TRADE

Even as late as 1760, rye formed the general food of one-seventh of the British population. In modern British husbandry, however, pure cultures of rye occupy only about 4 ac. in every 1,000 ac. of arable land: it has been almost entirely displaced by wheat, which not only produces corn that is preferred to rye for milling purposes but also yields a heavier crop of grain.

In northern Russia, Germany and Scandinavia, where black bread is still in demand, rye is extensively grown for milling purposes. This crop can be grown, however, on soils that are too poor, too sour, or too light and dry for wheat production. Rye is also capable of growth and ripening at altitudes and in latitudes that are too cold for other cereals. These characteristics of rye are well exploited in the countries of continental Europe. In Britain, however, rye-growing is not a feature of upland or northerly farming, but the crop is grown to a limited extent on soils too poor for the other cereals.

The straw of rye is remarkable for its length and toughness, hence it is valuable for thatching and for packing purposes, especially for saddlery work. For the same reasons rye may be a valuable component of a mixed crop grown for green soiling or for silage, as it supports the climbing leguminous components of the mixture. The earliness of the spring growth of rye is another economic quality of which advantage is taken: rye sown in September and suitably treated, will yield grazing material in March and April when other green food is scarce.

There are few commercial varieties of rye in this country. Common rye, or rye without varietal description, is the sort used for autumn sowing where the crop is intended to be harvested for grain. "Giant" is a descriptive name used by seedsmen in respect of an earlier and taller-growing strain that is recommended for straw production or for forage purposes. On the Continent a greater range of varieties is recognized. Special sorts are used for growing in districts that necessitate spring instead of autumn sowing; there are also sorts which may successfully be sown in summer, grazed in the autumn, and then left to be harvested for grain in the following year. The fundamental difficulty in developing and maintaining special strains of rye, however, lies in the fact that the plant is mainly cross-pollinated and almost self-sterile; hence new varieties tend to revert to the type common in the district. On account of this mode of pollination, also, rye is very dependent on suitable weather conditions at the time of flowering, and as the entire head of florets opens at the same time, not gradually and extending over a period of two or three weeks as in wheat, the set of grain is good or bad according to the weather at the time the crop reached the flowering stage.

When cultivated for grain, rye occupies the same place as wheat (*q.v.*) in the rotation; but it is a better crop than wheat as a successor to other straw crops on poor land or on land that is not very clean. Rye is often grown continuously on outlying parts of German farms. Except that less liberal manuring is required for this crop than for wheat, the general rules for cultivating the two crops are the same. The seed is, however, smaller, and requires shallower covering and a smaller quantity per acre suffices —typically two bushels when drilling in October. Summer rye is sown in March or April and requires a little more seed. Rye is ripe for cutting about a week or a fortnight earlier than wheat. The yield varies widely, from 12 to 25 cwt. of corn per acre, the quantity of straw being from two and a half to three times that of the grain. The composition of the grain is very similar to that of wheat, but the straw is more fibrous and less digestible.

Although rye is used extensively in many European countries for bread-making, there is only a comparatively small trade in this cereal in Great Britain. About one-fourth of the small area cropped is grazed or cut green for fodder, and only about 15,000 tons per annum of home-grown rye is marketed. A certain amount of this is exported to the Continent, annual exports being usually about 4,000 to 5,000 tons. Imports are also small, the average imports in the five years 1922–1926 being only 27,700 tons per annum, practically all of which came from North America—Canada supplying 14,100 tons and the U.S.A. 11,800 tons.

(J. R. B.; H. C. L.)

United States.—The production of rye in the United States in 1918–27 has ranged from 40,795,000 to 103,362,000 bushels. The average for 1921–25 was 68,007,000 bushels. Exports of rye, including flour, have in the last decade been as low as 12,647,000 bushels in 1925, and as high as 51,663,000 bushels in 1922. In 1920 the exports (47,337,000 bushels) constituted 78% of the domestic crop, whereas in 1925 the exports were only 27% of the total production. There are practically no importations. Most of the rye consumed in the United States is ground into flour which is mixed with wheat flour to make rye bread.

Rye is grown in all parts of the United States but most extensively in North Dakota and Minnesota, which furnish ⅓–½ of the total production. The average yield of rye per acre for 1921–25, inclusive, was 13.8 bushels.

Hardy varieties of winter (fall-seeded) rye are the most common. The date of seeding winter rye varies from late August in the northern parts of North Dakota and Minnesota to October in States south of Kansas. Spring rye is sown as early as soil conditions permit.

Rye should be sown 1½–2½ in. deep by means of a grain drill.

The customary rate of seeding is 3–4 pecks per acre in semi-arid regions, 5 pecks in subhumid regions, and 6 in humid or irrigated regions. It should be harvested when the first kernels are ripe. Either a header or a binder may be used. Most of the rye in the United States is threshed with the ordinary threshing machine, though a special machine exists which ensures unbroken straw.

(N. A. C.)

RYKOV, ALEXEI IVANOVICH (1881–), Russian politician, was born in Saratov, the son of a peasant. Saratov was a place of banishment for revolutionaries, and Rykov came under their influence. When he went to Kazan he was already taking part in social democratic organizations. He was imprisoned and sent back to Saratov to remain under police supervision. Continuing his revolutionary work, he was rearrested, but escaped abroad before his trial. He visited Lenin at Geneva, and returned to Russia as a propagandist in various industrial districts. In 1904 he was in Moscow, and in 1905 attended a congress of the Communist party which elected him a member of the party's central committee. On returning from the congress he was arrested in St. Petersburg (Leningrad). He was freed by the revolution of 1905, was a representative of the Bolsheviks in the St. Petersburg workmen's soviet and escaped from the capital when the soviet was arrested. He took part in the December revolt and the fighting on the barricades in Moscow, escaped to Odessa after the failure of that revolt, but presently was again working in Moscow, where he was arrested, but once more succeeded in escaping.

In 1907 he was arrested and banished to Samara, but went abroad to visit Lenin. He was arrested on returning and exiled to the province of Archangel for three years. He escaped shortly before the end of his term of exile, and went to Paris. He returned to Russia to organize a congress, was arrested in 1911 and remained in prison till 1913, when in October he was sentenced to exile to the Narym district for four years. In 1915 he escaped, went to Samara, was recaptured and sent back to the Narym district, where he remained until the revolution of 1917, after which he worked in the Moscow organisation of the Bolsheviks. He took an active part in the November revolution, was for some time president of the supreme economic council, and, after the death of Lenin, became president of the council of people's commissars. He was occupying this position in 1929.

RYLANDS, JOHN (1801–1888), English manufacturer and merchant, was born at St. Helens, Lancashire, on Feb. 7, 1801, and was educated at the grammar school in that town. In 1819 he, his elder brothers and his father, a manufacturer of cotton goods, founded the firm of Rylands and Sons, cotton goods and linen manufacturers, at Wigan. The business rapidly increased, dye-works and bleach-works were added, and the discovery of coal under some of the firm's property added materially to its wealth. In 1825 the partners became merchants as well as manufacturers, and subsequently acquired spinning mills at Bolton and elsewhere. In 1847, his father being dead and his brothers having retired, John Rylands assumed entire control of the business, which in 1873 was turned into a limited liability company. John Rylands was a benefactor to various charities, and was one of the original financiers of the Manchester Ship canal. He died at Stretford on Dec. 11, 1888. A permanent memorial, the John Rylands Library, was erected by his widow in Manchester in 1899.

RYLANDS, SIR (WILLIAM) PETER (1868–), English industrialist, was born on Oct. 23, 1868, and educated at Charterhouse and at Trinity college, Cambridge. He studied law and was called to the bar in 1894, but four years later became managing director of Rylands Brothers. In 1900 he was made president of the Iron and Steel Wire Manufacturers' association. After the World War he became president of the Federation of British Industries (1919–21), and of the Iron and Steel institute (1926–27). He was knighted in 1921.

RYLE, HERBERT EDWARD (1856–1925), son of Bishop John Ryle of Liverpool and a distinguished Old Testament scholar, was made bishop of Exeter in 1901, and in 1903 bishop of Winchester. In 1911 he became dean of Westminster, which office he held until his death, Aug. 20, 1925.

RYMER, THOMAS (1641–1713), English historiographer royal, was the younger son of Ralph Rymer, lord of the manor of Brafferton in Yorkshire, executed for his share in the "Presbyterian rising" of 1663. Thomas was probably born at Yafforth Hall early in 1641, and was educated at a private school kept at Danby-Wiske by Thomas Smelt, a noted Royalist, and at Sidney Sussex college, Cambridge. He left the university without taking a degree. On May 2, 1666, he became a member of Gray's Inn, and was called to the bar on June 16, 1673. Rymer executed translations, wrote plays, prefaces and complimentary pieces. In 1692 Rymer became historiographer royal.

Within eight months of his official appointment Rymer was directed (Aug. 26, 1693) to carry out that great national undertaking with which his name will always be honourably connected, and of which there is reason to believe that Lords Somers and Halifax were the original promoters. The *Codex Juris Gentium Diplomaticus* (1693) of Leibniz was taken by the editor as the model of the *Foedera*. The plan was to publish all records of alliances and other transactions in which England was concerned with foreign powers from 1101 to the time of publication, limiting the collection to original documents in the royal archives and the great national libraries. Unfortunately, this was not uniformly carried out, and the work contains some extracts from printed chronicles. From 1694 Rymer corresponded with Leibniz, by whom he was greatly influenced with respect to the plan and formation of the *Foedera*. While collecting materials, Rymer unwisely engraved a spurious charter of King Malcolm, acknowledging that Scotland was held in homage from Edward the Confessor. When this came to be known the Scottish antiquaries were extremely indignant, and a controversy arose, the documents in which are now rare and valuable.

At last, on Nov. 20, 1704, was issued the first folio volume of the *Foedera, Conventiones, Litterae et cujuscumque generis Acta Publica inter reges Angliae et alios quosvis imperatores, reges, etc., ab* A.D. *1101 ad nostra usque tempora habita aut tractata.* The publication proceeded with rapidity, and 15 volumes were brought out in nine years. Rymer died after the appearance of the last volume, but he had prepared materials for carrying the work down to the end of the reign of James I. These were placed in the hands of Robert Sanderson, his assistant, who produced the remaining five volumes (1715–17 and 1726–35).

Rymer died at Arundel Street, Strand, on Dec. 14, 1713, and was buried in the church of St. Clement Danes. His will was dated July 10, 1713.

In 1810 the Record Commissioners authorized Dr. Adam Clarke to prepare a new and improved edition of the *Foedera*. Six parts, large folio, edited by Clarke, Caley and Holbrooke, were published between 1816 and 1830. Considerable additions were made, but the editing was performed in so unsatisfactory a manner that the publication was suspended in the middle of printing a seventh part. The latter portion, bringing the work down to 1383, was ultimately issued in 1869. A general introduction to the *Foedera* was issued by the Record Commission in 1817, 4to.

The best account of Rymer is to be found in the prefaces to Sir T. D. Hardy's *Syllabus* (1869–85, 3 vols. 8vo).

RYNCHOPIDAE: *see* SKIMMER.

RYOT or **RAYAT,** properly a subject, then a tenant of the soil (from the Arabic *ra'a,* "to pasture"). The word is used throughout India for the general body of cultivators; but it has a special meaning in different provinces. The *ryotwari* tenure is one of the two main revenue systems in India. Where the land revenue is imposed on an individual or community owning an estate, and occupying a position analogous to that of a landlord, the assessment is known as *zamindari;* and where the land revenue is imposed on individuals who are the actual occupants, the assessment is known as *ryotwari.* (*See* ZAMINDAR.)

RYSWICK, TREATY OF, the treaty of peace which in 1697 ended the war which had begun in 1689 between France on the one side and the Empire, England, Spain and Holland on the other (*see* GRAND ALLIANCE, WAR OF THE). The treaty was signed by all the Powers concerned except the Empire on Sept. 20, 1697, a treaty being concluded between France and the Emperor on Oct. 30.

The basis of the peace was that all towns and districts seized

since the treaty of Nijmwegen in 1679 should be restored. Thus France surrendered Freiburg, Breisach and Philippsburg to Germany, although she kept Strasbourg. On the other hand, she regained Pondicherry and Nova Scotia, while Spain recovered Catalonia, and the barrier fortresses of Mons, Luxemburg and Courtrai. The duchy of Lorraine, which for many years had been in the possession of France, was restored to Leopold Joseph, a son of duke Charles V., and the Dutch were to be allowed to garrison some of the chief fortresses in the Netherlands, including Namur and Ypres. Louis undertook to recognize William as king of England, and promised to give no further assistance to James II.; he abandoned his interference in the electorate of Cologne and also the claim which he had put forward to some of the lands of the Rhenish palatinate.

See C. W. von Koch and F. Scholl, *Histoire abregée des traités de paix* (1817–18); A. Moetjens, *Actes et mémoires de la paix de Ryswick* (The Hague, 1725); A. Legrelle, *Notes et documents sur la paix de Ryswick* (Lille, 1894); H. Vast, *Les Grands Traités du règne de Louis XIV.* (1893–99).

RYŪKYŪ ARCHIPELAGO (called also LUCHU), a long chain of islands belonging to Japan, stretching from a point 80 m. S. of Kyushu to a point 73 m. from the N.E. coast of Formosa, and lying between 24° and 30° N. and 123° and 130° E. Japanese cartographers reckon the Luchu islands as 55, having a total coast-line of 768 m., an area of 935 sq.m., and a population of about 455,000. They divide them into three main groups, of which the northern is called Oshimashoto; the central, Okinawa-gunto; and the southern, Sakishima-retto. The terms *shoto, gunto* and *retto* signify "archipelago," "cluster of islands" and "string of islands" respectively. The last-named group is subdivided into Miyako-gunto and Yayeyama-gunto.

Almost at the extreme north of the chain are two islands with active volcanoes; Nakano-shima (3,485 ft.) and Suwanose-shima (2,697 ft.), but the remaining members of the group give no volcanic indications, and the only other mountain of any size is Yuwan-dake (2,299 ft.) in Amami-Oshima. The capital is Shuri in Okinawa, with a picturesque castle. The more modern town of Nafa, on the same island, possesses the principal harbour and has considerable trade.

Though so close to the tropics, the islands cannot be said to present tropical features: the bamboo is rare; there is no high grass or tangled undergrowth; open plains are numerous; the trees are not crowded together; lakes are wanting; the rivers are insignificant; and an unusual aspect is imparted to the scenery by numerous coral crags. The temperature in Nafa ranges from a mean of 82° F in July to 60° in January.

The fauna includes wild boars and deer, rats and bats. Excellent small ponies are kept, together with cattle, pigs and goats. The majority of the islands are infested with venomous snakes called *habu* (*Trimeresurus*), which attain a length of 6 to 7 ft. and a diameter of from 2½ to 3 in. Their bite generally causes speedy death, and in the island of Amami-Oshima they claim many victims every year. The most important cultivated plant is the sugar-cane, which provides the principal staple of trade.

Luchu is noted for the production of particularly durable vermilion-coloured lacquer, which is much esteemed for table utensils in Japan. The islands also manufacture fabrics.

People.—Although the upper classes in Luchu and Japan closely resemble each other, there are palpable differences between the lower classes, the Luchuans being shorter and better proportioned than the Japanese; having higher foreheads, eyes not so deeply set, faces less flattened, arched and thick eyebrows, better noses, less marked cheek-bones and much greater hairiness. The last characteristic has been attributed to the presence of Ainu blood, and has suggested a theory that when the Japanese race entered south-western Japan from Korea, they drove the Ainu northwards and southwards, one portion of the latter finding their way to Luchu, the other to Yezo. Women of the upper class never appear in public in Luchu, and are not even alluded to in conversation, but women of the lower orders go about freely with uncovered faces. The Luchu costume resembles that of Japan. The chief staple of the people's diet is the sweet potato, and pork is the principal luxury. An ancient law, still in force, requires each family to keep four pigs. In times of scarcity a species of sago (obtained from the *Cycas revoluta*) is eaten.

History.—Tinsunshi, "Grandson of Heaven," is the mythical founder of the Luchu monarchy. Towards the close of the 12th century his descendants were driven from the throne, but the old national party soon found a victorious leader in Shunten, son of Tametomo, a member of the famous Minamoto family, who, having been expelled from Japan, had come to Luchu and married there. The introduction of the arts of reading and writing are assigned to Shunten's reign. Chinese invasions of Luchu may be traced back to A.D. 605, but they did not result in annexation; and it was in 1372 that China first obtained from the Luchuans recognition of supremacy. Luchuan relations with Japan had long been friendly, but at the end of the 16th century the king refused Japan assistance against Korea, and in 1609 the prince of Satsuma invaded the islands with 3,000 men, took the capital by storm, captured the king and carried him off to Kagoshima. A few years later he was restored to his throne on condition of acknowledging Japanese suzerainty and paying tribute. The Luchuans nevertheless continued to pay tribute to China also.

The Chinese government, however, though taking a benevolent interest in the welfare of the islanders, never attempted to bring them under military sway. The incongruity of this state of affairs did not force itself upon Japan's attention so long as her own empire was divided into a number of semi-independent principalities. But in 1879 the Japanese government, treating Luchu as an integral part of the mikado's dominions, dethroned its prince, pensioned him as the other feudal chiefs had been pensioned, and converted Luchu into a prefecture under the name of Okinawa. China remonstrating, a conference was held in Peking, when plenipotentiaries of the two empires signed an agreement to the effect that the archipelago should be divided equally between the claimants. The Chinese government, however, refused to ratify this compromise, and the Japanese continued their measures for the effective administration of all the islands. Ultimately (1895) Formosa also came into Japan's possession, and her title to the whole chain of islands ceased to be disputed.

BIBLIOGRAPHY.—*See* Basil Hall, *Account of a Voyage of Discovery to the West Coast of Corea and the Great Loo-choo Island* (London, 1818); Comm. M. C. Perry, *Narrative of the Expedition of an American Squadron to the China Seas and Japan, 1852–1854* (Washington, 1856); B. H. Chamberlain, "The Luchu Islands and their Inhabitants," in the *Geographical Journal*, vol. v. (1895); "Contributions to a Bibliography of Luchu," in *Trans. Asiatic Soc. Japan*, xxiv. (1896); C. S. Leavenworth, "History of the Loo-choo Islands," *Journ. China Br. Royal Asiatic Soc.* xxxvi. (1905); and *see* the *Transactions of the Asiatic Society of Japan* (annual).

RZESZÓW, a town of Poland, in the province of Lemberg, situated on the river Wislok, half-way between Lemberg and Cracow. Pop. (1921), 25,000. It was founded by Casimir the Great and became the seat of a great family, taking their name from the town and dying out in 1583. The old church shows traces of the original structure built by King Casimir in the 14th century. To-day it is a prosperous town in an agricultural and pastoral district.

RZHEV or RZHOV, a town of Russia in the province of Tver, in 56° 20′ N., 34° 19′ E., lying on both sides of the Volga river, here 350 ft. wide, and navigable for steamers. It is a centre for four branch railway lines and a telegraph line, and has a radio-station. Pop. (1926) 31,691, mainly employed in saw-milling, leather work, oil pressing, silk spinning, distilling, brewing and the making of machinery. In the 12th century it was part of the principality of Smolensk, which from 1225 was a dependency of Novgorod. In the 15th century the parts of the town on the left and right banks of the river were governed separately under the rule of independent princes.

S This letter corresponds to the Semitic W (*sin*). The Greek treatment of the sibilants that occur in the Semitic alphabet is somewhat complicated. Semitic ⋔ (*samech*) appears in Greek as Ξ (*ksi*) with the value in early times of *ss*, later and more generally of *x* or *ks*. The name *samech*, however, which through its Aramaean form became in Greek *sigma*, was applied to the letter ϟ which corresponded to Semitic W (*sin*) and stood for *s*. In certain Greek alphabets the letter was called by the name *san*. Semitic *ssade* appears in the early alphabets of Thera and Corinth in the form M representing *s*. These alphabets have no *sigma*, while those that have *sigma* do not have M.

Greek forms of the letter were ϟ, Ɛ, ≤, ϟ, Ɛ. The rounded form appears in the Chalcidic alphabet and from this it was taken into Latin. Etruscan had no rounded form, but it appears in Umbrian and Faliscan. In Latin cursive writing of the 6th century the form was ⅴ, and from this descended the Irish and Saxon forms ſ. The Carolingian form on the other hand was extended above the line instead of below, *e.g.*, ſ. In England in the 17th century the form was ſ and this is occasionally still seen in handwriting when followed by another *s*. The form ß also occurs, the left hand oblique stroke being really part of a ligature with a preceding letter.

NAME OF FORM	APPROXIMATE DATE	FORM OF LETTER
PHOENICIAN	B.C. 1,200	W
CRETAN	1,100-900	? ϟ
THERAEAN	700-600	? ϟ
ARCHAIC LATIN	700-500	Ɛ
ATTIC	600	ϟ Ɛ
CORINTHIAN	600	? ϟ
CHALCIDIAN	600	Ɛ
IONIC	403	ϟ ϟ
ROMAN COLONIAL	PRE-CLASSICAL AND CLASSICAL TIMES	ϟ Ϛ ϟ S
URBAN ROMAN		S
FALISCAN		Ɛ S
OSCAN		Ɛ ϟ
UMBRIAN		Ɔ
CLASSICAL LATIN AND ONWARDS		**S**

THE DEVELOPMENT OF THE LETTER "S" FROM THE PHOENICIAN, THROUGH THE CLASSICAL, DOWN TO MODERN TIMES

The letter represents an unvoiced fricative. This has become voiced in English when intervocalic (e.g., *houses, nose*). In most other positions it remains unvoiced (e.g., *sing, save, stamp, speak, aspect*). When doubled the letter represents the unvoiced sound in all positions (e.g., *grasses, miss, assess*). (B. F. C. A.)

SAADIA, BEN JOSEPH (892–942): *see* SEADIAH.

SAALE, a river of Germany, a tributary of the Elbe, 226 m. long, rises between Bayreuth and Hof in the Fichtelgebirge. It joins the Elbe just above Barby. It is navigable from Naumburg, 100 m., with the help of sluices, and is connected with the Elster near Leipzig by a canal. Its chief affluents are the Elster, Regnitz and Orla (right), and the Ilm, Unstrut, Salza, Wipper and Bode (left). Its upper course is rapid. It is sometimes called the Thuringian or Saxon Saale, to distinguish it from another Saale (70 m. long), a right-bank tributary of the Main.

SAALFELD, a town of Germany, in the republic of Thuringia, situated on the left bank of the Saale, 24 m. S. of Weimar and 77 S.W. of Leipzig by rail. Pop. (1925) 18,177. Saalfeld grew up around the abbey founded in 1075 by Anno, archbishop of Cologne, and the palace built up by the emperor Frederick I. In 1389 it was purchased by the landgrave of Thuringia, and with this district it formed part of Saxony. In 1680 it became the capital of a separate duchy, but in 1699 it was united with Saxe-Coburg, passing to Saxe-Meiningen in 1826. One of the most ancient towns in Thuringia, Saalfeld is still partly surrounded by old walls and bastions, and contains some interesting mediaeval buildings, among them a palace, built in 1679 on the site of the Benedictine abbey of St. Peter, which was destroyed during the Peasants' War; the Gothic church of St. John, dating from the beginning of the 13th century; the Gothic town hall, completed in 1537; the Kitzerstein, a palace standing on an eminence above the river, probably first erected by the German king Henry I., although the present building is not older than the 16th century; and the ruin of the Hoher Schwarm, called later the Sorbenburg, said to have been erected in the 7th century. Saalfeld has a number of prosperous industries, and there are ochre and iron mines in the neighbourhood.

SAAR, a right-bank tributary of the Moselle. It rises in the Donon, an eminence of the Vosges, and flows generally northward through the Saar coalfield to its junction with the Moselle at Konz. The principal towns on the Saar are Saarguemines, Saarbrücken and St. Johann, Saarlouis and Saarburg. The river is navigable up to Saarguemines, a distance of 75 m., where there is connection with the Rhine-Marne canal.

SAARBRÜCKEN, a town in the Saar Territory (*q.v.*), on the Saar, 49 m. by rail N.E. of Metz. Pop. (1925) 125,141. Saarbrücken owes its name to a bridge which existed in Roman times. Its early lords were the bishops of Metz, the counts of

the lower Saargau, and the counts of the Ardennes. From 1381 to 1793 it belonged to the counts of Nassau-Saarbrücken, and then, after having been in the possession of France from 1801 to 1815, it passed to Prussia. St. Johann, Malstatt-Burbach and Saarbrücken were united in 1909. The trade of Saarbrücken is chiefly connected with the produce of the neighbouring coal-mines and that of important iron and glass works. The Saarbrücken coal-fields extend over 70 sq. miles.

SAARBURG, in Alsace-Lorraine: *see* SARREBOURG.

SAARE MAA, an island of Estonia, lying in the Baltic Sea across the mouth of the Gulf of Riga, formerly belonging to Russia under the name of Oesel. It has a length of 45 m., and an area of 1,010 sq.m. The chief town, Arensburg, on the south coast, is a place of 5,000 inhabitants, with summer sea-bathing and mud-baths. In 1227 Oesel was conquered by the Knights of the Sword, and was governed by its own bishops till 1561, when it passed into the hands of the Danes. By them it was surrendered to the Swedes by the peace of Brömsebro (1645), and, along with Livonia, it was united to Russia in 1721, passing to Estonia in 1918.

SAARGEMUND: *see* SARREGUEMINES.

SAARLOUIS, a town in the Saar territory (*q.v.*), situated on the left bank of the Saar, and on the railway from Saarbrücken to Trier, 40 m. S. of the latter. Pop. (1925) 16,298. Saarlouis was founded in 1681 by Louis XIV. of France, and was fortified by Vauban in 1680–85. By the peace of Paris, in 1815, it was ceded to the allies and by them was made over to Prussia. Marshal Ney was born here. It contains a town hall, in which the walls of the council chamber are hung with Gobelins, the gift of Louis XIV. There are coal-mines in the vicinity, and the town has metal foundries and considerable manufactures.

SAAR (SARRE) TERRITORY, an industrial and mining region on the Franco-German frontier, north of Lorraine, near the iron-ore deposits of Briey. Area, 726 sq. miles. Pop. 790,000. Chief town, Saarbrücken (pop. 126,000). Basic industry: coal, good for industrial purposes and gas production and moderate for coke, with 31 mines employing 67,000 men. Average yearly production for 1924–27, in round figures, 13,361,000 tons (slightly less than 1913). Average monthly production for 1927, 1,115,140 tons; stocks on hand, 590,000 tons. Coal reserves (lowest estimate, 9,000 million tons). Metallurgy employs 33,000 men, with a production in 1927 of 1,743,000 tons of pig iron and 1,863,000 tons of steel. Next come ceramic, glass and chemical products industries. The Saar is largely dependent on imports for certain commodities (including food supplies).

Treaty of Versailles and Administrations.—The treaty gave France absolute possession of the mines as compensation for destruction of her northern mines during the World War, and as part-payment towards German reparations. Districts containing these were detached from Germany and formed into the Saar Territory. To assure the welfare of the inhabitants and enable France to exploit the mines, an international governing commission, responsible to the League of Nations as trustee, and exercising all powers of government formerly held by the German empire, Prussia and Bavaria, was instituted for 15 years. (Residence, Saarbrücken.) It has five members, one French, one native inhabitant of Saar (non-French), one British, one Czechoslovak and one Finnish. The president is the British member (in 1928 Sir Ernest Wilton, K.C.M.G.), who acts as its executive. Decisions are taken by majority. Local German officials have pledged fidelity to the commission. The eventual fate (return to Germany, union with France or continuation of League administration) of the whole territory (or part) will be decided in 1935 by the League of Nations, according to plebiscite of the inhabitants. If the whole (or part) is united to Germany, the latter may repurchase ownership of the mines situated in such a part at a price, payable in gold, to be fixed by three experts. Both countries may, however, agree between themselves, before the time fixed for such repayment, to modify Paras. 36–38 of Annexe Saar of the Treaty. The powers of the governing commission are very considerable, but the elected representatives of the people (consultative council) must be consulted before modification of laws or imposition of new taxes (except customs duties). This council has no power of initiative. The mines and customs are administered separately and independently of the commission by two local directors (the mines being the property of the French State, and the Saar having been incorporated within the French customs régime in Jan. 1925). The French franc became the only legal currency in June 1923. In many other respects, the *status quo* under German rule has been maintained; the inhabitants retain their local assemblies, religious liberties, schools, language and nationality. A court of appeal of mainly neutral composition was instituted in 1920. A local gendarmerie (*Landjägerkorps*) of 1,000 men, recruited by the commission, and 700 local police, maintain order, French garrison troops having withdrawn in May 1927. A Saar railways defence force of 800 men (British, Belgian and French) is stationed in the territory to protect the railways.

The naturally somewhat unsympathetic attitude towards the imposed governing body has not prevented the latter caring for the inhabitants' welfare, or from coping successfully with periodical unrest, wages grievances and occasional strikes. The world coal situation has not left the Saar unaffected. The most important strike occurred in Spring 1923 (during Franco-German tension consequent upon Ruhr occupation), when 75,000 miners downed tools for 100 days. Unemployment amounts to 2·7% of total working population. The Treaty of Locarno and widening influence of the League of Nations have created a more conciliatory atmosphere, both politically and industrially. The Saar has no foreign debt, and is exempt from participation in reparation payments; taxation is comparatively low. France's interest in Saar industries was reflected at an economic congress held at Saarbrücken in Oct. 1927. The Franco-German Trade Treaty of 1927 and Customs Convention of March 1928 should improve industrial and commercial conditions yet further.

BIBLIOGRAPHY.—*Führer durch das industrielle Saargebiet* (Handelskammer Saarbrucken, 1926); *Die Staat-und Völkerrechtliche Stellung des Saargebietes* (Wehlberg, 1924); *Le Statut International du Territoire de la Sarre* (Coursier); *League of Nations Official Journals* (1920 onwards); *Treaty of Versailles,* part 3, section iv., and *Annexe Saar; L'introduction du franc en Sarre* (Herly); *Die Geschichte des Saargebietes* (Ruppertsberg). (N. P. C. M.)

SAAVEDRA FAJARDO, DIEGO DE (1584–1648), Spanish diplomatist and man of letters, showed himself master of an excellent prose style in his *Idea de un príncipe político cristiano* (1640), of which there is an English translation by Astry (1700).

His most interesting work is the *República literaria,* published in 1655 as the *Juicio de Artes y Sciencas* under the name of Claudio Antonio de Cabrera.

SABAC, a town in Serbia, Yugoslavia. Pop. (1921), 9,224, of whom a considerable number are Jews. It is a busy river port on the Sava, exporting cereals, prunes, cattle and pigs, with a large weekly market for livestock, cheeses and grain. It is the seat of a bishop, a prefecture and a tribunal. The fortress, now used as a garrison, was built by Mohammed II. in 1470 to facilitate incursions into Slavonia. In the Austro-Turkish wars of 1788–91 the Serbs captured the town, and in the first Serbo-Turkish rising, Kara George, in 1806, defeated the Turks at Mishar, near Sabac. In the World War (1914–18) the Serbs took the town and drove the Austrians back across the Sava.

SABADELL, a town of north-eastern Spain, in the province of Barcelona; on the river Ripoll and on the Barcelona-Saragossa railway. Pop. (1920) 37,529. Cloth, linen, paper, flour and brandy are manufactured, and there are iron foundries and saw-mills. About half the inhabitants are employed in the textile factories. Sabadell is said to be the Roman *Sebendunum,* but in Spanish annals it is not noticed until the 13th century.

SABAEANS. This name is used loosely for the ancient dwellers in south-west Arabia, in the parts now called Yemen, Hadramaut and Asir. Strictly it belongs to one tribe and one State only. The chief source of information about these peoples is their inscriptions, found in their own land and elsewhere; other sources are the Greek geographers, Babylonian and Ethiopic inscriptions, the Bible and the record of Aelius Gallus' expedition. The Arab tradition is not of much value and only for the latest period of the history.

History.—The land produced spices and incense and was a stage on the trade road from India, the Malay archipelago and Africa. At an early date men from Arabia migrated to Abyssinia. The oldest State in Yemen of which anything is known was Ma'īn or Ma'ān, the Minaeans of the Greeks. Its chief towns, Karnawu, Kaminahu and Yathil (the modern Barāḳish) lay in the southern Jōf, about 120km. N.N.E. of Sanaa. Though the names of 20 kings are known the history of Ma'īn cannot be written. Relations with Hadramaut were friendly, indeed they "almost suggest a personal union," and there was a colony or outpost at Ma'īn Muṣrān (now El 'Ola) to guard the trade road to Egypt and Palestine. Later the State of Ḳatabān began to encroach on Minaean territory, and after fighting with and becoming a vassal or ally of Saba, it joined with that State in destroying Ma'īn about 700 B.C. Taking all things into account, the extent of the State, the number of kings, the highly developed script and language, the beginning of the Minaean kingdom cannot be put later than about 1500 B.C. The Sabaeans are mentioned in a Minaean inscription as nomads who raided the caravan road to El 'Ola. This suggests that they may have migrated south to Yemen and founded the kingdom of Saba which bears their name. Perhaps the queen of Sheba lived in the north of Arabia though she has been decorated with the wealth of the kingdom in Yemen. Marib, 100km. east of Sanaa was its capital. An inscription of Sargon (*c.* 715 B.C.) refers to It'i-amara the Sabaean, and one of Sennacherib (*c.* 685 B.C.) to Ka-ri-bi-lu, king of Saba'i. More than once the second successor of a Yt' 'Mr was a Krb'l. Most probably the pair referred to by the Assyrian kings was Yt' 'mr'Byn, who completed the Marib dam, so famous in Arab story, and defeated Ma'īn, killing 45,000 of its inhabitants, and his grandson Krb'l Wtr, who finished the overthrow of Ma'īn and pacified the country. Sennacherib speaks of receiving a present from Saba; even court flattery did not dare to call it tribute. About the same time Ausan, which had been a vassal of Ḳatabān, was crushed along with its ally and neighbour Datinat.

Ḳrb'l Wtr was one of the last of a line of rulers who bore the title Mkrb. It was used also by the earlier lords of Ḳatabān. Not long after, the title of king was adopted by the ruler of Saba and used till 115 B.C. This period is marked by the rise of noble clans and ended with the incorporation of Ḳatabān after war both civil and foreign. At home the Hamdān clan tried for the throne and Himyar appears for the first time among the external enemies with Gedarot which had taken the place of the older Ausan. This year 115 is the first of an era by which some of the later monuments are dated. Now began a serious attack on the trade supremacy of the Sabaeans. The Nabataeans fixed themselves across the trade road to Syria and from Egypt as a base Rome tried to control the sea traffic, besides sending Gallus to attack by land. The royal title now became king of Saba and Du Raidān. About A.D. 300 Hadramaut was conquered and the style became king of Saba, Du Raidān, Hadramaut and Yamnat. This change coincided with a slackening of the Roman effort to control the eastern trade. In the middle of the century Abyssinia conquered the land but already in A.D. 375 there was a native king again. His immediate successor adopted the Jewish religion, a mark of an anti-Roman policy, and in A.D. 525 Du Nuwās, the last Jewish king, was killed and an Abyssinian governor ruled the land. The failure of the dam at Marib was at once an effect and a cause of the national decay. In A.D. 579 Persia conquered the country and in A.D. 628 the governor turned Muslim and submitted to the prophet. Ḳatabān was ruled at first by Mkrb and then by kings who may have been foreigners. The capital Tmna lay some 110km. S.E. of Marib. The capital of Hadramaut was Šabwat, the Sabota of the ancients.

Government and Social Conditions.—The States were built up of tribes mostly held together by local ties not by blood bonds. A tribe contained an aristocracy, tenant vassals, resident aliens and serfs. The name Ḳatabān stood for the kingdom and for the tribes composing it; all were children of the god 'Amm. In Saba the tribe of that name stood apart from the others and held a commanding position in the kingdom. The common phrase is "Saba and the tribes." Saba alone is the child of 'lmkh. Later it was put on a level with the other tribes, and was merged in the militia. The king, tribal aristocrats and the temples were the great landholders. Under the form of government in Ḳatabān (probably much the same in the other States) the king was helped and to some extent controlled by a council of elders, though general policy was decided by the assembly of the tribes. In this the serfs had of course no place. At a later time in Saba the government became feudal; no longer did the tribal assembly decide the allocation of the land, the king granted fiefs. The change may have been helped by the example of the temples, where the retainers had to obey the orders of the god whose land they tilled. The offices of Mkrb and king were hereditary and the latter seems often to have associated his son with himself. The land paid three taxes which are never mentioned separately. The amount paid is not known but it was assessed while the crops were standing. Taxes were paid to the temples also; the tithe is named. Public works were done by forced labour. No list of customs, duties or tolls has been found. In early times the title Ḳbr is given to the chief of a tribe or clan, the governor of a town or district, the chief of the king's serfs and the head of a college of officials; thus there were many offices with one name. Down to the latest times a Ḳbr was the eponym after whom the year was named. Ḳyl is first heard of as the name of a leading section of a tribe in the territory of the god Ta'lab Riyam. The ancestors of a petty king are also called Ḳyl. So it is probable that he was part of the tribal organisation and took the place of the Kbr. The Ḳyn was an administrative officer to serve princes, temples or cities. One was a priest. The name suggests that he was not a part of the tribal organisation.

Trade and the Arts.—Monuments of the south Arabians have been found in Kuweit and Mesopotamia; a coffin of a dealer in spices was found in Egypt and an altar with a bi-lingual dedication to Wadd in Delos. Spices and incense were the chief exports and re-exports. The road from Hadramaut ran through the capitals of the other three States, so it is not surprising that one tried to make itself supreme. The returning caravans certainly brought back female slaves for the temple service; women from Gaza and Yathrib (Medina) are mentioned. The production of incense was in the hands of the nobles, 3,000 families Pliny says, and was surrounded with various tabus, besides a tithe paid to the temple at Šabwat. Great care was given to irrigation and the terracing of the hills into fields. The people were fine masons and stonecutters. The dam at Marib is now in much the same condition as when Hamdani (A.D. 848) saw it. The buildings were made of stone so carefully dressed that often the joints are scarcely visible; the stones are held together by leaden dowels and pillars are strengthened by mortise and tenon joints. Big buildings were often elaborately decorated and several forms of pillars and capitals were in use. The Arab tales of lofty houses with windows of translucent stone are not much exaggerated. The pointed arch was known. Many of the old cisterns are still in use. Many of the inscriptions are beautiful and testify to the skill of the stone-cutters, who were successful with the figures of animals and conventional foliage in low relief. Figures in the round were less good and in statues of men the body is usually a mere block while the face is wooden and expressionless and often out of proportion. Stone pots and jars for household use are simple but neat and well shaped. Most of the metal work that survives is figures of animals and tablets with inscriptions. The figures are generally crude. One can never be sure that the jewellery, pottery and similar small articles really belong to the land and the period. The best things suggest foreign influence or even origin. At first the coins followed Athenian models and the workmanship is very good in some. Later they degenerated till the owl looks like a jar with two round handles. Curiously the standard is Babylonian. The latest coins are weak imitations of Roman coins.

Inscriptions and Language.—The inscriptions are all on stone or metal. Words are separated by a divider and the letters are never joined. In early times the characters are angular but later the corners are rounded and curves appear. The alphabet is connected with the Phoenician; some of the letters are exactly alike, some look as if they had been purposely altered by

those who understood the art of carving in stone, and some not found in Phoenician are formed by differentiation from those that are. Short inscriptions have been found in Mesopotamia in which Sabaean letters are combined with others resembling the Phoenician and Greek forms. It is not certain whether this is an early form of the alphabet or merely a freak. There are 29 letters, the 28 of Arabic and the second form of *s* which is found in Hebrew. The language is classified with Abyssinian as south Semitic and is split into several dialects which differ in grammatical forms and vocabulary. In Ma'īn and Ḳatabān *s* is used in the pronoun of the third person and in the causative form of the verb where Sabaean has *h*. Hadramaut has forms which are phonetically later than the other dialects. The vowels are not indicated so the pronunciation of all words is a matter of guesswork. The writing is usually from right to left but some of the oldest inscriptions read alternately from right to left and from left to right. This is occasionally found in later ones but then for special reasons. Presumably there was a literature but it has disappeared. Sabaean inscriptions have been found in Abyssinia and the Ethiopic alphabet is derived from the south Arabian. Inscriptions in various alphabets derived from the Sabaean are found in different parts of Arabia as far north as Damascus and testify to the widespread influence of the south Arabian kingdoms. Many of the south Arabian inscriptions are hard to interpret and the sense highly problematical.

Religion.—Over 100 gods and many temples are named but next to nothing is known about them. Certain deities are common to the whole land. Šams, the sun, is feminine and perhaps all goddesses are forms of it. 'Aṯtar, the star Venus, is masculine but corresponds philologically with the Babylonian Ishtar and the Canaanite Ashtoreth. The moon, Waraḥ, Šahr or Sīn, occurs occasionally and Il or Ilan is the name of a god as well as a common noun. Each country had its own god; Ma'īn had Wadd, Ḳatabān had 'Amm, Saba had Ilmukah and the clan of Hamdān had Ta'lab Riyam. Perhaps these tribal gods are all forms of the moon. There are indications that the moon, sun and Venus formed a divine family. Others are Anbai, Ḏu Samawi, the enigmatic Nakraḥ and Atirat (the Hebrew Ashera). Other divine names are clearly descriptive; Hawbas "the drier" is the moon according to Hamdāni, Kahil "the old," Sa'd "luck" the giver of good fortune and Ḥukm "judgment" the judge. At times kings seem to have been worshipped (after death?). Springs and water courses were inhabited by spirits. The bull, the bull's horns and the crescent were symbols of the moon and a disc stood for both the sun and Venus. Often one cannot decide which of the two is meant. The people were the offspring and the king the first-born of the god, so the formula runs "god, king and people." There were no images of the gods. To obtain success in one's undertakings it was the custom to dedicate to the god a statue of oneself in stone or figures of men or animals in gold (? gilt). Sacrifices and incense were offered to them. The names for altar and sacrifice are the common Semitic terms, and the altar of incense has among other names that of *miḳtār* as in Hebrew. A variety of spices (the wealth of the land) are named on these altars, as rand, ladanum, costus, tarum, frankincense and others not yet interpreted. Pilgrimages were made at certain seasons and the pilgrim month was named Du Ḥijjatan or Ḏu Maḥajjat. There are many names for the months, some of which refer to agriculture. The name for priest is r-š-w (which may mean giver) and in the El 'Ola texts comes the word l-w-', both masculine and feminine, which looks very like Levite. In later times the name Rahmān for God suggests Jewish influence. Christianity was introduced into South Arabia but it was not favoured because of its association with Abyssinia and the famous church in Sanaa was looked on as a sign of foreign domination. The massacre of Christians in Nejran had political causes as well as religious.

The ruins of the temple at Marib are an open space surrounded by an elliptical wall with the main door at one end of the shorter axis and a smaller at one end of the longer axis. Columns flanked the main door. Outside are several groups of pillars and a set of four may have held a canopy over a throne. The temple at Sirwaḥ is an oblong building with two sets of pillars inside it. One set held up the roof of the sanctuary and the other surrounded a light well. Another at Yeha in Abyssinia is an oblong building with the door at one end. It seems to have been of three storeys.

Bibliography.—A full list of the older books is given in Fr. Hommel, *Südarabische Chrestomathie* (1893), and from 1892 to 1907 in O. Weber, *Studien zur altarabischen Alterthumskunde* iii. (1908). More recent works are: Hartmann, *Die arabische Frage*, (Leipzig, 1909); *Deutsche Aksum Expedition* (1913), Rhodokanakis, *Studien zur Lexicographie und Grammatik des altsüdarabischens* (1915 and 1917), *Katabanische Texte zur Bodenwirtschaft* (1919 and 1922) *Die Bodenwirtschaft im alten Südarabien* (1924), Nielsen, *Der Sabäische Gott Ilmukah* (1910), *Der Dreieinige Gott* (1922), Margoliouth, *Relations between Arabs and Israelites* (1924); *Handbuch der altarabischen Altertumskunde*, ed. Nielsen (1927), in progress; O'Leary, *Arabia before Mohammed* (1927). (A. S. T.)

SABAKI, a river, 400 m. long, in Kenya colony, and which enters the Indian ocean north of Malinda. As the Athi, it rises north of Nairobi, flows across the Kapoté and Athi plains, and turns south under the Yatta ridge. Navigation is interrupted by the Lugard falls, 100 m. from its mouth.

SABANG, a free port situated on the island of Pulo Weh, about 20 m. N. of Kuta Raja, the capital of Acheen, in North Sumatra, Dutch East Indies, 308 m. from Penang (from which it lies due west), 608 from Singapore and 1,100 from Batavia. Pop. 5,251. It is the first port of call in the Malay archipelago for vessels proceeding from Europe eastwards, being the westernmost point at the entrance to the Straits of Malacca. The harbour, built in 1887, principally as a coaling-station (coal being imported, a good deal of it from the Sawah Lunto mines in Sumatra), is sheltered from the heavy swell of the Indian ocean and strong winds by mountains and high stretches of coast-line, break-waters being unnecessary. Coal wharves extend 1,700 ft., the coal being conveyed to vessels by five electric transporters, and vessels drawing 30 ft. can moor alongside; coal is also conveyed to vessels at anchor in Sabang bay (which is extensive) by lighters. There is a small dry dock of 2,600 tons capacity (one of 5,000 tons is to replace it shortly) and slipways for the construction of small ships and lighters up to 1,000 tons. On the eastern side of the bay there is a petroleum wharf and two tanks, with a capacity of 4,000 tons. Goods destined for Northern Sumatra are landed at Sabang, a ferry service being maintained with Oleh Leh, the harbour for Kuta Raja. There is a Dutch settlement at the head of the bay, with a post, telegraph and harbourmaster's office, and there is a cable to Oleh Leh and a wireless station.

SABATIER, LOUIS AUGUSTE (1839–1901), French Protestant theologian, was born at Vallon (Ardèche), in the Cévennes, on Oct. 22, 1839, and was educated at the Protestant theological faculty of Montauban and the universities of Tübingen and Heidelberg. After four years' work as a pastor he became professor of reformed dogmatics at Strasbourg. His markedly French sympathies during the war of 1870 led to his expulsion from Strasbourg in 1872. After five years' effort he established a Protestant theological faculty in Paris, and became professor and then dean. In 1886 he became a teacher in the newly founded religious science department of the École des Hautes Études of the Sorbonne. He died on April 12, 1901.

Among his chief works were *The Apostle Paul* (3rd ed., 1896); *Mémoire sur la notion hébraïque de l'Esprit* (1879); *Les Origines littéraires de l'Apocalypse* (1888); *The Vitality of Christian Dogmas and their Power of Evolution* (1890); *Religion and Modern Culture* (1897); *Historical Evolution of the Doctrine of the Atonement* (1903); *Outlines of a Philosophy of Religion* (1897); and his posthumous *Religions of Authority and the Religion of the Spirit* (1904), to which his colleague Jean Réville prefixed a short memoir. On his theology *see* E. Ménégoz in *Expository Times*, xv. 30, and G. B. Stevens in *Hibbert Journal* (April 1903).

SABATIER, PAUL (1858–1928), French historian, the younger brother of Louis Auguste Sabatier (*q.v.*), was born at Chabrillanoux, in the Cévennes, on Aug. 3, 1858. He studied at the Faculty of Theology in Paris, and in 1885 became vicar of St. Nicholas, Strasbourg, from which he was expelled on declining the German Government's offer of preferment which was conditional on his becoming a German subject. He was then appointed

pastor of St. Cierge, but being compelled by ill-health to give up his cure, he devoted himself to historical research. The appearance of his *Life of St. Francis,* in 1893, made his name, and his reputation was enhanced by the publication of *Collection d'études et de documents,* in 1898. In this work were incorporated the texts of the *Speculum Perfectionis seu Sancti Francisci Assisiensis legenda antiquissima,* an early life of St. Francis written by his disciple, Brother Leo, in 1227, the *Tractatus de Indulgentia Portiunculae,* and the *Actus B. Francisci et sociorum eius;* but Sabatier's criticism and interpretation of the documents were widely challenged. In 1902 Sabatier founded the International Society of Franciscan Studies, and soon after he organized at Assisi *La Refezione Scolastica* for feeding necessitous children, in support of which he delivered a brilliant lecture on Modernism in France at London (1905). In 1914 he sent a striking letter to the president of the International Society of Franciscan Studies in reply to a resolution in favour of peace which had been passed by the council, in which he eloquently set forward the ideals of France in the World War. This was published in *The Times,* Jan. 22, 1915, and was later reprinted as a pamphlet. In 1919 Sabatier became professor of Protestant theology at Strasbourg, which post he held until his death in March 1928.

SABAZIUS, a Phrygian or Thracian deity, frequently identified with Dionysus, sometimes (but less frequently) with Zeus. His worship was closely connected with that of Cybele and Attis and was chthonian and mystic in character. It reached Greece in the 5th century B.C. A few passages state that the Jews worshipped him (confusion with Heb. *sabaōth*?) *see* Val. Max. I., 3, 2. The true etymology of the name is unknown. Whether he was the same as Sozon, a marine deity of Southern Asia Minor, is doubtful. His image and name are often found on "votive hands," a kind of talisman adorned with emblems, the nature of which is obscure. His ritual and mysteries (*Sacra Savadia*) gained a firm footing in Rome during the 2nd century A.D.

See Eisele in Roscher's *Lexikon, s.v.* (bibl.).

SABBATAI SEBI (1626–1676), Jewish mystic, who claimed to be the Messiah, was born in Smyrna, of Spanish descent. As a lad he was attracted by the mysticism of Luria (*q.v.*), which impelled him to adopt the ascetic life. He passed his days and nights in a condition of ecstasy. He began to dream of the fulfilment of Messianic hopes, being supported in his vision by the outbreak of English Millenarianism. Christian visionaries fixed the year 1666 for the millennium. Sabbatai's father (Mordecai) was the Smyrna agent for an English house, and often heard of the expectations of the English Fifth Monarchy men. In 1648 (the year which Kabbalists had calculated as the year of salvation) Sabbatai proclaimed himself Messiah, and in Constantinople came across a man, who pretended that he had been warned by a prophetic voice that Sabbatai was indeed the long-awaited Redeemer. At first his adherents were a small circle of devotees who kept their faith a secret. He charmed men by his sweet singing of Psalms, and children were always fascinated by him. He journeyed to Jerusalem, where a local pasha was opposing the Jews, and Sabbatai secured help for them from Cairo. At Cairo Sabbatai married, and secured the support of Raphael Halebi. With a retinue of believers, a charming wife and considerable funds, Sabbatai returned in triumph to the Holy Land. Nathan of Gaza assumed the rôle of Elijah, the Messiah's forerunner, proclaimed the coming restoration of Israel and the salvation of the world through the bloodless victory of Sabbatai "riding on a lion with a seven-headed dragon in his jaws" (Graetz). Again 1666 was given as the apocalyptic year.

Threatened with excommunication by the Rabbis of Jerusalem, Sabbatai returned to Smyrna (autumn of 1665). Here he was received with wild enthusiasm. From the Levant the Sabbataean movement spread to Venice, Amsterdam, Hamburg and London. Sabbatai no longer doubted the reality of his mission. Day by day he was hailed from all the world as king of the Jews. At the beginning of the fateful year 1666 Sabbatai went (or was summoned) to Constantinople. Here he was arrested, but reports of miracles continued, and many of the Turks were inclined to become converts. Soon he was transferred to Abydos. In September Sabbatai was brought before the Sultan, and he had not the courage to refuse to accept Islam. The Messianic imposture ended in the apostacy of Sabbatai. In 1676 he died in obscurity in Albania. A sect of Sabbataeans—the Dormeh of Salonica—survived him and for many years the controversy for and against his claims left an echo in Jewish life.

See Graetz, *History of the Jews,* vol. v. ch. iv. 1. Zangwill has a brilliant sketch of Sabbatai's career in his *Dreamers of the Ghetto.*

SABBATH, the seventh and especially sacred day of the week among the Jews.

Observance.—How tenaciously the Jews held to the observance of the Sabbath may be seen from the fact that on this account the Romans found themselves compelled to exempt them from military service. The rules of the Scribes enumerated thirty-nine main kinds of work forbidden on the Sabbath, and each of these prohibitions gave rise to new subtleties. When the disciples of Jesus plucked ears of corn on the Sabbath they had, according to the Rabbinical views, violated the third of the thirty-nine rules, which forbade harvesting; and in healing the sick Jesus himself broke the rule that a sick man should not receive medical aid unless his life was in danger. In fact, as Jesus put it, the Rabbinical theory seemed to be that the Sabbath was not made for man but man for the Sabbath, the observance of which was so much an end in itself that the rules prescribed for it did not require to be justified by appeal to any larger principle of religion or humanity. The precepts of the law were valuable in the eyes of the Scribes because they were the seal of Jewish particularism, the barrier erected between the world at large and the exclusive community of Yahweh's grace. The ideal at which these rules aimed was absolute rest on the Sabbath from everything that could be called work; and even the exercise of those offices of humanity which the strictest Christian Sabbatarians regard as service to God, and therefore as specially appropriate to his day, was looked on as work. To save life was allowed; danger to life "superseded the Sabbath." The positive duties of its observance were to wear one's best clothes, eat, drink and be glad (justified from Isaiah lviii. 13). A more directly religious element, it is true, was introduced by the practice of attending the synagogue service, but even this service was regarded as a meeting for instruction in the law rather than as an act of worship.

Attitude of Jesus and Early Christian Church.—The general position which Jesus takes up, that "the Sabbath is made for man and not man for the Sabbath," is only a special application of the wider principle that the law is not an end in itself but a help towards the realization in life of the great ideal of love to God and man, which is the sum of all true religion. But Jesus further maintains that this view of the law as a whole, and the interpretation of the Sabbath law which it involves, can be historically justified from the Old Testament. In this connection He introduces two of the main methods to which historical criticism of the Old Testament has recurred in modern times: He appeals to the oldest history rather than to the Pentateuchal code as proving that the later conception of the law was unknown in ancient times (Matthew xii. 3 *seq.*), and to the exceptions to the Sabbath law which the Scribes themselves allowed in the interests of worship (v. 5) or humanity (v. 11), as showing that the Sabbath must originally have been devoted to purposes of worship and humanity, and was not always the purposeless arbitrary thing which the Scribes made it to be. Modern criticism of the history of Sabbath observance among the Hebrews has done little more than follow out these arguments in detail, and show that the result is in agreement with what is known as to the dates of the several component parts of the Pentateuch.

In the early Christian church Jewish Christians continued to keep the Sabbath, like other points of the old law. Eusebius records that the Ebionites observed both the Sabbath and the Lord's day, the weekly celebration of the resurrection. This practice obtained to some extent in wider circles, for the *Apostolical Constitutions* recommend that the Sabbath shall be kept as a memorial feast of the creation, as well as the Lord's day as a memorial of the resurrection. The festal character of the Sabbath was long recognized in a modified form in the Eastern

church by a prohibition of fasting on that day, which was also a point in the Jewish Sabbath law. On the other hand Paul from the first days of Gentile Christianity, laid it down definitely that the Jewish Sabbath was not binding on Christians. Controversy with Judaizers led in process of time to direct condemnation of those who still kept the Jewish day (*e.g.*, Co. of Laodicea, A.D. 363). For discussion of the difficult problem when and how the Christian Sunday superseded and took on some characteristics of the Jewish Sabbath *see* SUNDAY. (W. R. S.; S. A. C.)

Origin.—What was the origin of the Sabbath? What part did it play in the life of the Israelite nation before the exile? To these questions confident answers have been given, but the material upon which we can base our conclusions is not sufficiently extensive or clear to warrant dogmatism. It is a noteworthy fact that there is no evidence of Sabbath observance in the patriarchal period: there is, indeed, very little material that can be reckoned as pre-exilic.

There are four passages which seem to point to the conclusion that in the earlier times a close connection existed between the Sabbath and the new-moon festival. In 2 Kings iv. 23 the Shunammite's husband asks, when she proposes to visit the prophet, "Wherefore wilt thou go to him to-day? it is neither new moon nor sabbath." Among the religious observances which Isaiah names as offensive to Yahweh he links together (i. 13) "new moon and sabbath." In Hosea ii. 11 Yahweh says of Israel "I will cause all her mirth to cease, her feasts, her new moons, her sabbaths, and all her solemn assemblies." Amos (viii. 5) denounces the traders who say "When will the new moon be gone, that we may sell corn? and the sabbath, that we may set forth wheat?" The reference in Hosea would make it probable that the Sabbath was a season of festal joy, and that in Amos makes it clear that there was at any rate some cessation of ordinary business activities on that day. By inference this latter conclusion may be deduced from the passage in Kings. The question of the Shunammite's husband suggests that the ass for which she had asked in order to make her journey would have been available, even in harvest time, had the day been a new moon or a Sabbath: the inference surely is that on those days the work of harvesting stood still, so that the beasts would not be required for labour on the farm. This combination of new moon and Sabbath suggested to Meinhold (*Sabbat und Woche im Alten Testament*, 1905) that originally the Sabbath must have been the day of the full moon. This theory is very plausible, though Meinhold's endeavour to explain how the full moon feast came to be transformed into the regular seventh day Sabbath of abstinence is not convincing. Kittel has attacked the fundamental hypothesis on which the theory rests. He contends that the existence of a full moon feast in ancient Israel is nowhere demonstrable, and points out that while the new moon festival has maintained itself in later Judaism there is no survival of a full moon festival. This last argument, however, might easily be countered, for if it be a fact that the full moon festival was converted into the weekly Sabbath the disappearance of the former would be amply accounted for.

Meinhold regards the Decalogue as dating, at the earliest, from the exile, and rejects decidedly the idea that before the exile the Hebrews had a seven day week running throughout the year. Many critics, however, tend distinctly towards the belief that the Decalogue in some simple form may very well go back to the time of Moses. The story of the manna in Exodus xvi. in its original form may represent Moses as the discoverer of the Sabbath; and if so, this would be evidence that in certain streams of tradition Moses was regarded as the sponsor in Israel of the Sabbath. If the kernel of the commandments be accepted as Mosaic the institution of the Sabbath goes back to the very beginnings of the history of Israel. In the decalogue of Exodus xx. 3–17 the command "remember the sabbath day" follows immediately upon the commandments which are concerned with Yahweh and Yahweh's name. This shows how great must have been the importance of the Sabbath, and suggests that it was regarded as in an especial sense Yahweh's day, a fact for which the Old Testament offers abundant confirmation. The emphasis on the Sabbath in this form of the Decalogue is the more noteworthy in view of the fact that it ignores all the other feasts and rites. It is highly probable, considering the close association between Yahweh and the Sabbath, that the celebration of the latter as a festival goes back to the time when Yahweh first became the national deity. This does not, of course, conflict with the theory that it was connected also with the changes of the moon, which, indeed, seems to be the most probable hypothesis. Whether originally it was the day of the full moon only, or whether the half-moon days were also Sabbaths, it is difficult to say.

It has been objected that a regular rest day like the Sabbath could be celebrated only by a settled agricultural people. Apart from the fact that the ancestors of the Israelite nation were not all nomads it may be urged that even the life of the desert was much more artificial than we have been accustomed to suppose. The wandering herdsmen have many trades. Some of them breed cattle. Slaves and artisans have always been known in the desert. At the oases corn and fruit are cultivated. And peoples in a comparatively primitive state of culture observe rest-days, though these are not as a rule periodic, and are not necessarily consecrated to a particular deity or employed for religious purposes. Hutton Webster (*Rest Days*, 1911), regards the restrictions which characterize them as being in the nature of tabus. Such days are observed at critical seasons, among which are the changes of the moon. He instances in particular the custom of Hawaii, according to which on a strict tabu day there must be no fire or light, and general gloom and silence prevail. No canoes may be launched, no one may bathe, or even be seen out of doors unless his presence is required at the temple. The old Hawaiian system included a remarkable approximation to the institution of a weekly Sabbath. In each lunar month four periods were tabu, the 3rd to the 6th nights, the time of the full moon, including the 14th and 15th nights, the 24th and 25th nights, and the 27th and 28th nights. On the other hand among some peoples such seasons of abstinence developed into joyous festivals and holidays. "Among many peoples in the lower culture," says Hutton Webster, "the time of the new moon and full moon, much less commonly each half moon, is a season of restriction and abstinence." Such days may be dedicated to a god, or may simply be regarded as unlucky days.

A theory that the Jewish Sabbath, name and institution alike, is derived from Babylonian sources was propounded by Friedrich Delitzsch (*Babel and Bible*) and has been widely accepted. To quote Delitzsch, "Since the Babylonians also had a Sabbath (*shabattu*) on which, for the purpose of conciliating the gods, there was a festival—that is to say, no work was to be done—and since the 7th, 14th, 21st and 28th days of the month are marked on a calendar of sacrifices and festivals dug up in Babylonia as days on which 'the shepherd of the great nations' (*i.e.*, the king) shall eat no roast flesh, shall not change his dress, shall not offer sacrifice, as days on which the king shall not mount the chariot, or pronounce judgment, the magus shall not prophesy, even the physician shall not lay his hand upon the sick, in short, as days which are not suitable for any affair, it is scarcely possible for us to doubt that we owe the blessings decreed in the Sabbath or Sunday day of rest in the last resort to that ancient and civilized race on the Euphrates and Tigris."

The evidence adduced by Delitzsch, plausible as it seems, is not however, conclusive. The inscription he quotes—which, though it comes from the "library" of Asurbanipal, is evidently of Babylonian origin—refers only to a particular month, the intercalary Elul, and it is not shown that these special days occurred in the other months. Further, the prohibitions apply only to particular persons such as the king and the physician. It should be noted, too, that the calendar specifies in addition to the 7th, 14th, 21st and 28th days also the 19th as an "evil day" on which the restrictions apply. It is explained that the 19th is the 49th day from the beginning of the preceding month, that is, the end of the seventh week from that starting-point. But even if this explanation is correct the fact would remain that the day of restriction occurs oftener than at the end of each week. In order to discover whether there is evidence of a general restriction of business in Babylonia on particular days C. H. W. Johns (*Ency. Brit.* 11th ed. vol. xxiii. 961 *seq.*) analyzed a great many business

contracts, classifying them according to the day of the week on which they were dated. The result showed that on all these "evil days" business was carried on, though, if the documents may be taken as fairly representative, there was a marked diminution of business on the 19th day of the month. During the First Dynasty of Babylon, and in the seventh century B.C., all these days show a falling off in the number of trading transactions. But, on the other hand, during the Kassite period trade went on much as usual on all days, including even the 19th day of the month. In any case these "evil days" seem different from the early Hebrew Sabbath; the latter was just the day when the Shunammite woman might actually have been expected to go on a journey, whereas the former were just the days when the king might not ride in his chariot.

It is true that the Babylonians had a day called *shabattum* or *shapattum*. This seems, however, to be distinct from the days of restriction dealt with in the calendar tablet. In a syllabary *shapattum* is equated to *um nuḫ libbi*, that is, "day of the rest of the heart." It has been urged that here is a proof that the Babylonians had a Sabbath which, like that of the Hebrews, was a rest day. But it is clear from the Babylonian penitential psalms that the real meaning of the words is "day when the heart (of the gods) is propitiated." A tablet discovered by Pinches shows that the *shapattum* was the 15th day of the month. A passage in the astronomical poem of the Babylonian epic *Enuma elish* quite clearly shows that the *shapattum* is the day of the full moon. The verb *shapatu* is elsewhere explained as equivalent to the verb *gamaru*, meaning "to be complete, full." None of the attempted etymologies for Sabbath from the Hebrew is successful, probably for the reason that the word is older than the Hebrew language. It is not unreasonable to suppose that both *shapattum* and *sabbath* are descended from a word belonging to the older tongue from which both the Babylonian language and the Hebrew developed, and that its prime meaning is "full moon day." This would confirm Meinhold's theory that among the Hebrews the Sabbath was originally the full moon day. But the fact that the name is derived from a common source, and that the day itself among both peoples is originally the day of the full moon, must not blind us to the truth that the Babylonians had no real equivalent to the Jewish Sabbath at regular seven-day intervals. Had there been any great likeness between the ways in which the *shapattum* and the Sabbath were celebrated the latter could hardly have been insisted on as a distinctive mark of the Jews.

Sabbatical Year.—An ancient Hebrew law enjoined that in every seventh year the land should lie fallow (Exodus xxiii. 11); vineyard and olive garden, too, are to remain uncultivated. Whatever may be produced under these conditions is to be for the poor and the wild beasts. It is extremely unlikely that this was meant to apply to all cultivated land in the same year. If any attempt were made to carry out this injunction the Sabbatical year must have varied from plot to plot. The later Law of Holiness does, however prescribe one definite year for all land. According to Josephus the Sabbatical year was a close time for warlike operations. From the same authority we learn that the Jews requested Alexander to remit tribute during the Sabbatical year, and that Tacitus complained that the Jews devoted every seventh year to idleness. Similar is the rule that there should be release of debtors from their debts in each seventh year.

The term has been adopted in universities for a period of freedom from academic duties every seventh year.

BIBLIOGRAPHY.—*See*, besides the literature already cited, Hehn, *Siebenzahl u. Sabbat bei den Babyloniern u. im Alten Testament* (1907); "Sabbath" in *E.R.E.* and Wardle, *Israel and Babylon*, pp. 236 *sqq.*

(W. L. W.)

SABBATION or SAMBATYON, a river (1) natural and (2) supernatural. (1) The Targum pseudo-Jonathan to Exod. xxxiv., 10 states that the Ten Tribes were exiled beyond the Sambatyon: this is repeated in Gen. Rabba lxxiii.: Num. Rab. xvi. and Yalqūṭ Genesis 984. This is therefore a river in Media, identified by Ramban (Deut. xxxii., 26) with the Gozan (II Kings xvii., 6) and a natural stream. Fuenn (*Pirḥe Çafōn* ii., 133) identifies this with the Zab in Adiabene which Xenophon calls Sabatos and which became corrupted to Sabbation. This river must be sharply distinguished from that mentioned by Josephus (*War*, vii., v., 1) who makes Titus on his return from the destruction of Jerusalem pass, near Beirut, a river which, flowing only on one day in seven, is called after the Sabbath. It will be noted that this river is in Palestine, not in Media and that it is periodic.

(2) With Pliny (*Hist. Nat.* xxxi., 2) two supernatural elements enter the story. First the river rests one day in seven instead of flowing on that day and secondly that day is the Sabbath. A variant of the miracle occurs in Gen. Rabba xi. In the 9th century the mysterious Eldad the Danite carried the wonder still further. In his chronicle the river is waterless but full of sand and stones which roll with a great noise during the week-days but rest on the Sabbath. Th. Noeldeke (*Beiträge zur Gesch. d. Alexanderromans*, 48) traces the Sambatyon in the Alexander legend. The river of sand (*Wadi ar-Raml*) is mentioned by Kazwini (*Cosmography* ed. Wüstenfeld, ii., 17) and by Mas'udi. Benjamin of Tudela mentions the ten tribes and the Gozan river but he ascribes no miraculous properties to it, save that David Alroy crossed it on his mantle. In the 17th century the miracles have increased. Travellers from India relate that the sand or water is curative of leprosy. Menasseh ben Israel states that the sand, if kept in a bottle moves about during the week but rests on Sabbath. It has been suggested that the sand element in the story is to be explained by a confusion of a Hebrew name נהר חל (*Nehar Ḥōl*) which could mean either "weekday river" or "river of sand."

See *Jew. Enc. s.v.* and A. Neubauer, *Jew. Quart. Rev. I.*, "Where are the Ten Tribes?"

SABELLIC (from Latin *Sabellus*, Samnite) has often been used of a minor group of the Italic dialects, namely the pre-Latin dialects of the Paeligni, Marrucini and Vestini (better called North Oscan), of the Volsci, and of the Marsi, Aequi, Sabini and other central Italian tribes (conveniently called Latinian); these dialects are all closely related to Oscan (*q.v.*). The same name, or sometimes Old Sabellic, is also used, but inaccurately, to describe two small but distinct groups of inscriptions from various sites near the east coast of central Italy (1) from Novilara and Fano (near Pesaro); (2) from Belmonte Piceno, Cupra Marittima, Castignano, Bellante, Grecchio and Superequo. These may be better designated, by "East Italic."

The second group, not more recent in date than the 6th century B.C., are doubtless the oldest written documents known from Italian soil. The lines of writing run alternately left to right and right to left, the positions of the letters being both reversed and inverted in the lines written right to left. Their alphabet is clearly of the same Chalcid-Etruscan origin as that of all the other alphabets of ancient Italy (except the Greek and Phoenician), but shows some peculiarities which suggest direct Greek influence; the language, still untranslated, will probably prove to be an Indo-European (two I.-E. stems, *pater* father, *mater* mother have been identified) and ancient Illyrian dialect (*meitime* is an Illyrian name). For it is known from the elder Pliny (*N.H.* 3,110, *cf.* 113), from the Iguvine tables (*iapuzkum* Iapydian, *i.e.*, belonging to the Illyrian Iapydes), and from archaeological evidence, that there were Illyrian settlers in or near that district, the ancient Picenum, where these inscriptions were discovered.

But the documents of the Novilara group are later in date, distinct in alphabet—this is perhaps of Etruscan origin, but shows certain resemblances both to the Umbrian and to the Oscan alphabets—and probably also in dialect. The suggestion that the dialect, however, is allied to Etruscan itself, is quite unsupported by the evidence; the decorative *motifs*, for example the spiral, which appear on all three of the inscriptions of this group, point rather to the opposite coast of the Adriatic, where similar *motifs* occur, especially round Nesazio, on contemporary monuments; and there is nothing in the word-forms of these documents which may not be Indo-European, while the characteristic Etruscan syncope and elision (at least in the writing) are entirely lacking.

BIBLIOGRAPHY.—R. von Planta, *Grammatik der oskisch-umbrischen Dialekte*, vol. ii., pp. 551 *sqq.*, 664 *sqq.* (1897); two new inscriptions discovered since 1897 were reported in *Rendiconti d. R. Acc. dei*

Lincei, ser. 5, vol. xvii (1908), pp. 681 *sqq.*, and *Notizie degli Scavi*, 1903, pp. 101 *sqq.* *See* also G. Herbig in M. Ebert's *Real-lexikon der Vorgeschichte, s.vv.* Novilara, Vorsabeller (1927–; bibl.), and R. S. Conway in *Cambridge Ancient History* vol. iv. (1926) p. 445. The inscriptions have been edited anew by J. Whatmough, *Prae-Italic Dialects of Italy: Part II.* (in the press, bibl.), Nos. 342–355. (J. Wh.)

SABELLIUS (*fl.* 230), early Christian presbyter and theologian, was of Libyan origin, and came from the Pentapolis to Rome early in the 3rd century. He became the leader of the strict Modalists (who regarded the Father and the Son as two aspects of the same subject) whom Calixtus had excommunicated along with their most zealous opponent Hippolytus. His party continued to subsist in Rome for a considerable time, and withstood Calixtus as an unscrupulous apostate. In the West, however, the influence of Sabellius seems never to have been important; in the East, on the other hand, after the middle of the 3rd century his doctrine found much acceptance, first in the Pentapolis and afterwards in other provinces. It was violently controverted by the bishops, notably by Dionysius of Alexandria, and the development in the East of the philosophical doctrine of the Trinity after Origen (from 260 to 320) was very powerfully influenced by the opposition to Sabellianism.

Sabellian Doctrine.—The Sabellian doctrine itself, however, during the decades above mentioned underwent many changes in the East and received a philosophical dress. In the 4th century this and the allied doctrine of Marcellus of Ancyra were frequently confounded, so that it is exceedingly difficult to arrive at a clear account of it in its genuine form. Sabellianism, in fact, became a collective name for all those Unitarian doctrines in which the divine nature of Christ was acknowledged. The teaching of Sabellius himself was very closely allied to the older Modalism ("Patripassianism") of Noetus and Praxeas, but was distinguished from it by its more careful theological elaboration and by the account it took of the Holy Spirit. His central proposition was to the effect that Father, Son and Holy Spirit are the same person, three names thus being attached to one and the same being. What weighed most with Sabellius was the monotheistic interest.

Sabellius further maintained that God is not at one and the same time Father, Son and Spirit, but, on the contrary, has been active in three apparently consecutive manifestations or energies—first in the πρόσωπον of the Father as Creator and Lawgiver, then in the πρόσωπον of the Son as Redeemer, and lastly in the πρόσωπον of the Spirit as the Giver of Life. It is by this doctrine of the succession of the πρόσωπα that Sabellius is distinguished from the older Modalists. In particular it is significant, in conjunction with the reference to the Holy Spirit, that Sabellius regards the Father also as merely a form of manifestation of the one God—in other words, has formally put Him in a position of complete equality with the other Persons. This view prepares the way for Augustine's doctrine of the Trinity. Sabellius himself appears to have made use of Stoical formulas (πλατύνεσθαι συστέλλεσθαι), but he chiefly relied upon Scripture, especially such passages as Deut. vi. 4; Exod. xx. 3; Isa. xliv. 6; John x. 38. Of his later history nothing is known; his followers died out in the course of the 4th century.

The sources of our knowledge of Sabellianism are Hippolytus (*Philos*, bk. ix.), Epiphanius (*Haer.* lxii.) and Dionys. Alex. (*Epp.*); also various passages in Athanasius and the other fathers of the 4th century. For modern discussions of the subject *see* Schleiermacher (*Theol. Ztschr.* 1822, Hft. 3); Lange (*Ztschr. f. hist. Theol.* 1832, ii. 2); Döllinger (*Hippolyt u. Kallist.* 1853); Zahn (*Marcell v. Ancyra*, 1867); R. L. Ottley, *The Doctrine of the Incarnation* (1896); various histories of Dogma, and Harnack (*s.v.* "Monarchianismus," in Herzog-Hauck, *Realencyk. für prot. Theol. und Kirche*, xiii. 303). (A. Ha.)

ṢĀBIANS. The Ṣābians (*aṣ-Ṣābi'ūn*) who are first mentioned in the Koran (ii. 59, v. 73, xxii. 17) were a semi-Christian sect of Babylonia, the Elkesaites, closely resembling the Mandaeans or so-called "Christians of St. John the Baptist," but not identical with them. How Mohammed understood the term "Ṣābians" is uncertain, but he mentions them together with the Jews and Christians. The older Mohammedan theologians were agreed that they possessed a written revelation and were entitled accordingly to enjoy a toleration not granted to mere heathen. Curiously enough, the name "Ṣābian" was used by the Meccan idolaters to denote Mohammed himself and his Muslim converts, apparently on account of the frequent ceremonial ablutions which formed a striking feature of the new religion.

From these true Ṣābians the pseudo-Ṣābians of Ḥarrān (*Carrhae*) in Mesopotamia must be carefully distinguished. In A.D. 830 the Caliph Ma'mūn, while marching against the Byzantines, received a deputation of the inhabitants of Ḥarrān. Astonished by the sight of their long hair and extraordinary costume, he inquired what religion they professed, and getting no satisfactory answer threatened to exterminate them, unless by the time of his return from the war they should have embraced either Islam or one of the creeds tolerated in the Koran. Consequently, acting on the advice of a Mohammedan jurist, the Ḥarrānians declared themselves to be "Ṣābians," a name which shielded them from persecution in virtue of its Koranic authority and was so vague that it enabled them to maintain their ancient beliefs undisturbed. There is no doubt as to the general nature of the religious beliefs and practices which they sought to mask. Since the epoch of Alexander the Great Ḥarrān had been a famous centre of pagan and Hellenistic culture; its people were Syrian heathens, star-worshippers versed in astrology and magic. In their temples the planetary powers were propitiated by blood-offerings, and it is probable that human victims were occasionally sacrificed even as late as the 9th century of our era. The more enlightened Ḥarrānians, however, adopted a religious philosophy strongly tinged with Neoplatonic and Christian elements. They produced a brilliant succession of eminent scholars and scientists who transmitted to the Muslims the results of Babylonian civilization and Greek learning, and their influence at the court of Baghdad secured more or less toleration for Ṣābianism, although in the reign of Harūn al-Rashīd the Ḥarrānians had already found it necessary to establish a fund by means of which the conscientious scruples of Muslim officials might be overcome. Accounts of these false Ṣābians reached the West through Maimonides, and then through Arabic sources, long before it was understood that the name in this application was only a disguise.

See also "Nouveaux documents pour l'étude de la religion des Harraniens," by Dozy and De Goeje, in the *Actes* of the sixth Oriental congress, ii. 281 f. (1885); and Chwolsohn, *Sabier und der Sabismus* (1856; complete discussion of sources).

SABICU WOOD is the produce of a large leguminous tree, *Lysiloma Sabicu*, a native of Cuba. The wood has a rich mahogany colour; it is exceedingly heavy, hard and durable.

SABINE, SIR EDWARD (1788–1883), English astronomer and geodesist, was born in Dublin on Oct. 14, 1788, and was educated at the Royal Military Academy, Woolwich. He was appointed astronomer of the expeditions commanded by Ross and Parry in search of the North-West Passage in 1818 and 1819. Then he went to Spitzbergen and the tropical coasts of Africa and America, where he conducted pendulum experiments for determining the figure of the earth. In 1821 he conducted experiments on the length of the seconds pendulum in London and Paris, his results appearing in *Philosophical Transactions*, 1828. The greater part of his life was devoted to researches on terrestrial magnetism. The establishment of magnetic observatories in various parts of British territory all over the globe was accomplished mainly on his representations. He discovered (1852) a connection between the periodic variation of sunspots and magnetic disturbances on the earth.

Sabine was president of the Royal Society from 1861–1871; received the Copley medal of that society in 1821 and the Royal medal in 1849; and was made K.C.B. in 1869. He died at East Sheen, Surrey, on June 26, 1883.

SABINI. This was an ancient tribe of Italy which was more closely in touch with the Romans from the earliest recorded period than any other Italic people. They dwelt in the mountainous country east of the Tiber, and north of the districts inhabited by the Latins and the Aequians in the heart of the Central Apennines. Their boundary, between the southern portion of the Umbrians on the north-west, and of the Picentines on the north-east,

was probably not very closely determined. The traditions connect them closely with the beginning of Rome, and with a large number of its early institutions, such as the worship of Jupiter, Mars, and Quirinus, and the patrician form of marriage (*confarreatio*).

Of their language as distinct from that of the Latins no articulate memorial has survived, but we have a large number of single words attributed to them by Latin writers, among which such forms as (1) *fircus*, Lat. *hircus;* (2) *ausum*, Lat. *aurum;* (3) *novensiles*, Lat. *novensides* ("gods of the nine seats"); (4) the river name *Farfarus*, beside pure Lat. *Fabaris* (Servius, *ad Aen.* vii. 715); and (5) the traditional name of the Sabine king, *Numa Pompilius* (contrasted with Lat. *Quinctilius*), indicate clearly certain peculiarities in Sabine phonology: namely, (1) the representation of the Indo-European palatal aspirate *gh* by *f* instead of Lat. *h;* (2) the retention of *s* between vowels; (3) the change of medial and initial *d* to *l;* (4) the retention of medial *f* which became in Latin *b* or *d;* and (5) the change of Ind.-Eur. *q* to *p*. The tradition (*e.g.*, Paul *ex Fest.* 327 M.) that the Sabines were the parent stock of the Samnites is directly confirmed by the name which the Samnites apparently used for themselves, which, with a Latinized ending, would be *Safini* (*see* SAMNITES and the other articles there cited, dealing with the minor Samnite tribes).

To determine the ethnological relation of these tribes, whom we may call "Safine," to the people of Rome on the one hand, and the earlier stratum or strata of population in Italy on the other, linguistic and archaeological material must be examined. Archaeological evidence connects the Sabines with the patricians of Rome, (*see* ROME, *Ancient History*). What language did the Sabines speak? Was it most nearly akin to Latin or to Oscan or again to Umbrian and Volscian? Festus, though he continually cites the *Lingua Osca*, never spoke of *Lingua Sabina*, but simply of Sabini, and the same is practically true of Varro, who never refers to the language of the Sabines as a living speech, though he does imply (v. 66 and 74) that the dialect used in the district differed somewhat from urban Latin. The speech therefore of the Sabines by Varro's time had become too Latinized to give us more than scanty indications of what it had once been. The language of the Samnites was that which is now known by the name of Oscan.

It appears that in, say, the 7th century, B.C., the Safines spoke a language not differing in any important particulars from that of the Samnites, generally known as Oscan; and that when this warlike tribe combined with the people of the Latian plain to found or fortify or enlarge the city of Rome, and at the end of the 6th century to drive out from it the Etruscans, who had in that century become its masters, they imposed upon the new community many of their own usages, especially within the sphere of politics, but in the end adopted the language of Latium henceforth known as *lingua Latina*.

See R. S. Conway, *Italic Dialects* p. 351 (Cambridge, 1897). For the history of the Sabine district *see* Mommsen, *C.I.L.* ix. p. 396; and Beloch, "Der italische Bund unter römischer Hegemonie" (Leipzig, 1880) and "La Conquista Romana della regione Sabina," in the *Rivista di storia antica* ix. p. 269 (1905).

SABINIANUS, pope from 604 to 606, the successor of St. Gregory the Great.

SABLE, the name of a small quadruped, closely akin to the martens, and known by the zoological name of *Mustela zibellina*. It is a native of Siberia and famous for its fur. The name appears to be Slavonic in origin, whence it has been adapted into various languages. The Eng. and Med. Lat. *sabellum* are from the O.Fr. *sable* or *saible* (*see* MARTEN and FUR). "Sable" in English is a rhetorical or poetical synonym for "black." This comes from its usage in heraldry (first in French) for the colour equivalent to black.

SABLE ANTELOPE, a large and handsome South African antelope (*Hippotragus niger*), exhibiting the rare feature of blackness or dark colour in both sexes. The sable and the roan antelope (*H. equinus*) belong to a genus nearly related to the oryxes (*q.v.*), but distinguished by the stout, thickly ringed horns (present in both sexes) rising vertically from a ridge over the eyes at an obtuse angle to the plane of the lower part of the face, and then sweeping backwards in a bold curve. The muzzle is hairy; there is no gland below the eye; the tail is long and tufted. Sable antelopes are among the handsomest of South African antelopes, and are endowed with great speed and staying power. They are commonly met with in herds including from 10 to 20 individuals. Forest-clad highlands are their favourite resorts. The roan antelope is a larger animal, with shorter horns, strawberry-roan in colour in both sexes.

SABLE ISLAND, an island of Nova Scotia, Canada, 110 m. S.E. of Cape Canso, in 43° 56′ N. and 60° W. It is composed of shifting sand, and is about 20 m. in length by 1 m. in breadth, rising in places to a height of 85 feet. In the interior is a lake about 10 m. in length. At either end dangerous sandbars run out about 17 m. into the ocean. It has long been known as "the graveyard of the Atlantic"; over 200 known wrecks have been catalogued, and those unrecorded are believed greatly to exceed this number. The coast is without a harbour and liable to fogs and storms; irregular ocean currents of great strength sweep round it, and its colour makes it indistinguishable until close at hand. Since 1873 an efficient lighthouse system and life-saving station has been maintained by the Canadian Government, and the danger has been much lessened. Since 1904 it has been connected with the mainland by wireless telegraphy. Sable Island is the home of the Ipswich sparrow (*Passerculus princeps*).

Sable Island was known to the early navigators as Santa Cruz.

See George Patterson, "Sable Island," *Trans. Roy. Soc.* Canada, xii. (1894); Harold St. John, "Sable Island," with history, zoology and botany, *Boston Soc. Nat. Hist.*, vol. 36, no. 1 (1917).

SABORAIM: *see* GAON.

SABOTAGE, systematic working in such a manner as to delay production, or to injure the quality of the product, a policy sometimes advocated by agitators either to remedy a particular grievance or as part of a general revolutionary programme. Sabotage may conveniently be discussed under two headings:

(1) Exceedingly slow work. This may be either ca' canny (*q.v.*), deliberately slow work, whose extreme form is the "stay-in strike" when the workers enter the factory but do no work at all, or it may take the form of elaborately careful work. Before the World War, the French building workers federation intermittently attempted the latter form of sabotage, insisting on doing "artistic work" and putting sound carpentry and solid construction work on jerrybuilders' contracts. But the only generally effective use of this kind of sabotage has been "working to rule" by railwaymen. On both British and Italian railways this has been applied several times, and extracted small concessions.

The procedure consists in following exactly the rule books, which, if rigorously applied, forthwith disorganize the service, as they generally contain items either obsolete or merely entered to satisfy some governmental requirement. An example of the former is the British regulation that every ticket must always be examined on both sides, the latter the Italian regulation that a driver must satisfy himself that he crosses all bridges at or about a certain speed, both of which items have been used for "working to rule" strikes. The first disorganizes the "City rush," the second the long-distance expresses (owing to the need which a careful driver feels to consult his guard after each bridge).

(2) Violent or obstructive behaviour. This kind of sabotage is responsible for the evil repute of the word, but it must be remembered that anarchist propaganda by deed (*see* ANARCHISM) is often, but improperly, included. The commonest form is destruction of machinery, but very fantastic action may be used. Certain Paris barbers are alleged to have shaved the whole head of customers who demanded attention after union hours. In Chicago, in a building erected by non-union labour, the gas mains were connected up with the water pipes and the water mains with the gas pipes. Destruction of the tools of blacklegs is an allied form of sabotage (it was common in Sheffield in the '60s under the name of "rattening"); and, like sabotage in general, is only common when peaceful picketing is forbidden.

Sabotage as a policy has been advocated by the French trade

unions and the (American) Industrial Workers of the World. In both cases the reason given is that the workers are engaged in a class struggle in which the capitalist class shrinks from no methods however brutal, and that the workers cannot afford to abstain from any weapon for sentimental reasons. Its chief advocates, the French *syndicats* and the I.W.W., emerged from the war and the ensuing crisis much weakened, and the Russian Revolution of Nov. 1917 had destroyed the general case for sabotage.

See Georges Sorel, *Reflexions sur la Violence* (1910); E. Pataud and E. Pouget, *Comment nous ferons la Revolution* (Eng. tr. 1913); E. Pouget, *Le Sabotage* (1910); and SYNDICALISM, SOCIALISM, TRADE UNIONISM, DIRECT ACTION and INDUSTRIAL WORKERS OF THE WORLD.

(R. W. P.)

SABRATHA, an ancient city of Africa Proconsularis (Tripolis), founded in the 7th-6th century B.C. by Tyrian settlers as a factory on the shore of a flat and inhospitable coast, named Sabratha Vulpia, 48 m. W. of Tripoli by rail. Towards the end of the 2nd century A.D. its prosperity began to increase: Antoninus Pius built two temples; the tribunal before which Apuleius (*q.v.*) was tried met here, and under Commodus the Sabrateneses had a *statio* (or office) at Ostia (*q.v.*). Towards the end of the 4th century there occurred fiscal exactions, religious disputes and attempts at invasion by the tribes of the interior (the most destructive being that of the Austuriani in A.D. 363), after which, as inscriptions show, the buildings of Sabratha, and notably the baths, were rebuilt. The Vandals themselves, who only occupied Tripolitania in A.D. 455, were defeated by a native rebellion, and after the destruction of their power by the Byzantines the very natives who had invited the aid of the latter rose against them also. During the years of peace following 548 new fortifications were made. Justinian's death, in 565, brought a renewal of the native risings. The Arabs took Tripoli in 643, and Sabratha was surprised in the night and sacked.

Excavations have revealed the east gate of the Roman walls, while Byzantine fortifications surround the western portion of the city, where are situated the forum, the *curia* or council hall, a temple of Jupiter (of whom a fine bust was found), and another temple (perhaps the Capitolium), both of the time of Antoninus Pius, two Christian basilicas (one, erected by Justinian, with fine mosaics), a baptistery. The theatre and the amphitheatre, fairly well preserved and recently carefully restored, lie farther away, near the quarries. The streets are wide and well laid, and the houses are numerous and closely built, without courtyards. There were no less than 12 fountains, supplied by an aqueduct. The Roman harbour was constructed by joining the rocks with masses of concrete, so as to form two moles with a narrow entrance between them; while along the shore were cisterns and storehouses.

See R. Bartoccini, *Guida di Sabratha* (Rome and Milan, 1927).

SABRE-FENCING, the art of attack and defence with the sabre, or broad-sword. About 1900 the light Italian sabre was introduced and became the recognized cut-and-thrust weapon. It was introduced in the United States about 1912; in Austria-Hungary it was popular as early as 1885; in Italy, the country of its origin, it has been in use since the middle of the 19th century. Its blade is about $\frac{7}{16}$ in. wide a little below the guard, tapering $\frac{5}{16}$ in., just under the point. For practice this is truncated and this edge blunt, but in scoring both edge and point are assumed to be sharp, while in countries on the continent of Europe (and also in Great Britain and the United States of America) the back-edge (false edge) is also supposed to be sharpened for some 8in. from the point. The modern sabre is a descendant of the curved light cavalry sword of the late 18th century, which was introduced into Europe from the Orient by the Hungarians.

The sabre championship of Great Britain was instituted in 1898, side by side with the foil championship, through the agency of the Amateur Gymnastic and Fencing Association. In this connection there were no heartburnings, for the sabre is essentially a competitive weapon. One of the chief features of the competition in recent years was the victory in 1923 and 1924 of the veteran fencer E. Seligman, who thus became the first British fencer to gain a championship with all three weapons.

The winners since 1910 have been:

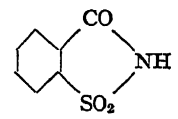
1910	A. Ridley-Martin	1922	A. H. Corble
1911	W. Hammond	1923	E. Seligman
1912	Captain C. F. Vander Byl	1924	E. Seligman
1913	A. Ridley-Martin	1925	Lieut.-Commander C. A. Kershaw, R.N.
1914	W. Hammond		
1915–1919	No Competition	1926	Lieut.-Commander C. A. Kershaw, R.N.
1920	Lieutenant C. A. Kershaw, R.N.	1927	A. H. Corble
1921	W. Hammond	1928	G. L. G. Harry

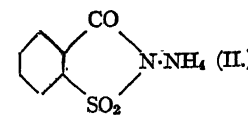
American Fencers League of America National champions:

1920	Sherman Hall	1925	Leo Nunes
1921	C. R. McPherson	1926	Leo Nunes
1922	Leo Nunes	1927	Nickolas Muray
1923	Leon Schoonmaker	1928	Nickolas Muray
1924	Dr. J. Ernest Gignoux		

SACCHARIC ACID exists in three forms. The ordinary or dextro (*d*)-saccharic acid is formed in the oxidation of cane sugar, grape sugar and many other carbohydrates with nitric acid. It forms a deliquescent mass, slowly yielding the crystalline lactonic acid, $C_6H_8O_7$. Sodium amalgam reduces it to glucuronic acid, $OHC[CH{\cdot}OH]_4CO_2H$, whilst hydriodic acid reduces it to adipic acid, $HO_2C[CH_2]_4CO_2H$. Laevo (*l*)-saccharic acid is formed by oxidizing *l*-gluconic acid with nitric acid, whilst the inactive (*d*+*l*)-acid is obtained similarly from inactive gluconic acid. These three acids differ mainly in their action on polarized light. All three are tetrahydroxyadipic acids, with the formula $HO_2C{\cdot}(CH{\cdot}OH)_4{\cdot}CO_2H$. Mucic acid (*q.v.*) is isomeric with them.

SACCHARIN, a name given to several totally different chemical substances of which the most noteworthy is the saccharin of commerce, a coal-tar product having an excessively sweet taste. This substance, which is the imide of *ortho*-sulphobenzoic acid and referred to scientifically as *ortho*-benzoicsulphinide, was discovered by Ira Remsen and C. Fahlberg in 1879 in the course of an investigation carried out at Johns Hopkins University, U.S.A., on the oxidation of *o*-toluenesulphonamide. The excessive sweetness of the substance was noticed accidentally by the latter observer who, after a day's work in the laboratory, washed his hands thoroughly and went home to supper, when he noticed that the bread tasted sweet, but closer examination showed that the taste came from his hands and even from his arms. He returned to the laboratory and tested the contents of each beaker and basin on the working bench until he came to the product possessing this remarkable property. This sweetening principle was the substance which subsequently attained world fame under its commercial name of saccharin. It is still manufactured substantially in the manner worked out by Fahlberg. Toluene (*q.v.*) is sulphonated with fuming sulphuric acid to its *ortho*- and *para*-sulphonic acids which are successively converted into calcium and sodium salts, and the latter treated with phosphorus pentachloride (or the trichloride plus chlorine). Phosphorus oxychloride is distilled off and the residue is thoroughly cooled and centrifuged to remove crystalline toluene-*p*-sulphonic chloride from the liquid toluene-*o*-sulphonic chloride, $CH_3{\cdot}C_6H_4{\cdot}SO_2Cl$. By a modification due to Heyden and to Monnet, this mixture of sulphonic chlorides is alternatively prepared by running toluene into excess of chlorosulphonic acid. The oily *ortho*-sulphonic chloride is converted by ammonium carbonate, or preferably by ammonia under pressure, into its amide, $CH_3{\cdot}C_6H_4{\cdot}SO_2{\cdot}NH_2$, which on oxidation with alkaline permanganate yields the alkali salt of *ortho*-sulphaminobenzoic acid. This acid, $NH_2{\cdot}SO_2{\cdot}C_6H_4{\cdot}CO_2H$, when liberated from its salts by mineral acid is converted spontaneously into saccharin (formula I.) which is its internal anhydride.

(I.) 



Saccharin is a white crystalline substance subliming at 100° and melting at 227–227·5° C. When pure and concentrated, it is 550 times as sweet as cane sugar, the commercial product being of 300 times the sweetness of sugar. It is only sparingly soluble in

cold water, one part dissolving in 400 parts of boiling water. It is more soluble in alcohol, glycerol, ethyl acetate and acetone. From the last of these solvents it separates in large, colourless, transparent, monosymmetric crystals which when crushed or rubbed together display triboluminescence (W. J. Pope, 1895). The sweetness of saccharin is enhanced by mixing with *dulcin*, *para*-phenetolecarbamide, $C_2H_5O{\cdot}C_6H_4{\cdot}NH{\cdot}CO{\cdot}NH_2$, which itself has some sweetening property.

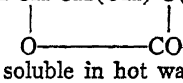
Saccharin forms a sodium salt (with $2H_2O$) which dissolves readily in water and is known as *soluble saccharin* or *crystallose*.

The ammonium salt (formula II.), known as *sucramine* (melting point 150° C), is obtained in white crystals equally soluble in hot or cold water; it is sweeter than saccharin, being 700 times as sweet as cane sugar.

Saccharin and its soluble derivatives are used as sweetening agents, and medicinally they are employed as sugar substitutes in diabetes, in liver disease and for the reduction of corpulence or wherever the use of sugar is undesirable. The physiological action is not, however, negligible, for saccharin decreases appetite, gastric secretion, peptic digestion and intestinal absorption.

In the United Kingdom there is an import duty of 1s. 3d. per ounce on saccharin, and in the U.S.A. the import duty is $1.50+45\%$ *ad valorem* per pound. Importation is prohibited in certain countries and in others high customs duties are imposed.

The lactones of saccharic acids (*q.v.*) are also known as "saccharins." By boiling dextrin or laevulose with milk of lime, a lactone of the formula $CH_2OH{\cdot}CH{\cdot}CH(OH){\cdot}C(OH){\cdot}CH_3$ is



obtained. It crystallises in prisms soluble in hot water and with bitter taste. Isosaccharin and metasaccharin, melting at 95° and 142° C, are formed by the action of lime on milk sugar. (*See* H. Pringsheim, *Zucker-Chemie*, Leipzig, 1925.)

BIBLIOGRAPHY.—T. E. Thorpe, *Dictionary of Applied Chemistry*, vol. vi., Longmans Green & Co., 1926; O. Beyer, *Über die Kontrolle und Herstellung von Saccharin*, Raschen & Cie, Zurich, 1918; F. Ullmann, *Enzyklopädie der technischen Chemie*, vol. 2, Urban & Schwarzenberg, Berlin, 1915. (G. T. M.)

SACCHETTI, FRANCO (*c.* 1335–*c.* 1400), Italian poet and novelist, was a member of the noble and ancient Florentine family of the Sacchetti (comp. Dante, *Par.* c. xvi.). He held many important posts in the Florentine State. Sacchetti left a considerable number of *sonnetti, canzoni, ballate, madrigali*, etc. His *Novelle*, based on real incidents of Tuscan life, are written in pure and elegant Tuscan and are valuable for the light they throw on the manners of that age.

SACCHI, ANDREA (*c.* 1600–1661), Italian painter of the later Roman school, was born at Nettuno near Rome in 1600, or perhaps as early as 1598. His father, Benedetto, a painter, gave him his earliest instruction in the art; Andrea then passed into the studio of Albani, of whom he was the last and the most eminent pupil. Sacchi was one of the most learned designers and one of the soundest colourists of the Roman school. He went to Venice and to Parma to study Venetian colour and the style of Correggio. His principal painting—in the Vatican Gallery—is "St. Romuald relating his Vision to Five Monks of his Order." The Vatican Gallery contains also an early painting of the master—the "Miracle of St. Gregory," executed in 1624; a mosaic of it was made in 1771 and placed in St. Peter's. Other leading examples are the "Death of St. Anna," in S. Carlo di Catinari; also frescoes in the Palazzo Barberini—"Divine Wisdom." There are pictures by the master in the galleries of Perugia, Madrid and Dresden. He had a flourishing school: Nicholas Poussin and Carlo Maratta were his scholars.

See Hans Posse, *Der Römische Maler Andrea Sacchi* (Leipzig 1925).

SACCO-VANZETTI CASE, THE, a murder trial in Massachusetts, extending over seven years, 1920–27, and resulting in the execution of the defendants, Nicola Sacco and Bartolomeo Vanzetti. The trial resulted from the murder in South Braintree, Mass., on April 15, 1920, of F. A. Parmenter, paymaster of a shoe factory, and Alessandro Berardelli, the guard accompanying him, in order to secure the pay roll they were carrying. On May 5 Sacco and Vanzetti, two Italians who had immigrated to the United States in 1908, one a shoe worker and the other a fish pedlar, were arrested for the crime. On May 31, 1921, they were brought to trial before Judge Webster Thayer of the Massachusetts superior court and, on July 14, were both found guilty by verdict of the jury. The verdict was disputed by Socialists and other Radicals on the ground that the men had not received a fair trial because of their Radical affiliations. Motion for a new trial, on grounds that the identification was not complete, failed. Further motions for a new trial were made from time to time but also failed on grounds that the evidence submitted did not justify it. On Nov. 18, 1925, the confession of Celestino Madeiros that he had participated in the crime, and that neither Sacco nor Vanzetti was present, added a new complication. Motion for a retrial on the basis of this confession was also denied by Judge Thayer who claimed that Madeiros, already sentenced to execution for another crime, was motivated in assuming the guilt in the hope that the giving of testimony would delay his own death. A motion of appeal to the State supreme court failed, the court taking the position that the trial judge had the final power to determine the matter of retrial on grounds of additional evidence. On April 9, 1927, Judge Thayer sentenced the two defendants to the electric chair.

It was at this point that the storm of protest broke loose. Newspapers in both Europe and America gave large amounts of space to the proceedings, mass meetings were held, and the officials connected with the case were flooded with petitions mingled with threats. The defence carried the case to Governor Fuller, holder of the power of clemency, who in addition to a personal investigation appointed President Lowell of Harvard university, President Stratton of the Massachusetts Institute of Technology and Robert Grant, a former judge, to investigate the case independently. On Aug. 3, Governor Fuller announced that he had found against the plea, and that his advisory committee had also come to the conclusion that a new trial was not warranted. Successive stays postponed the execution while further vain appeals were made to Judge Thayer, to the supreme judicial court, and finally to members of the U.S. Supreme Court, the attorney-general and the president. During the days following Governor Fuller's denial of clemency, demonstrations were made in many cities in America and abroad, bombs were set off in New York city and Philadelphia and guards were set up against other threats of violence. The two men were executed on Aug. 23, 1927, both maintaining their innocence.

See *The Sacco-Vanzetti Case: a Transcript of the Record of the Trial* (1928); F. Frankfurter, *The Case of Sacco and Vanzetti* (1927), and *The Outlook*, vol. cl., pp. 1,053 ff. (1928).

SACHAU, CARL EDUARD (1845–), German scholar, was born on July 20, 1845 at Neumünster in Holstein. In 1869 he was appointed professor of Semitic languages at the University of Vienna, and in 1876 professor of oriental languages at Berlin, where he became director of the school of oriental languages. In 1879–80 he travelled extensively in Syria and Mesopotamia, and in 1897–98 in Babylonia and Assyria. He wrote *Syrisch-römisches Rechtsbuch aus dem 5. Jahrhundert* (1890); *Reise in Syrien und Mesopotamien* (1883); *Neuarabische Volkslieder aus Mesopotamien* (1889); *Katalog persischer Handschriften* (1889); *Muhammedanisches Erbrecht von Zansibar und Ost-Afrika* (1894); *Am Euphrat und Tigris* (1900); *Syrische Rechtsbücher* (1907–14).

For a complete bibliography of the works of Sachau, *see* S. Weil, *Die Festschrift zu Ehren Ed. Sachaus* (1915).

SACHEVERELL, HENRY (1674–1724), English ecclesiastic and politician, was the son of Joshua Sacheverell, rector of St. Peter's, Marlborough. He was adopted by his godfather, Edward Hearst, and his wife, and was sent to Magdalen college, Oxford, in 1689, was demy of his college from 1689 to 1701 and fellow from 1701 to 1713. Sacheverell took his degree of B.A. in 1693, and became M.A. in 1695 and D.D. in 1708. His first preferment was the small vicarage of Cannock in Staffordshire; and in 1705 he was elected to the chaplaincy of St. Saviour's, Southwark. In 1709 he leapt into notoriety by his famous sermons attacking the Whig ministry on the charge of

neglecting to watch over the interests of the church. These sermons were delivered, one in Derby on Aug. 15, the other in St. Paul's cathedral; and both, especially the latter, were delivered in excessively violent language. They were immediately printed, and made the preacher the idol of the Tory party.

The attention of the House of Commons was drawn to the two sermons by John Dolben in Dec. 1710, and were denounced as "malicious, scandalous and seditious libels." The Whig ministry, then slowly but surely losing the support of the country, were divided in opinion as to the propriety of prosecuting Sacheverell. Somers was against such a measure; but Godolphin urged the necessity of a prosecution, and gained the day. The trial lasted from Feb. 27 to March 23, 1710, and the verdict was that Sacheverell should be suspended for three years and that the two sermons should be burnt at the Royal Exchange. Popular resentment over the trial resulted in the downfall of the ministry, Godolphin being dismissed in August and the other ministers in November. Immediately on the expiration of his sentence (April 13, 1713) Sacheverell was instituted to the valuable rectory of St. Andrew's, Holborn, by the new Tory ministry. He died at the Grove, Highgate, on June 5, 1724. (*See* also ENGLISH HISTORY.)

See Hearne's *Diaries,* Bloxam's *Register of Magdalen* and Hill Burton's *Queen Anne,* vol. ii. There is an excellent bibliography by Falconer Madan (1887).

SACHEVERELL, WILLIAM (1638–1691), English statesman, son of Henry Sacheverell, a country gentleman, entered parliament in 1670 for Derbyshire. He was an opponent of the court policy, especially of the secret treaty with France. In 1678 he was one of the most active investigators of the "Popish Plot," and one of the managers of the impeachment of the five Catholic peers. He also served as a manager in the impeachment of Danby. He made the first suggestion of the Exclusion Bill on Nov. 4, 1678, in a debate raised by Lord Russell with the object of removing the duke from the King's Council. He vigorously promoted the bill in the House of Commons and opposed granting supplies till it should pass.

At the general election following the death of Charles II. in 1685 Sacheverell lost his seat, but he was an active member of the convention parliament. He died on Oct. 9, 1691. In the judgment of Speaker Onslow, Sacheverell was the "ablest parliament man" of the reign of Charles II. He was one of the earliest of English parliamentary orators; his speeches greatly impressed his contemporaries, and in a later generation, as Macaulay observes, they were "a favourite theme of old men who lived to see the conflicts of Walpole and Pulteney."

BIBLIOGRAPHY.—Many of Sacheverell's speeches are reported in Anchitell Grey's *Debates of the House of Commons, 1667–1694* (10 vols., London, 1769). *See* also Sir George Sitwell, *The First Whig* (Scarborough, 1894).

SACHS, HANS (1494–1576), German poet and dramatist, was born at Nuremberg on Nov. 5, 1494. His father was a tailor, and he himself was trained to the calling of a shoemaker. Before this, however, he received a good education at the Latin school of Nuremberg. In 1509 he began his apprenticeship, and was initiated into the art of the Meistersingers by a weaver, Leonhard Numnenpeck. In 1511 he set out on his *Wanderjahre,* and worked at his craft in many towns, including Regensburg, Passau, Salzburg, Munich, Osnabrück, Lübeck and Leipzig. In 1516 he returned to Nuremberg, where he remained during the rest of his life, working steadily at his handiwork and devoting his leisure time to literature. In 1517 he became master of his gild and in 1519 married. Sachs became an ardent adherent of Luther, and in 1523 wrote in Luther's honour the poem beginning *Die wittenbergisch Nachtigall, Die man jetzt höret überall,* and four dialogues in prose, in which his warm sympathy with the reformer is tempered by counsels of moderation. The town council of Nuremberg then forbade him to publish any more *Büchlein oder Reimen.* Before long, however, the council itself declared for the Reformation. Sachs died on Jan. 19, 1576.

By the year 1567 Sachs had composed, according to his own account, 4,275 *Meisterlieder,* 1,700 tales and fables in verse, and 208 dramas, which filled no fewer than 34 large manuscript volumes; and this was not all, for he continued writing until 1573. The *Meisterlieder* were not printed, being intended solely for the use of the Nuremberg Meistersinger school, of which Sachs was the leading spirit. His fame rests mainly on the *Spruchgedichte,* which include his dramatic writings. His "tragedies" and "comedies" are, however, little more than stories told in dialogue, and divided at convenient pauses into a varying number of acts. The subjects are drawn from the Bible, the classics, the Italian novelists and elsewhere. He succeeds best in the short anecdotal *Fastnachtsspiel* or Shrovetide play, where characterization and humorous situation are of more importance than dramatic form or construction. Farces like *Der fahrende Schüler im Paradies* (1550), *Das Wildbad* (1550), *Das heiss Eisen* (1551), *Der Bauer im Fegefeuer* (1552), are inimitable in their way, and have even been played with success on the modern stage.

Hans Sachs himself made a beginning to an edition of his collected writings by publishing three large folio volumes (1558–61); after his death two other volumes appeared (1578, 1579). A critical edition has been published by the Stuttgart *Literarischer Verein,* edited by A. von Keller and E. Goetze (23 vols., 1870–96); *Sämtliche Fastnachtsspiele,* ed. by E. Goetze (7 vols., 1880–87); *Sämtliche Fabeln und Schwänke,* by the same (3 vols., 1893). There are also editions of selected writings by J. Tittmann (3 vols., 1870–71; new ed., 1883–85) and B. Arnold (2 vols., 1885). *See* E. K. J. Lützelberger, *Hans Sachs* (1876); C. Schweitzer, *Étude sur la vie et les oeuvres de Hans Sachs* (1887); K. Drescher, *Hans Sachs Studien* (1890, 1891); E. Goetze, *Hans Sachs* (1891); A. L. Stiefel, *Hans Sachs-Forschungen* (1894); R. Genée, *Hans Sachs und seine Zeit* (1894; 2nd ed., 1902); E. Geiger, *Hans Sachs als Dichter in seinen Fastnachtsspielen* (1904).

SACHS, JULIUS VON (1832–1897), German botanist, was born at Breslau on Oct. 2, 1832. On leaving school in 1851 he became assistant to the physiologist J. E. Purkinje at Prague. In 1856 he graduated as doctor of philosophy, and established himself as *Privatdozent* for plant physiology in the university of Prague. In 1859 he was appointed physiological assistant to the Agricultural Academy of Tharandt in Saxony; and in 1861 he went to the Agricultural Academy at Poppelsdorf, near Bonn, where he remained until 1867, when he was nominated professor of botany in the university of Freiburg-im-Breisgau. In 1868 he accepted the chair of botany in the university of Würzburg, which he continued to occupy until his death on May 29, 1897.

Sachs was especially associated with the development of plant physiology which marked the latter half of the 19th century, though he contributed to every branch of botany. His earlier papers, in botanical journals and publications of learned societies, are of interest. Prominent among them is the series of "Keimungsgeschichten," which laid the foundation of our knowledge of microchemical methods, and the morphological and physiological details of germination. Then there is his resuscitation of the method of "water-culture," and its application to problems of nutrition; and further, his discovery that the starch-grains to be found in chloroplastids are the first visible product of their assimilatory activity. His later papers were published in the three volumes of the *Arbeiten des botanischen Instituts in Würzburg* (1871–88). Among these are his investigation of the periodicity of growth in length; his researches on heliotropism and geotropism, in which he introduced the "clinostat"; his work on the structure and arrangement of cells in growing-points; the evidence upon which he based his "imbibition-theory" of the transpiration-current; his studies of the assimilatory activity of the green leaf; and other papers.

Sachs' works are: *Handbuch der Experimentalphysiologie der Pflanzen* (1865; French edition, 1868); *Lehrbuch der Botanik* (1868, Eng. ed. 1875 and 1882), a comprehensive work, giving a summary of the botanical science of the period, including the results of original investigations; *Vorlesungen über Pflanzenphysiologie* (1st ed., 1882; 2nd ed., 1887; Eng. ed., Oxford, 1887); *Geschichte der Botanik* (1875, Eng. ed. 1890).

A full account of Sach's life and work was given by Professor Goebel, formerly his assistant, in *Flora* (1897), of which an English translation appeared in *Science Progress* for 1898. There is also an obituary notice of him in the *Proc. Roy. Soc.* vol. lxii.

SACHS, MICHAEL (1808–1864), German Rabbi, one of the first of Jewish graduates of the modern universities, was appointed Rabbi in Prague in 1836, and in Berlin in 1844. He took

the conservative side against the Reform agitation, and retired from the Rabbinate rather than acquiesce in the use of the organ in the synagogue. Sachs co-operated with Zunz in a new translation of the Bible. He is best remembered for his work on Hebrew poetry, *Religiöse Poesie der Juden in Spanien* (1845).

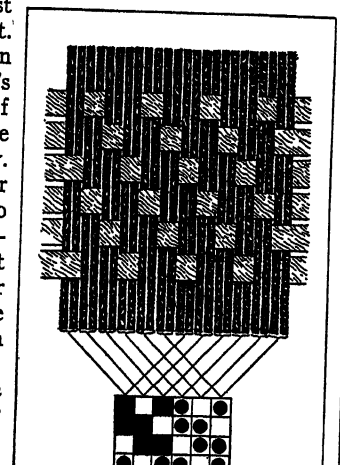
SACKBUT, SHAKBUSSHE, SAGBUT, DRAW or DRAWING TRUMPET, the earliest form of slide trumpet, derived from the Roman buccina, which afterwards developed into the trombone. As soon as the effect of the slide in lengthening the main tube and therefore proportionally deepening the pitch of the instrument was understood, and its capabilities had been realized, the development of a family of powerful tenor and bass instruments followed as a matter of course. The transformation of the busine (*buccina*) into the sackbut involved two or three processes, the addition of the slide being accomplished in at least two stages, the extending portion of the tube being at first straight and later bent or folded to make the instrument less unwieldy. (*See* also TROMBONE, TRUMPET and BUCCINA.)

SACKETT'S HARBOR, a village in Jefferson county, New York, U.S.A., at the eastern end of Lake Ontario, on the south shore of Black River bay, about 1 m. from its mouth, and about 10 m. W. by S. of Watertown. Pop. (1910) 868; (1930) 742. Sackett's Harbor is served by the New York Central railway. It is built on low land, around a small, nearly enclosed harbour, the northern shore of which is formed by Navy Point, a narrow tongue of land extending about ¼ m. nearly due eastward from the mainland. In the military cemetery is the grave of Gen. Zebulon M. Pike (*q.v.*), killed at York (Toronto) on April 27, 1813.

The first settlement was made in 1801 by Augustus Sackett, and the village was incorporated in 1814. In the War of 1812 Sackett's Harbor was an important strategic point for the Americans, who had here a naval station, Ft. Tompkins, at the base of Navy Point, and Ft. Volunteer, on the eastern side of the harbour. In July 1812 a British squadron unsuccessfully attempted to capture a brig and schooner in the harbour. From Sackett's Harbor American expeditions against York (now Toronto) and Ft. George respectively set out in April and May 1813. Sackett's Harbor was the starting-point of a force of 700 men under a Pole named von Schultz, who in Nov. 1838, during the uprising in Upper Canada (Ontario) attempted to invade Canada, was taken prisoner near Prescott, was tried at Kingston, being defended by Sir John Macdonald, and with nine of his followers was executed in Kingston in December.

See A. T. Mahan, *Sea-Power in its Relation to the War of 1812* (Boston, 1905); and W. Kingsford, *The History of Canada*, vol. viii. (Toronto, 1895).

SACKING AND SACK MANUFACTURE. Sacking is a heavy closely-woven fabric, originally made of flax, but now almost exclusively made of jute or of hemp. The more expensive kinds, such as are used for coal sacks for government and other vessels, are made of hemp, but the jute fibre is extensively used for the same purpose, and almost entirely for coal sacks for local house supplies. The same type of fabric is used for wool sacks, cement bags, ore bags, pea sacks and for any heavy substance; it is also made up into a special form of bag for packing cops and rolls of jute and flax yarns for delivery from spinners to manufacturers. Proper sacking is essentially a twilled fabric, in which the number of warp threads per inch greatly exceeds the number per inch of weft. The illustration shows a typical kind of three-leaf twill, double warp sacking. All three-leaf twill sackings are double in the warp, but four-leaf sackings are usually single; special kinds may be double in the warp. In all cases the warp is comparatively thin, say 6lb. to 8lb. per spyndle, whereas the weft is thick and single from 16lb. to 48lb. per spyndle. Cloths are usually 27in. wide, but other widths are made.



WEAVE AND CLOTH PLANS
Bottom; black squares show unit weave, black circles show three repeats of unit weave: top; plan of 8 units of the weave structure of cloth showing 12 double threads of warp and 6 picks of weft

The lower part of the illustration shows four repeats of the three-leaf twill, while the lines drawn to the plan of the fabric show that each line of the design is reproduced in the cloth by two warp threads. Large quantities of cotton sacks are made for flour, sugar and similar produce; these sacks are usually plain cloth, some woven circular in the loom, others made from the piece.

Large quantities of seamless bags or sacks for light substances are woven in the loom, but these are almost invariably made with what is termed the double plain weave; *i.e.*, the cloth, although circular except at the end, is perfectly plain on both sides, and similar in structure to, but wider than hose-pipe (*q.v.*). Circular bags have been made both with three-leaf and four-leaf twills, but it is found much more convenient and economical to make the cloth for these kinds, and in most cases, for all other types, in the piece, and then to make it up into sacks by one or other of the many types of sewing machines. The pieces are first cut up into definite lengths by special machinery, which may be perfectly automatic or semi-automatic—usually the latter, as many thicknesses may be cut at the same time, each of the exact length. The lengths of cloth are then separately doubled up, the sides sewn by special sewing machines.

The chief centres for jute bags are Dundee and Calcutta, all varieties of sacks and bags being made in and around the former city. For paper sacks *see* PAPER AND PAPER MANUFACTURE.

See T. Woodhouse, *The Finishing of Jute and Linen Fabrics* (1928).

SACKVILLE, GEORGE, 1ST VISCOUNT (1716–1785), generally remembered as Lord George Sackville or Lord George Germain, third son of Lionel Cranfield Sackville, 1st duke of Dorset, was born on Jan. 26, 1716. Educated at Westminster School and Trinity College, Dublin, he was gazetted captain in 1737, and saw active service in the German campaign. Wounded in the charge of Cumberland's infantry column at Fontenoy, he was taken to the tent of King Louis XV. to have his wound dressed, and was soon released. He received rapid military promotion, and was gazetted major-general in 1755 and lieutenant-general in 1757. Meanwhile he filled the offices of first secretary to his father, the lord-lieutenant of Ireland, and Irish secretary of war, and sat in each of the two Houses of Commons at Westminster and Dublin. In 1758, under the duke of Marlborough, he shared in the ineffective raid on Cancale Bay, and the troops, after a short sojourn in the Isle of Wight, were sent to join the allied army of Duke Ferdinand of Brunswick in Germany. Marlborough died shortly after they landed, and Sackville succeeded him as commander-in-chief of the British contingent. His haughty and domineering temper estranged him both from his second-in-command, Lord Granby, and the commander-in-chief, Prince Ferdinand. This culminated on the day of Minden (August 1, 1758). The British infantry, aided by some of the Hanoverians, had won a brilliant success, and every man in the army looked to the British cavalry to charge and to make it a decisive victory. But Sackville, in spite of repeated orders from Prince Ferdinand, sullenly refused to allow Granby's squadrons to advance. The crisis passed, and the victory remained an indecisive success. A court-martial in 1760 pronounced him guilty of disobedience, and adjudged him "unfit to serve his Majesty in any military capacity whatsoever." In 1763 his name was restored to the list of the Privy Council. In 1769 he allied himself with Lord North. To this period belong the famous Junius Letters, with the authorship of which Sackville was erroneously credited. In 1770, under the terms of a will, he assumed the name of Germain. In 1775, having meantime taken an active part in politics, he became secretary of state for the colonies in the North cabinet, and he was practically the director of the war for the suppression of the revolt in the American colonies. Germain and the North cabinet misunderstood the situation and there was constant friction with the generals and the army in the theatre of war. Nevertheless he received a peerage. He died at Stoneland Lodge (Buckhurst Park) Sussex, on Aug. 26, 178[illegible]

SACKVILLE, THOMAS, 1ST EARL OF DORSET (*c.* 1530–1608), English statesman and poet, son of Sir Richard Sackville, was born at Buckhurst, Sussex, took his M.A. at Cambridge, and was called to the bar at the Inner Temple. He married Cicely, daughter of Sir John Baker of Sissinghurst, Kent; in 1558 he entered parliament as member for Westmorland, in 1559 he sat for East Grinstead, Sussex, and in 1563 for Aylesbury, Buckinghamshire. During a visit to the Continent in 1565 he was imprisoned for a rash declaration of Protestant opinions. The news of his father's death on April 21, 1566, recalled him to England. On his return he was knighted in the queen's presence, receiving at the same time the title of baron of Buckhurst. In 1571 he was sent to France to congratulate Charles IX. on his marriage with Elizabeth of Austria, and he took part in the negotiations for the projected marriage of Elizabeth to the duke of Anjou. In 1572 he was one of the peers who tried Thomas Howard, duke of Norfolk, and in 1586 he was selected to convey the sentence of death to Mary, queen of Scots. He was sent in 1587 as ambassador to The Hague and carried out under protest the foolish and often contradictory orders he received. His plain speaking on Leicester's action in the Netherlands displeased the queen. His return was followed by a short period of disgrace, but he was sent again to the Netherlands in 1589 and 1598. He was elected chancellor of the University of Oxford in 1591, and in 1599 succeeded Lord Burghley as lord high treasurer. In 1601 as high steward he pronounced sentence on Essex, his rival for the chancellorship and his opponent in politics. James I. confirmed him in the office of lord treasurer. He was created earl of Dorset in 1604, and died suddenly at the council table on April 19, 1608. His eldest son, Robert, the 2nd earl (1561–1609), was a member of parliament and a man of great learning. Two other sons were William (*c.* 1568–91), a soldier killed in the service of Henry IV. of France, and Thomas (1571–1646), also a soldier.

Sackville is remembered, not by his distinguished political career, but by his share in two works, each of which was, in its way, a new departure in English literature. To the second edition (1563) of the *Myrroure for Magistrates,* edited by William Baldwin, Sackville contributed the *Complaint* of Henry Stafford, duke of Buckingham, to which he prefixed an *Induction.* This induction was arbitrarily transposed (1610) to the beginning of the collection by a later editor, Richard Niccols, a proceeding which led to the attribution of the general design to Sackville, an error repeated by Thomas Warton. The originators were certainly Baldwin and his "printer" who designed the *Myrroure* as a continuation of Lydgate's *Fall of Princes* in the form of laments of the ghosts of great men written by various hands. Fragments of the earliest edition entitled *A Memoriall of such princes as . . . have been unfortunate . . .* are sometimes found bound up with Lydgate's book.

Sackville's *Induction* opens with a description of the oncoming of winter. The poet meets Sorrow, who offers to lead him to the infernal regions that he may see the sad estate of those ruined by their ambition, and thus learn the transient character of earthly joy. At the approaches of Hell he sees a group of terrible abstractions, Remorse of Conscience, Dread, Misery, Revenge, Care, etc., each vividly described. The last of these was War, on whose shield he saw depicted the great battles of antiquity. Finally, penetrating to the realm of Pluto, he is surrounded by the shades, of whom the duke of Buckingham is the first to advance, thus introducing the *Complaint.* Sackville's models were Gavin Douglas and Virgil. The dignity and artistic quality of the narrative of the fall of Buckingham make the work one of the most important between the *Canterbury Tales* and the *Faerie Queene.*

Sackville has also the credit of being part author with Thomas Norton of the first legitimate tragedy in English. This was *Gorboduc* or *Ferrex and Porrex,* performed at Christmas 1560 by the society of the Inner Temple, and on Jan. 18, 1561, before Elizabeth at Whitehall. The argument is as follows:

"Gorboduc, king of Brittaine, devided his Realme in his lyfe time to his Sones, Ferrex and Porrex. The Sonnes fell to dyvision and discention. The yonger kylled the elder. The Mother, that more dearely loved thelder, fr revenge kylled the yonger. The people, moved with the Crueltie of the fact, rose in Rebellion, and Slewe both father and mother. The Nobilitie assembled, and most terribly destroyed the Rebelles. And afterwards for want of Issue of the Prince, wherby the Succession of the Crowne became uncertayne, they fell to Ciuill warre, in whiche both they and many of their Issues were slayne, and the Lande for a longe tyme almoste desolate, and myserablye wasted."

The story is taken from book ii. chap. xvi. of Geoffrey of Monmouth's history. It was first printed (1565) in an unauthorized edition as *The Tragedie of Gorboduc* "whereof three Actes were wrytten by Thomas Nortone, and the two laste by Thomas Sackvyle." In 1570 appeared an authentic edition, *The Tragedie of Ferrex and Porrex.* The tragedies of Seneca were now being translated, and the play is conceived on Senecan lines. The paucity of action is eked out by a dumb show to precede each act, and the place of the Chorus is supplied by four "ancient and sage men of Britain." In the variety of incident, however, the authors departed from the classical model. The play is in blank verse, and is the first example of the application of Surrey's innovation to drama. Jasper Heywood in the poetical address prefixed to his translation of the Thyestes alludes to "Sackvylde's Sonnets sweetly sauste," but only one, prefixed to Sir T. Hoby's translation of Castiglione's *Courtier,* has survived.

The best edition of *A Mirror for Magistrates* is that of Joseph Haslewood (1815). *Gorboduc* was edited for the Shakespeare Society by W. D. Cooper in 1847; in 1883 by Miss L. Toulmin Smith for C. Vollmöller's *Englische Sprach und Litteraturdenkmale* (Heilbronn, 1883) and by J. Q. Adams *Chief pre-Shakespearian Dramas* (1925). The *Works* of Sackville were edited by C. Chapple (1820) and by R. Sackville-West (1859). *See* also *A Mirror for Magistrates* (1898) by W. F. Trench; and accounts in W. J. Courthope's *History of English Poetry,* vol. i. and in the *Cambridge History of English Literature,* vol. iii.

SACO, a city of York county, Maine, U.S.A., on the Saco river and the Atlantic ocean, opposite Biddeford and 14 m. S.W. of Portland. It is on the Atlantic highway, and is served by the Boston and Maine railroad. Pop. (1920) 6,817 and 7,233 in 1930. There is abundant water-power, and the city has cotton mills and various other factories. The adjoining town of Old Orchard, which has one of the finest beaches on the coast (a wide crescent 10 m. long) has long been a popular summer resort, and recently has been a starting-point for transatlantic air flights. Saco was settled as early as 1631, and was the seat of the Gorges government from 1636 to 1653. Until 1762 Saco and Biddeford were one town or plantation (under the name of Saco before, of Biddeford after 1718) as now they are practically one community in economic and social interests. In 1716 Sir William Pepperell acquired title to most of what is now Saco, and in 1762 this was incorporated as the town of Pepperellboro. The Pepperell property was confiscated in 1779. In 1805 the name of Saco was adopted, and in 1867 the town was chartered as a city.

SACRAMENT, the title given by Christians to an external rite or ceremony regarded as the instrument, or at least a symbol, of the reception by those who participate in it of a spiritual benefit whereof Christ is the author. As the conception of a spiritual benefit received through participation in an external rite is by no means peculiar to Christianity, the expression is often applied also to rites in other religions more or less analogous to those designated sacraments by Christians, and sometimes to any instance of the use of material objects as instruments whereby spiritual benefits may be conveyed or appropriated, even although no religious doctrine or ritual be associated with such conveyance or appropriation. The present article, however, will be mainly concerned with the Christian conception of a sacrament, and rather with the content and significance of that conception than with its history.

In the *Sentences* of Peter Lombard, Bishop of Paris 1159–1160, which served for centuries as the theological text-book of western Christendom, *sacramentum* in the most general use of the word is defined (5 *Sent.* dist. 1 B. following Augustine *Ep.* 138 § 8, *signa quae, cum ad res divinas pertinent, sacramenta appellantur*) as *sacrae rei signum;* and, more precisely, as *invisibilis gratiae visibilis forma;* but in its strictest acceptation, wherein it is applicable only to certain Christian rites, as *quod ita signum est*

gratiae Dei et invisibilis gratiae forma ut ipsius imaginem gerat et causa existat—an outward and visible sign of an inward divine grace, which it both aptly represents (as immersion in baptismal water represents cleansing from sin, or eating and drinking eucharistic bread and wine the maintenance and strengthening of spiritual life) and also actually imparts to the recipient.

The word *sacramentum* is used in classical Latin literature of the pledge deposited in a temple by the parties to a lawsuit, and also of the soldier's oath of allegiance to his commander; and neither of the senses has been without influence on its employment by Christian theologians. But the far less restricted sense given to it by the Latin-speaking Fathers and their choice of it to render the Greek μυστήριον point to its having had a more general signification, corresponding to its etymology, such as is suggested by St. Thomas Aquinas when he says that that may be called *sacramentum* whereby anything is made sacred (*sacratur*) as that whereby anything is adorned (*ornatur*) is called *ornamentum* (in 4 *Sent.* i. 1; *cf. Summ. Theol.* q.u. lx. art. 1: *Sacramentum dicitur a sacrando, sicut medicamentum a medicando*). Thus, behind the conception of a sacrament lies the notion, common to all peoples, of a "sacred" sphere or world, distinct from, but in close contact with, that of everyday life, so that particular persons, things, places and times can, by recognized methods of "consecration" or "desecration," be removed from one to the other.

The word μυστήριον, employed by the Greek-speaking Church, was associated with the same notion, being the regular designation of religious ceremonies of initiation. These ceremonies distinguished the initiated from those not counted worthy of such translation from the sphere of ordinary life to communion with denizens of a higher world, and suggested the *secrecy* with which "sacred" rites were invested, in order to secure their performance from the intrusion of profane or unconsecrated persons or things. In the New Testament μυστήριον is almost exclusively used of the divine secrets (*e.g.*, of God's purpose to include all nations in the covenant made by him at first with Israel alone) which are described as now at length divulged to the world by the preaching of Christ's apostles. It is not applied to the solemn rites of initiation and communion which were nevertheless already regarded as "means of grace," and came, with the spread of Christianity in the Graeco-Roman world, to be treated as corresponding in the new faith to the ceremonies there denoted by the name, in which Christians from Justin onwards, were accustomed to see a diabolical travesty of the Christian "sacraments." Nor for a long time was the word *sacramentum*, by which the earliest Latin translators of the Scriptures rendered μυστήριον limited to those outward "means of grace" to which it came eventually to be appropriated; and, even after it had been thus appropriated, it was only gradually that among a host of ceremonies and things used in ceremonies, all supposed to convey divine grace in some manner or degree, a certain number were definitely acknowledged as properly entitled to the name of sacraments.

THE SEVEN SACRAMENTS

Seven rites were recognized in the west, from Peter Lombard onwards, as sacraments in the strict sense: Baptism, Confirmation, the Eucharist, Penance, Extreme Unction, Orders and Marriage; the Councils of Trent and of the Vatican endorsed this list which has also been adopted by the orthodox Church of the east. The Churches of the Reformation, on the other hand, acknowledged only baptism and the eucharist, to which indeed a certain pre-eminence was universally allowed, as entitled to be called sacraments in the proper sense; mainly on the ground that these alone could be proved from Scripture to have been instituted by Christ himself as external ceremonies effecting, or at least attesting and sealing, the conveyance of an inward spiritual grace to worshippers qualified to receive it by faith in the promise expressly associated with its performance by its divine Founder. In demanding that a sacrament in the proper sense must be able to claim institution by Christ the Reformers did not differ from the Roman Church. But they refused to accept inferences from the words of Scripture, though supported by ecclesiastical tradition, as evidence of such institution equivalent to the direct commands to be found for baptism in Matt. xxviii. and for the eucharist especially in 1 Cor. xi.

The Scriptural texts alleged to suggest a like institution for the other rites recognized by the Roman Church as sacraments seemed to them either to be inapplicable to them or else to make no such provision for a particular outward symbol of the promised grace as was necessary to constitute a "sacrament," while the traditional rendering of μυστήριον by *sacramentum* in the application of the word to marriage in Eph. v. 32 could hardly be said to warrant the interpretation of the word there, as intended in a very specialized sense otherwise unknown to the New Testament. Where, however, there was, as with baptism and the eucharist, express scriptural authority for the institution by Christ of an outward and visible sign of an inward spiritual grace, of the bestowal whereof it was to be, to a believer in his promise, at least the assurance, if not the instrument, there the Protestant as well as the Catholic, recognized a genuine sacrament.

There was, however, an important point of difference between them, in respect of such ceremonies as they agreed in regarding as "sacraments." The former denied, and the latter affirmed that they confer grace *ex opere operato*. This phrase seems to have been originally intended to express the belief that sacraments do not depend for their efficacy on the moral character or even on the private beliefs of the individual minister; that where an otherwise qualified person, though wicked or unbelieving, yet intending "to do what the Church does," observes the appointed forms, the recipient need not be afraid that the promised grace is not received; the human minister being no more than an instrument in the hand of the true Giver, Christ Himself. This the Churches of the Reformation for the most part did not deny; the view of Wyclif that only one himself in a state of grace could administer a valid sacrament obtained little acceptance. But the Reformers objected to the phrase *ex opere operato*, which was solemnly reaffirmed against their objections by the Council of Trent. It seemed to them inconsistent with the supreme place assigned in their theology to faith as the sole means of justification. Catholics did not indeed deny that the absence of personal faith in a recipient in whom it could be present (as it could not be, for example, in infants brought to baptism) would present an impediment to this profiting by the grace offered in a sacrament, and on their side, Protestants, in allowing infant baptism, were constrained to admit that the requisite faith was not necessarily that of the individual recipient, but might be that of his parents or of the Church.

Nevertheless, the difference between Catholic and Protestant in that the one laid stress upon the necessity to salvation of sacraments where they could be had, and the other on the indispensableness of faith, which could justify without sacraments, while without it sacraments could not justify, profoundly affected their respective attitudes towards an institution which the Protestant as little intended to disparage as the Catholic. In respect of the eucharist, whereas Luther, Calvin, and the Reformers generally had hoped, by abolishing celebrations at which the priest alone communicated, to restore the primitive frequency of communions, the actual result of the changes introduced by them was to deprive that service in any form of the central place in the public worship of the Church which it had held from the very beginnings of Christianity. Catholics on the other hand were driven by the necessity of maintaining the efficacy of sacraments *ex opere operato* into placing and encouraging a reliance on sacraments which exposed them to the charge of allowing their religion to degenerate in practice into magic.

SYMBOLISM

It cannot be denied that the use of sacraments presents a certain resemblance to some kinds of magic. There is in both the employment of material objects and of bodily gestures in conjunction with a particular form of words to produce effects which, apart from such conjunction, they could not have accomplished. But sacraments resemble far more closely facts of human life which no one would think of describing as magical in any disparag-

ing sense; such as the operation of words, spoken or written, in creating states of feeling, inspiring action, or revealing personality. Here the necessity of intelligent acceptance by those affected of the conventional meaning of the sounds or words employed, the limitation of the effect produced to a certain social context, and the quality (not merely physical, but intellectual or spiritual) of the result obtained distinguish verbal communication (though, as certainly not fully explicable on the principles recognized in the natural sciences, it may fairly be called *mysterious*) from what is usually meant by *magic*. And in these respects, sacraments must be classed with verbal communication. No Christian theologian would allow that these are effective altogether outside of the context of that agreement as to the meaning of the signs and formulas used which exists among Christians, or for the production of merely physical effects according to any law which, like those called "natural," operates irrespectively of the consciousness of those in whose bodies they are produced.

Attempts to treat sacraments as thus effective for "magical" purposes have not been unknown; but they have always been denounced by ecclesiastical authority and regarded as wrong and profane. Without entering into details as to charges of the magical use of sacraments made by theological opponents against particular groups of Christians, it may be observed, in reference to one of special historical importance that, while it is quite arguable that to use the eucharist as a focus of adoring devotion apart from communion is an unwarrantable departure from its original intention, both parties to the controversy here indicated would agree in disapproving as illegitimate any use of it for purposes really other than that or those (whatever it or they may be) for the sake of which it was originally instituted.

Wherever sacraments are used at all (and few Christian denominations have, like the Society of Friends, abandoned the use even of the two which undoubtedly date back to New Testament times), although there may be no crude abuse of them for confessedly magical purposes, quite other than those which the Church holds them to be intended to secure, it is possible to assimilate them to magical performances, by losing sight of their function as vehicles for communicating to individuals a life essentially social and, like all social life, requiring a conventional or ceremonial mode of expression, and of the essentially ethical character of the life which they are thus designed to communicate. The use of material objects or of bodily gestures in the communication of spiritual grace is not alien to the religion of the New Testament, but it is never there taken out of the context of a moral and social life in the imparting and maintaining of which the whole purpose of such use of objects and gestures consists. It is in a firm grasp of the *social* character of sacraments and of the *moral* quality of the life which they are designed to serve as instruments in communicating that the true safeguard against the very real danger of a degeneration of sacramentalism into magic-mongering should be sought rather than in the elimination of sacramentalism from religion, with the whole history of which it is intimately bound up, and by which, as has been well said, "the higher gifts are made accessible to persons of all stages of culture."

"The principle that spiritual values and forces are mediated through material processes," the same writer observes, "runs through nature as a whole." The very production of a new personality is only possible through "a material process the most liable . . . to carnal misuse." "Truth, beauty, goodness . . . become effective only through material forms." There are "natural sacraments"—the kiss, the handshake, the flag—outside of religion. The admittedly important part which these and their like play in our common social life the sacraments play in religion; and in Christianity in particular, "we are bidden to act as sons of God and sharers in Christ, knowing by an outward sign that we are so. Our reliance is to be on the word and act of God, while the joy of responsive emotion comes and goes." (Gore, *The Holy Spirit and the Church*, pp. 24, 146, 148.)

To the value of sacramentalism to human life Goethe (*Wahrheit u. Dichtung, Th.* ii., B. 7) and Comte, who devised an elaborate system of symbolic rites for his new Religion of Humanity, may be cited as witnesses. That in the early stages of civilization the magical and the sacramental are not easily discriminated is no more than may be said of the magical and the religious in general, or indeed of the magical and the scientific. Primitive magic owes its disappearance at a higher level of culture to its confusion (arising at first from lack of experience, afterwards from the persistence of uncriticized tradition) of different kinds of causation; the supposition, for instance, that the utterance of a name may affect an animal, thing, or unconscious person as it may a person who hears himself called; or that the moral healing of a soul may be effected by external actions without a change in the direction of the will. We still know too little about the interaction of mind and body to despise our ancestors or undeveloped contemporaries for making mistakes in this department, which it has taken centuries of progress, religious and scientific, to render us inexcusable in making. But neither need these ancient errors, even though they may, here as elsewhere, have left traces of themselves, interesting to the archaeologist in conventions and customs which have survived the false beliefs in which they originated, be supposed to render trivial or illusory the higher activities and experiences in connection with which these traces are retained.

THE ARGUMENT OF CONTINUITY

But while we may speak of "natural sacraments" the word is strictly appropriate only where a distinction is drawn between the everyday world and a "sacred" world transcending this, although not necessarily separated from it in space or time. Where the use of the term is extended to the communication of spiritual illumination or power through material symbols apart from religion, we have to do either with a metaphor or, more usually, with a conviction that what is experienced in religion may be employed as a key to the true or ultimate nature of the world as a whole, including those features of it which are revealed to us in that part of our experience which is not in itself specifically religious. For Christians the "sacred" sphere is that which is directly related to Christ, and accordingly nothing can be properly called a "sacrament" which cannot claim authorization by Christ as a vehicle of Divine grace. While a statement in the Bible was taken as, by its presence there, guaranteed to be, when rightly understood, free from error, the undoubted occurrence in Scripture of direct statements that Christ instituted baptism and the eucharist was sufficient to establish their claim. Critical study of the Bible has here, however, altered the situation. Few scholars would now be prepared to regard Matt. xxviii. 19, and 1 Cor. xi. 23 *sqq.* as putting it beyond doubt that the historical Jesus actually prescribed the permanent observance of these rites by his followers. Thus the old question as to the number of sacraments cannot be argued on the old grounds, but rather on that of the continuity between any rite now in use and a rite observed in the primitive Christian community from which the New Testament proceeded; and of the degree in which that community regarded it as intimately bound up with that fellowship with the crucified and risen Saviour which this community existed to offer to all who would join themselves with it.

That baptism and the eucharist were regarded as very intimately bound up with it is certain. Converts were always initiated by a ceremonial washing in Christ's name; such a washing, symbolical of cleansing from sin, being (whether or no actually practised or enjoined by Jesus) familiar to Jews as used in the admission of proselytes and specially associated with Christ's own baptism by John the Baptist, whose mission Christians believed to have been preparatory to their Master's. From the first the followers of Jesus continued the custom, which had plainly been characteristic of his daily intercourse with his disciples, of the solemn blessing and breaking of bread at their social meals; a custom invested with specially solemn associations by the circumstances of His last supper whereat he was believed to have used words identifying the bread and cup shared among his companions with his own body and blood, which were so soon after to be broken and shed upon the cross.

The credentials of the other rites acknowledged by many Christians as sacraments were more doubtful. A laying on of hands

symbolical of the gift of the Spirit seems usually from the beginning to have formed part of the initiatory rite, though sometimes detached from the baptism proper; but no tradition connected it with any injunction of Jesus; the gift imparted was associated in the New Testament with extraordinary manifestations not destined to be permanent; of the anointing which later became the chief feature of "confirmation" Scripture says nothing. Jesus had been wont to forgive sins and sins were believed to be washed away in baptism; but no ceremony or fixed formula is recorded to have been used by Jesus in this connection; only gradually was it realized that sin after baptism would be a normal feature of the Christian's life; nor can scriptural authority be claimed for the system of penitential discipline which was gradually developed in the Church. The unction of the sick mentioned in James was not, like the later rite which appealed to its precedent, intended to be "extreme"; its primary purpose was not the imparting of a spiritual gift, but bodily healing, which alone is mentioned as the object of unction in the only scriptural passage (Mark vi. 13) which appears to represent it as performed by Christ's direction. The setting apart of office bearers in the Christian community by laying on of hands is certainly apostolical; but this symbolic mode of appointment is nowhere stated in Scripture to have been used or enjoined by Jesus himself. Lastly, the only claim of the immemorial and universal institution of marriage to be a "sacrament of the new law" appears, as said above, to be the incidental observation of St. Paul (doubtless suggested by the prophetic use of it as a symbol of the bond between Yahweh and Israel) that it is a "great mystery" or "sacrament" as representing the union of Christ with his Church.

But though only certain rites may be reckoned as sacraments in a prerogative sense, the whole system through which individual members of a religious group are placed, through symbols, conventionally recognized therein as instruments of its communication, in contact with the spiritual life which gives unity to the group may be regarded as sacramental. In Christianity—and the associations of the word "sacrament" are Christian—this is the divine life historically manifested in the person and work of Jesus Christ and believed to be continued in the community which, as inspired by His Spirit, may be called His "mystical body." Here those rites, the continuous experience of grace received through which throughout the history of the community attest the unbroken presence therein of the same source of spiritual life are entitled to the name of sacraments. It is clear that only where there exists faith in the reality of this divine life and in the organic relation of the community thereto, can any significance or efficacy be attributed to these; but also that such faith can only be other than an illusion if this life and this relation are in fact real.

BIBLIOGRAPHY.—Peter Lombard, *Sententiae*, Book iv.; St. Thomas Aquinas, *Summa Theologica*, Part 3; *Concilii Tridentini Canones et Decreta; Sylloge Confessionum sub tempus reformandae Ecclesiae editarum* (Oxford, 1827); Calvin, *Institutes*, Book iv.; Harnack, *Dogmengeschichte; cf.* the articles on *Sacraments* in Hastings' *Encyclopaedia of Religion and Ethics* and the bibliographies there given. (*See* also BAPTISM, EUCHARIST.) (C. C. J. W.)

SACRAMENTALS, in the Roman Catholic Church certain acts or ordinances instituted not by Christ, but by the Catholic Church with divine authority. They are believed, in their application to persons and things, to communicate *quasi ex opere operato* through ordained priests the grace of God, consisting in purification, supernatural revivification and sanctification. The term is thus used to cover the rites of dedication, consecration and benediction, and, closely connected with the last-named, exorcism.

SACRAMENTARIANS, the name given to those who during the Reformation controversies not only denied the Roman Catholic doctrine of "transubstantiation," but also the Lutheran "consubstantiation." They admitted a spiritual presence of Christ which the devout soul can receive and enjoy, but denied any physical or corporeal presence. Finally accepting the Confession of Augsburg, they were merged in the general body of Lutherans; with the exception of the Swiss followers of Zwingli, whose position was incorporated in the Helvetic Confession. It is a curious inversion of terms that in recent years has led to the name Sacramentarians being applied to those who hold a high or extreme view of the efficacy of the sacraments.

SACRAMENTO, the capital city of California, U.S.A., and the county-seat of Sacramento county, on the east bank of the Sacramento river, at the mouth of the American, midway between the Sierra Nevada and the Pacific ocean. It is on Federal highways 40, 50 and 99; has several airports, and is a station on the Chicago to San Francisco air-mail route; and is served by the Southern Pacific, the Santa Fe, the Western Pacific and three electric inter-urban railways, 12 auto-stage companies, and passenger and freight steamship lines on the river to San Francisco. Pop. 65,908 in 1920, of whom 1,976 were Japanese, 831 Chinese and 10,873 foreign-born white; 93,750 in 1930 by the Federal census. The city occupies 14 sq.m. and is about 30 ft. above sea-level. The mean annual temperature is 60° F, and the mean annual rainfall is 18·28 inches. The fine State capitol (built 1860–69) stands in a park of 40 ac. (owned by the State) in the heart of the city. A mile east of the capitol (in another State-owned park) is old Ft. Sutter, restored and maintained by the State as an historic museum. Within the city limits are the State fair grounds of 119 acres. The city park system covers 1,219 ac.; a municipal vacation camp is maintained in the mountains; the municipal auditorium (completed 1927) seats 5,000, and the athletic stadium (1928) 25,000. Zoning ordinances are in effect, and a city-planning board was created in 1926. The public-school system provides instruction from the kindergarten through two years of a college course. At Davis, 14 m. west, is a branch of the College of Agriculture of the State university. The State library (350,000 vols.) has a fine law department and the most complete collection in existence on the history of California, and the Crocker art gallery houses one of the largest and most valuable collections in the West. Since 1921 the city has operated under a council-manager form of government. The assessed valuation of property in 1928 was $119,736,770.

Industries and Commerce.—Sacramento is the commercial and shipping centre for the Sacramento valley, a highly productive agricultural, mining and lumbering region. The immediate vicinity produces pears, peaches, plums, apricots, oranges, olives, cherries, strawberries, asparagus, celery, spinach, almonds and Tokay grapes, and harvests some fruit or vegetable every month in the year. Canning and preserving is the city's leading manufacturing industry, its product amounting to 4,000,000 cases (96,000,000 cans) a year. A can-manufacturing plant (erected 1927) has a daily output of 1,500,000 cans. The large railroad shops employ over 5,000 men. Among the other major industries are meat-packing plants, rice and flour mills, olive pickling plants, bean and rice cleaners and polishers, brick and pottery works, box factories and an almond shelling plant. The aggregate factory output in 1927 was valued at $42,969,159. About 75% is marketed in California, 16% elsewhere in the United States, and 9% in foreign countries. Bank debits in 1927 totalled over $400,000,000.

History.—On Aug. 12, 1839, Capt. John Augustus Sutter (1803–80), a Swiss army officer, with three companions, landed at the confluence of the American and the Sacramento rivers, coming by row-boat from the port of San Francisco, then known as Yerba Buena. With the help of a few Indians they built an adobe house, roofed with tules, fortified it and surrounded it with a protecting adobe wall. Sutter had obtained from Governor Alvarado a grant of eleven square leagues of land. Settlers came, whom he welcomed, and his hospitality and prosperity made "Fort Sutter" famous. Situated as it was on the main line of overland travel, it soon became the greatest trading post in the West. Capt. Sutter employed several hundred men, had 13,000 head of stock on his ranges, a vast acreage of wheat and a large mercantile business. In 1847 he sent James W. Marshall to find a good site for a new saw-mill. A spot was selected on the south fork of the American river, 35 m. N.E. of the fort at Coloma, and work had begun on the mill when, on Jan. 24, 1848, Marshall picked up in the mill-race the first gold nugget found in California. The discovery of gold on his own land by his own man was, ironically, the cause of Sutter's ruin, for his men deserted him, the newcomers pillaged his property, and he died in the East a poor man; but it

was the foundation of the city's development and of the rapid settlement of the whole State. The site of the present city was surveyed in 1848 and the name Sacramento (already in common use) was adopted. The first sale of town lots was held in Jan. 1849. The Federal census reported a population of 6,820 in 1850, and the city was incorporated in that year. For some time conditions were chaotic, as in most new mining towns. Trouble with "squatters" almost led to local war in 1850. In 1849 the city offered $1,000,000 for the honour of being the State capital. The legislature met here in 1852, and in 1854 it was chosen as the permanent seat of government. Three times between 1849 and 1853, and again in 1862, the city suffered from devastating floods, and in 1852 two-thirds of it was destroyed by fire. Further danger from flood has been averted by strong levees and by filling in the low land along the river. By 1856 the Sacramento Valley railroad (the first steam railway in California, built to accommodate the business developed in the gold mines) was completed to Folsom, 23 m. N.E. of Sacramento. Its chief engineer, Theodore D. Judah, took plans for a feasible route across the mountains to the capitalists in San Francisco and was laughed at as a dreamer. In Sacramento, however, he found four merchants (Stanford, Hopkins, Crocker and Huntington) who pledged their personal fortunes to secure the undertaking of the enterprise, and on Feb. 22, 1863, in Sacramento, the construction of the Central Pacific railroad across the Sierras was begun. On May 10, 1869, at Promontory Point, Utah, Senator Stanford drove the golden spike that united the section of road built from the West (in the face of tremendous physical obstacles) with the section built from the East, and later in the month the first through train from the Atlantic Coast reached the city. Through the rest of the 19th century the growth of Sacramento was steady and gradual, and in 1900 the population was 29,282. Since then, accompanying the increasing productivity of its tributary territory (due largely to irrigation and completion of the great levee system) there has been a rapid commercial and industrial expansion. Between 1900 and 1920 the population considerably more than doubled. Between 1910 and 1928 the assessed valuation of property and the postal receipts each increased more than threefold, bank clearings more than fivefold and building permits for the 18 years represented values aggregating $85,498,366.

SACRARIUM, a term used in Classical Latin for the place where sacred things were kept in a temple or private house. In mediaeval ecclesiology the term is used in various senses, *e.g.*, choir or chancel of a church (usually called sanctuary or presbytery), tabernacle, sacristy, etc.

SACRED HEART. Devotion to the Sacred Heart of Jesus is a cult peculiar to the modern Roman Catholic Church. The principal object of this devotion is the Saviour Himself. Saint Margaret Mary Alacoque (*q.v.*), assisted by her director, the Venerable Claude de la Colombière, S.J. (1641–1682), originated the cult. This devotion was strongly opposed, not only by the Jansenists, but by others within the Church, under the mistaken idea that the Heart of Christ was viewed in it as separate from the rest of His Being. Scipione de Ricci, bishop of Pistoia from 1780 to 1791, issued a pastoral letter (3rd June, 1784), in which he pointed out that the spirit of true religion was "far removed from fetichism," and warned his flock against "cardiolatry." This only provoked a clearer explanation of the doctrine, which contributed to confirm the cult. In 1856 Pius IX. introduced the feast into the general calendar of the Roman Catholic Church, fixing the Friday after the Octave of Corpus Christi for its celebration. The Beatification of Blessed M.M. Alacoque in 1864 gave a new impetus to the movement. She was canonized on May 13, 1920.

BIBLIOGRAPHY.—*See* Nic. Nilles, S.J., *De rationibus festorum SS. Cordis Jesu,* etc. (3rd ed., 1873); E. Letrierce, S.J., *Études sur le Sacré Coeur et la Visitation* (1890). These two works contain bibliographical lists. Dalgairns, *The Devotion to the Heart of Jesus* (1853); H. E. Manning, *The Glories of the Sacred Heart* (1876); Jos. Nix, *Cultus SS. Cordis Jesu . . . cum additamento de cultu purissimi cordis B.V. Mariae* (2nd ed., 1891); and the *Catholic Encyclopaedia,* art. "Sacred Heart."

SACRIFICE, the ritual destruction of an object, or, more commonly, the slaughter of a victim by effusion of blood, suffocation, fire or other means (from Lat. *sacrificium; sacer,* holy and *facere,* to make). While the Hebrew for sacrifice, זבח, makes the killing of the victim the central feature, the Latin word brings out sacralization (*see* TABOO) as an essential element in many cases. The sacrifice of desacralization is also found; hence MM. Hubert and Mauss describe a sacrifice as "a religious act, which, by the consecration of a victim, modifies the moral state of the sacrificer or of certain material objects which he has in view," *i.e.,* it either confers sanctity or removes it and its analogue, impurity. It is, in fact, "a procedure whereby communication is established between the sacred and profane spheres by a victim, that is to say by an object destroyed in the course of the ceremony."

Principles of Classification.—It is possible to classify sacrifices according to (*a*) the occasion of the rite, (*b*) the end to be achieved, (*c*) the material object to be effected or (*d*) the form of the rite. (*a*) The division into periodical and occasional is important in Hindu and other higher religions; the former class is obligatory, the latter facultative. In less developed creeds the difference tends to remain in the background; but where sacrifices are found, solemn annual rites, communal, purificatory or expiatory, are celebrated, and are obligatory. (*b*) The end to be achieved is, sometimes sacralization, sometimes desacralization. In the former case the sacrificer is raised to a higher level; he enters into closer communion with the gods. In the latter either some material object, not necessarily animate, is deprived of a portion of its sanctity and made fit for human use, or the sacrificer himself loses a portion of his sanctity or impurity. In the sacrifice of sacralization the sanctity passes from the victim to the object; in that of desacralization, from the object to the victim. (*c*) Sacrifices may be classified into (i.) subjective or personal, where the sacrificer himself gains or loses sanctity or impurity; (ii.) objective, where the current of *mana* (*see* TABU) is directed upon some other person or object, and only a secondary effect is produced on the sacrificer himself.

Ritual.—The necessary elements of a Hindu sacrifice are: (1) the *sacrificer,* who provides the victim, and is affected, directly or indirectly, by the sacrifice; he may or may not be identical with (2) the *officiant,* who performs the rite; we have further (3) the *place,* (4) the *instruments* of sacrifice and (5) the *victim;* where the sacrificer enjoys only the secondary results, the direct influence of the sacrifice is directed towards (6) the *object;* finally, we may distinguish (7) three *moments of the rite* —(*a*) the *entry,* (*b*) the *slaughter,* (*c*) the *exit.*

Sacralization and desacralization, sometimes performed by means of subsidiary sacrifices, were the essential elements of the preparation for sacrifice and the subsequent lustration. In developed forms, such as the offering of *soma,* they assumed a great importance; (1) the sacrificer had to pass from the world of man into a world of the gods; consequently he was separated from the common herd of mankind and purified; he underwent ceremonies emblematic of rebirth and was then subject to numberless taboos imposed for the purpose of maintaining his ceremonial purity. In like manner (2) the officiant prepared himself for his task; but in his case the natural sanctity of the priest relieved him of the necessity of undergoing all that the common man had to pass through; in fact, this was one of the causes which brought him into existence, the other being the need of a functionary familiar with the ritual, who would avoid disastrous errors of procedure, destructive of the efficacy of the sacrifice. (3) Where there was an appointed place of sacrifice there was no need of preparation of a place of sacrifice. (4) The necessary rites included (*a*) the establishment of the fires, friction being the only permitted method of kindling it, (*b*) the tracing on the ground of the *vedi,* or magical circle, to destroy impurities, (*c*) the digging of the hole which constituted the real altar, (*d*) the preparation of the post which represented the sacrificer and to which the victim was tied, and other minor details. (5) The victim might be naturally sacred or might have to undergo sanctification. In the former case (*a*) individual animals might be distinguished by certain marks, or, (*b*) the whole species might be allied to the god. In the latter case the victim had to be with-

out blemish; (*c*) the age, colour or sex of the victim might differ according to the purpose of the sacrifice. It reached a degree of sanctity when only the priest might touch it. Finally, the priest made three turns round it with a lighted torch in his hand, which finally separated it from the world and fitted it for its high purpose. The sacrificer had to remain in contact with the victim, either personally, or, to avoid ritual perils, by the intermediary of the priest. After excuses made to the animal or to the species in general, the victim was placed in position, and silence observed by all who were present. The cord was drawn tight and the victim ceased to breathe; its spirit passed into the world of the gods. It remained to dispose of the corpse. After a rite intended to secure its perfect ceremonial purity, a part of the victim was removed, held over the fire and finally cast into it. The remainder, divided into portions, was cooked; a certain number of these portions fell to the sacrificer, after an invocation, which made them sacred by calling the deity to descend into the offering and thus sanctify the sacrificer. (6) Then followed the rites of desacralization. Finally the priest, the sacrificer, and his wife performed a lustration and the ceremonies were at an end.

With present knowledge the problem of the original form of sacrifice, if there be a single primary form, is insoluble. It is impossible to give a general survey of the purposes of sacrifice; they are too numerous, and it is rare to find any but mixed forms.

Cathartic Sacrifice.—In primitive cults the distinction between sacred and unclean is not well defined (*see* TABU); consequently we find two types of cathartic sacrifice—(i.) one to cleanse of impurity and make fit for common use, (ii.) the other to rid of sanctity and in like manner render suitable for human use or intercourse.

(i.) The best example of the first class is the scapegoat, where a more concrete idea of expulsion of evil (*see* DEMONOLOGY, EXORCISM) is present among primitive peoples, such as the Australians.

(ii.) As an example of the second class may be taken the sacrifice of the bull to Rudra, which exemplifies the concentration of holiness in a single animal as representative of its species (*see* ANIMAL WORSHIP).

Communal Sacrifice.—The common meal is not a primitive rite of adoption. The custom of eating the body of the victim does not necessarily spring from any idea of communion with the god; it may also arise from a desire to incorporate the sanctity which has been imparted to it—an idea on a level with many other food customs (*see* COUVADE), and based on the idea that eating anything causes its qualities to pass into the eater. Where the victim is an animal specially associated with a god (the most conspicuous case is perhaps that of the corn spirit), it may be granted that the god is eaten; but precisely in these cases there is no custom of giving a portion of the victim to the god.

Deificatory Sacrifice.—The object of certain sacrifices is to provide a tutelary deity of a house, town or frontier. (*a*) In many countries, those who die a violent death are held to haunt the place where they met their fate; consequently, when a town is built living men are interred beneath the ramparts and the pillars of the gates. (*b*) In parts of North America the *nagual* or *manitu* animal, of which the Indian dreams during the initiation fast and which is to be his tutelary spirit, is killed with certain rites. (*c*) Human representatives of the corn or vegetation spirits are killed; in these, as in other cases of the sacrifice of the man-god, the killing of the old god is at the same time the making of a new god. (*d*) Suicide is treated as a means of raising a human being to the rank of a god. (*e*) Gods may be sacrificed (in theriomorphic form) to themselves as a means of renewing the life of the god. (*f*) The method of creating a fetish (*see* FETISHISM) on the Congo resembles deificatory sacrifice: but here there is no actual slaughter of a human being; magical means are alone relied upon.

Honorific Sacrifices.—Sacrifices tend to be interpreted as gifts to the god. Man seeks to influence his fellow men in various ways, and it is quite natural to find the same ideas in the sphere of religion. Food is often given to a god because he is believed to take pleasure in eating; the germ of this idea may have been to nourish the divine life. With the spiritualization of the god, comes a refinement of the tastes attributed to him, and the finer parts of the sacrifice, finally it may be only its savour, are alone regarded as acceptable offerings. Just as attendants are provided for the dead, so the god receives sacrifices intended to put slaves at his disposal. The gift theory of sacrifice is closely associated with that of the god as the ruler or king to whom man brings a tribute, just as he had to appear before his earthly king bearing gifts in his hands. The honorific sacrifice is essentially a propitiation but must be distinguished from the *piaculum* (*see* (below).

Mortuary Sacrifice.—Sacrifices, especially of human beings, are offered immediately after a death or at a longer interval. Their object may be (*a*) to provide a guide to the other world; (*b*) to provide the dead with servants or a retinue suitable to his rank; (*c*) to send messengers to keep the dead informed of the things of this world; (*d*) to strengthen the dead by the blood or life of a living being, in the same way that food is offered to them or blood rituals enjoined on mourners.

Piacular Sacrifice.—Whereas the god receives a gift in the honorific sacrifice, he demands a life in the piacular. The essential feature of the *piaculum* is that it is an expiation for wrong-doing, and the victim is often human.

Human Sacrifice.—If tradition is any guide, human sacrifice seems in many important areas to be of secondary character; in spite of the great development of the rite among the Aztecs, tradition says that it was unknown till 200 years before the conquest; in Polynesia human sacrifices seem to be comparatively modern; and in India they appear to have been rare among the Vedic peoples. On the whole, human sacrifice is far commoner among the semi-civilized and barbarous races than in still lower stages of culture. In Australia, however, where sacrifice of the ordinary type is unknown, the ritual killing of a child is practised in connection with the initiation of a magician.

Among the forms of human sacrifice must be reckoned religious suicide, mainly found in India but not unknown in Africa and other parts of the world.

Sacrifice in Greece and Rome.—Both on the mainland of Greece and in the Greek colonies human sacrifice was practised, usually as a means towards expulsion of evil. (*See* GREEK RELIGION.)

At Rome the scapegoat did not suffer death; but in the Saturnalia a human victim seems to have been slain till the 4th century A.D. Many forms of animal sacrifice were found. (*See* ROMAN RELIGION.)

Sacrifice in Egypt.—Of Egyptian ritual little is known. (*See* EGYPT: *Religion.*)

Sacrifice in India.—Among human sacrifices may be mentioned the *suttee,* or custom of immolating a widow on the funeral pyre of the husband, and the Khond sacrifice of the Meriah, who was either purchased or the son of a victim father. Some days before the sacrifice, the victim, who was often kept in captivity for long periods, was devoted and his sanctity was increased; finally he was put to death by strangulation or pressure. The remains were dismembered and distributed among the fields, excepting the portion offered to the earth goddess, which was buried.

Sacrifice in Africa.—Especially in West Africa, many forms of sacrifice are found. Three main forms of human sacrifice existed: (1) the scapegoat; (2) the messenger; and (3) the expiation; but combinations were not infrequent. On the Congo, if a man committed a murder, the community voted whether he should die or be expelled; if the latter, a victim was killed, of which all partook; this is not a *piaculum* for re-establishment of the tribal bond, for the criminal is driven out of the community.

Sacrifice in America.—The Pawnees had an elaborate ritual, in which a human victim was sacrificed to the Morning Star; the blood of the victims was sprinkled on the fields, and the details of the rite are not unlike those of the Khond custom. The Iroquois sacrifice of the white dog bore in later times the character of a scapegoat festival. In Mexico human sacrifices were very

common, the number being estimated at 20,000 a year.

BIBLIOGRAPHY.—H. Hubert and M. Mauss in *Année sociologique*, ii.; J. G. Frazer, *Golden Bough*, ii., iii.; W. R. Smith, *Religion of Semites;* E. B. Taylor, *Primitive Culture;* Ed. Westermarck, *Origin of Moral Ideas* (esp. vol. i. for Human Sacrifice). For Greece and Rome *see* L. Farnell, *Cults of the Greek States*, especially i. 56, 88 *seq.;* W. W. Fowler, *Festivals;* and Pauly, *Realencyklopädie, s.v.* "Sacrificia." The sections of the article "Sacrifice" in *Encyclopaedia of Religion and Ethics* contain references to bibliography and details of importance.

THE IDEA OF SACRIFICE IN THE CHRISTIAN CHURCH

There can be no doubt that the idea of sacrifice occupied an important place in early Christianity. It had been a fundamental element of both Jewish and Gentile religions, and Christianity tended rather to absorb and modify such elements than to abolish them. To a great extent the idea had been modified already. Among the Jews the preaching of the prophets had been a constant protest against the grosser forms of sacrifice, and there are indications that when Christianity arose bloody sacrifices were already beginning to fall into disuse; a saying which was attributed by the Ebionites to Christ repeats this protest in a strong form, "I have come to abolish the sacrifices; and if ye do not cease from sacrificing the wrath of God will not cease from you" (Epiph. xxx. 16). Among the Greeks the philosophers had come to use both argument and ridicule against the idea that the offering of material things could be needed by or acceptable to the Maker of them all. Among both Jews and Greeks the earlier forms of the idea had been rationalized into the belief that the most appropriate offering to God is that of a pure and penitent heart, and that the vocal expression of contrition in prayer or of gratitude in praise is also acceptable.

The best instances of these ideas in the Old Testament are in Psalms l. and li., and in Greek literature the striking words which Porphyry quotes from an earlier writer, "We ought, then, having been united and made like to God, to offer our own conduct as a holy sacrifice to Him, the same being also a hymn and our salvation in passionless excellence of soul" (Euseb. *Dem. Ev.*, 3). The ideas are also found both in the New Testament and in early Christian literature: "Let us offer up a sacrifice of praise to God continually, that is, the fruit of lips which make confession to His name" (Heb. xiii. 15); "That prayers and thanksgivings, made by worthy persons, are the only perfect and acceptable sacrifices I also admit" (Just. Mart. *Trypho*, c. 117); "We honour God in prayer, and offer this as the best and holiest sacrifice with righteousness to the righteous Word" (Clem. Alex. *Strom.*, vii. 6).

But among the Jews two other forms of the idea expressed themselves in usages which have been perpetuated in Christianity, and one of which has had a singular importance for the Christian world. The one form, which probably arose from the conception of Yahweh as in an especial sense the protector of the poor, was that gifts to God may properly be bestowed on the needy, and that consequently alms have the virtue of a sacrifice. Biblical instances of this idea are—"He who doeth alms is offering a sacrifice of praise" (Ecclus. xxxii. 2); "To do good and to communicate forget not, for with such sacrifices God is well pleased" (Heb. xiii. 16); so the offerings sent by the Philippians to Paul when a prisoner at Rome are "an odour of a sweet smell, a sacrifice acceptable, well pleasing to God" (Phil. iv. 18). The other form, which was probably a relic of the conception of Yahweh as the author of natural fertility, was that part of the fruits of the earth should be offered to God in acknowledgment of His bounty, and that what was so offered was especially blessed and brought a blessing upon both those who offered it and those who afterwards partook of it. The persistence of this form of the idea of sacrifice constitutes so marked a feature of the history of Christianity as to require a detailed account of it.

Meals as Thank-offerings.—In the first instance it is probable that among Christians, as among Jews, every meal, and especially every social meal, was regarded as being in some sense a thank-offering. Thanksgiving, blessing and offering were co-ordinate terms. Hence the Talmudic rule, "A man shall not taste anything before blessing it" (*Tosephta Berachoth*, c. 4), and hence St. Paul's words, "He that eateth, eateth unto the Lord, for he giveth God thanks" (Rom. xiv. 6; *cf.* 1 Tim. iv. 4). But the most important offering was the solemn oblation in the assembly on the Lord's day.

The points in relation to this offering which are clearly demonstrable from the Christian writers of the first two centuries, but which subsequent theories have tended to confuse, are these. (1) It was regarded as a true offering or sacrifice; for in the *Teaching of the Twelve Apostles*, in Justin Martyr and in Irenaeus it is designated by each of the terms which are used to designate sacrifices in the Old Testament. (2) It was primarily an offering of the fruits of the earth to the Creator; this is clear from both Justin Martyr and Irenaeus, the latter of whom not only explicitly states that such oblations are continued among Christians, but also meets the current objection to them by arguing that they are offered to God not as though He needed anything but to show the gratitude of the offerer (Iren. iv. 17, 18). (3) It was offered as a thanksgiving partly for creation and preservation and partly for redemption: the latter is the special purpose mentioned (*e.g.*) in the *Teaching of the Twelve Apostles;* the former is that upon which Irenaeus chiefly dwells; both are mentioned together in Justin Martyr (*Trypho*, c. 41). (4) Those who offered it were required to be not only baptized Christians but also "in love and charity one with another"; there is an indication of this latter requirement in the Sermon on the Mount (Matt. v. 23, 24, where the word translated "gift" is the usual lxx. word for a sacrificial offering, and is so used elsewhere in the same Gospel, viz. Matt. viii. 4, xxiii. 19), and still more explicitly in the *Teaching*, c. 14, "Let not any one who has a dispute with his fellow come together with you (*i.e.* on the Lord's day) until they have been reconciled, that your sacrifice be not defiled." This brotherly unity was symbolized by the kiss of peace. (5) It was offered in the assembly by the hands of the president; this is stated by Justin Martyr (*Apol.* i. 65, 67), and implied by Clement of Rome (*Ep.* i. 44, 4).

Sacred Meals.—Combined with this sacrifice of the fruits of the earth to the Creator in memory of creation and redemption, and probably always immediately following it, was the sacred meal at which part of the offerings was eaten. Such a sacred meal had always, or almost always, formed part of the rites of sacrifice. There was the idea that what had been solemnly offered to God was especially hallowed by Him, and that the partaking of it united the partakers in a special bond both to Him, and to one another. In the case of the bread and wine of the Christian sacrifice, it was believed that, after having been offered and blessed, they became to those who partook of them the body and blood of Christ. This "communion of the body and blood of Christ," which in early writings is clearly distinguished from the thank-offering which preceded it, and which furnished the materials for it, gradually came to supersede the thank-offering in importance, and to exercise a reflex influence upon it. In the time of Cyprian, though not before, we begin to find the idea that the body and blood of Christ were not merely partaken of by the worshippers but also offered in sacrifice, and that the Eucharist was not so much a thank-offering for creation and redemption as a repetition or a showing forth anew of the self-sacrifice of Christ.

This idea is repeated in Ambrose and Augustine, and has since been a dominant idea of both Eastern and Western Christendom. But, though dominant, it has not been universal, nor did it become dominant until several centuries after its first promulgation. The history of it has yet to be written. For, in spite of the important controversies to which it has given birth, no one has taken the pains to distinguish between (i.) the theories which have been from time to time put forth by eminent writers, and which, though they have in some cases ultimately won a general acceptance, have for a long period remained as merely individual opinions, and (ii.) the current beliefs of the great body of Christians which are expressed in recognized formularies. A catena of opinions may be produced in favour of almost any theory; but formularies express the collective or average belief of any given period, and changes in them are a sure indication that there has

been a general change in ideas.

It is clear from the evidence of the early Western liturgies that, for at least six centuries, the primitive conception of the nature of the Christian sacrifice remained. There is a clear distinction between the sacrifice and the communion which followed it, and that which is offered consists of the fruits of the earth and not of the body and blood of Christ. Other ideas no doubt attached themselves to the primitive conception, of which there is no certain evidence in primitive times, *e.g.* the idea of the propitiatory character of the offering, but these ideas rather confirm than disprove the persistence of those primitive conceptions themselves. All Eastern liturgies, in their present form, are of later date than the surviving fragments of the earlier Western liturgies, and cannot form the basis of so sure an induction; but they entirely confirm the conclusions to which the Western liturgies lead.

In the course of the 8th and 9th centuries, by the operation of causes which have not yet been fully investigated, the theory which is first found in Cyprian became the dominant belief of Western Christendom. The central point of the sacrificial idea was shifted from the offering of the fruits of the earth to the offering of the body and blood of Christ. The change is marked in the rituals by the duplication of the liturgical forms. The prayers of intercession and oblation, which in earlier times are found only in connection with the former offering, are repeated in the course of the same service in connection with the latter. The designations and epithets which are in earlier times applied to the fruits of the earth are applied to the body and blood. From that time until the Reformation the Christian sacrifice was all but universally regarded as the offering of the body and blood of Christ. The innumerable theories which were framed as to the precise nature of the offering and as to the precise change in the elements all implied that conception of it. It still remains as the accepted doctrine of the Church of Rome. For, although the council of Trent recognized fully the distinction which has been mentioned above between the Eucharist and the sacrifice of the mass, and treated of them in separate sessions (the former in Session xiii., the latter in Session xxii.), it continued the mediaeval theory of the nature of the latter.

The reaction against the mediaeval theory at the time of the Reformation took the form of a return to what had no doubt been an early belief,—the idea that the Christian sacrifice consists in the offering of a pure heart and of vocal thanksgiving. Luther at one period (in his treatise *De captivitate Babylonica*) maintained, though not on historical grounds, that the offering of the oblations of the people was the real origin of the conception of the sacrifice of the Mass; but he directed all the force of his vehement polemic against the idea that any other sacrifice could be efficacious besides the sacrifice of Christ. In the majority of Protestant communities the idea of a sacrifice has almost lapsed. That which among Catholics is most commonly regarded in its aspect as an offering and spoken of as the "mass" is usually regarded in its aspect as a participation in the symbols of Christ's death and spoken of as the "communion." But it may be inferred from the considerable progress of the Anglo-Catholic revival in most English-speaking countries that the idea of sacrifice has not yet ceased to be an important element in the general conception of religion.

See J. H. Srawley and H. Watt, art. "Eucharist" in Hastings, *Encyclopaedia of Religion and Ethics*, vol. v.; R. A. S. Macalister, art. "Sacrifice (Semitic)," *ibid.* vol. ix., p. 31; M. Gaster, art. "Sacrifice, Jewish," *ibid.* p. 24; G. F. Moore, art. "Sacrifice" in the *Encyclopaedia Biblica;* W. R. Smith, *Religion of the Semites* (1889; reprint of 2nd ed., 1907); J. G. Frazer, *The Golden Bough*, pt. vi., "The Scapegoat," and *Folklore in the Old Testament.*

SACRILEGE, the violation or profanation of sacred things. The word comes from the Lat. *sacrilegium,* which originally meant merely the theft of sacred things, although already in Cicero's time it had grown to include in popular speech any insult or injury to them.

In primitive religions inclusive of almost every serious offence even in fields now regarded as merely social or political, its scope is gradually lessened to a single part of one section of ecclesiastical criminology, following inversely the development of the idea of holiness from the concrete to the abstract, from fetishism to mysticism. The primitive defence against sacrilege lay directly in the nature of sacred things, those that held a curse for any violation or profanation (*see* TABU). Early criminal law brought a measure of physical sanction into consideration. The Levitical code exacted of the offender reparation for the damage with the addition of one-fifth of the amount, and an expiatory sacrifice (Lev. v. 15, 16). The tragic story of the stoning of Achan, who stole some of the spoils of Jericho which Joshua had consecrated to the treasury of Yahweh, is one of the most graphic details of Old Testament history (*cf.* Joshua vii. 20–25).

No religion was more prodigal in rules to safeguard that which was holy or consecrated than the Jewish, especially in its temple laws; violation of them often led to mob violence as well as divine chastisement. The temple rules do not apply to synagogues, however, and unseemly conduct in them is liable only to civil action.

While the Roman cults were amply protected by tabus, there was no comprehensive term in Roman law for religious violations and profanations in general. *Sacrilegium* was narrowly construed as the theft of sacred things from a sacred place. According to Ulpian the punishment for *sacrilegium* varied according to the position and standing of the culprit and the circumstances under which the crime was committed. For the lower classes it was crucifixion, burning or the wild beasts. The latter penalty was also attached to theft of sacred things by night, but stealing by day from a temple objects of little value brought only sentence to the mines. People of higher rank were deported. During classical times the law kept to the narrow meaning of *sacrilegium,* but in popular usage it had grown to mean about the same as the English word. Traces of this usage are frequent in Augustan writers. The early church Fathers use the word most frequently in the restricted sense, although an effort has been made to read the wider meaning in Tertullian. But by the middle of the 4th century the narrower meaning had disappeared. In Ambrose, Augustine and Leo I., *sacrilegium* means sacrilege. The wider meaning had invaded the law as well. Mommsen was of the opinion that *sacrilegium* had no settled meaning in the laws of the 4th century. But it was rather that an enlarged application of the idea of sacredness made the crime of sacrilege in the sense of *violatio sacri* a more general one. This was partly due to the influence of Christianity, which sought to include as objects of sacrilege all forms of church property, rather than merely those things consecrated in pagan cults, partly to the efforts of the later emperors to surround themselves and everything emanating from them with highest sanctions. In the Theodosian Code the various crimes which are accounted sacrilege include—apostasy, heresy, schism, Judaism, paganism, attempts against the immunity of churches and clergy or privileges of church courts, the desecration of sacraments, etc., and even Sunday. Along with these crimes against religion went treason to the emperor, offences against the laws, especially counterfeiting, defraudation in taxes, seizure of confiscated property, evil conduct of imperial officers, etc. There is no formal definition of sacrilege in the code of Justinian but the conception remains as wide.

The penitentials (*q.v.*), or early collections of disciplinary canons, gave much attention to sacrilege. The Frankish synods emphasize the crime of seizing church property of every kind, including the vast estates so envied by the lay nobility. The worst sacrilege of all, defiling the Host, is mentioned frequently, and generally brought the death penalty accompanied by the cruellest and most ignominious tortures. The period of the Reformation naturally increased the commonness of the crime. Under the emperor Charles V. the penalty for stealing the Host was the stake; that for other crimes was graded accordingly. In France, in 1561, under Charles IX., it was forbidden under penalty of death to demolish crosses and images and to commit other acts of scandal and impious sedition. In the declaration of 1682, Louis XIV. decreed the same penalty for sacrilege joined to superstition and impiety, and in the somewhat belated religious persecution of the duke of Bourbon in 1724 those convicted of larceny in churches, together with their accomplices, were condemned, the men to the galleys for life or for a term of years, the

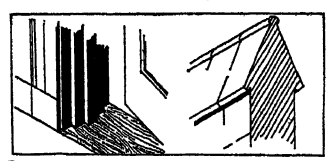
women to be branded with the letter V and imprisoned for life, or for a term. The trial of La Barre in 1766 at Abbeville is the most famous sacrilege case in modern times. Convicted of wearing his hat while a religious procession was passing—as well as of blasphemy—he was accused as well of having mutilated a crucifix standing on the town bridge. Declared guilty, after torture, he was sentenced to have his tongue cut out, to be beheaded and the body to be burned, a sentence which was confirmed by the parlement of Paris and the bigoted king Louis XV. In the midst of the French Revolution respect for *civic* festivals was sternly enacted, but sacrilege was an almost daily matter of state policy. In 1825 the reactionary parlement once more brought back the middle ages, by decreeing the death penalty for public profanation, the execution to be preceded by the *amende honorable* before the church doors. "Theft sacrilege" was treated in a separate series of equally savage clauses. This ferocious legislation was expressly and summarily abrogated in 1830.

English Law.—In English law, sacrilege is the breaking into a place of worship and stealing therefrom. At common law benefit of clergy was denied to robbers of churches. A statute of 1553 made the breaking or defacing of an altar, crucifix or cross in any church, chapel or churchyard punishable with three months' imprisonment on conviction before two justices, the imprisonment to be continued unless the offender entered into surety for good behaviour at quarter sessions. The tendency of the later law has been to put the offence of sacrilege in the same position as if the offence had not been committed in a sacred building. Thus breaking into a place of worship at night, says Coke, is burglary, for the church is the mansion house of Almighty God. The Larceny Act of 1861 punishes the breaking into, or out of, a place of divine worship in the same way as burglary, and the theft of things sacred in the same way as larceny. Now by the Malicious Damage Act 1861 the unlawful and malicious destroying or damaging any picture, statue, monument or other memorial of the dead, painted glass or other monument or work of art, in any church, chapel, meeting-place or other place of divine worship, is a misdemeanour punishable by imprisonment.

SACRISTY, in ecclesiastical architecture, the room or hall in a church wherein are kept the vestments and utensils (*sacra*) used in the services and celebrations.

SADDLE, a seat, usually of leather, fixed by girths to the back of a horse for riding; also a padded cushion for the back of a draught horse, fastened by girths and crupper; to it are attached the supports for the shafts, and rings for the reins. (*See* SADDLERY.) The word is also applied to many objects resembling a saddle in shape or function, such as a block to support a spar in a ship, or in machinery to support a rod.

In architecture, a saddle is a piece of wood, metal, marble, etc., at the bottom of a door opening. It is usually raised slightly above the floor on either side, and is used not only to cover the space or joint between the flooring of two adjacent rooms or spaces, but also to raise the bottom of the door sufficiently to clear carpets, rugs, etc. The word saddle is usually restricted to such a member in interior doorways; sill (*q.v.*) is used similarly in the case of exterior doorways. The term is also applied to a saddle-shaped stone used as a coping.



SADDLE IN ARCHITECTURE: (LEFT) IN DOOR OPENING, (RIGHT) STONE COPING

Saddle bars are small, horizontal bars of iron or bronze running across a stained glass window, and fastened to the stone or frame on each side, not only bracing the window structure, but forming a rigid basis to which the leading of the stained glass can be attached.

SADDLERY AND HARNESS. These two terms embrace the equipment for the horse when used for riding or driving. "Harness" was originally a general term for equipment, *e.g.*, the body armour of a soldier. It is now usually confined to the work and driving horse's equipment, "saddle and bridle" being applied to that of the riding horse.

Saddlery is principally a leather trade, and the craft has been established in England as a separate trade since the 13th century, when the London Saddlers' Company received its charter from Edward I. There is evidence also of its early prosperity at Birmingham; the principal seat of the British harness and saddlery trade is now at Walsall. Saddlers' ironmongery embraces the making of buckles, rings, chains, stirrups, spurs, bits, hames.

The "bridle" is the combination of straps, bits, rings, chains and buckles which fits on the horse's head. The headstall consists of the headpiece passing behind the ears and joining the head-band over the forehead; the cheek-straps run down the sides of the head to the bit to which they are fastened; in the "blind" type of driving bridle the "blinkers," rectangular or round leather flaps which prevent the horse from seeing anything except what lies in front, are attached to the cheek-straps; the nose-band passes round the front of the nose just above the nostrils; and the throat-latch extends from the top of the cheek-straps underneath the head. The "martingale," an attachment sometimes used on riding horses, passes between the horse's forelegs, with one end fastened to the saddle girth and the other to the bridle. It prevents the horse throwing up his head uncontrollably. The bit is the metal contrivance inserted in the mouth to which the reins are attached. There are innumerable patterns of bits, but they may be roughly divided into the straight bar, "snaffle" and "curb." The "snaffle" for the riding horse generally has a smooth, jointed steel mouthpiece, with straight cheek-bars, the rings for the reins and cheek-pieces of the headstall being fixed in the bars at the junction with the mouthpiece. A severer snaffle has the mouthpiece twisted and fluted. The bars prevent the horse pulling the bit through the mouth. The snaffle without bars is generally termed a "bridoon." The commonest form of bit used in driving is the double-ring snaffle, in which the rings work one within the other, the headstall straps fastening to one and the reins to the other, or, if the horse is driven on the double ring, the reins are buckled to both rings. The curb-bit (Fr. *courbe,* Lat. *curvus,* bent, crooked) is one to which a curb-chain or strap is generally attached, fastened to hooks on the upper ends of the cheek-bars of the bit and passing under the horse's lower jaw in the chin groove. The reins are attached to rings at the lower ends of the cheek-bars, the leverage thus pressing the curb-chain against the jaw. The mouthpiece of the curb-bit is unjointed and commonly has in the centre a "port," *i.e.* a raised curve allowing liberty for the tongue and bringing the pressure on the base of the horse's jaw. The curb-bit and the bridoon can be used together with separate headstalls and reins, and there are many combination bits.

Saddles.—The riding saddle is composed of the "tree," the framework, the parts of which are the pommel or head, the projection which fits over the withers, and the side bars which curve round into the cantle or hind-bow. The tree in the best saddles is made of beechwood split with the grain; thin canvas is glued over the wood to prevent splitting, and iron or steel plates then riveted on the head and on the cantle. Linen webs are fastened lengthwise and across, over which is nailed canvas and serge between which the padding is stuffed. To the tree are fastened the stirrup-bars. The leather covering of the tree should be of pig-skin; cheap saddles are made of sheep-skin stamped to imitate pig-skin. The various parts of the man's saddle are the seat, the skirt, *i.e.*, the fold or pad of leather on either side of the head, and the hanging flaps; knee-rolls are not used as much as they were, except where roughly broken-in horses are ridden. The saddle is cut straight over the withers with a square-ended cantle, as in the hunting saddle, or cut back over the withers with a round-ended cantle, as in the polo saddle. The saddles in use on the continent of Europe still retain the high pommel and cantle and heavy knee-rolls discarded by riders trained in the British school and the hunting-field. The saddles of the East and of the Arabs keep their primitive shape, and they are really seats *in* which rather than *on* which the rider sits. The Mexican saddle, with its silver adornments and embossed leather, is a characteristic type. It has a very high padded pommel and a round-headed projecting cantle.

Harness.—Space forbids the discussion of the varieties of harness for the pair-horse carriage, the four-horse coach, the farm wagon, etc., or the different kinds of ornamentation that are or

have been lavished upon it. The leather collar, heavily padded, passes over the head and rests firmly on the shoulders; the hames, linked pieces of metal, fit tightly round it and are fastened at the top and bottom by the hame-straps; they bear the traces, or straps which pass along the horse's sides and the shafts, and are attached to the whiffletree. Where the collar is dispensed with, the traces are attached to a breast-strap against which the horse works. This breast harness is much used for the lightly harnessed American trotting horses, and for military draught horses. The saddle pad is a narrow leather cushion resting on the back and girthed under the belly and held in position by the back-band and crupper, a loop strap passing under the tail. The saddle supports the shafts by straps fitted with shaft loop-holes. The reins pass from the bit through "terrets" or rings on the hames and pad. The harness on the horse's hind-quarters consists of the breeching, passing round behind the horse and helping in backing and stopping the vehicle and the hip-strap fastened to the breeching and passing over the hind-quarters. The bearing rein, or check-rein as it is often called, when used as a support to the head, or as a so-called aid to improvement of the paces, consists of a separate bridoon-bit with the reins passing through rings on the throat-band and thence slipped over a hook on the pad.

Historical Sketch.—Questions as to the epoch in the history of mankind when the horse was first trained for draught and riding are for archeologists and anthropologists to discuss (HORSE: *History*). With the domestication of the horse came the development of the bit; first a halter of hide bound the muzzle, then a thong slipped into the mouth, finally replaced by wood or bone. Stone age objects have been found in lake-dwellings, such as that at Robenhausen, near Zürich, which may have been bits; one is slightly curved, with two knobs grooved at either end for the reins. Bits from the bronze age and the iron age can be seen in most museums showing that the forms have changed little. In the late iron age burial of a Gaulish chief with his chariot at Somme-Bionne were two horses' bits of the jointed snaffle type.

In ancient Greece and Rome the bit and bridle were used during historic times, and allusions to riding without them refer to exhibitions of horsemanship. On Trajan's column the Numidians ride without bridles or bits, and various North African tribes trained their horses to obey their voice alone (*cf.* Claudian, *Epig.* i. 10, of the Gaulish *essedarii*, driving without bridle and reins). The *locus classicus* for the bridling and saddling of the Greek horse is Xenophon, Περὶ ἱππικῆς. The Greek name for the bridle bit and reins collectively is χαλινός (Lat. *frenum*), the bit proper στόισμιον; in Lat. *frenum* is also used of the bit itself. The headstall (κορυφαία) and cheek-straps (παρήϊα) were richly decorated. In Homer (*Il.* iv. 142) the latter are ornamented with ivory plates stained with purple, and such have been found on the site of Troy (Schliemann, *Ilios*, 476, 631). The head-band also bore a crest (λοφός, *crista*), and in front the ἄμπυξ (*frontale*) might be extended down the face to serve as a defence, as in the mediaeval *chaufrein*. This frontal was a special subject of decoration. Of the two principal types of ancient bits, the unjointed and the jointed mouthpiece, the latter is the most common form. There are also other forms of bits; those with sharp points were called *lupata* (Virg. *Georg.* iii. 208). There is a Greek bit in the British Museum with revolving disks, a device which occurs in mediaeval bits, to give the horse something to keep turning in his mouth. The curb was also used: Xenophon distinguishes between the snaffle (λεῖος χαλινός) and the curb. The curb-strap or chain was termed ὑποχαλινιδία or ψάλιον, which, however, may mean a muzzle. A bronze bit found at Pompeii has a twisted and jointed metal mouthpiece and a plain curved bar acting as a curb-strap. The cheek-bars of the bit take a variety of forms: straight bars, circles with rays, square or oblong plaques, triangles and the swan-necked or S-shaped type are all found. In medieval times complicated and severe bits were used, and heavy bits with cruel mouthpieces and long elaborately curved cheek-bars are still used by Arabs and the riders of Central and South America.

The saddle was not used in Egypt; the Assyrian monuments show decorated saddle-cloths rather than the saddle. The harness of the chariots of Egypt and Assyria are also illustrated on the monuments (*see* especially Sir J. G. Wilkinson, *Manners and Customs of the Ancient Egyptians* revised ed. 1878). The ancient Greeks rode bare-backed as in the Panathenaic frieze of the Parthenon or used a saddle-cloth (ἐφίππιον, Lat. *ephippium; sella* as applied to a saddle is quite late). Even the saddle-cloth does not appear to have been in use till the 5th century. A 6th-century vase, found at Daphnae, Lower Egypt (Flinders-Petrie and Murray, *Tanis*, 1888, ii. Pl. xxix.), shows a woman riding astride on a cloth, with fully developed headstall and powerful bit. A black-figured sarcophagus, now in the British Museum, from Clazomenae, shows a long pointed *ephippium* with a chest-strap. These indicate Asiatic influence, for Daphnae was an Ionian and Carian settlement of the 7th century B.C. In Xenophon (*l.c.*) we find that the saddle-cloth had been adopted by the Athenian cavalry, and from his advice as to the seat to be adopted pads or rolls seem to have been added. There were no stirrups (till the time of the emperor Maurice, A.D. 602), and the rider mounted at a vault or by blocks; mounting by the spear used as a vaulting pole was also practised as an athletic feat. On a funeral monument of the time of Nero in the museum at Mainz is the figure of a horseman on a saddle-cloth with something resembling the pommel and cantle of a saddle, but the first saddle proper is found in the so-called column of Theodosius at Constantinople (usually ascribed to the end of the 4th century A.D., though it may be more than 100 years earlier), where two figures are riding on high-peaked saddles resting on embroidered saddle-cloths. In mediaeval times the saddle was much like that of the Oriental saddle of to-day with high peaks before and behind. In the military saddle of the 14th and 15th century the high front parts of the saddle were armoured and extended to protect the legs of the rider. The jousting saddle (*cf.* the example in the Tower of London) becomes almost a box into which the rider is fixed; the high cantle fits round the rider's loins and when charging he lifted himself into practically a standing position in the stirrups. The saddle for use on the road or hunting was much like the Arab saddle of to-day, and similar forms are in use in Europe and elsewhere where the British saddle has not been adopted. Women rode astride or on a pillion behind a male rider. The side-saddle is said to date from the end of the 12th century. For the harness of the ancient draught horse *see* CHARIOT.

(C. WE.)

See J. C. Ginzrot, *Wagen und Fahrwerke der Griechen und Römer* (1817); C. Berjeau, *The Horses of Antiquity, Middle Ages and Renaissance* (1864); J. Philipson, *Harness* (1882); B. Tozer, *The Horse in History* (1908). *See* also HORSE, DRIVING, RIDING.

SADDUCEES, the name of a party which was opposed to the Pharisees down to the destruction of Jerusalem in A.D. 70. The Sadducees have been represented, not so much an organized party, as the lax and wordly-minded aristocrats, who were primarily interested in maintaining their own privileged position; who favoured Greco-Roman culture. Their attitude towards religious questions was purely negative; indeed, they were not a religious party at all. This view, championed by G. Hölscher, is not supported by the early sources. Both in Josephus and the N.T. Sadduceeism is represented as associated with certain definite religious positions; they represented the conservative tendency in matters of religion.

The most probable explanation of the name Sadducees is that proposed by A. Geiger, viz., that it is equivalent to "Zadokites," *i.e.*, "the adherents of the Sons of Zadok." The latter were a priestly family who claimed descent from Zadok, who was head of the priesthood in the days of Solomon (*cf.* 1 Kings i. 34; and ii. 35); Ezekiel (xliv. 10–15) selected this family as worthy of being invested with the control of the Temple; and in fact members of this family formed the Temple hierarchy down to the time of Ben Sira (*cf.* Sirach. li. 12, Hebrew text). Later this priestly line became tainted with Hellenism, and ultimately the high priesthood was usurped by others. After the disappearance of the legitimate high priest of the house of Zadok the title "Zadokites" may well have been assumed by conservative elements in the priesthood, to preserve the earlier traditions of their order.

Unfortunately, we possess no statement from the Sadducean side of their beliefs and principles, unless the "Zadokite" work

discovered by Schechter represents, as is possible, the views of a section of the party. There are many controversial references in the Rabbinical literature to the Sadducees on points connected with the interpretation of the law. The main principle that divided the two parties was concerned with the written Torah (the Pentateuch). The supremacy of the law was common ground to both parties, but whereas the Pharisees assigned to the oral tradition a place of authority side by side with the written law, and determining its interpretation, the Sadducees refused to accept any ordinance as binding, unless it was based directly on the written word. The rest of Scripture (the Prophets and the Hagiographa) they regarded as mere Kabbalah "tradition." The Pharisaic device of harmonizing apparent contradictions between the Law and the Prophets by exegetical expedients was not accepted by the Sadducees, who refused to sanction doctrines and practices which could not be based on the written law. Thus the doctrine of a Davidic Messiah was rejected because it was considered that the prophetic teaching on this subject was in conflict with the *Torah*.

R. Leszynsky suggests that the Sadducees, or a section of them, accepted the hope of a priestly Messiah (*cf.* Ex. xix. 6), from which passage it might be inferred that a priestly line was destined to possess the Kingdom. There was also the example of the Priest King Melchizedek, which might easily suggest "Zadok King," or "Sadducean King." According to Acts xxiii. 8, the Sadducees denied the existence of angels and spirits, as well as the doctrine of the resurrection. This probably means that they did not accept the fully developed angelology of later times, while in the latter case the point of controversy was not whether the resurrection was true, but whether it could be proved from the Pentateuch. Another interesting point of difference is concerned with the date of Pentecost. The Sadducean hierarchy had its stronghold in the Temple, and it was only during the last 10 or 20 years of the Temple's existence that the Pharisees finally got control. With the destruction of the Temple in A.D. 70 their power as an organized party disappeared.

See R. Leszynsky, *Die Sadduzäer*, (1912); Art. "Sadducees," *E.R.E.* where further literature is cited. *Cf.* also Burkitt "Jesus and the 'Pharisees'" in *J. Th. S.* xxviii., 392–397. (G. H. B.)

SADE, DONATIEN ALPHONSE FRANÇOIS, COUNT [usually called the MARQUIS DE SADE] (1740–1814), French writer, was born in Paris on June 2, 1740. He entered the light horse at fourteen and saw considerable military service before returning to Paris in 1766. Here his vicious practices became notorious, and in 1772 he was condemned to death at Aix for an unnatural offence, and for poisoning. He fled to Italy, but in 1777 he was arrested in Paris, removed to Aix for trial, and there found guilty. In 1778 he escaped from prison, but was soon re-arrested and finally committed to the Bastille. Here he began to write plays and obscene novels. In 1789 he was removed to the Charenton Lunatic Asylum, but was discharged in 1790, only to be recommitted as incurable in 1803. He died there on Dec. 2, 1814. Among his works, all of the type indicated, were *Justine* (1791), *Juliette* (1792), *Philosophie dans le boudoir* (1793) and *Les Crimes de l'amour* (1800). The word Sadism is derived from his name.

See C. R. Dawes, *The Marquis de Sade: his Life and Works* (1927).

SÁ DE MIRANDA, FRANCISCO DE (1485?–1558), Portuguese poet, was the son of a canon of Coimbra belonging to the ancient and noble family of Sá. He probably made his first studies of Greek, Latin and philosophy in one of the colleges of the Old City, and in 1505 went to Lisbon university. He seems to have resided for the most part in the capital down to 1521, dividing his time between the palace and the university, in the latter of which he had taken the degree of doctor of law by 1516.

In the middle of July 1520 he set out across Spain for Italy, and spent the years 1521 to 1525 abroad, visiting Milan, Venice, Florence, Rome, Naples and Sicily "with leisure and curiosity." He enjoyed intimacy with Giovanni Ruccellai, Lattanzio Tolomei and Sannazaro; he saluted the illustrious Vittoria Colonna, a distant connection of his family, and in her house he probably talked with Bembo and Ariosto, and perhaps met Machiavelli and Guicciardini. He brought home with him (*ca.* 1525) the sonnet and canzone of Petrarch, the tercet of Dante, the *ottava rima* of Ariosto, the eclogue in the manner of Sannazaro and Italian hendecasyllabic verse. He did not, however, abandon the short national metre, but carried it to perfection in his *Cartas*.

His *Os Estrangeiros*, produced in 1527–28, was the first Portuguese prose comedy, as his *Cleopatra* (*c.* 1550) is recognised to be the first Portuguese classical tragedy. In 1528 Miranda made his first real attempt to introduce the new forms of verse by writing in Spanish a canzon entitled *Fabula do Mondego*, and in 1530–32 he followed it up with the eclogue *Aleixo*.

The year 1532 had marked his passage from the active to the contemplative life, and the eclogue *Basto*, in the form of a pastoral dialogue written in *redondilhas*, opened his new manner. It has a pronounced personal note, and its episodes are described in a genuinely popular tone. The same epoch saw the composition of his *Cartas* or sententious letters in *quintilhas* which, with *Basto* and his satires, make up the most original, if not the most valuable, portion of his legacy. A more lyrical vein is apparent in the *quintilhas* of *A. Egipciaca Santa Maria*.

In 1538 he wrote his second classical prose comedy *Os Vilhalpandos*, which was played before the Cardinal Infant Henry. He died on March 15, 1558.

Sá de Miranda led the way in a revolution in literature, and especially in poetry, which under his influence became higher in aim, purer in tone and broader in sympathy. He introduced the Renaissance into Portugal and at the same time made an austere stand against materialism. Some of his sonnets are admirable, and display a grave tenderness of feeling, a refinement of thought and a simplicity of expression which give them a high value. He wrote much and successfully in Castilian, several of his best eclogues being in that language.

Sá de Miranda's works were first published in 1595, but the admirable critical edition of Madame Michäelis de Vasconcellos (Halle, 1885) containing life, notes and glossary, supersedes all others. His plays can best be read in the 1784 edition of the collected works, *A. Egipciaca Santa Maria* was edited by T. Braga (Oporto, 1913). *See* Sousa Viterbo, *Estudos sobre Sá de Miranda* (3 parts, Coimbra, 1895–96); Decio Carneiro, *Sá de Miranda e a sua obra* (Lisbon, 1895); Theophilo Braga, *Sá de Miranda* (Oporto, 1896); C. Michaëlis de Vasconcellos, *Novos estudos sobre Sá de Miranda* in vol. v. (1912) of the *Boletim da Segunda Classe* of the Lisbon Academy of Sciences.

SĀDHU, a Sanskrit word meaning "straight," so "pure," a saint-like ascetic or devotee, who may belong to any order, such as the Sanyāsis, Bairāgis or Gosains.

SA'DĪ (*c.* 1184–1291), MUṢLIḤ-UDDĪN, or more correctly MUSHARRIF-UDDĪN B. MUṢLIḤ-UDDĪN, the greatest didactic poet and the most popular writer of Persia, was born about 1184 (A.H. 580) in Shiraz. His early youth was spent in study at the Nizāmiyya in Baghdād and he returned to Isfahan just at the time of the inroads of the Mongols, when the atābeg Sa'd (in whose honour Sa'dī took his pen-name) had been deposed by the victorious Khwarizm ruler of Ghiyāss-uddīn (1226). Distressed by the misfortune of his patron and disgusted with the miserable condition of Persia, Sa'dī quitted Shīrāz and entered upon the second period of his life—that of his wanderings (1226–1256). He proceeded via Balkh, Ghaznī and the Punjab to Gujarāt, on the western coast of which he visited the famous shrine of Sīva in Somnath. After a prolonged stay in Delhi, where he learnt Hindūstānī, he sailed for Yemen. Overcome with grief at the loss of a beloved child (when he had married is not known), he undertook an expedition into Abyssinia and a pilgrimage to Mecca and Medina. Thence he directed his steps towards Syria and lived as a renowned sheikh for a considerable time in Damascus, which he had once already visited. There and in Baalbek he added to his literary renown that of a first-rate pulpit orator. Weary of Damascus, he withdrew into the desert near Jerusalem and led a solitary wandering life, till one day he was taken captive by a troop of Frankish soldiers, brought to Tripoli, and condemned to forced labour in the trenches of the fortress. After enduring countless hardships, he was eventually rescued by a rich friend in Aleppo, who paid his ransom, and gave him his daughter in marriage. But Sa'dī, unable to live with his quarrelsome wife, set out on fresh travels, first to North Africa and then

through the length and breadth of Asia Minor and the adjoining countries. Not until he had passed his seventieth year did he return to Shiraz (about 1256; A.H. 653). Finding the place of his birth tranquil and prosperous under the wise rule of Abūbakr b. Sa'd, the son of his old patron (1226–1260; A.H. 623–658), the aged poet took up his permanent abode, interrupted only by repeated pilgrimages to Mecca, and devoted the remainder of his life to Ṣūfic contemplation and poetical composition. He died at Shiraz in 1292 (A.H. 691) according to Ḥamdallāh Mustaufī (who wrote only forty years later), or in December 1291 (A.H. 690), at the age of 110 lunar years.

His *Būstān* or "Fruit garden" (1257) and *Gulistān* or "Rose-garden" (1258), both dedicated to the reigning atābeg Abū Bekr, acquired great popularity in both the East and the West, owing to their easy, varied style and their happy *bons mots*. But Sa'dī's *Dīwān*, or collection of lyrical poetry, far surpasses the *Būstān* and *Gulistān*, at any rate in quantity, and perhaps in quality. Minor works are the Arabic *qaṣīdas*, the first of which laments the destruction of the Arabian caliphate by the Mongols in 1258 (A.H. 656); the Persian *qaṣīdas*, partly panegyrical, partly didactical; the *marāthī*, or elegies, beginning with one on the death of Abū Bekr and ending with one on the defeat and demise of the last caliph, Mosta'sim; the *mulamma'āt*, or poems with alternate Persian and Arabic verses of a rather artificial character; the *tarjī'āt*, or refrain-poems; the *ghazals*, or odes; the *ṣāhibiyyah* and *muḳatta'āt*, or moral aphorisms and epigrams; the *rubā'iyyāt*, or quatrains; and the *mufradāt*, or distichs. Sa'dī's lyrical poems possess neither the easy grace and melodious charm of Ḥāfiz's songs nor the overpowering grandeur of Jelālud-dīn Rūmī's divine hymns, but they are nevertheless full of deep pathos and show a fearless love of truth.

The first who collected and arranged his works was 'Alī b. Aḥmad b. Bīsutūn (1326–1334; A.H. 726–734). The most exact information about Sa'dī's life and works is found in the introduction to Dr. W. Bacher's *Sa'dī's Aphorismen und Sinngedichte* (*Ṣāhibiyyah*) (Strassburg, 1879; a complete metrical translation of the epigrammatic poems), and in the same author's "Sa'dī Studien," in *Zeitschrift der morgenländischen Gesellschaft*, xxx. pp. 81–106; *see* also H. Ethé in W. Geiger's *Grundriss der iranischen Philologie*, ii. pp. 292–296, with full bibliography; and E. G. Browne, *Literary History of Persia*, pp. 525–539. Sa'dī's *Kulliyyāt* or complete works have been edited by Harrington (Calcutta, 1791–1795) with an English translation of some of the prose treatises and of Daulat Shah's notice on the poet, of which a German version is found in Graf's *Rosengarten* (Leipzig, 1846 p. 229 *sq.*); for the numerous lithographed editions, *see* Rieu's *Pers. Cat. of the Brit. Mus.* ii. p. 596. The *Būstān* has been printed in Calcutta (1810 and 1828), as well as in Lahore, Cawnpore, Tabriz, etc., a critical edition with Persian commentary was published by K. H. Graf at Vienna in 1850 (German metrical translations by the same, Jena 1850, and by Schlechta-Wssehrd, Vienna, 1852); English prose translations by H. W. Clarke (1879); and Ziauddin Gulam Moheiddin (Bombay, 1889); verse by G. S. Davie (1882); French translation by Barbier de Meynard (1880). The best editions of the *Gulistān* are by A. Sprenger (Calcutta, 1851) and by Platts (London, 1874); the best translations into English by Eastwick (1852) and by Platts (1873), the first four *bābs* in prose and verse by Sir Edwin Arnold (1899); into French by Defrémery (1858); into German by Graf (1846); *see* also S. Robinson's *Persian Poetry for English Readers* (1883), pp. 245–366.

SADIYA, the extreme north-east frontier station of British India, headquarters of the Sadiya Frontier Tract of Assam. Pop. (1921), 3,590. It stands high on a grassy plain, nearly surrounded by forest-clad mountains, on the right bank of what is locally (but erroneously) considered the main stream of the Brahmaputra. A railway on the opposite bank connects with the Assam-Bengal line. There is a bazaar, to which the hillmen beyond the frontier—Mishmis, Abors and Khamtis—bring down rubber, wax, ivory and musk, to barter for cotton-cloth and salt.

The Sadiya Frontier Tract covers an (estimated) area of 10,000 sq.m. extending to Tibet on the north and east and to Burma on the south and south-east, but only 4,200 sq.m. are under regular administration.

SADLER, MICHAEL THOMAS (1780–1835), English social reformer and economist was born at Snelston, Derbyshire, on Jan. 3, 1780. Entering business in Leeds in 1800, he took an active part in politics, devoting himself particularly to the administration of the poor law. In 1829 he was elected M.P. for Newark and thenceforward, until he was deprived of his seat, he was the leader of factory reform in parliament. He was also chairman of the committee on this subject. His interest in agriculture is shown by his introduction of a bill in 1831 for the rebuilding of cottages, and the provision of allotments for the labourer. In 1832 he unsuccessfully contested Leeds, and after being rejected by Huddersfield in 1834, he settled in Belfast, where he died on July 29, 1835.

See R. B. Seeley, *Memoirs of M. T. Sadler* (1842).

SADLER (or SADLEIR), **SIR RALPH** (1507–1587), English statesman, the son of Henry Sadler, steward of the manor of Cilney, near Great Hadham, Hertfordshire, was born at Hackney, Middlesex, in 1507. While a child he was placed in the family of Thomas Cromwell, afterwards earl of Essex, whose secretary he eventually became. Sadler held many positions under Henry VIII., but he is best known for his employment under Elizabeth in connection with the affair of Mary, Queen of Scots. Elizabeth sent him (1559) to Scotland, ostensibly to settle the border disputes, but in reality to secure a union with the Protestant party there, and he helped to arrange the treaty of Leith, July 6, 1560. In 1568 Sadler was appointed chancellor of the duchy of Lancaster, and in the same year was one of the English commissioners employed in treating on the matters arising from the flight of the Queen of Scots. From this time he seems to have been continually engaged as a discreet and trusty servant in connection with Mary's captivity, and was frequently sent with messages to her. On Aug. 25, 1584, when, owing to the imputations made by his countess, George 6th earl of Shrewsbury resigned his guardianship of the Queen, Sadler succeeded him. In September Mary was removed from Sheffield to Wingfield and thence early in 1585 to Tutbury. In April, Sadler, after numerous petitions on his part, was permitted to resign his distasteful charge. On March 30, 1587, Sadler died at Standon, and was buried there. His letters on Scottish affairs are most interesting.

BIBLIOGRAPHY.—*Letters and Negotiations of Sir Ralph Sadler* (Edinburgh, 1720); *The State Papers and Letters of Sir R. Sadler*, ed. Arthur Clifford, with a memoir by Sir Walter Scott (Edinburgh, 1809, 3 vols.).

SADO, an island belonging to Japan, lying 32 m. W. of Niigata (*q.v.*), in 38° N., 138° 30′ E. It has a circumference of 130 m., an area of 336 sq.m. and a population of *c.* 115,000. The port is Ebisa, on the east coast; and at a distance of 16½ m., near the west coast, is the town of Aikawa, having in its vicinity gold and silver mines, for which Sado is famous.

SADOWA, a village of Bohemia, now in Czechoslovakia, 4m. N.W. of Königgrätz (Czech, *Sádová*). Sadowa, with the small adjoining wood, was one of the principal and most hotly contested Prussian positions in the decisive battle of July 3, 1866, now usually called Königgrätz (*see* SEVEN WEEKS' WAR).

SAFED KOH, in many respects the most remarkable range of mountains on the north-west frontier of India, extending like a 14,000 ft. wall, straight and rigid, towering above all surrounding hills, from the mass of mountains which overlook Kabul on the south-east to the frontiers of India, and preserving a strike which—being more or less perpendicular to the border line—is in strange contrast to the usual frontier conformation. The highest peak, Sikaram, is 15,620 ft. above sea-level, and yet it is not a conspicuous point on this unusually straight-backed range. Geographically the Safed Koh is not an isolated range, for there is no break in the continuity of water divide which connects it with the great Shandur offshoot of the Hindu Kush except the narrow trough of the Kabul river, which cuts a deep waterway across where it makes its way from Dakka into the Peshawar plains.

The same name is often used for the mountain range north of the Hari Rud river in its upper course.

SAFEGUARDING OF INDUSTRY. This is a term which has come into use to designate a policy, entered upon by Great Britain after the World War, of tariff protection to particular industries under certain definitely prescribed conditions. The idea took shape at the Economic Conference of the Allies in Paris in 1916. The first of the resolutions concerning permanent measures, as distinct from war and reconstruction measures, was as follows:—

The Allies decide to take the necessary steps to render themselves independent of the enemy countries in so far as regards the raw materials and manufactured articles essential to the normal development of their economic activities.

The signatories—including, of course, Great Britain—retained complete freedom as to the nature of the measures to be adopted, and expressly added that, in deciding upon them, they would "have regard to the principles which govern their economic policy."

The Balfour Committee.—The further consideration of the matter was at once referred by H. H. Asquith, the prime minister, to the "committee on commercial and industrial policy after the war," presided over by Lord Balfour of Burleigh. In an interim report in March 1917 it drew a distinction between the great staple industries of the country and those producing "certain special commodities essential to national safety as being absolutely indispensable to important British industries, which were supplied before the war entirely or mainly from present enemy sources or from sources under present enemy control." The report also set forth the position with respect to synthetic dyes, spelter, tungsten, magnetos, optical and chemical glass, hosiery needles, thorium nitrate, gauges and drugs, as pivotal or "key" industries.

The committee presented its final report on Dec. 3, 1917, definitely recommending that "some Governmental action should be taken to promote and safeguard the development in the United Kingdom of industries of a special or pivotal character"; and also expressing the opinion that "the producers of this country are entitled to require from the Government that they should be protected in their home market against dumping." Dumping was defined as "the sale of goods at prices lower than those at which the goods are currently offered in the country of manufacture."

No action was taken on these recommendations until Aug. 1921, when the Coalition Government secured the passage of the Safeguarding of Industries Act, 1921. This dealt, in Part I., with the safeguarding of key industries, and in Part II. with the prevention of dumping, authorizing, in each case, a duty of one-third of the value.

Key industries were specified in a schedule to the Act; the Board of Trade was authorized to issue lists in accordance therewith; and complaints as to improper inclusion in, or exclusion from, the lists were to be considered by a referee appointed by the Lord Chancellor. The duration of this part of the Act was for five years. The enactment as to dumping in Part II. was restricted to goods other than articles of food or drink; and dumping was defined by implication as sale "at prices below the cost of production," which was itself defined as "95% of the wholesale price at the works." These provisions were unlimited in point of time. But under Part II. were now included conditions beyond those contemplated in 1917. The depreciation of the exchanges of continental countries, especially of Germany, had been accompanied by a "lag" between the internal and external value of their currencies, which, so long as it continued, gave their exports an advantage in foreign markets, thus exposing the home manufactures of those markets to an exceptional but, it might be, ruinous competition.

Accordingly the act added to the goods with respect to which action could be taken those sold "at prices which, by reason of depreciation in the value in relation to sterling of the currency of the country in which the goods are manufactured (not being a country within His Majesty's dominions) are below the prices at which similar goods can be profitably manufactured in the United Kingdom." On complaint being made to the Board of Trade, the Board must satisfy itself that the value of the currency of the country in question had fallen by at least one-third in relation to sterling. Whether it was alleged that the imports were being "dumped" in the usual sense, or sold cheaply on account of the rate of exchange, the Board was required to satisfy itself that there was a *prima facie* case for maintaining that such imports were seriously affecting employment. It might then refer the complaint to a special committee, selected from a permanent panel mainly of persons of commercial or industrial experience, which was directed to report as to whether the conditions were satisfied; into the effect which the imposition of a duty would exert on any other industry using the goods as materials; and also as to wheth the threatened industry in the United Kingdom was being carri on with reasonable economy and efficiency.

If the report was satisfactory, the Board of Trade was give power, but not required, to make an order applying the act, s long as it was not at variance with any engagement with any fo eign state. The draft of the order must, however, be approved b the House of Commons before it became operative. Such a order, unless renewed, would not be valid for more than thre years, and if made on the ground of depreciation of currency fc more than three years after the passing of the act, after whic period these provisions of the act were to lapse (*i.e.*, in Au 1924).

Four Classes of Goods Safeguarded.—Most of the applica tions received were adversely reported upon; but four havin been adjudged to fulfil all the conditions, formed the subjects o a draft order laid before the House of Commons in June 1922, an approved by resolution of the House at the end of July. In eac instance the complaint had been made on the ground of depreci ated exchanges. The order applied to four descriptions of good manufactured in Germany: fabric gloves and glove fabric, do mestic glassware, illuminating glassware and domestic hollow ware. The case of fabric gloves had previously been referred bac to the committee that it might consider the assertion that th Lancashire cotton trade would be injured by the effect which th duty would have on the export of yarn from England, and it hac reported, repeating its former recommendation. In the case of glassware, though the report of the committee had included imports from Czechoslovakia, that country had been so successful in stabilizing its currency before the order was actually prepared, that the president of the Board of Trade, in the exercise of his discretion under the act, determined to limit the imposition of duties to imports from Germany. In Oct. 1922 a further order was made with respect to gas mantles from Germany, the complainants having satisfied a committee that the conditions of the act were in fact satisfied.

The time required by so elaborate a procedure and the limited duration of the promised safeguarding prevented any further action being taken before the fall of the first Baldwin administration at the end of 1923. As to the effect of the orders it is difficult to form any confident opinion, in view of the continuance, outside the particular trades under the act, of the severe general depression of trade. But there is some evidence that in the case of domestic hollow-ware some improvement was discernible, and that in the other cases the trades were enabled to keep alive, and were saved from the still greater decline they would otherwise have experienced.

A Change in Procedure.—On the formation of the second Baldwin administration a new procedure was adopted. The general conditions on which safeguarding duties would be granted were announced on Feb. 3, 1925, in a White Paper (Cmd. 2327, 1925), together with the intention of the Government, when a *prima facie* case had been made out and reported on favourably by a special committee, and the imposition of a duty had been concurred in by the Board of Trade and the Treasury, to proceed by the ordinary methods of financial legislation, with all their customary safeguards. To the conditions imposed by the earlier act were now added (1) that the applicant industry should be "of substantial importance, on account of the volume of employment or the nature of the goods," and (2) that the competing imports should be "abnormal." And it was now made necessary to prove that the competition came "largely from countries where the conditions are so different . . . as to render it unfair." "Unfairness" was limited to one or more of the following causes:—

(*a*) Depreciation of currency, operating so as to create an export bounty.

(*b*) Subsidies, bounties and other artificial advantages.

(*c*) Inferior conditions of employment of labour.

The special committee in each case might "call attention to any special circumstances by reason of which the industry in the United Kingdom was placed at a serious relative disadvantage." Finally, the committee was called upon, in the event of the claim

to a duty being made out, to express its opinion as to the rate of duty which "would be reasonably sufficient to counteract the unfair competition."

The operation of the previous act had been restricted by existing treaty obligations, and a commercial treaty had recently been made with Germany extending to that country most favoured nation rights. The Government therefore now determined that any safeguarding duties imposed under the new act should be general in their application and not limited to imports from particular countries.

Further Applications Granted.—The following applications had been granted under the new procedure in 1928:

Subject of Application. Date of Appointment of Committee. Date and Command Number of Report.	*Action taken.*
Lace and embroidery. March 9, 1925. April 27, 1925. Cmd. 2403.	Duty of 33⅓% recommended on lace or cotton, silk or other fibre, and on "Embroidery manufactured on net or dissoluble or otherwise eliminable fabric" imposed for five years from July 1, 1925, by Section 6 of Finance Act, 1925.
Leather and fabric gloves and glove fabrics. April 25, 1925. July 6, 1925. Cmd. 2531.	Duty of 33⅓% recommended on leather gloves and on fabric gloves of cotton, but not on glove fabric, except when cut out ready for sewing, imposed (and on fur gloves) for five years from Dec. 22, 1925, by Safeguarding of Industries (Customs Duties) Act, 1925.
Gas mantles. April 25, 1925. July 29, 1925. Cmd. 2533.	Duty of 6s. per gross recommended, imposed for five years from Dec. 22, 1925, by Safeguarding of Industries (Customs Duties) Act, 1925.
Cutlery. Sept. 29, 1925. Nov. 23, 1925. Cmd. 2540.	Duty of 33⅓% recommended, imposed for five years from Dec. 22, 1925, by Safeguarding of Industries (Customs Duties) Act, 1925.
Packing and wrapping paper. Sept. 7, 1925. Nov. 25, 1925. Cmd. 2539.	Duty of 16⅔% imposed on packing and wrapping paper, and articles made of such paper in which the value of materials other than wrapping paper does not exceed one-sixth of the value of the whole article for five years from May 1, 1926, by Section II. of the Finance Act, 1926.
Pottery. Translucent or vitrified articles of a description commonly used in connection with the serving of food or drink, or component parts of such articles. Oct. 6, 1926. March 23, 1927. Cmd. 2838.	Duty of £1 8s. 0d. for every hundredweight of pottery described for a period of five years from April 19, 1927, was levied under the Finance Act, 1927 (Sec. 9. para. 1).

The lace, cutlery and glove trades were deemed important by reason of the volume of employment they provided. The gas mantle industry was considered important in view of its character. During the war it had been discovered that there was vital need in every branch of gunnery of the rare metals thorium and cerium for the manufacture of searchlights, and it was held that the only chance of maintaining the production of these metals was to give those engaged in their extraction the one commercial market furnished by the gas mantle trade.

The following were the subject of applications referred to but not recommended by the Committees: superphosphates, aluminium-hollow-ware, brooms and brushes, worsted and woollen fabrics, enamelled hollow-ware, hosiery and light leather goods and metal fittings.

An application was made in June 1925 for duties on pig-iron, wrought iron, heavy steel products and wire, but the Government refused to submit this to a committee. It should be added that no applications under the "dumping" provisions of the Act of 1921 have been successful.

The report of the committee appointed by the Board of Trade upon:—

(*a*) The effect of Part I. of the Safeguarding of Industries Act 1921 on the development of the industries manufacturing the goods covered by the schedule to that Act.

(*b*) The question of the desirability or otherwise of an extension of Part I. of the Act after its expiry on Aug. 19, 1926.

(*c*) The question of the desirability of inclusion within the ambit of the schedule of any articles or substances not now covered.

was published on April 22, 1926 (Cmd. 2631 of 1926). The committee recommended the continuation, and in certain cases, the increase or extension of rates of duty, and the continuation of the safeguarding duties for ten years. These recommendations were carried into effect by the Finance Act, 1926.

See *Reports* of Board of Trade committees; *Final Report* of the committee on commercial and industrial policy after the war (Cd. 9035, 1918); *Official Reports* of parliamentary debates (Hansard's), especially those in the House of Commons (Aug. 11, 1921; July 31, 1922; and Dec. 9, 1925), and of the committee on industry and trade factors in industrial and commercial efficiency (1927).

(C. Te.)

SAFES, STRONG-ROOMS AND VAULTS. The term "safe," whilst really including any receptacle for the secure custody of valuables provided with a lock, has come to be confined to such receptacles when fitted with a vertical door, as distinguished from a lid, and of such a size that they can be moved into position, by the use of proper appliances, in one piece. Such receptacles, when so large as to require that their parts should be assembled *in situ,* fall under the term "strong-rooms," or in the case of safe-deposit "vaults," and when constructed with hinged lids, as distinct from doors, under the terms "cash-box," "deed-box" and "coffer."

Although boxes provided with locks or coffers must have followed closely on the development of locks (*q.v.*) and been in use in ancient Egypt, yet no examples remain to us of earlier date than the middle ages. The earliest examples extant were constructed of hard wood banded with hammered iron, and subsequent development took place rather on artistic than on practical lines up to the time of the introduction of boxes entirely of iron. On the continent of Europe the iron box was developed to a very high standard of artistic beauty and craftsmanship, but with no real increase of security. Several specimens of these coffers supposed to be of 17th-century workmanship are preserved in the museum at Marlborough House.

Milner's Work.—Up to this time no attempt had been made to make coffers fireproof, for though a patent for fireproofing had been taken out in 1801 by Richard Scott, it does not appear to have been used. In 1834, however, a patent was obtained by William Marr for the application of non-conducting linings, followed about four years later by a similar patent in the name of Charles Chubb. The foundation, however, of the modern safe industry was laid by Thomas Milner, originally a tinsmith of Sheffield, who after a few years' business in Manchester established, in 1830, works at Liverpool for the manufacture of tinplate and sheet iron boxes and who later made plate iron chests or coffers and, probably the earliest, safes about the year 1846.

For some years no marked improvements in safes were made, although the manufacture had been taken up in various places by different firms. Safes had, however, been constructed of thicker materials, and some attention had been paid to the more secure attachment of the various parts; also, with the advent of the wrought-iron safe, as distinct from the coffer, the practice had developed of securing the door by a number of bolts operated by a handle and fastening them in the locked position by the lock proper, in order that a small key might be used (Charles Chubb's patent, 1845).

Chatwood's Patent, 1860.—Concurrently with the increase of strength in safes and probably with the increased value of articles preserved in safes, the skill of the professional thief had also increased, and this went on for some years until the Cornhill burglary of 1865 called general attention to the question. In 1860

a patent was taken out by Samuel Chatwood for a safe constructed of an outer and inner body with the intervening space filled with ferro-manganese or spiegeleisen in a molten state, the total thickness being 2 in.

It is about this period (1860–1870), perhaps the most important in the history of safes, that the opening of safes by wedges seems to have become prominent. The effect of wedges was to bend out the side of the safe sufficiently to allow of the insertion of a crowbar between the body and the edge of the door, and various devices were adopted by different makers with the object of resisting this mode of attack.

To prevent safes from being opened by the drilling of one or two small holes in such positions as to destroy the security of the lock itself, advantage was taken of the improvements in the manufacture of high carbon steel, and even in what is to-day called the "fire-proof" safe a plate of steel which offers considerable resistance to drilling is placed between the outer door plate and the lock.

About 1888 the "solid" safe was introduced. In this the top, bottom and two sides of the safe, together with the flanges at the back only or at both back and front, are bent from a single steel plate. This construction, with solid corners, only became practicable in consequence of the great improvements which had been made in the quality of steel plates.

The Modern Safe.—The requirements of a modern safe may be briefly summarized as follows:

For fire resisting safes, the safe body must be constructed of steel plate of sufficient thickness, this varying with the dimensions of the safe, to withstand the effect of a fall from an upper floor in the event of a fire and to resist the crushing effect of falling masonry, displaced girders, etc., as safes are frequently buried by falling debris in the ruins of office buildings. The crucial test of the fire resisting capacity of a safe is fully applied under these conditions, *i.e.*, when buried under a red hot mass of ruins, often for a period of several days, before it can be dug out and removed from the collapsed building. The "proofing" of the safe must be of sufficient quantity, packed around the whole area of the body and door to preserve the heat resistance over a long period, otherwise when this reserve is exhausted the safe would become a slow oven and its contents charred and completely destroyed.

Safes which are intended to resist burglars, as well as fire, must be made with greater constructional strength successfully to resist brute force and destructive violence. In addition, they need to be formed from such a combination of metals and alloys as will withstand all forms of cutting and piercing tools and appliances, in addition to the oxy-acetylene cutting blow-pipe. This appliance, which is now in wide industrial use, will cut through practically all known steels, so that modern safe makers have had to resort to the metallurgist for the production of ferrous alloys which possess the power to resist the cutting effect of the gas flame, and are impervious to all drilling methods. The more successful of these alloys, although they can be heated by the gas flame to their melting point, cannot be cut, like steel, by the application of a stream of pure oxygen when their melting temperature has been reached.

It is essential that the walls and doors of such safes should be of considerable thickness, as mass is of great importance in providing resistance to the blow-pipe method of attack. The doors of such safes must be closely and accurately fitted to the opening in the safe body and secured in the closed position by a number of suitable moving bolts operated by an external handle. The actual shape of the bolts is not of vital importance, provided they are of sufficient strength and rigidity to resist all forces that can be brought to bear against them in an effort to force the door away from the safe body. The majority of safe manufacturers use bolts formed from either round or flat section steel bars, but others are of special shape and design.

In America, fire-resisting safes usually are not made burglar-proof; the highest standard of requirement being 20 minutes' protection against amateur attack through the door. Burglar-proof alloy steel chests are however frequently fitted into fire-resisting safes. Most important are the locks used to control its operation. To provide the maximum amount of security and lengthen the period of resistance that a safe will offer to forcible entry, more than one lock should be employed and the locks need to be made as large as possible to increase the amount of material which has to be removed to expose the lock. It is also advisable to provide the lock with more than one moving bolt to engage with the bolting mechanism, as it is this moving lock bolt which prevents the bolt action being operated and the bolts retracted into the door.

When gunpowder was the only explosive available, it was possible to construct safe locks to resist its use, but with present day high power explosives other methods must be employed. In good quality safes these take the form of independent bolting actions which are brought into active operation only by the actual force of an explosive, when used to destroy the working lock; the effect of such an explosion being to substitute the dogging action of the special device for that of the lock which it was sought to destroy. To prevent the insertion of explosives in the keyholes it is the practice with work intended for bankers' use to provide a shutter, either in the form of a rotating disc or a sliding bar built into the door, to close the entrance to the locks after the keys have been used, the shutter action being in turn locked by a dial on the face of the door. In some instances, keyless combination locks only are used to control the bolting mechanism, but these locks are not in general use or favour in Great Britain, although their use is practically universal in the United States.

Time locks with two, three or four chronometer movements are frequently employed to control the hours for opening safes and vault doors. These locks are fitted in addition to either the key or dial operated locks, and are intended to prevent the door being opened at any other than the official times.

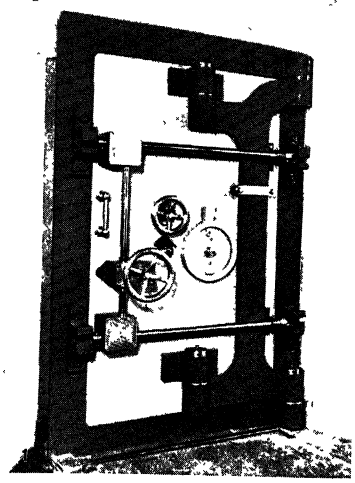
Strong-rooms and Vaults.—For the purpose of providing security for deeds, papers and books against the risk of fire, rooms are built either of brick or concrete, according to the conditions existing on the site and the amount to be expended on the construction, the thickness of the walls varying from 14 inches to 18 inches if built in brick, and from 8 to 14 inches in concrete. Bank vaults and strong-rooms for the custody of securities, cash, etc., are now mainly constructed of reinforced concrete or with a combination of brick and concrete, the thickness of the walls varying with their importance and the ground space available. Generally speaking, reinforced concrete walls can be built of less thickness than brickwork to provide equivalent security against penetration, but in all important vaults and strong-rooms it is advisable to reinforce the walls, roof and floor with linings of steel and flame resisting alloy, forming a self-contained safe inside the concrete shell.

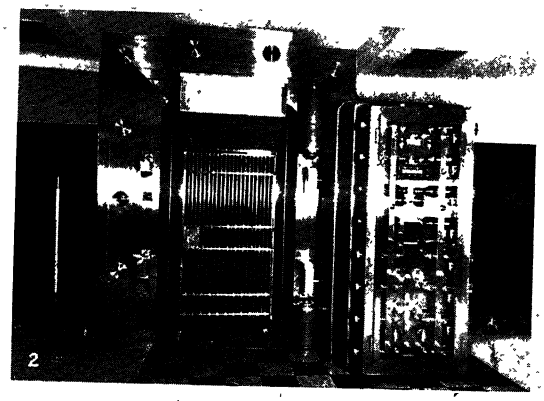
The most effective method of employing steel to reinforce the concrete construction is to use it in the form of plates attached to the inner face of the walls by rag bolts or other suitable connections. The steel then has the protection of the full thickness of the concrete and itself prevents the breaking away of the inner face of the concrete in large sections into the void forming the strong-room, whereas if the steel reinforcement is distributed throughout the concrete walling in the form of bars or mesh work, it can be quickly and easily cut through with the blow-pipe.

In the design of strong-rooms and vaults, the formation of the roof and floor is frequently of more importance than that of the walls, the latter are usually subject to inspection (unless the room is built against an exterior or party wall, which should be avoided if possible), whereas the floor is liable to attack by means of tunnelling which can be carried out without any indication being given until the actual breaking through of the floor of the room. The highest degree of security is obtained when the vault is built as an island with an inspection or patrol passage entirely surrounding it, the floor of the vault being laid on sleeper walls providing for full visibility below the floor level, with suitable lamps and switches for illumination.

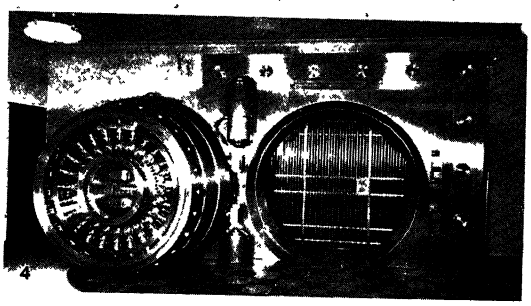
Electrical devices are frequently installed to give an alarm in the event of a burglarious attempt upon strong-rooms, either

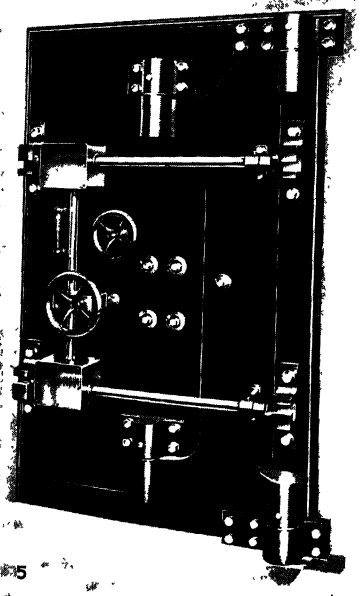
SAFES, STRONG-ROOMS AND VAULTS



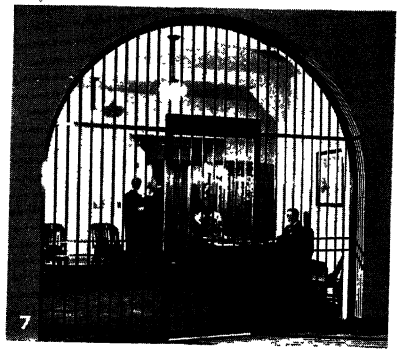


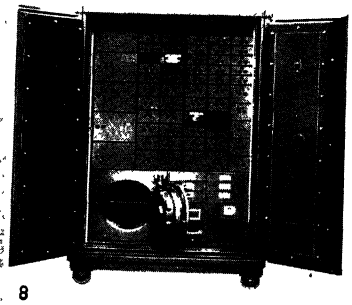




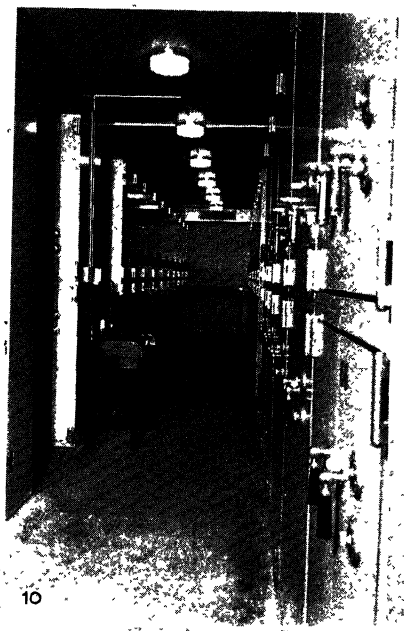












BY COURTESY OF (1, 3, 5, 9) HOBBS, HART AND COMPANY, LTD , (2, 4, 6, 8) THE MOSLER SAFE COMPANY, (7, 10) THE NATIONAL CITY BANK OF NEW YORK

VARIOUS TYPES OF SAFES, STRONG ROOMS AND VAULTS

1. Closed vault door, English type. Only one combination lock used in this type of door
2. A strong room with the cash or security vault door open, showing complicated mechanism that operates bolts
3. English type of strong room door standing open. Seven large bolts seen in front
4. A circular vault door used almost exclusively for safety deposit vaults. It has two combination locks and one four-movement time lock
5. English type door to vault or strong room. Equipped with four separate combination locks (each combination is known to but one man, thus four men are needed to open this type of door)
6. Safe-deposit boxes that are rented by the year
7. Barred entrance to a safety deposit vault. Customer must first gain entrance through outer gate before entering vault
8. Steel filing safe equipped with safe-deposit boxes, an armoured steel chest with steel circular door, and filing units. Designed especially for hotels, clubs, lodges, etc.
9. A complete burglar's outfit for opening safes and strong rooms from a photograph taken by the British police after the set had been abandoned by the foiled owners. Acetylene gas containers, hose, torch, bits, drills, levers, chisels and other instruments are shown
10. [illegible]

upon the main structure or the door. In no case should they be regarded as a primary means of defence, for they may be put out of action through failure of an essential feature or neglect of maintenance and inspection duties.

A new type of bank vault that is said to be virtually immune to burglar attack through the use of copper in construction has been recently announced by the Copper and Brass Research Association in America. It is said that a burglar would require about six hours of uninterrupted effort with the oxy-acetylene torch to penetrate a modern vault door 20 in. thick, containing a 12 in. plate of pure copper. The high resistance of copper to torch attack is explained by the fact that this metal is a rapid conductor of heat, in contrast with other metals of low heat conductivity heretofore used in vault construction. A torch capable of developing a heat between 5,000° and 6,000° F will penetrate the first few inches of a copper plate in a comparatively short time. However, the flame loses its efficiency as the copper conducts the heat rapidly away before the entire body of the metal can be raised to a fusing point, and the torch becomes ineffective. The ductility of the metal makes it unsuited for successful attack with explosives. The largest bank in Asia, Mitsui Bank building in Tokyo, is of this construction.

SAFETY GLASS: *see* GLASS, SAFETY.

SAFETY LAMP. On one occasion George Stephenson of locomotive fame observed that the flame of the candle did not pass through the small apertures of the latticed fender, and he gathered from this fact the rude idea of his safety lamp which he constructed and tried at Killingworth colliery, near Newcastle-upon-Tyne, before anyone else had tested one under similar conditions; and, in 1818, he was presented at Newcastle with a silver tankard containing one thousand guineas as the "discoverer of the safety lamp." In May 1818, however, Sir Humphry Davy gathered together and published his collected papers that he had written on the subject, from which it is evident that the ideas he had worked out were his own, so it would appear that Stephenson and Davy had been independent labourers in the same field, just as Daguerre and Talbot in the art of photography reached the same goal by somewhat different paths.

Sir H. Davy first turned his attention particularly to the subject of explosions of fire-damp in Aug. 1815, in consequence of a letter from the Rev. Dr. Gray. He arrived at the conclusion that a metallic tissue, however thin and fine, of which the apertures filled more space than the cooling surface, so as to be permeable to air and light, offered a perfect barrier to explosion. By surrounding the light entirely by wire gauze he established the principle which has governed the flame safety lamp since his day.

Dr. W. Reid Clanny (1776–1850) invented a safety lamp about the same time as Stephenson and Davy, but whereas Stephenson covered the light with a glass cylinder surrounded by an outer casing and top of wire gauze, the feed air being admitted through small holes in a copper ring below the level of the wick; and whereas Davy entirely enclosed the light by a cylinder of gauze, Clanny on the other hand substituted a glass cylinder for the lower portion of the wire gauze, the air entering at the bottom of the gauze and passing down the inner side of the glass.

In Great Britain, in any mine comprised within the Coal Mines Act of 1911, no lamp or light other than a locked safety lamp is allowed to be used in any seam the air current in the return airway of which is found normally to contain more than one half per cent of inflammable gas; and there are specified certain other conditions relative to safety lamps. Wherever safety lamps are required by the act, or regulations under that act, to be used the lamp must be of a type approved by the Secretary of State.

The safety lamps at present in use in the coal mines of Great Britain are divisible into two broad classes, viz., flame safety lamps and electric safety lamps. The official test of the lamps is in respect of general design, strength and general character of construction. Flame safety lamps must be provided with double gauzes or some other adequate arrangement serving the same purpose, the nature of the material forming the gauze being specified. The gauze to be composed of wire with 28 meshes to the linear inch (784 to the square inch) and the lamp must be so constructed that it is not possible to put together the component parts without the gauze; and it must be provided with an efficient locking device. Electric safety lamps must be so constructed that no liquid can escape from the battery when the lamp is turned upside down. The switch and other electrical contacts must be contained in flame-tight enclosures. For the United States, *see* COAL AND COAL MINING, *United States*.

The number and type of safety lamps in use in Great Britain during the years 1907 and 1926 were:—

	1907	1926
Flame	677,688	493,325
Electric	2,684	380,123
Total	680,372	863,448

The flame safety lamp is put to another use besides that of illumination, namely, that of ascertaining the presence of inflammable gas, for when the lamp is placed in an atmosphere containing fire-damp, the flame elongates, and if the gas is present in considerable quantity the lamp is filled with blue flame. For testing the presence of gas the flame of the lamp is lowered until the yellow part is almost non-existent, when the gas will be discernible as a small blue cap to the flame; as the size of cap and the percentage of gas present in the air have been correlated, it is possible by this means to detect the presence of as low as one per cent of fire-damp in the air current. (R. R.)

SAFETY RAZOR: *see* RAZOR.

SAFETY-VALVE is a valve which lifts at a predetermined pressure and prevents the accumulation of a dangerous pressure in a steam boiler. The resistance to pressure is provided by a weight or by springs, the use of the latter being obligatory if the boiler is not a stationary one. The *lever* valve (*see* drawing) is loaded with a weight at the end, to keep the valve shut. A casing with lock may be fitted over to prevent tampering by an unauthorized person. Many boilers carry two safety-valves as a precaution, one being locked up. Marine boiler valves are of the direct spring-loaded type, the spring encircling the valve spindle. The *pop* valve blows off sharply with a pop, and is used for yacht and launch boilers. The valve closes again quickly when the pressure has been slightly reduced.

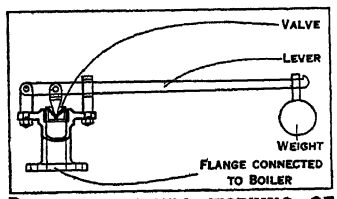


DIAGRAM SHOWING WORKING OF SAFETY-VALVE ON STEAM BOILER

SAFFĀRIDS, a Persian dynasty of the 9th century, founded by Yaḳub (Yaqub) b. Laith b. Saffār ("coppersmith") about 866, who, originally a leader of bandits and outlaws, became governor of Sejistan. He soon added to his province Herat, Fars, Balkh and Tokharistan, overthrew the Tahirids in Khurasan, and, nominally still dependent on the caliphs of Baghdad, established a dynasty in Sejistan. (*See* CALIPHATE, section C, *Abbasids*, § 10, and PERSIA: *History*, section B.) Soon after 900 the dynasty became subordinate to the Sāmānids (*q.v.*) and few of its rulers had any real authority.

See S. Lane Poole, *Mohammedan Dynasties* (1894), p. 129.

SAFFI: *see* SAFI.

SAFFLOWER or **BASTARD SAFFRON** (*Carthamus tinctorius*), a plant of the family Compositae; its flowers form the basis of the safflower dye of commerce. The plant is a native of the East Indies, but is cultivated in Egypt and to some extent in southern Europe. To obtain the dyeing principle (carthamin, $C_{14}H_{14}O_7$) the flowers are first washed to free them from a soluble yellow colouring matter they contain; they are then dried and powdered, and digested in an alkaline solution in which pieces of clean white cotton are immersed. The alkaline solution having been neutralized with weak acetic acid, the cotton is removed and washed in another alkaline solution. When this second solution is neutralized with acid, carthamin in a pure condition is precipitated as a dark red powder. It forms a brilliant but fugitive scarlet dye for silk, but its principal use is in the preparation of toilet

rouge, for which it is mixed with powdered talc.

SAFFRON, a product manufactured from the dried stigmas and part of the style of the saffron crocus, a cultivated form of *Crocus sativus;* some of the wild forms are also employed for the manufacture. The purple flower, which blooms late in autumn, is very similar to that of the common spring crocus, and the stigmas, which protrude from the perianth, are of a characteristic orange-red colour; the fruit is rarely formed. The Egyptians, though acquainted with the bastard safflower, do not seem to have possessed saffron; but it is named in Canticles iv. 14 among other sweet-smelling herbs. It is also repeatedly mentioned by Homer, Hippocrates and other Greek writers.

Saffron has long been cultivated in Persia and Kashmir, and is supposed to have been introduced into China by the Mongol invasion. It is mentioned in the Chinese materia medica (*Pun tsaou,* 1552–78). The chief seat of cultivation in early times, however, was the town of Corycus (modern Korghoz) in Cilicia. According to Hehn, the town derived its name from the crocus; Reymond, on the other hand, with more probability, holds that the name of the drug arose from that of the town. It was cultivated by the Arabs in Spain about 961, and is mentioned in an English leechbook of the 10th century, but seems to have disappeared from western Europe till reintroduced by the crusaders. According to Hakluyt, it was brought into England from Tripoli by a pilgrim, who hid a stolen corm in the hollow of his staff. It was especially cultivated near Histon in Cambridgeshire and in Essex at Saffron Walden, its cultivators being called "crokers."

Saffron was used as an ingredient in many of the complicated medicines of early times; that it was very largely used in cookery is evidenced by many writers; the Chinese used to employ it largely, and the Persians and Spaniards still mix it with their rice. As a perfume it was strewn in Greek halls, courts and theatres, and in the Roman baths. The streets of Rome were sprinkled with saffron when Nero made his entry into the city.

It was, however, mainly used as a dye. It was a royal colour in early Greek times, though afterwards, perhaps from its abundant use in the baths and as a scented salve, it was especially appropriated by the hetairai.

Saffron is chiefly cultivated in Spain, France, Sicily, on the lower spurs of the Apennines and in Persia and Kashmir. It occurs in the form of *cake saffron,* which consists of the stigmas and part of the style which have been "sweated" and pressed together into a cake, and also as *hay saffron,* which consists of the dried stigmas alone.

For further details, *see* M. Kronfeld, *Geschichte des Safrans* (Vienna, 1892).

SAFFRON WALDEN, a market-town and municipal borough in Essex, England, on a branch of the L.N.E.R., 43½ m. N.N.E. from London. Pop. (1931) 5,930. Of the old castle, dating probably from the 12th century, the keep and a few other portions still remain. Near it are a series of curious circular excavations in the chalk, called the Maze, of unknown date or purpose. The earthworks west and south of the town are of great extent; there was a large Saxon burial-ground here. The church of St. Mary the Virgin contains the tomb of Lord Audley, chancellor to Henry VIII. The town has a museum with good archaeological and natural history collections, an important school under the direction of the Society of Friends, a literary institute and a horticultural society. Benevolent institutions include the hospital and the Edward VI. almshouses. In the neighbourhood is the fine mansion of Audley End, built by Thomas, 1st earl of Suffolk, in 1603 on the ruins of the abbey, converted in 1190 from a Benedictine priory founded by Geoffrey de Mandeville in 1136.

Saffron Walden (*Waledana*) was almost certainly fortified by the Britons, and probably by some earlier people. The town corporation grew out of the Gild of the Holy Trinity, which was incorporated under Henry VIII., the lord of the town, in 1514. It was dissolved under Edward VI., and a charter was obtained appointing a treasurer and chamberlain and twenty-four assistants, who, with the commonalty, formed the corporation. In 1694 William and Mary made Walden a free borough, with a mayor, 4 aldermen and 12 town councillors. The culture of saffron was the most characteristic industry at Walden from the reign of Edward III. until its gradual extinction about 1768.

SAFFRON WOOD or **SAFFRONHOUT** (*Elaeodendron croceum*), a South African tree belonging to the staff-tree family (Celastraceae) and yielding valuable timber. The genus *Elaeodendron* contains about 30 species, confined to the tropics and subtropics.

SAFI or **ASFI,** a seaport on the west coast of Morocco, in 32° 20′ N. 9° 12′ W., 106 m. W.N.W. of Marrákesh. The old town, built on the rapid slope of a plateau towards the sea, is surrounded by crenellated ramparts dominated by an old Portuguese citadel, the Kechla. A small harbour protected by a jetty projecting into 9 metres of water is being built. Safi is the chief town of the *contrôle civil* of Abda-Ahmar and the nearest port to Marrákesh. Trade reaches 55 millions (imports 34 millions, exports 21 millions). The share of France is 37 millions, that of Great Britain nine millions, that of Spain eight millions. The population is 26,914, of which 21,347 are Muslim, 4,172 are Jews, 1,595 Europeans.

SAFRANINE, a red "basic" dyestuff belonging to the azine class. (*See* DYES, SYNTHETIC.)

SAGA, originally something related, Icelandic *segin saga,* a tale told, in English a *saw.* The early books speak of sagas which, apparently, were never written down and were in consequence lost; but, as soon as the art of writing was understood, the word *saga* began for the future to be used for written historical books. A volume made up of such histories was known as a *sögubók* or book of sagas. They were not rigidly historical; any story which was constructed according to the literary formula was called a saga. The telling of tales was a recognized form of entertainment at Icelandic banquets; the person who repeated or read the tale being known as the *sögumaðr* or sagaman, and being held in high honour at the feast.

The saga, as has been often pointed out, is a prose epic, and in its various kinds it follows strict laws of composition. It was composed with great regularity, so as to proceed uniformly from the birth of the hero to his death, and indeed from before the one date until after the other. The style is brief, clear and conversational; the hero was often a distinguished poet, and in that case some of the best of his verses are interwoven into the narrative, being put in his mouth on striking occasions. Alliteration takes a great part in the ornament of the style. The skill with which the story is told, the quick turns of the dialogue, the brilliant evolution of the plot, all these give enduring charm to the more successful and ample of the sagas, and in the earlier examples these qualities are very rarely missing. The *sögu-öld* or epoch celebrated in the sagas, lies between the years 890 and 1030, and opens with the original colonization of Iceland; before the end of the 11th century, the actual age of saga-composition has arrived; and lastly comes the age of writing when the sagas received their present literary form, the blossoming time of which was the 13th century. According to the definite statement of the great historian, Sturla, the first man who wrote down in the Norse tongue, in Iceland, "histories relating to times ancient and modern," was Ari Fróði (1067–1148), who was therefore the earliest of the saga-writers. He, as we know, was the author of *Íslendingabók,* an invaluable survey of the history of Iceland from the Settlement down to the year 1120. An earlier *Íslendingabók* by Ari, now lost, contained lives of the kings of Norway (*Konungabók* or book of kings) and pedigrees of early Icelandic settlers. These pedigrees with others supplied by Kolskeggr Fróði and Brandr served later as a basis for the famous *Landnámabók,* which has come down to us and is of priceless value. The *Landnámabók* was gradually enlarged by the addition of new matter from the sagas and elsewhere till it reached its final form about the year 1220. It is believed that the admirable style in which the sagas are composed owed much to Ari, to whose individual genius the form of Icelandic classical prose is attributed. The works of Saemundr Sigfússon (1056–1133), who succeeded Ari as a writer of the lives of kings, are unfortunately lost.

We now pass to what are called the Greater or Íslendinga

sagas, which are of a more romantic character than the historical biographies. Among these the greatest is *Njálssaga* (or *Njála*), the work of an unknown author. Extensive as is the work, it was evidently written by one hand, for the same idiosyncrasies of style recur throughout the whole saga. It must have been composed between 1230 and 1280. Vigfússon has described *Njála* as being, *par excellence*, the saga of law, and adds, "the very spirit indeed of early law seems to breathe through its pages." The scene in which Njál, the Lawman of judgment and peace, is burned in his homestead by his enemies is perhaps the most magnificent passage which has been preserved in the whole ancient literature of the North. The story of *Njála* is placed at the close of the 10th and the early years of the 11th century. *Eyrbyggiasaga* deals with politics as *Njálssaga* deals with law; it is a precious compendium of history and tradition handed down from heathen times. Extremely beautiful in its attitude to external nature, a matter often ignored in the sagas, is *Laxdaelasaga*, which is also the most romantic in sentiment. The aristocratic spirit of the great Icelandic families finds its most characteristic expression in *Egilssaga*, a stirring tale of adventure, the central figure of which, Egill, is depicted with more psychological subtlety than is usual in the sagas; it probably belongs to about 1230. In *Grettissaga* biographical and mythical elements are curiously mingled; it is probably a recension, made about 1310, of two or more earlier sagas now lost. These are the five famous groups of anonymous narrative which are known as the Greater Sagas.

The Minor Sagas must be treated more briefly. *Gunnlaugssaga Ormstungu* (The story of Gunnlaug Serpent's-Tongue) is a love-story of great charm. In *Gíslasaga* the gloom of the Icelandic outlaw-life is strikingly depicted in the adventures of Gísli. A very unusual specimen of the minor saga is *Bandamannasaga*, a comic story of manners in the north of Iceland in the 11th century, in which an intrigue of the old families banded against the pretensions of a wealthy *parvenu*, is handled in a spirit of broad humour. Among sagas which deal with the annals of Greenland and Vínland, a foremost place is taken by *Flóamannasaga*, which possesses peculiar interest from its description of the shipwreck of colonists on the coast of Greenland. We possess a late (13th century) recension of what must have been equally important as a record of the Greenland colony in the 11th century, *Fóstbræðrasaga*. Vigfússon formed a class of still shorter sagas than these, *thaettir* or "morsels" of narrative. At the close of the great period of the composition of all these anonymous sagas, a work of enormous length and value was composed or compiled by a poet and historian of great eminence, Sturla Thordsson (1214–84). About the year 1270 he began to compile the mass of sagas known as *Sturlungasaga*. The theory that Sturla was the author of the whole of this bulky literature is now abandoned; it is certain that *Hrafns Saga Sveinbjarnarsonar*, for instance, belongs to an earlier generation, and the same is true of *Guðmundar Saga Góða*. Vigfússon distinguished these and other sagas, which Sturla evidently only edited, from those which it is certain that he composed, and gathered the latter together under the title of *Íslendingasaga*. To Sturla also are attributed two saga-biographies, the *Hákonssaga* and the *Magnússaga*. It is a remarkable fact that while Icelandic saga-literature begins and ends with a definite figure of a writer, all that lies between is wholly anonymous. Ari was the earliest and Sturla the latest of the saga-writers of the classical period, but in the authors of *Njála* and *Laxdaela* we have nameless writers whose genius was still greater than that of the pioneer and of the last representative of old Icelandic literature. These unknown men deserve a place of honour among the best narrative-writers who have ever lived. In another class are the stories of bishops, *Biskupasögur*, which have considerable value as biographical material for reconstructing Icelandic social life in the 12th century. The admirable saga of Bishop Lárenzíus (1266–1331) was composed by his private secretary, Einar Haflidason (1307–93), who also wrote *Annals*, and is the latest Icelandic biographer. After his time a long silence fell on the literature of the country, a silence not broken until the revival of Icelandic learning in the 17th century.

It is evident that a vast number of sagas must have perished; when we consider how many are preserved, we can only express amazement at the fecundity of the art of saga-telling in the classical period. The mss. in which what we have were preserved, were all of vellum, and there were no sagas written on paper until the time of Bishop Oddr, who died in 1630; there was an enormous destruction of vellums during the dark ages. After 1640 it became the practice to make transcripts on paper from the perishing vellum mss.

For the history of the sagas *see* the copious *prolegomena* to Dr. Gudbrandr Vigfússon's edition of the text of *Sturlungasaga*, published in 2 vols., by the Clarendon Press at Oxford in 1878. *See* also the edition of *Biskupasögur*, issued by the same author, at Copenhagen, in 1858. Vigfússon and Möbius published the *Fornsögur* or archaic sagas in 1860. In connection with the descents of Northmen on the shores of Britain particular interest attaches to the four volumes of sagas edited by Vigfússon for the "Rolls" series (1887–94). William Morris, who had done much to interpret the spirit of the sagas to English readers, and had published a translation of *Grettissaga* in 1869, started in 1891 the "Saga Library," in conjunction with E. Magnússon; of this a sixth volume appeared in 1905.

See also Jónsson, *Den oldnorske og oldislandske Litteraturs Historie* (Copenhagen, 1894–1901); F. W. Horn, *Geschichte der Literatur des Skandinavischen Nordens* (Leipzig, 1880). (E. G.; R. P. Co.)

SAGAING, a district and division of Burma, lying to the west of Mandalay on both sides of the Irrawaddy. The district has an area of 1,825 sq.m.; pop. (1921), 326,908, showing an increase of 14,797 in the decade. The chief crops are sesamum, millet, rice, peas, wheat and cotton. It lies in the heart of the dry belt, and the rainfall ranges from about 25 to 35 inches. In the hot season the maximum shade temperature rises to a little over 100° F. The lowest readings in the cold season average about 56° F.

Sagaing, the headquarters town, is opposite Ava, a few miles below Mandalay; pop. (1921), 11,854. It was formerly a capital of Burma. It is the terminus of the railway to Myitkyina. A steam ferry connects with the Rangoon-Mandalay line, and the steamers of the Irrawaddy Flotilla Company call daily.

The Sagaing division includes the districts of Upper and Lower Chindwin, Shwebo, Sagaing, Katha, Bhamo and Myitkyina.

SAGALLO, a small settlement on the north shore of the Gulf of Tajura, French Somaliland. In January 1889 Sagallo was occupied by a Cossack chief named Achinov, who was accompanied by some 200 people, and the archimandrite Païsi who had been entrusted by the metropolitan of Novgorod with an evangelistic mission to the Abyssinian Church; while Achinov stated that he had a commission from the Negus for the purchase of arms and ammunition. The presence of Achinov at Sagallo was regarded by the French government as an invasion of French territorial rights. The Russian foreign office having disavowed (7th of February) any connection with Achinov, instructions were sent from Paris to secure the removal of the Cossacks. On the 17th of February French warships appeared off the port, and after an ultimatum which had no effect the fort was bombarded, and seven persons killed. The Cossacks then surrendered and were deported to Suez, whence they returned to Russia. Achinov was interned by the Russian government until October 1889. In 1891 he returned to Abyssinia. Païsi was promoted by his ecclesiastical superiors. In Paris the incident caused great excitement amongst the Russophils, and the consequent demonstrations led to the suppression of the League of Patriots and the prosecution of M. Paul Déroulède.

See *L'Archimandrite Païsi et l'Ataman Achinoff*, by vicomte de Constantin (1891).

SAGAN, a town in the Prussian province of Silesia, situated on the Bober, a tributary of the Oder, 60 m. S.S.E. of Frankfort-on-Oder and 102 m. S.E. of Berlin by the direct main line of railway to Breslau. Pop. (1925) 17,584. The mediate principality of Sagan, now forming a portion of the Prussian governmental district of Liegnitz, was formed in 1397 out of a portion of the duchy of Glogau. One of its most famous possessors was Wallenstein. The town is still partly surrounded by its old fortifications and has numerous mediaeval houses. It contains the former palace of the dukes of Sagan and a mediaeval town-hall with old cloisters attached. The leading industries of the town are cloth-weaving and wool-spinning.

SAGASTA, PRÁXEDES, MATEO (1827–1903), Spanish statesman, born July 21, 1827, at Torrecilla de Cameros, in the province of Logroño. From the first he displayed Liberal inclinations. He entered the Cortes in 1854 as a Progressist deputy for Zamora. Exiled after O'Donnell's *coup d'état* (1856), he returned to sit in the Cortes 1859–63. Exiled again after conspiring with Prim and the Progressists against Isabella, he took part in the rising at Cadiz which culminated in the revolution of Sept. 1868, was minister several times under Serrano and then under King Amadeo, 1868–72. Sagasta headed the most conservative groups of the revolutionary politicians against Ruiz Zorrilla and against the Federal republic in 1873; and in 1874 he vainly attempted to crush the Carlists and to check the Alphonsist military conspiracy that overthrew Serrano (Dec. 1874). After the restoration of the Bourbons, Sagasta was premier in 1885–90 and again in 1892–95.

His attempt to conciliate both the Cubans and the United States by a tardy offer of colonial home rule, the recall of Weyler, and other concessions, did not avert the disastrous war with the United States, and his party was defeated (March, 1899). A trimmer *par excellence*, abler in opposition than in office, Sagasta returned with the Liberals to power in March 1901; in Dec. 1902 he was defeated on a vote of censure and resigned office, dying at Madrid on Jan. 15, 1903.

SAGE, MARGARET OLIVIA SLOCUM (1828–1918), American philanthropist, was born at Syracuse, N.Y., Sept. 8, 1828. She was educated at the Troy, N.Y., Female Seminary, afterwards known as the Emma Willard School. She married Russell Sage in 1869. Knowing her business ability and her interest in charity, her husband left her at his death over $64,000,000 without restriction. In 1907 the Russell Sage Foundation was incorporated for the "improvement of social and living conditions of the United States of America." To it Mrs. Sage gave $10,000,000. In 1912 Mrs. Sage bought Marsh island, off the coast of Louisiana, and later turned it over to the State as a permanent refuge for birds. She died in New York city Nov. 4, 1918. By her will she left $36,000,000 to be divided into 52 parts and distributed to various public institutions. It is estimated that during her life she made public gifts to the amount of $40,000,000.

SAGE, RUSSELL (1816–1906), American financier, was born in Oneida county (N.Y.), on Aug. 4, 1816. He had a part interest in 1837–39 in a retail grocery in Troy, and in a wholesale store there in 1839–57. He was an alderman of Troy in 1841–48 and treasurer of Rensselaer county in 1845–49. In 1853–57 he was a Whig representative in Congress. He became an associate of Jay Gould in the development and sale of railways; and in 1863 removed to New York city, where, besides speculating in railway stocks, he became a money-lender and a dealer in "puts" and "calls" and "privileges," and in 1874 bought a seat in the New York Stock Exchange. Sage died in New York on July 22, 1906. His wife, Margaret Olivia Slocum (*q.v.*), inherited his fortune, and gave liberal benefactions to different institutions. *See* RUSSELL SAGE FOUNDATIONS.

SAGE-BRUSH, the name given to various shrubby species of *Artemisia* (*q.v.*) native to plains and mountain slopes of western North America. The common sage-brush (*A. tridentata*) is a much-branched shrub, usually 3 ft. to 6 ft., but sometimes 12 ft. high, with silvery-grey, bitter-aromatic foliage, the small, wedge-shaped leaves mostly with three teeth at the outer end. This shrub is very abundant on semi-arid plains, mainly between 1,500 ft. and 6,000 ft. altitude, where it is often a conspicuous and characteristic feature of the vegetation. It occurs from Montana and western Nebraska to British Columbia and California, growing usually on fertile soil.

SAGE HEN or **SAGE-GROUSE** (*Centrocercus urophasianus*), a long-tailed North American grouse. The male is 26 to 30 in. long; breeds in the sage-brush plains from Saskatchewan to Utah and California, feeding on grasshoppers and the leaves and buds of the sage-brush.

SAGINAW (*săg'in-aw*), a city of Michigan, U.S.A., 85 m. N.W. of Detroit, on the Saginaw river, 15 m. from its entrance into Saginaw bay (Lake Huron); a port of entry and the county seat of Saginaw county. It is on Federal highways 10 and 23, and is served by the Grand Trunk, the Michigan Central and the Pere Marquette railways. The population was 61,903 in 1920 (81% native white) and was 80,715 in 1930 by the Federal census. The city lies on both banks of the river, on level ground, at an altitude of 581 ft. The area is 17 sq.m. and the assessed valuation for 1927 was $92,169,191. A commission form of government has been in operation since 1913. It is in the principal coalfield of the State; there are 200 oil wells in the near vicinity, and immense brine wells, from which 1,000,000 barrels of salt are produced annually. The region raises large crops of sugar beets, grain, beans and other vegetables. Saginaw is the metropolis of a wide area, and has a large wholesale and distributing trade. Its manufacturing industries employed 11,638 workers with a total output in 1927 valued at $59,960,758. Among the more important are railroad car and locomotive shops, foundries and machine shops and factories making automobiles and parts, boilers, phonographs, furniture and sugar. In 1815 Saginaw City was founded on the west bank of the river, and in 1849 East Saginaw was laid out and financed by eastern capitalists. The two cities were chartered separately in 1859, and were consolidated in 1890 to form the city of Saginaw. The lumber industry, to which the city owed its early development, was at its height about 1880–90.

SAGITTARIUS ("the Archer"), in astronomy, the 9th sign of the zodiac denoted by the symbol ♐ an arrow or dart. The Greeks represented this constellation as a centaur in the act of shooting an arrow, and professed it to be Crotus, son of Eupheme, the nurse of the Muses. On account of its southern declination the constellation is not well seen in the latitude of Great Britain; but it is one of the most interesting regions of the sky. A very bright arm of the Milky Way passes through it, and another part of the constellation is occupied by remarkable dark obscuring patches of nebulae. It contains the Trifid nebula and the Omega nebula, both fine examples of bright diffuse nebulae. Cepheid variables and globular clusters seem to congregate in this region, and it is probable that the extension of the galactic stellar system is greatest in this direction.

SAGO, a food-starch prepared from a deposit in the trunk of several palms, the principal source being the sago palms (*Metroxylon Rumphii* and *M. laeve*), a native of the East Indian archipelago, the sago forests being especially extensive in the island of Ceram. The trees flourish only in low marshy situations, seldom attaining a height of 30 ft., with a thick-set trunk. They attain maturity and produce an inflorescence (flower spike) at the age of 15 years, when the enormous pith of the stem is gorged with starch. If the fruit is allowed to form and ripen, the whole of this starchy core material passes into the developing fruits, leaving the stem a mere hollow shell; and the tree after ripening its fruit dies. Accordingly the palms are cut down directly the inflorescence appears, the stems divided into sections and split up, and the starchy pith extracted and grated to a powder. The powder is then kneaded with water over a strainer, through which the starch passes, leaving the woody fibre behind. The starch settles in the bottom of a trough, in which it is floated, and after one or two washings is fit for use by the natives for cakes and soups. That intended for exportation is mixed into a paste with water and rubbed through sieves into small grains, from the size of a coriander seed and larger, whence it is known according to size as pearl sago, bullet sago, etc. A large proportion of the sago imported into Europe comes from Borneo, and the increasing demand has led to a large extension of sago-palm planting.

Sago is also obtained from various other East Indian palms such as the Gomuti palm (*Arenga saccharifera*), the Kittul palm (*Caryota urens*), the cabbage palm (*Corypha umbraculifera*), besides *Corypha Gebagan, Raphia flabelliformis* and *Phoenix farinifera,* also from *Mauritia flexuosa* and *Guilielma speciosa,* two South American species. It is also obtained from the pith of species of *Cycas.*

SAGUENAY, a river of Quebec province, Canada, flowing into the St. Lawrence 120 m. north-east of Quebec. It drains Lake St. John, from which it issues by two channels, La Grande

and La Petite Décharge. It is a source of hydro-electric power, owing to its fall of 314 feet in its descent to sea-level, and the reduction of aluminium from its ores is carried on at the town of Arvida. From Chicoutimi the river is navigable by small steamers, and from Ha Ha Bay to the mouth by vessels of the largest size. It is indeed rather a fjord than a river, containing neither rock nor shoal, and having at its mouth a depth of some 600 ft. greater than that of the St. Lawrence. Its width varies from three-quarters of a mile to two miles, and the waters are blackened by the shadow of treeless cliffs, over 1,000 ft. in height, separated here and there by narrow wooded valleys, and culminating in Capes Trinity and Eternity, 1,600 and 1,800 ft. in height. Tadoussac, at its mouth, is the oldest European trading post in Canada.

Lake St. John is a shallow basin, 26 m. by 20, with an area of 365 sq.m. It receives the waters of the Ashuapmuchuan, often spoken of as the upper course of the Saguenay, the Mistassini, the Peribonka and various other important streams. In it is found the *ouinaniche,* or land-locked salmon, which attains a weight of about 6 lb.

SAGUNTO, formerly Murviedro, a Spanish town 18 m. north of Valencia on the Valencia-Barcelona coast railway. Pop. (1920) 10,417. The well-preserved Roman theatre looks across the Huerta de Valencia to the Mediterranean. Sagunto is the ancient Saguntum, an ancient Greek or Greek-Iberian town, founded by colonists from Zacynthus (whence its name). About the year 228 B.C. the Romans, disquieted by the enormous growth of Carthaginian power in Spain, concluded an alliance with Saguntum and further required the Carthaginian general, Hasdrubal, not to pass the Ebro. These conditions were observed until 219 when Hannibal judged it safe to begin the war by attacking Saguntum. Confident in Roman protection, the town made a desperate resistance for eight months, at the end of which it was taken by storm. Rome complained to Carthage, requiring the surrender of Hannibal and the members of the Council present with him; the Council, though doubtful of the wisdom of Hannibal's action, naturally refused, and the second Punic War began. Saguntum never recovered its old importance, and in 138 B.C. was definitely eclipsed by the foundation of Valentia by D. Iunius Brutus, and its population by Lusitanian war-captives who were given the Latin franchise.

SAHAPTIN or **SHAHAPTIN,** originally the name of a tribe also called Nez Percé, has become the usual designation of a family of Indians on middle Columbia and lower Snake river, in Idaho, Oregon and Washington. The principal tribes are the Nez Percé, Paloos, Wallawalla, Umatilla, Tenino, Yakima, Klikitat. Subsistence was primarily on salmon and roots, residence likely to be shifting. The Sahaptin are now on Lapwai, Umatilla, Warm Springs and Yakima reservations, with remnants of other groups; the tribal lines are much blurred.

SAHARA, the great desert of North Africa. It forms the western part of a wide desert tract which extends from the Atlantic ocean through Egypt, across the Red sea and through Arabia to Mesopotamia. Its physical boundaries are in some directions clearly defined but in others vague, conventional and disputed. On the west the desert extends in many places to the Atlantic coast; on the north to the foot of the Atlas mountains and to the Mediterranean sea east of these ranges. The eastern part, the Libyan desert, is flanked by the Nile, but the Nubian desert beyond differs very little from it; whilst on the south the Sahara merges into the Sudan and the basin of the Niger and only in a few places does a natural boundary exist between them. The area of the desert is estimated at 3½ million square miles, about the area of Europe minus Scandinavia. Its greatest length along lat. 20° N. is 3,200 m. and its breadth from north to south varies from 800 to 1,400 miles.

In such a vast region as the Sahara desert a wide range of topographical forms must occur. Some small tracts lie below sea-level, but, on the other hand, approximately half the area stands above the 1,000 ft. contour line, the highest altitude (8,800 ft.) being reached in the volcanic cone of Tusidde (Tibesti massif). The horizontally bedded Cretaceous rocks form characteristic plateaux and escarpments which are dissected by an ancient river system and form a sharp contrast with the volcanic cones.

The Sahara Proper.—This is the region which extends southward from the Atlas mountains as far as the highland tract of the central massif and down the western side of the latter to the basin of the Niger. For the most part it is a succession of low plateaux of Cretaceous rocks covered largely by dunes, locally called *erg* or *igidi,* although, in many parts of the west and south, Palaeozoic and Archaean rocks crop out. Along the Atlantic coast, in Mauritania, is a wide belt of dune country with recent deposits of salt and gypsum; inland the dunes give place to tracts of pebbles, the eastern continuation of which is the low plateau country of Adrar and El Juf again covered with dunes, which extend as far as the central massif. To the north are the districts of Rio de Oro, with a peneplained mass of Archaean and metamorphic rocks in the Wessat region; the plateaux of Dra'a and Tafilelt of Cretaceous and newer rocks, at the foot of the Anti Atlas and drained by the Wad Dra'a; the desert of Igidi, a large part of which is covered by dunes; and the plateau of Tademait formed of flat Cretaceous rocks and formerly the watershed of this region. This plateau is continued eastward into the Hammada el Homra whilst to the north is the Great Erg, into which a spur of the hammada extends northward dividing it into the western and the eastern Erg.

The Central Tuareg Massif.—This comprises the Ahaggar plateau of Archaean and Palaeozoic rocks which occupies a central position in the desert and on which are several peaks of volcanic origin which do not rise above 8,000 ft. but are periodically snow-capped. The mass is flanked on the west, north-west and north-east by the lower plateaux of Ahenet, Muydir and the Tazili of the Asjer (5,000 ft.) respectively. The latter is continued south-eastward by a low range, the Tummo, into the Tibesti mass of Archaean rocks in which occurs the highest peak in the desert, Mt. Tusidde (8,800 ft.), an extinct volcano, and still farther south-eastward into the lower range of Ennedi.

The Libyan Desert.—This is triangular in shape, extending from the Mediterranean sea to the Sudan. In the north-west is the hammada country of the Fezzan (*q.v.*) in which are the mountains of Jebel es Soda (Black mts.) which are continued south-eastward towards Kufara by the Huruj es Soda. On the coast in the extreme north are the Jebel el Akhdar ranges, but the rest of the desert is a wide expanse of almost level country, over 500,000 sq.m. in extent, which consists of dunes and sandy wastes of unascertained limits, and across which there is only one known route, running from north to south through the oases of Kufara.

Geology and Structure.—Exact geological information about many parts of the Sahara is not known, but the main structure is now fairly well understood. In the central Tuareg massif we find Archaean gneisses, mica schists, granites, etc., which are flanked by folded Silurian rocks upon which rest Devonian and, in some places, Carboniferous strata. Permian, Trias, Jurassic and Lower Cretaceous rocks are apparently missing in the central Sahara, although the Jurassic crops out in south-west Algeria and along the Atlas borders, but a large area is covered by horizontally bedded Middle and Upper Cretaceous rocks, at the base of which is a variegated clay with gypsum. This latter, a typical lagoon formation, indicates the incoming of changed conditions which caused a widespread transgression in the Cenomanian epoch (lower chalk of Britain) and established an epi-continental sea on the stable mass of northern Africa. Miocene, Pliocene and Quaternary deposits occur locally, the Nummulitic limestone being important in the Libyan desert and Egypt. The Sahara is quite distinct from the folded Atlas mountains (*q.v.*), which tectonically belong to Europe and to which North Africa acted as hinterland during the period of Tertiary folding.

Water Supply.—The winds of the Sahara are very dry, and in consequence there is little or no precipitation, except in the highland region of the central massif, where there is a fall of a few inches per annum, and also along the coastal fringes. Nevertheless, the desert as a whole is not entirely without water, but possesses a skeleton of a regular river system. Inadequate streams radiate from the central massif, but they are soon lost in the sand

of the surrounding country. Similar streams flow down from the Atlas mountains, the Wad Dra'a finally reaching the ocean, whilst in the Atlantic and Mediterranean coastal regions similar streams occur, some reaching the sea, others losing themselves in the desert. Irrigation has been attempted in various parts, and it has been found that in many places, especially south of the Atlas and in Algeria, the geological structure is such that artesian water has been obtained. The water so obtained is remarkably fresh, and by means of it agriculture has been made possible in several districts, but the arid hammada country must be abandoned as hopeless. How far such irrigation works can be extended is very uncertain for the detailed geological structure of the area is not yet sufficiently known.

Origin of the Sand.—Several theories have been put forward to explain the enormous quantity of sand in the Sahara. The theory of marine origin is now no longer tenable, for the sand is Quaternary, or at the oldest Pleistocene, in age, and there is no evidence of a marine transgression since pre-Tertiary times. During the great Ice age, when the southern limit of the ice-sheet extended across Central Europe, meteorological conditions were such that much, if not all, of the desert belt lay in a warm, moist, temperate or sub-tropical zone. Under such conditions rock disintegration and soil formation would proceed in the way normal to such regions, the soil being held in position by vegetation, as is still the case in parts of Mauritania, the regions of north of Timbuktu and round Lake Chad and the several oases. A mature river system also assisted in the disintegration and transportation of sediments. Later the soil lost its moisture and the winds became dry, consequent upon the changed meteorological conditions brought about by the retreat of the ice, and vegetation disappeared, leaving the dry soil at the mercy of the wind.

Climate.—The summer heat (June, July and August) is very great and is measured by Augieras in terms of the number of days on which a thermometer not directly exposed to the sun's rays reached 50° C (122° F). In 1913 the number was 33, in 1914 it was 37, in 1915 it was 11 and in 1916 it was 42. During the hottest night in 1916 the temperature did not go below 104°, but the average summer night temperature is about 77°. These figures are for the western Sahara; the central highlands are cooler. The highest recorded temperature for the western Sahara is 56° C (132·8° F). In the cool season the monthly average maxima are about 68°–78°, the minima about 41°–50°. On one or two nights of the year the ground in the west may freeze; there is more frost in the central highlands. In summer the soil-temperature may occasionally reach 175°, the relative humidity may be as low as 5% even in the oases; in the cooler season the relative humidity may increase to 48%. The winds in many parts are chiefly the north-east trades, but there may be summer centres of low pressure, and in the western Sahara the wind often blows from the west.

Flora.—The three chief trees are the date palm, *Acacia tortila* (on the rocky areas), and *Tamarix articulata* (in beds of wadis). The small plants belong mostly to the Compositae, Cruciferae, Leguminosae and Gramineae, usually with small, often hard, leaves, and sometimes fleshy stems. Some desert plants have leaves grey with hairs, which immediately suck in any drop of dew, while others have salt incrustation that attracts any moisture; some plants (colocynth) have very deep roots. Many desert plants retain vitality in spite of years of "resting" while they wait for water; the rose of Jericho is famous in this connection.

Fauna.—The antelope and gazelle occur in the Sahara, and were formerly hunted by the lion, which is now nearly extinct in the desert. Jackal, fox, fennec, badger, jerboa, rat, isabelline hare and, near water, bats also occur. The hyena wanders near the desert border, and the mouflon is found here and there on the higher land. Ostriches survive in the Mauretanian Ergs, but must once have been abundant and widespread. Eagles are fairly numerous, and there are quails, with some ducks, flamingoes and herons near the wadis, where there is water occasionally. Horned vipers, several large lizards, scorpions, tarantulas, beetles, myriads of locusts and flies and many ticks are other members of the fauna. A few crocodiles survive in some dwindling swamps of the west.

Peoples and Settlement.—It has been indicated above that what is now the desert of Sahara seems to have been open grass land or steppe land in the days of early man. Consequently, it is not surprising to find evidences of a more extensive human occupation of the region than its present climatic and physical conditions will allow.

Barth, in 1850, described drawings as representing a dense crowd of cattle all moving in one direction. Incised drawings are known in Tibesti, and in the region of North Tuareg (Adger), and north of this, through Algeria to Morocco from Constantine by Ain Sefra to Figig. The animals represented on these drawings no longer inhabit these regions. Neolithic implements have been found at the base of the rocks. Rock drawings are rarer in the western Sahara; some occur at Meherrah 60 km. W. of Menakeb.

Attempts have been made to trace in certain of the existing inhabitants the remnants of an early race of negro affinities, which inhabited the Sahara before the arrival of the Berbers and Arabs. Gautier thought that at a period as recent as the Roman conquest of North Africa the Sahara had still a Neolithic culture and people of negro affinities. Negro influence is undoubtedly seen in various parts of the Sahara, but it may date from a much more recent period than has been supposed. For example, the connection between many of the place-names in Fezzan and the language of Bornu is attributable to the northward extension of the influence of the Bornu-Kanem empire between the 11th and 14th centuries A.D. The allusions by classical writers to Ethiopians as inhabitants of the Sahara prove little, in view of the very vague and general meaning attached to the word. Caravans of negro slaves from time immemorial passed northwards along the main desert routes, and it is just in the oases on these routes that the dark element in the population is chiefly found. The oases are naturally the chief centres of population in the Sahara. They occupy positions where the underground water makes its way to the surface or is readily reached by boring; other centres of population are certain mountainous districts where the atmospheric moisture is condensed, and a moderate rainfall results.

The northern oases, such as Dra'a and Tafilelt, are poor. In the east is the Zusfana group, near Tarhit. The Gurara oasis is probably an old lake floor watered by subterranean galleries made by man, and called *goggaras*, and is a rather rich settlement. Tuat is of the same type, but on a cliff top. Tinerkuk and Tarhuzg are Erg oases. Tidikelt is the only artesian oasis. Ugarta, Zerhama and Bon Mahud are small "spring" oases. The Tafilelt people meet in the Maïder pass by the Daura, Bubut or Wahila, and move over the central plateau and pass Chech in the Tarhamant. The Dra'a meet at Tingut and go via Regbat and the edge of the Erg, and then across the central plateau to Tarhamant. Another raiding group are the Seguiet el Hamra. These people of the northern Sahara are nomads. The various confederations of the Tuareg, in the central Sahara, are grouped around hilly districts. The most important are the Awellimiden, on the left bank of the Middle Niger; and the Kel-Ui, grouped around the mountainous districts of Air or Asben, with Agades as centre; the two northern confederations, those of the Ahaggar and Asjer, being less powerful. North-west of Timbuktu, in the district or "kingdom" of Biru, is the oasis and town of Walata, a Tuareg settlement. The Tuareg are mostly a nomadic people of pre-Arab stock. All the men folk are veiled, and they have been known accordingly as the "People of the Veil." They were doubtless pushed into the fastnesses of the southern desert by Islamic invasions. Other mountainous districts in which a certain amount of rain falls regularly, and which contain a population above the average for the Sahara, are Tibesti and Borku, in the east centre, and Adrar in the west. Tibesti and Borku are peopled by Tibbus, once thought to be almost pure negroes. This has, however, been disproved. They are light or dark bronze in colour. Their language is related to that of the Kanuri in Bornu, but it appears that the language of the Tibbu is the older. The Tibbus are probably of Hamitic stock. The western Adrar is peopled

mainly by Moors (Berbers).

Commerce.—From the earliest times Saharan commerce has been the monopoly of the nomad peoples. Salt and ivory were carried across the desert in very early times. In the middle ages the Jews possessed great influence in this part of Africa as organizers of trade. In 1447 the Genoese merchant traveller, Antonio Malfaute, visited the Oasis of Tuat and pointed out its importance as a trade centre between the Muslim countries surrounding the desert. He mentions the large quantities of copper carried south to the negro kingdoms of the Sudan, and the vegetable butter there produced. There is evidence that the Venetians and Genoese both had considerable interests in African trade.

Salt and date palms are the chief products of the Sahara at the present time. The principal sources of the salt supply are the rock salt deposits of the Juf (especially Taudeni), the lakes of Kufara and the rock salt and brine of Bilma (*q.v.*).

Trade routes run (1) from Morocco to Cairo by Insalah and Ghadames, the route of West African pilgrims to Mecca, now largely superseded by the sea route from Tangier to Alexandria; (2) from Kuka (Lake Chad) to Murzuk and Tripoli; (3) from Kano and Zinder to Tripoli by Air and Ghat; (4) from Timbuktu to Insalah, Ghadames and Tripoli; (5) from Timbuktu to Insalah and thence to Algeria and Tunisia; (6) from Algeria—through Tuat and Timbuktu to the Niger. The Senussi movement brought into prominence the desert routes between Wadai in the south and Jalo and Benghazi in the north, which partially superseded some of the older routes. The long-established route from Darfur to the Kharga and Dakhla oases fell into disuse on the closing of the eastern Sudan by the Mahdist troubles. The great route leading from Tripoli via Ghadames and Ghat, to Zinder, Kano, and other great centres of the Hausa States maintains its importance, but the opening of trade from the side of the Niger by the British in the early years of the 20th century affected its value. The route across the western Sahara to Timbuktu is less used than formerly owing to the establishment by the French of a route from Senegal via Nioro to the Upper Niger. The old route, however, retains some importance on account of the salt trade from the Sahara, which centres at Timbuktu.

Railway Schemes.—Two principal routes for a railway across the desert have been suggested, the one taking an easterly line from Biskra through Warqla to Air (Agades) and Zinder, the other starting from the terminus of the most westerly railway already existing, and reaching Timbuktu via Igli and the Tuat oases. A third suggested route is one from Igli to the Senegal, still farther west.

Political Divisions.—The western Sahara, in the main, is administered within French West Africa while the eastern regions of the desert fall into Italian Libya, Egypt and Anglo-Egyptian Sudan. The French first acquired an interest in the Sahara by their conquest of Algiers (1830–45). They gradually extended their influence southward with the purpose of forming a junction with their possessions on the Senegal. The acquisition of Tunisia (1881) largely increased the hold of the French on the Sahara, and the work of French pioneers to the south of Algeria was recognized by the Anglo-French agreement of 1890, which assigned to France the whole central Sahara from Algeria to a line from Say, on the Niger, to Lake Chad. The southern limit of the territory was, however, not strictly defined until 1898, when a new agreement gave to France a rectangular block south of the line mentioned, including the important frontier town of Zinder. A further agreement in 1904 again modified the frontier in favour of France. To the north-east and east the boundary of the French sphere was made to run south-east from the intersection of 23½° N. with 16° E., following this south to the western frontier of Darfur and the Anglo-Egyptian Sudan. French Sahara is thus connected with the French possessions in West Africa and with the Congo-Shari territories of France on the south-east. The Spanish possessions are known as Rio de Oro. In the south the French influence extends beyond the Sahara, reaching the coast in Senegal, French Guinea, Ivory coast, Togo and Dahomey. The French Sahara proper may be very roughly estimated at about 1,500,000 sq. miles. Over the whole of French West Africa there is a governor-general, who is assisted by a council. The seat of the General Government is at Dakar. Under the governor-general the various colonies are administered by lieutenant-governors.

Exploration.—The Egyptians penetrated the Libyan and Nubian deserts at points, and Carthaginians and Phoenicians were acquainted with the northern fringe of the desert in the west. Jews and Genoese in the middle ages learned much about the Sahara in the course of trade, and their knowledge was mapped by Jewish cartographers in Majorca in the 14th and 15th centuries. In 1819 Capt. G. F. Lyon and Joseph Ritchie penetrated from Tripoli to Murzuk. In 1822 came the journey of Oudney, Clapperton and Denham, from Tripoli to Lake Chad, and a year or two later Maj. A. G. Laing reached Timbuktu, also from Tripoli. In 1828 René Caillié crossed from Timbuktu to Morocco. Heinrich Barth, in the course of his great journey (1849–1856), commenced from Tripoli under the leadership of James Richardson, traversed a considerable portion of the Sahara. Between 1859 and 1861 Henri Duveyrier explored parts of the Tuareg domain. Knowledge of the northern Sahara, from Morocco to Tripoli, was largely increased by the journeys of Gerhard Rohlfs, begun in 1861; Rohlfs subsequently crossing (1865) from Tripoli to Lake Chad by nearly the same route as that previously taken by Barth. In 1873–74 Rohlfs visited the oases in the north of the Libyan desert, and in 1878–79 reached the oasis of Kufara. In 1876–77 Erwin von Bary, made his way to Ghat and Air. A French expedition under Col. Paul Flatters, after penetrating far south of Algeria, was massacred (1881) by Tuareg. Farther west, in 1880, Dr. Oskar Lenz started from Morocco, partly by a new route, to Timbuktu. In 1892 the Sahara was crossed from Lake Chad to Tripoli by the French Colonel Monteil.

In 1899 the central Sahara, from Algeria to Air, was traversed by Fernand Foureau. The great desideratum was the opening up of a route to the Niger countries, which might in time divert the trade from Tripoli to Algeria. In 1890 Foureau, who in 1883 had undertaken a first journey of exploration south of Warqla, reached the Tademait plateau in 28° N., fixing the position of many places, and in 1892–93 came the first of his long series of expeditions undertaken with a view of penetrating the country of the Azjer Tuareg, the powerful confederacy which lay on the route to Air and Lake Chad. Foureau finally reached Zinder, the important trade centre on the borders of Nigeria, in 1899.

In the central Sahara, French posts were gradually pushed farther south under a military organization. Subsequent travellers gathered much information respecting the mapping, geology, and other features of this part of the Sahara. Subsequent work in the Sahara is associated with the names of Laperrine, Arnaud, Cortier, Nieger, Villatte, Gautier and Chudeau, on the French side, while Vischer, Haywood, Hassanein Bey, Buchanan, Augiéras, Godefroy, Harding King, and F. R. Rodd have contributed much to our knowledge of the peoples and their environment.

BIBLIOGRAPHY.—Vatonne, *Mission de Ghadames* (1863); H. Duveyrier, *Les Touaregs du Nord* (1864); Ville, *Explor. géologique du Mzab, etc.* (1867); A. Pomel, *Le Sahara* (1872); F. G. Rohlfs, *Quer durch Afrika* (1874), *Drei Monate im libyschen Wüste* (1875) and *Kufra* (1881); V. Largeau, *Le Pays de Rirha-Ouargla* (1879); G. Nachtigal, *Sâhârâ und Sûdân* (3 vols., 1879–89); G. Rolland, "Le Crétacé du Sahara septentrional" (with geological map of the Central Sahara), in *Bull. de la Soc. Géol. de France* (1881); Roudaire, *Rapport sur la dernière expéd. des Chotts* (1881), and other reports by the same author; Tchihatchef, "The Deserts of Africa and Asia," in *British Association Reports* (Southampton, 1882); Derrécagaix, "Explor. du Sahara: les deux missions du Lieut.-Colonel Flatters," *in Bull. de la Soc. de Géogr.* (1882); O. Lenz, *Timbuktu Reise durch Marokko, etc.* (1884); and E. L. Reclus, *Nouv. Géographie univ. XI.* (1886); H. Schirmer, *Le Sahara* (1893); P. Vuillot, *L'Exploration du Sahara* (1895); P. L. Monteil, *De Saint-Louis à Tripoli* (1895); Fr. Foureau, *D'Alger au Congo par le Tchad* (1902) and *Documents scientifiques de la mission saharienne*, fasc. i.–iii. (1903–05); Privat-Deschanel, "Peut-on reboiser le Sahara?" *Rev. scientif.* (1896); K. A. Zittel, *Paläontologie der libyschen Wüste* (Cassel, 1893); G. Rolland, *Chemin de fer transsaharien, géologie du Sahara algérien, et aperçu géologique sur le Sahara de l'océan atlantique à la mer rouge* (1891); J. Walther, *Die Denudation in der Wüste* (Leipzig, 1900); M. Honoré, *Le Transsaharien et la pénétration française en Afrique* (1901); E. Dürkop, *Die wirtschafts-und handels-geographischen Provinzen der*

Sahara (Wolfenbüttel, 1902); W. J. Harding King, *A Search for the Masked Tawareks* (1903); A. Bernard and N. Lacroix, *La Pénétration saharienne* (Algiers, 1906); C. Vélan, "État actuel de nos connaissances sur la géographie et la géologie du Sahara d'après les explorations les plus récentes," *Revue de géogr.*, t. 1 (1906–07), pp. 447–517; J. Lahache, "Le Desséchement de l'Afrique française est-il démontré?" *Bul. Soc. Géogr. Marseille*, 31 (1907), pp. 149–185; E. Arnaud and M. Cortier, *Mission Arnaud-Cortier: nos confins sahariens* (1908); E. F. Gautier and R. Chudeau, *Missions au Sahara*, t. 1 "Sahara algérien," par E. F. Gautier (1908), t. 2 "Sahara sudanais," par R. Chudeau (1909); H. Vischer, *Across the Sahara from Tripoli to Bornu* (1910); H. J. Ll. Beadnell, "Sand Dunes of the Libyan Desert," *Geog. Jour.* (April 1910); E. Fallot, "Le Commerce du Sahara" *Ques. dip. et col.* t. 15 (1903), pp. 209–225; Lt.-Col. Godefroy, *Transsahariens et Transafricains* (Paris, 1919); F. R. Rodd, *The People of the Veil* (Tuareg Tribes) (London, 1926); A. Buchanan, *Sahara* (London, 1926); Augiéras (Capitaine), *Le Sahara Occidental* (Paris, 1919); Hassanein Bey, A.M., *The Lost Oases* (London, 1925); C. de la Roncière, *La Découverte de l'Afrique au Moyen Âge. Cartographes et Explorateurs* (Cairo, 1925); P. Lemoine, *Afrique occidentale Handbuch der regionalen Geologie* (1913); A. G. P. Martin, *Les Oases sahariennes* (1908); H. Hubert, *État actuel de nos connaissances sur la Géologie de l'Afrique occidentale* (1912); E. Haug, *Sur la structure géologique du Sahara central* (1906).

SAHARANPUR, a city and district of British India, in the Meerut division of the United Provinces. The city is situated on a stream called the Damaula Nadi, 998 m. by rail from Calcutta. Pop. (1921) 62,261, of whom more than half are Mohammedans. It is an important railway junction. There are railway workshops, and a large wood-carving industry.

The DISTRICT OF SAHARANPUR has an area of 2,133 sq.m. It forms the most northerly portion of the Doab, or alluvial tableland between the Ganges and Jumna. The population in 1921 was 937,471. The district contains the towns of Roorkee and Hardwar.

SAHOS or **SHOHOS,** Africans of Hamitic stock living to the west of Massawa. Probably akin to the Gallas and Afars. They are mostly Mohammedans, some few being Christians.

SAID HALIM, PRINCE (1863–1921), Turkish statesman, the son of Halim Pasha and the grandson of Mohammed Ali, the founder of the present Egyptian dynasty, was born in Cairo and was educated in Turkey, completing his studies in Geneva. Exiled because of his sympathy with the Young Turkish movement, he affiliated himself to the Committee of Union and Progress in Paris. After the revolution of July 1908 he returned to Constantinople and was nominated senator. At various times from 1908 to 1918 he was president of the council of state, minister for foreign affairs and general secretary to the Union and Progress party. On June 17, 1913, he became Grand Vizier, in which capacity he endeavoured to settle the questions of Armenian reforms, Mosul oil, and the participation of English, French and Russian capital in the Baghdad railway. He also endeavoured to establish close relations with Greece. Said Halim favoured a Turco-German alliance, but sought to keep Turkey neutral in the World War. On her entry into the war he tendered his resignation, which was refused, and he remained in office until Feb. 1917. After the Armistice of Mudros, Oct. 31, 1918, Said Halim was imprisoned by the British in Malta. Released in 1921, he was assassinated in Rome on Dec. 6, 1921.

SAID PASHA, MOHAMMED (d. 1928), Egyptian statesman, succeeded Boutros Pasha as prime minister of Egypt in 1910. He held office for four difficult years, in which he succeeded in carrying out various administrative reforms and an extension of provincial government. In May 1919 he formed a non-political ministry in the heat of the revolutionary movement. A bomb thrown at him in the street in September of that year exploded harmlessly in the roadway. In Nov. 1919, when he was informed of the coming of the Milner mission to Egypt, Said Pasha resigned with his cabinet. He was minister of education in Zaghlul's cabinet (1924), and he was acting prime minister during Zaghlul's absence in Europe. He resigned in Oct. 1924, and presently resigned his membership of the Wafd. He was returned to parliament as an independent member for Alexandria in Jan. 1925. Said Pasha died on July 20, 1928.

SAIGA (*Saiga tatarica*), a desert-dwelling antelope inhabiting the Khirghiz Steppe. A century ago it extended as far west as Poland. During the later Tertiary period the saiga was widely distributed in Europe.

SAIGO, TAKAMORI (1832–1877), Japanese patriot, was born in Satsuma in 1832. From early youth he took a prominent part in the politics of his clan, and owing to his extreme opinions with regard to the expediency of abolishing the Tokugawa administration, he was banished (1858) to the island of Oshima (Satsuma), where he attempted unsuccessfully to commit suicide. Ultimately he rose to high rank in the newly organized imperial government, but in 1873 he retired from the cabinet by way of protest against its decision not to take armed action against Korea. Thenceforth he became the rallying point of a large number of men dissatisfied with the new administration, and in 1877 he headed a rebellion which taxed all the resources of the central government. After several months of desperate fighting, Saigo and a small remnant of his followers made a swift retreat to Kagoshima, and fell fighting (September 14) within sight of their homes.

SAIGON, a town of French Indo-China, capital of the colony of Cochin-China, on the right bank of the river Saigon, 34 m. from the sea. Pop. 143,167 of which 9,415 are French. The town is enclosed by the river Saigon on the east, the Chinese Arroyo on the south and the Arroyo of the Avalanche on the north, while on the west it extends towards the neighbouring town of Cholon. Double rows of trees which give shade in all the streets, and beautiful gardens, make Saigon one of the finest towns of the Far East. It is lighted chiefly by electricity and its water-supply is secured by a filtering reservoir. The chief public buildings are the government house, the law courts, the theatre, the cathedral, etc. The commercial port provided with new quays at the mouth of the Chinese Arroyo carries on a large rice trade. It is the only maritime entrance to Cochin-China and the principal port of the Messageries Maritimes line which links France with the Far East.

Saigon is the seat of two chambers of the court of appeal of French Indo-China, of tribunals of first instance and of commerce, and of the vicar apostolic of Cochin-China.

Before the French conquest, Saigon, then known as *Gai-dinh-thanh,* was the capital of Lower Cochin-China, which consisted of the "six southern provinces" of the Annamese empire, and constituted a vice-royalty under the government of a *kinhluoc.* The French captured it in 1859, and it was part of the territory ceded in 1862.

SAILCLOTH AND SAILMAKING. Sailcloth, now more commonly called canvas (*q.v.*) or, in the United States, duck, is usually a double warp, single weft fabric of the same structure as bagging (*q.v.*) and tarpaulin, although it is sometimes made with single threads of warp. Hemp and ramie are occasionally used in the manufacture of this cloth, but flax and cotton are the chief fibres employed. Many of the sails of fishing smacks and similar vessels are made entirely of cotton—the fabric sometimes retaining its natural colour, but more often dyed or stained tan. Since most of the larger vessels are now driven by steam or oil, the quantity of cloth used for sails is comparatively small. A large quantity of cloth, however, is used on steamships for covers, and for coal bags, sailcloth buckets, etc.

The very best kind of sailcloth is made from long flax, as this fibre possesses flexibility, lightness and strength combined. The number of threads per inch of warp varies from 14 double threads to 48 double threads, and from 12 to 36 shots per inch of weft, while the usual widths are 18, 24, 30 and 36 inches. Cotton canvas has for its limits about 26 to 54 threads of warp per inch, and 15 to 46 shots per inch; the warp yarn for cottons may be 2, 3 or several ply.

Sailmaking.—This is a very ancient industry, but is naturally much less important than it was before the introduction of steamships. The operations of the sailmaker may be stated as follows. The dimensions of mast and yards and sail plan being supplied, the master sailmaker is enabled to determine the dimensions of each sail—after due allowance for stretching—in terms of cloths and depth in yards—if a square sail, the number of cloths in the head, number in the foot and the depth in yards; if a fore-

and-aft sail (triangular), the number of cloths in the foot and the depth in yards of the luff or stay and of leech or after-leech; if a fore-and-aft sail (trapezium form), the number of cloths in the head, number in foot and the depth of mast or luff and of after-leech. These particulars obtained, there is got out what is technically termed a "casting," which simply means the shape, length, etc., of each individual cloth in the sail. These figures are given to the cutter, who proceeds to cut out the sail cloth by cloth in consecutive order, numbering them 1, 2, 3, 4, etc.; the series of cloths thus cut out are handed over to the workman, who joins them together by carefully made double flat seams, sewn with twine specially prepared for the purpose, with about 120 stitches in a yard. In the heavy sails the seam is about 1½in. in width, and in the British navy stuck or stitched in the middle of the seam to give additional strength; the seams in the lighter sails are about 1in. wide. The whole of the cloths are then brought together, and spread out, and the tabling (or hemming, so to say) is turned in and finished off with about 72 stitches to a yard. Strengthening pieces or "linings" are affixed where considered necessary, in courses and top-sails such pieces as reef-bands, middle-bands, foot-bands, leech-linings, bunt-line cloths; in top-sails (only) a top-lining or brim; in other and lighter sails such pieces as mast-lining clew and head, tack and corner pieces; holes, such as head, reef, stay (luff), mast, cringle, bunt-line, etc., are also made where required, a grommet of line of suitable size being worked in them to prevent their being cut through. The next thing to be done is to secure the edges of the sail. Bolt-rope, a comparatively soft rope made from the finer hemp yarn (Italian) is used for this purpose; in the British navy it ranges from 1in. (increasing in size by quarter inches) up to 8in. inclusive; it is then neatly sewn on with roping twine specially prepared, the needle and twine passing between and clear of every two strands of the rope in roping.

Where slack sail has to be taken in, it is the practice to leave it to the judgment of the sail-maker; but where possible it is better to set up the rope by means of a tackle to a strain approximate to what it will have to bear when in use, and whilst on the stretch mark it off in yards, as also the edge of the sail in yards, so that by bringing the marks together in roping the sail will stand flat. In the British navy the largest size of rope sewn on to a sail is six inches; sizes above this are used for foot and clew ropes of top-sails and courses, being first wormed, parcelled (that is, wound round with strips of worn canvas), tarred and served over with spun yarn; the foot of the sail is then secured to it by being marled in. Where two sizes of bolt-rope used in roping a sail have to be connected, it is effected by a tapered splice. Cringles (similar to the handle of a maund) formed by a strand of bolt-rope, mostly having a galvanized iron thimble in them as a protection, are then stuck where necessary, as at the corners, sides or leeches, mast or luff; they are required either for making stationary or hauling "taut" by tackle or otherwise certain parts of the sail when in use. Fore-and-aft sails, such as spankers, gaff-sails and storm try-sails, are reduced in size by reef-points made of stout line (four to 20 lb.), crow-footed in the middle, a hole being pierced through every seam; one-half of the point is passed through and the crowfoot sewn firmly to the sail; the number of reefs depends upon the size of the sail, and the reefs are placed parallel to the foot. (T. W.)

UNITED STATES

Sailcloth or canvas is better known by the American trade as numbered duck. England manufactures a great deal from flax, while the U.S. mostly uses cotton. It is a plain woven fabric of heavy construction which varies with its use and is usually of plied warp and filling yarns (although in some cases the warp yarn may be single and drawn two ends per dent). Duck is used for many purposes including sails, tents, tarpaulin, bags, awnings, fire hose, wearing apparel such as overalls, hunting coats, belts, etc. The number of warp ends per inch vary from 26 to 48 and may be 2 to 5 ply and from 16 to 34 filling picks per inch 2 to 8 ply.

Specifications adopted by the Cotton Duck Association specify that duck shall be made of cotton, free from waste and thoroughly cleaned, evenly woven, free from all sizing and free from an excessive number of avoidable imperfections in manufacture. Duck is numbered as follows: No. 1 duck is 22 in. wide and weighs 18 oz. per linear yard and is taken as the basis. For each ounce under 18 the number is increased by one which would make a 17 oz. duck #2, 16 oz. #3 and so on up to #12 which weighs 7 ounces. Duck heavier than 18 oz. per yard is numbered by ciphers, a cipher being added for each ounce increase in weight. Thus 1/0=19 oz. duck; 2/0=20 oz. duck. Duck is made as heavy as 20/0 which would weigh 38 oz. per yard. However, duck above 2/0 is very seldom used.

The numbering of duck conforms in England and the United States in number only. English specifications are based on a 24 in. fabric and on two ply yarn warp and filling for all numbers, while in the United States 22 in. is the standard width and designates that each number shall be more than two ply and varies with the number and the weight per running yard for specified widths in exact proportion. Thus a 24 in. duck would weigh $\frac{1}{11}$ more than the standard 22 in. goods, while 11 in. duck would weigh one-half as much as the standard width. Duck is made in widths from 14 to 120 in., but the most common widths are 22, 28 and 36 in., and are delivered in standard lengths of 110 to 120 yd. differing from the English requirements of 40 yd. lengths. Duck in the United States is known as hard, medium or soft texture. Hard duck is made from 2/0–#12, and medium texture 2/0–#6.

The English specifications for a #1 duck specifies it should weigh 18·8 oz. per yard, 24 in. wide, be delivered in a 39 yd. bolt, to weigh 46 lb. containing 26 lb. of warp, 660 double ends (approximately 28 ends per inch) and 20 lb. of filling, breaking 340 lb. in the warp and 480 lb. in the filling, using the Avery method of breaking a 24×1 in. test strip. Comparing this with the U.S. Government specification a #1 duck should weigh 18 oz. per linear yard, 22 in. wide, have as a minimum 26 ends and 19 picks per inch of 5 ply warp and filling, and specified widths should weigh in proportion to the 22 in. standard (that is, a #1 duck 24 in. wide should weigh 19·6 oz. per yard). The fabric when tested by the 1×1×3 in. grab method, should break 440 lb. in the warp and 370 lb. in the filling. The difference in breaking strength is partially due to the method employed, therefore no comparison can be made. (R. T. F.)

SAINFOIN (*Onobrychis sativa*) in botany is a low-growing perennial plant of the pea family (Leguminosae), with a woody rootstock, whence proceed the stems, which are covered with fine hairs and bear numerous long pinnate leaves, the segments of which are elliptic. The flowers are borne in close pyramidal or cylindrical clusters on the end of long stalks. Each flower is about half an inch in length with lanceolate calyx-teeth shorter than the corolla, which latter is pink, with darker stripes of the same colour. The pods or legumes are flattened, wrinkled, somewhat sickle-shaped and crested, and contain a single olive-brown seed. In Great Britain the plant is a native of the calcareous districts of the southern counties. It is native through central Europe and Siberia and is sparingly naturalized in the eastern United States.

SAINT. The articles on the different Saints are to be found in their proper alphabetical places, followed not preceded by the word saint, as Peter, Saint; Patrick, Saint, etc.

The term was originally applied, *e.g.* in the New Testament and also in the most ancient monuments of Christian thought, to all believers. In ancient inscriptions it often means those souls who are enjoying eternal happiness, or the martyrs. For a long time, too, *sanctus* was an official title, particularly reserved for bishops (v. *Analecta Bollandiana*, xviii. 410–411). It was not till almost the 6th century that the word became a title of honour specially given to the dead whose cult was publicly celebrated in the churches. It was to the martyrs that the Church first began to pay special honour. We find traces of this in the end of the 2nd century, in the *Martyrium Polycarpi* (xviii. 3) in connection with a meeting to celebrate the anniversary of the martyr's death. Another passage in the same document (xvii. 3) shows clearly that this was not an innovation, but a custom already established among the Christians. It does not follow that it was henceforth

universal. The Church of Rome does not seem to have inscribed in its calendar its martyrs of an earlier date than the 3rd century. The essential form of the cult of the martyrs was that of the honours paid to the illustrious dead; and these honours were officially paid by the community. Each church first confined itself to celebrating its own martyrs; but it was not long before it became customary to celebrate the anniversaries of martyrs of other churches. Finally the famous ascetics began to share in the honours paid to the martyrs.

The cult of the saints early met with opposition, in answer to which the Church Fathers had to defend its lawfulness and explain its nature. The Church of Smyrna had early to explain its position in this matter with regard to St. Polycarp: "We worship Christ, as the Son of God; as to the martyrs, we love them as the disciples and imitators of the Lord" (*Martyrium Polycarpi*, xvii. 3). St. Cyril of Alexandria defends the worship of the martyrs against Julian, St. Asterius and Theodoret against the pagans in general, and they all lay emphasis on the fact that the saints are not looked upon as gods by the Christians, and that the honours paid to them are of quite a different kind from the adoration reserved to God alone. St. Jerome argued against Vigilantius with his accustomed vehemence, and especially meets the objection based on the resemblance between these rites and those of the pagans. But it is above all St. Augustine who in his refutation of Faustus, as well as in his sermons and elsewhere, clearly defined the true character of the honours paid to the saints: "Non eis templa, non eis altaria, non sacrificia exhibemus. Non eis sacerdotes offerunt, absit, Deo praestantur. Etiam apud memorias sanctorum martyrum cum offerimus, nonne Deo offerimus? . . . Quando audisti dici apud memoriam sancti Theogenis: offero tibi, sancte Theogenis, aut offero tibi Petre, aut offero tibi Paule?" (*Sermo*, 273, 7; cf. *Contra Faustum*, xx. 21). The undoubted abuses which grew up, especially during the middle ages, raised up, at the time of the Reformation, fresh adversaries of the cult of the saints. The council of Trent, while reproving all superstitious practices in the invocation of the saints, the veneration of relics and the use of images, expresses as follows the doctrine of the Roman Church: "That the saints who reign with Christ offer to God their prayers for men; that it is good and useful to invoke them by supplication and to have recourse to their aid and assistance in order to obtain from God His benefits through His Son our Saviour Jesus Christ, who alone is our Saviour and Redeemer."

BIBLIOGRAPHY.—*See* H. Thurston, art. "Saints and Martyrs, Christian" in Hastings, *Encyclopaedia of Religion and Ethics*, xi. 51 ff.; H. R. Percival, *The Invocation of Saints* (London, 1896).

ST. AFFRIQUE, a town of France, in the department of Aveyron, on the Sorgues, 68 m. N.N.W. of Beziers on the railway to Clermont Ferrand. Pop. (1926) 4,096. St. Affrique grew up in the 6th century around the tomb of St. Africain, bishop of Comminges. An old bridge over the Sorgues and some megaliths in the neighbourhood, especially the dolmen at Tiergues, are notable.

ST. ALBANS, EARLS OF. The English title of earl of St. Albans was first borne by Richard Bourke, or de Burgh, 4th earl of Clanricarde (d. 1635), who was made earl of St. Albans in 1628.

The second creation of an earl of St. Albans was in 1660, when Henry, Baron Jermyn, was made an earl under this title. *See* below.

ST. ALBANS, CHARLES BEAUCLERK, 1ST DUKE OF, *cr.* 1684 (1670–1726), a natural son of Charles II. by Nell Gwynne. Born in London on May 8, 1670, Charles was made Baron Hedington and earl of Burford in Dec. 1676. He took service with the emperor Leopold I., being present at the siege of Belgrade in 1688. After the battle of Landen in 1693, William III. made him captain of the gentlemen pensioners, and four years later gentleman of the bedchamber. His Whig sentiments prevented his advancement under Anne, but he was restored to favour at the accession of George I. He died at Bath on May 10, 1726. His wife Diana, daughter and heiress of Aubrey de Vere, last earl of Oxford, was a well-known beauty, who became lady of the bedchamber to Caroline, princess of Wales, and survived until Jan. 15, 1742.

ST. ALBANS, HENRY JERMYN, EARL OF (*c.* 1604–1684), son of Sir Thomas Jermyn of Rushbroke, Suffolk, was vice chamberlain and then master of the horse to Queen Henrietta Maria. He accompanied Henrietta Maria in 1644 to France, where he continued to act as her secretary. In the same year he was made governor of Jersey, and conceived the idea of ceding the Channel Islands to France as the price of French aid to Charles against the parliament. When Charles II. went to Breda, Jermyn remained in Paris with Henrietta Maria, who persuaded her son to create him earl of St. Albans in 1660. Gossip even asserted a secret marriage between the queen and Jermyn. At the Restoration St. Albans received various appointments, and he contributed to the close secret understanding between Charles II. and Louis XIV., taking part in the preliminaries of the Treaty of Dover in 1669. In 1664 he obtained a grant of land in London near St. James's Palace, where Jermyn street preserves the memory of his name, and where he built the St. Albans' market on a site afterwards cleared for the construction of Regent street and Waterloo place. The earl, who was a friend and patron of Abraham Cowley, died in January 1684.

ST. ALBANS, a city, municipal borough, and market town in the St. Albans parliamentary division of Hertfordshire, England, on the L.M.S. and L.N.E. railways, 20 m. north-west of London. Pop. (1931) 28,625. St. Albans became the seat of a bishop in 1877; the diocese covering the greater part of Essex and Hertfordshire, with small portions of Cambridgeshire, Bedfordshire and Buckinghamshire. The great cathedral, or abbey church, is finely situated on the steep hill, above the small river Ver, on which the central part of the city is placed.

History.—Shortly after the martyrdom of St. Alban, probably in 303, a church was built on the spot, and in 793 Offa, king of Mercia, who professed to have discovered the relics of the martyr, founded in his honour a monastery for Benedictines, which became one of the richest and most important houses of that order in the kingdom. The abbots, Ealdred and Ealmer, at the close of the 10th century began to break up the ruins of the old Roman city of Verulamium for materials to construct a new abbey church; but its erection was delayed till the time of William the Conqueror, when Paul of Caen, a relative of Archbishop Lanfranc, was in 1077 appointed abbot. The church was built on the model of St. Stephen's, Caen, but on a larger scale. It was consecrated in 1115, but had been finished some years before. Of the original Norman church the principal portions now remaining are the eastern bays of the nave, the tower and the transepts, but the main outlines of the building are still those planned by Paul. It is thus one of the most important specimens of Norman architecture in England, with the special characteristic that, owing to the use of the flat broad Roman tile, the Norman portions are peculiarly bare and stern.

About 1155 Robert de Gorham repaired and beautified the early shrine and rebuilt the chapter-house and part of the cloister; but nothing of his work now remains except part of a very beautiful doorway discovered in recent times. About 1200 Abbot John de Cella pulled down the west front and portions of the north and south aisles. He began the erection of the west front in a new and enriched form, and his work was continued by his successor William de Trumpyngtone in a plainer manner. In 1257 the eastern portion was pulled down, and between the middle of the 13th and the beginning of the 14th century a sanctuary, ante-chapel and lady chapel were added, all remarkably fine specimens of the architecture of the period. In 1323 two great columns on the south side suddenly fell, and this necessitated the rebuilding of five bays of the south aisle and the Norman cloisters. Various incongruous additions were made during the Perpendicular period, and much damage was also done during the dissolution of the abbeys to the finer work in the interior. Structural dangers gave rise to an extensive restoration and partial rebuilding, begun under the direction of Sir Gilbert Scott, and completed in 1894 by Lord Grimthorpe, some of whose work was, and remains, the subject of much adverse criticism. The abbey's extreme length outside is 550 ft., which is exceeded by Winchester by 6 ft. The nave (292 ft.) is the longest Gothic

nave in the world and exceeds that of Winchester by about 20 ft. The length of the transepts is 175 ft. inside. The monastic buildings have all disappeared except the great gateway.

St. Michael's church, within the site of Verulamium, was originally constructed in the 10th century. Considerable portions of the Norman building remain. The church contains the tomb of Lord Chancellor Bacon. St. Stephen's church, dating from the same period, contains some good examples of Norman architecture. The restored clock-house in the market-place was built by one of the abbots in the reign of Henry VIII.

To the south-west of the present city of St. Albans stood the ancient Verulamium (*q.v.*), one of the oldest towns in Britain, on Watling Street. The ruins served as a quarry not only to the builders of the Abbey, but also for the other churches and the monastic buildings of St. Albans, and Roman bricks are found even in the fabric of the churches of neighbouring villages, as at Sandridge, 2½ m. north-east. After being burnt by Boadicea (A.D. 61), Verulamium revived, and its church was famous early in the 8th century. The origin of the royal castle of Kingsbury is variously assigned to the 6th and 8th centuries. In the 9th and 10th centuries the abbots enlarged the town, which was confirmed to them as a borough by Henry II. In 1253 a charter gave borough jurisdiction to the good men of St. Albans; and there were several succeeding charters. In 1877 St. Albans became a city. Two burgesses were returned to the parliament of 1306–1307, and to others; after 1336, such right fell into abeyance until its resumption in 1553. Its abolition, as a result of corrupt electioneering practices, took place in 1852.

During Wat Tyler's insurrection the monastery was besieged by the townspeople, many of whom were executed in consequence. At St. Albans the Lancastrians were defeated on the 21st of May 1455, their leader, the duke of Somerset, being killed, and Henry VI. taken prisoner; here, too, Queen Margaret defeated the earl of Warwick on the 17th of February 1461. During the civil wars the town was garrisoned for the parliament. One of the earliest printing presses in the kingdom was set up in the abbey, and a number of books were printed there in the late 15th century.

Battle of St. Albans, May 22, 1455. The first battle in the WARS OF THE ROSES (*q.v.*) wherein the smaller Lancastrian force was defeated by the Yorkists and King Henry VI. taken prisoner. A subsequent battle at the same place on Feb. 17, 1461, ended in the Lancastrians defeating Warwick and regaining possession of King Henry VI.'s person.

See *Victoria County History, Herts,* vol. ii.; Peter Newcome, *The History of the Abbey of St. Albans* (London, 1793); and *Chronica monasterii S. Albani,* edited by H. T. Riley for the "Rolls" series (1863–1876).

SAINT ALBANS, a city of north-western Vermont, U.S.A., a port of entry and the county seat of Franklin county; 3 m. from Lake Champlain (St. Albans bay) and 15 m. from the Canadian border. It is on Federal highway 7, and is served by the Central Vermont railway. Pop. (1920) 7,588; 1930 it was 8,020. The city is 300 ft. above the level of the lake and is surrounded by hills commanding fine views of the Green mountains, Lake Champlain and the Adirondacks beyond. St. Albans bay is a famous fishing ground. The city is a summer resort and touring centre; headquarters of the railway, which employs some 500 persons in its offices and shops, and of various activities of the Federal Government (including the Bureau of Customs, the Bureau of Prohibition, the Immigration Service, and the Canadian Border and Lake Patrol); and a shipping point for maple sugar and dairy products, variegated marble and various other products of the region and its own factories. Exports of the customs district of Vermont (of which St. Albans is the headquarters) in 1927 were valued at $50,628,412; imports at $47,680,024. The first settlement here was made in 1774. The town was organized in 1788, incorporated in 1859 and chartered as a city in 1897. It has a commission-manager form of government. On Oct. 19, 1864, it was raided from Canada by a party of Confederate soldiers (not in uniform), who looted three banks and wounded several citizens. They escaped to Canada, where the leader and 12 others were arrested, but were not deprived of the $75,000 they had taken. Later this amount was refunded by the Canadian Government. In 1866 and 1870 the Fenians made St. Albans a base for attacks on Canada, and U.S. troops were sent here to preserve neutrality.

ST. ALDWYN, MICHAEL EDWARD HICKS BEACH, 1ST EARL (1837–1916), English statesman, son of Sir Michael Hicks Beach, 8th Bart., whom he succeeded in 1854, was born in London on Oct. 23, 1837, and was educated at Eton and Christ Church, Oxford. He entered parliament as Conservative M.P. for East Gloucestershire in 1864, and held various offices between 1868 and 1880. In 1885 he was elected for West Bristol, and the Conservative party having returned to power, became chancellor of the exchequer and leader of the House of Commons. After Gladstone's brief Home Rule ministry in 1886 he entered Lord Salisbury's next cabinet again as Irish secretary, making way for Lord Randolph Churchill as leader of the House; but his eyesight compelled him to resign in 1887 and meanwhile Goschen replaced Lord Randolph as chancellor of the exchequer. From 1888 to 1892 Sir Michael Hicks Beach returned to active work as president of the Board of Trade, and in 1895—Goschen being transferred to the Admiralty—he again became chancellor of the exchequer. In 1899 he lowered the fixed charge for the National Debt from 25 to 23 millions—a reduction imperatively required, apart from other reasons, by the difficulties found in redeeming Consols at their then inflated price. When compelled to find means for financing the war in South Africa, he insisted on combining the raising of loans with the imposition of fresh taxation; and besides raising the income-tax each year, up to 1s. 3d. in 1902, he introduced taxes on sugar and exported coal (1901), and in 1902 proposed the reimposition of the registration duty on corn and flour which had been abolished in 1869 by Lowe. On Lord Salisbury's retirement in 1902 Sir Michael Hicks Beach also left the Government. He accepted the chairmanship of the Royal Commission on Ritualistic Practices in the Church, and he did valuable work as an arbitrator; he was a firm advocate of free trade and by his campaign against Joseph Chamberlain's protectionist programme did much to prevent Balfour from committing his party to that policy. When Balfour resigned in 1905 he was raised to the peerage as Viscount St. Aldwyn, (1906), and was created an earl in 1915. He died in London on April 30, 1916.

ST. AMAND-LES-EAUX, a town of northern France, in the department of Nord, at the junction of the Elnon with the Scarpe, 22 m. S.E. of Lille by rail. Pop. (1926) 10,598. St. Amand owes its name to St. Amand, bishop of Tongres, who founded a monastery here in the 7th century. The abbey was laid waste by the Normans in 882 and by the count of Hainaut in 1340. The town was captured by Mary of Burgundy in 1477, by the count of Ligne, Charles V.'s lieutenant, in 1521, and finally in 1667 by the French. The town has mineral waters and mud baths. The discovery of statues and coins in the mud shows that these must have been used during the Roman period.

ST. AMAND-MONT-ROND, a town of central France, capital of an arrondissement in the department of Cher, 39 m. S. by E. of Bourges on the railway to Montluçon. Pop. (1926) 8,413. The town grew up round a monastery founded by St. Amand, a follower of St. Columban, in the 7th century.

SAINT-AMANT, MARC ANTOINE DE GÉRARD, SIEUR DE (1594–1661), French poet, was born near Rouen in the year 1594, the son of a merchant. He obtained a patent of nobility, and attached himself to different great noblemen—the duc de Retz and the comte d'Harcourt among others. He saw military service and sojourned at different times in Italy, in England—a sojourn which provoked from him a violent poetical attack on the country, *Albion* (1643)—in Poland, where he held a court appointment for two years, and elsewhere. Saint-Amant's later years were spent in France; and he died at Paris on Dec. 29, 1661. Saint-Amant has left a not inconsiderable body of poetry. His *Albion* and *Rome ridicule* set the fashion of the burlesque poem, a form in which he was excelled by his follower Paul Scarron. In his later years he devoted himself to serious subjects and produced an epic, *Moïse sauvé* (1653). His best work consists of Bacchanalian songs, his *Débauche* being one of the most remarkable convivial poems of its kind.

The standard edition is that in the *Bibliothèque Elzévirienne*, by M. C. L. Livet (2 vols., 1855).

SAINT ANDRÉ, ANDRÉ JEANBON (1749–1813), French revolutionary, was born at Montauban (Tarn-et-Garonne) on Feb. 25, 1749. In July 1793 he became president of the Convention, entered the Committee of Public Safety and was sent on mission to the Armies of the East. On Sept. 20, 1793, he obtained a vote of one hundred million francs for constructing vessels, and reorganized the military harbours of Brest and Cherbourg. After a mission in the south (July 1794–March 1795) in which he showed great moderation, he was arrested on May 28, 1795, but was released by the amnesty of the year IV. He was then appointed consul at Algiers and Smyrna (1798), imprisoned by the Turks for three years, and subsequently became prefect of the department of Mont-Tonnerre (1801) and commissary-general of the three departments on the left bank of the Rhine. He died at Mainz on Dec. 10, 1813.

See Lévy-Schneider, *Le Conventionnel Jeanbon St. André* (1901).

ST. ANDREWS, city, royal burgh, university town and seaport of Fifeshire, Scotland. Pop. (1931), 8,269. It is situated on a bay of the North Sea, 12½ m. S.E. of Dundee by the L.N.E. railway, *via* Leuchars junction. It occupies a plateau of sandstone rock about 50 ft. high, on the north breaking off in precipitous cliffs. The Eden enters St. Andrews bay N.W. of the golf links, which rank amongst the finest in the world. The Royal and Ancient Golf Club, founded in 1754, is the legislative authority of the game. There is a Marine Biological station. The city was never surrounded by walls, and of its ancient gates the West Port only remains. The Martyrs' memorial, erected to the honour of martyrs of the Reformation epoch, stands at the west end of the Scores on a cliff overlooking the sea.

The cathedral originated partly in the priory of Canons Regular founded by Bishop Robert (1122–1159). At the end of the 17th century some of the priory buildings were still entire and considerable remains of others existed, but nearly all traces have now disappeared except portions of the wall and the archways. The wall is about three-quarters of a mile long, and bears turrets at intervals. The cathedral was founded by Bishop Arnold (1159–1162), to supply more ample accommodation than was afforded by the church of St. Regulus. The principal portions extant, partly Norman and partly Early English, are the east and west gables and part of the nave and the south transept.

The castle, on a rocky promontory, is supposed to have been erected by Bishop Roger about the beginning of the 13th century as an episcopal residence, and was strongly fortified. It was destroyed, but rebuilt towards the close of the century. There remains a portion of the south wall enclosing a square tower, the "bottle dungeon" below the north-west tower, the kitchen tower and a subterranean passage. The grounds have been laid out as a public garden.

The town church, formerly the church of the Holy Trinity, was originally founded in 1112 by Bishop Turgot; but was rebuilt at the close of the 18th century with the exception of the square tower and spire, and again in recent years, the original lines being followed as closely as possible. In this church John Knox first preached in public, and in it, on June 4th, 1559, he delivered the famous sermon which led to the stripping of the cathedral and the destruction of the monastic buildings. The church contains a monument to James Sharp, archbishop of St. Andrews (assassinated 1679). In South Street is the ruin of the north transept of the chapel of the Blackfriars' monastery founded by Bishop Wishart in 1274; but the Observantine monastery founded about 1450 by Bishop Kennedy has disappeared, except the well.

The university of St. Andrews owed its origin to a society formed in 1410 by Lawrence of Lindores, abbot of Scone, and others. A charter was issued in 1411 by Bishop Henry Wardlaw (d. 1440), and six bulls were obtained from Benedict XIII. in 1413 confirming the charter and constituting the society a university. The lectures were delivered in various parts of the town until 1439, when Wardlaw allowed the lecturers the use of a building called the Paedagogium, or St. John's. St. Salvator's college was founded and richly endowed by Bishop Kennedy in 1456; seven years later it was granted the power to confer degrees in theology and philosophy, and by the end of the century was regarded as a constituent part of the university. In 1512 St. Leonard's college was founded, and the original Paedagogium nominally changed into a college, with the parish church of St. Michael of Tarvet annexed to it; but its actual erection into a college did not take place until 1537, when it was dedicated to the Blessed Virgin Mary of the Assumption. The outline of the ancient structure is preserved, but its general character has been much altered by various restorations. It forms two sides of a quadrangle. The University library, which now includes the older college libraries, was founded about the middle of the 17th century and rebuilt in 1764. The lower hall in the older part of the building was used at times as a provincial meeting-place for the Scottish parliament. When the constitution of the colleges was remodelled in 1579 St. Mary's was set apart for theology; and in 1747 the colleges of St. Salvator and St. Leonard were formed into the United college. The buildings of St. Leonard's are now occupied as a school for girls. The college chapel is in ruins. The United college occupies the site of St. Salvator's college, but the old buildings have been removed, with the exception of the college chapel, now used as the university chapel and the parish church of St. Leonard's, a fine Gothic structure, containing an elaborate tomb of Bishop Kennedy and Knox's pulpit; the entrance gateway, with a square clock tower; and the janitor's house with some class-rooms above. University college, Dundee, was in 1897 affiliated to the university of St. Andrews. In 1892 provision was made within the university for the instruction of women; and for the board and residence of women students a permanent building was opened in 1896. Medical buildings were opened in 1899. Madras college, founded and endowed by Dr. Andrew Bell (1755–1832) is a famous school.

St. Andrews was probably the site of a Pictish stronghold, and tradition declares that Kenneth, the patron saint of Kennoway, established a Culdee monastery here in the 6th century. The foundations of the little church dedicated to the Virgin were discovered on the Kirkheugh in 1860. Another Culdee church of St. Mary on the Rock is supposed to have stood on the Lady's Craig, now covered by the sea. At that period the name of the place was Kilrymont (Gaelic, "The church of the king's mount") or Muckross. St. Andrews is said to have been made a bishopric in the 9th century, and when the Pictish and Scottish churches were united in 908, the primacy was transferred to it from Dunkeld, its bishops being thereafter known as bishops of Alban. It became an archbishopric during the primacy of Patrick Graham (1466–1478). The town was created a royal burgh in 1124. In the 16th century St. Andrews was one of the most important ports north of the Forth, but it fell into decay after the Civil War.

SAINT ARNAUD, JACQUES LEROY DE (1801–1854), marshal of France, was born at Paris on Aug. 20, 1801. He entered the army in 1817, retired from the service in 1827, and re-entered it at thirty as a sub-lieutenant. He took part in the suppression of the Vendée émeute, and was for a time on General (Marshal) Bugeaud's staff. But his debts and the scandals of his private life compelled him to go to Algeria as a captain in the Foreign Legion. In 1848 he was placed at the head of a brigade during the revolution in Paris. On his return to Africa, it is said because Louis Napoleon considered him suitable to be the military head of a *coup d'état*, an expedition was made into Little Kabylia, in which St. Arnaud provided his superiors with the pretext for bringing him home as a general of division (July 1851). He succeeded Marshal Magnan as minister of war and superintended the military operations of the *coup d'état* of the 2nd of December (1851) which placed Napoleon III. on the throne. A year later he was made marshal of France and a senator, remaining at the head of the war office till 1854, when he set out to command the French in the Crimea, his British colleague being Lord Raglan. He died on board ship on Sept. 29, 1854, shortly after commanding at the battle of the Alma. His body was conveyed to France and buried in the Invalides.

See *Lettres du Maréchal de Saint Arnaud* (Paris, 1855; 2nd edition with memoir by Sainte-Beuve, 1858).

ST. ASAPH, a cathedral city of Flintshire, north Wales, on the Rhyl-Denbigh branch of the L.M.S. about 6 m. from each of these towns. Pop. (1921) 1,830. Its Welsh name, Llanelwy, is derived from the Elwy, between which stream and the Clwyd it stands. Asaph, to whom the cathedral (one of the smallest in Great Britain) is dedicated, was bishop here during the Celtic period (6th century). The small, irregularly built town has also a parish church, remains of a Perpendicular chapel near Ffynnon Fair (St. Mary's Well) and almshouses founded in 1678 by Bishop Barrow. The hill on which St. Asaph stands is Bryn Paulin, with early associations. The early cathedral, of wood, was burned by the English in 1247 and 1282, and that built by Bishop Anian in the 13th century (Decorated) was mostly destroyed during the raids of Owain Glyn Dwr (Owen Glendower) (*c.* 1402). Bishop Redman's building (*c.* 1480) was completed by the erection of the choir about 1770. Further restoration took place in the 19th century. The church is plain, cruciform, chiefly Decorated but partly Early English, with a square tower; it has a library of nearly 2,000 volumes (some rare). In 1920 the then bishop of St. Asaph was enthroned in his cathedral as the first archbishop of the disestablished church in Wales.

SAINT AUGUSTINE, a city of north-eastern Florida, U.S.A., on the coast, 36 m. S.E. of Jacksonville; a port of entry and the county seat of St. Johns county. It is on Federal highway 1 and the East Coast Inland waterway, and is served by the Florida East Coast railway. Pop. 10,458 in 1925 (State census), of whom 3,516 were negroes; in 1930, 12,111 by Federal census. The city occupies a narrow sandy peninsula formed by the Matanzas and San Sebastian rivers, and is separated from the ocean by the northern end of Anastasia island (½ m. wide). It is the oldest city in the United States. One of the main streets (St. George) is only 17 ft. wide, and others are even narrower. Many old houses remain, some with balconies projecting over the street. Ft. Marion (originally the Castle of San Marco) is a well-preserved specimen of Spanish military architecture, built of coquina, begun about 1638 and finished in 1756. The arsenal occupies the site, and incorporates part of the walls, of the old Franciscan convent. Between the fort and the arsenal extends a sea-wall, originally built in the 16th century and reconstructed in 1835 by the United States, along which runs a beautiful drive. A wall and moat formerly ran across the peninsula at the northern edge of the city, and the city gate which was in this wall still stands, a picturesque ruin, at the end of St. George street. The Roman Catholic cathedral was first built in 1791. The post-office was the Spanish Government building; the public library and the historical society both occupy buildings of historic interest. There is a beautiful modern church (Presbyterian) built in 1890 by Henry M. Flagler as a memorial to his daughter. St. Augustine is both a winter and a summer resort. The general offices and shops of the railway are here. Since 1915 the city has had a commission-manager form of government.



BY COURTESY OF THE ST. AUGUSTINE CHAMBER OF COMMERCE

COURTYARD OF FORT MARION, ST. AUGUSTINE, SHOWING THE INCLINED ARCH BUILT BY THE SPANIARDS FOR THE TRANSPORTATION OF CANNON FROM THE PLAZA TO THE TERREPLEIN. THE STEPS ARE MODERN

On St. Augustine's day (Aug. 28), 1565, Pedro Menéndez de Avilés sighted this coast, and on Sept. 6 he landed with his band of colonists and began to fortify the peninsula. In 1586 Sir Francis Drake captured the fort and burned the town, and in 1665 it was pillaged by Capt. John Davis, an English freebooter. Conflicts with the English settlements in South Carolina and Georgia were frequent after 1681. When Florida was ceded to England in 1763 most of the Spanish population of St. Augustine went to Cuba; when in 1783 it came again under Spanish rule, most of the English left for the Carolinas, Georgia, or the West Indies; and when in 1821 it passed to the United States, the Spanish inhabitants remained. On Jan. 7, 1861, three days before Florida passed her Ordinance of Secession, a State force compelled the small garrison to evacuate the fort, but on March 11, 1862, it was retaken without bloodshed, and was then held by the Federals until the close of the war.

ST. AUSTELL, market town, urban district, Penryn and Falmouth parliamentary division, Cornwall, England, 14 m. N.E. of Truro, on the G.W. railway. Pop. (1931) 8,295. To the north the high ground on which St. Austell stands culminates in Hensbarrow Downs (1,034 ft.), so called from a barrow standing at the loftiest point. The church of the Holy Trinity is Perpendicular, with Decorated chancel, richly ornamented. The town is the centre of a district productive of china clay (kaolin). Close to St. Austell is a good example of an ancient baptistery, called Menacuddle Well, the little chapel being Early English.

ST. BARTHOLOMEW or **ST. BARTHÉLEMY,** French West Indian island, 17° 55′ N. and 63° 60′ W., about 130 m. N.W. of Guadeloupe, of which it is a dependency. The horns of an irregular crescent enclose the bay of St. Jean, pointing north; the surface culminates in a central limestone hill 1,003 ft. high. It is 8 sq.m. in area, and timberless. Gustavia, on the south-west coast has a small but safe harbour. Lorient is the only other town. The inhabitants, mainly of French and negro descent, are English-speaking, and number about 2,520. St. Bartholomew was occupied by France in 1648 and ceded to Sweden in 1784. In 1877 it was again acquired by France at the cost of £11,000.

ST. BARTHOLOMEW, MASSACRE OF. This was the name given to the massacre of the Huguenots, which began in Paris on St. Bartholomew's Day, Aug. 24, 1572. The initiative for the crime rests with Catherine de' Medici. Disquieted by the growing influence of Admiral Coligny, who against her wishes was endeavouring to draw Charles IX. into a war with Spain, she resolved to have him assassinated. The attempt failed, however, and Catherine then determined to massacre all the Huguenot leaders.

After holding a council with the Catholic leaders, including the Duke of Anjou, Henry of Guise, the Marshal de Tavannes, the Duke of Nevers, and René de Birague, the keeper of the seals, she persuaded the king that the massacre was a measure of public safety, and on the evening of Aug. 23 succeeded in wringing authorization from him.

The massacre began on Sunday at daybreak, and continued in Paris till Sept. 17. Once let loose, it was impossible to restrain the populace. From Paris the massacre spread to the provinces till Oct. 3. The Duc de Longueville in Picardy, Chabot-Charny (son of Admiral Chabot) at Dijon, the Comte de Matignon (1525–97) in Normandy and other provincial governors refused to authorize the massacres. François Hotman estimates the number killed in the whole of France at 50,000. Catherine de' Medici received the congratulations of all the Catholic powers, and Pope Gregory XIII. commanded bonfires to be lighted and a medal to be struck.

See H. Mariéjol, "La Réforme et la Ligue" (1904), in vol. vi. of the *Histoire de France*, by E. Lavisse, which contains a complete bibliography of the subject.

ST. BENOÎT-SUR-LOIRE, a village of France, in the department of Loiret, on the Loire, 22 m. E.S.E. of Orléans. St. Benoît possesses a huge basilica, the only survival of a famous 7th century monastery to which the relics of St. Benedict were brought from Monte Cassino. In the crypt is a modern shrine containing

the remains of St. Benedict, which still attract many pilgrims. The establishment was very important during the middle ages, owing partly to its school. In 1562 it was pillaged by the Protestants and, though the buildings were restored by Richelieu, the abbey declined. The basilica (1025–1218) has a narthex of two storeys and two sets of transepts, surmounted by a square central tower.

SAINT BERNARD, a city of Hamilton county, Ohio, U.S.A., 15 m. N.E. of Cincinnati; served by the Baltimore and Ohio and the Norfolk and Western railways and others for freight. Pop. (1920) 6,312; 1930 it was 7,487. It is a residential suburb of Cincinnati, and has various manufacturing industries.

ST. BERNARD PASSES, two passes across the main chain of the Alps, both traversed by motor roads. The Great St. Bernard (8,111 ft.) leads (53 m.) from Martigny (anc. *Octodurus*) in the Rhone valley (Switzerland) to Aosta (anc. *Augusta Praetoria*) in Italy. It was known in Roman times. The hospice on the pass was founded (or perhaps refounded) by St. Bernard of Menthon (d. about 1081), and since the 12th or early 13th century has been in charge of a community of Austin canons, the mother-house being at Martigny. In former days the servants of the canons, and the famous dogs, saved many lives, especially of Italian workmen. In May 1800 Napoleon led his army over the pass, which was then traversed by a bridle road only. The Little St. Bernard (7,179 ft.) also was known in Roman times, and the hospice refounded by St. Bernard of Menthon, though it is now in charge of the military and religious order of SS. Maurice and Lazarus. The pass leads (39 m.) from Bourg St. Maurice in the Isère valley (Savoie) to Aosta, but is much less frequented by travellers than its neighbour opposite.

There is no certain mention of the road over the pass of the Great St. Bernard (*Alpis Poenina, Poeninus Mons*) before 57 B.C. when Julius Caesar sent Servius Galba over it. Even in Strabo's time it was impassable for wheeled traffic; we find that Augusta Praetoria originally had but two gates, one opening towards the Little St. Bernard (*Alpis Graia*), the other towards Eporedia (Ivrea), but none towards the Alpis Poenina. The military arrangement of the German provinces rendered the construction of the road necessary, and it is mentioned as existing in A.D. 69. Remains of it cut in the rock, some 12½ ft. in width, still exist near the lake at the top of the pass. On the plain at the top of the pass is the temple of Jupiter Poeninus (Penninus), remains of which were excavated in 1890–1893, though objects connected with it had long ago been found. The oldest of the votive-tablets which can be dated belongs to the time of Tiberius, and the temple may be attributed to the beginning of the empire; objects, however, of the first Iron age (4th or 5th century B.C.) were also found and many Gaulish coins. Other buildings, probably belonging to the post station at the top of the pass, were also discovered. Many of the objects found then and in previous years, including many votive-tablets, are in the museum at the hospice of the Great St. Bernard.

The Little St. Bernard was known to the Romans as Alpis Graia. It derived its name from the legend that Hercules, returning from Spain with the oxen of Geryon, crossed the Alps by this route, though the legend rather suits the route through the Maritime Alps. According to some modern scholars, Hannibal passed this way over the Alps (*see* HANNIBAL, and Partsch in Pauly-Wissowa, *Realencyklopädie* i., 1604). In any case it was the principal pass over the Alps into Gallia Comata until the pass of the Alpis Cottia (Mont Genèvre) was opened by Cn. Pompeius in 75 B.C., and became the principal route, though the road was only completed under Augustus by Cottius in 3 B.C. Various remains of the road are visible, and those of a building (possibly a temple of Jupiter) have been found on the summit of the pass.

See *Notizie degli scavi* (1883), 7 (1894), 46; and C. Promis, *Antichità di Aosta* (Turin, 1862), 115 *sqq.*

ST. BERTRAND-DE-COMMINGES, a village of south-western France at the foot of the Pyrenees in the department of Haute-Garonne, about 70 m. S.W. of Toulouse by rail and road. St. Bertrand-de-Comminges (*Lugdunum Convenarum*) was founded in 72 B.C., and by the end of the 5th century became the seat of a bishopric suppressed at the Revolution. The town was destroyed towards the end of the 6th century by Guntrum, king of Burgundy. St. Bertrand stands about 1 m. from the left bank of the Garonne on the slopes of an isolated hill crowned by its celebrated cathedral of Notre Dame. The façade of the church with its square tower and the first bay with its aisles are Romanesque, and belong to an 11th century church begun by Bishop Bertrand, afterwards canonized.

ST. BRIEUC, a town of western France, capital of the department of Côtes-du-Nord, 63 m. N.W. of Rennes by the railway to Brest. Pop. (1926) 19,262. St. Brieuc owes its origin and its name to the missionary St. Briocus, who came from Wales in the 5th century, and whose tomb afterwards attracted crowds of pilgrims. The place was defended in 1375 by Olivier de Clisson against the duke of Brittany, and later attacked by the same Clisson in 1394, the cathedral suffering greatly in both sieges. In 1592 the town was pillaged by the Spaniards, in 1601 ravaged by the plague, and in 1628 surrounded by walls of which no traces remain. Between 1602 and 1768 the states of Brittany several times met at St. Brieuc. It stands 290 ft. above the sea, between 1 and 2 m. from the English channel and less than a mile from the right bank of the Gouët, at the mouth of which is its seaport, Le Légué. St. Brieuc is the seat of a bishopric in the province of Rennes, and has a 13th century cathedral, partially rebuilt in the 18th, and afterwards restored.

ST. CATHARINES, a city of Ontario, Canada, and the capital of Lincoln county, on the Welland Canal and the Canadian National and Niagara, St. Catharines and Toronto electric railways, 35 m. S. of Toronto, with which it has steamer connection. Pop. (1931) 24,753.

ST. CHAMOND, a manufacturing town of east-central France, in the department of Loire, 7½ m. E.N.E. of St. Etienne, on the railway from St. Etienne to Lyons. Pop. (1926) 15,250. St. Chamond, founded in the 7th century by St. Ennemond or Chamond, archbishop of Lyons, became the chief town of the Jarret, a little principality formed by the valley of the Gier. Silk-milling was introduced in the town in the middle of the 16th century by Gayotti, a native of Bologna. There are remains of a Roman aqueduct.

SAINT CHARLES, a city of eastern Missouri, U.S.A., on the north bank of the Missouri river, 22 m. N.W. of Saint Louis; the county seat of St. Charles county. It is on Federal highway 40, and is served by the Missouri-Kansas-Texas and the Wabash railways. Pop. 8,503 in 1920, 87% native white; 10,491 in 1930 by the Federal census. St. Charles was settled by the French in 1769, and a Spanish official was placed in residence soon afterwards. In 1849 it was incorporated as a city. From 1820 to 1826 it was the capital of the State.

SAINT CLAIR, an anthracite-mining borough of Schuylkill county, Pennsylvania, U.S.A., on Mill creek, 3 m. N. of Pottsville; served by the Pennsylvania and the Reading railways. Pop. (1920), 6,495; 1930 it was 7,296. Saint Clair was settled in 1825 and incorporated in 1850.

SAINT CLAIR RIVER, the outlet for Lake Huron, which in turn receives the waters from Lakes Superior and Michigan. Forming part of the boundary between the State of Michigan and the Province of Ontario, Canada, it flows in a southerly direction into Lake St. Clair with a fall of about 5·8 ft. in 40 miles. The river discharges through seven mouths, the one known as the South channel being used for deep-draught vessels, while several of the other channels are used for small craft. The South channel has been improved by the dredging of separate channels for up-bound and down-bound traffic, extending from deep water in the river into Lake St. Clair.

The project for the main improved channel through the river calls for a minimum depth of 20 ft. when the levels of Lakes Huron and St. Clair are at low water datum. The U.S. Congress in 1928 gave consideration to increasing the depth of this channel in connection with a programme for general deepening of all the main connecting channels of the Great Lakes, and some increase will probably be authorized in the near future. The water level of this river fluctuates with the levels of the lakes above and below. During the past 20 years the difference

between the highest and lowest monthly mean levels during the navigation season has been about 4 feet. Occasional fluctuations due to winds of high velocity may be 3·5 ft. in six hours.

Near the head of the river are located the cities of Port Huron, Mich., and Sarnia, Ontario, both of which handle some water-borne commerce but the great bulk of the traffic moves through the river without intermediate stop. This traffic in 1927 totalled 89,000,000 tons, composed principally of iron ore, grain and limestone down-bound and coal up-bound.

BIBLIOGRAPHY.—*Annual Report* of the chief of engineers, Government Printing Office (1928); *House Document* No. 253 of the 70th Congress, 1st Session, Government Printing Office (1928); *Transportation on the Great Lakes*, Government Printing Office (1926); Bulletin No. 37, *Survey of Northern and North-western Lakes*, U.S. Lake Survey, Detroit (April 1928). (E. JA.)

ST. CLAUDE, a town of eastern France, capital of an *arrondissement* in the department of Jura, 42 m. S.S.E. of Lons-le-Saunier by rail. Pop. (1926) 11,990. The town is situated 1,300 ft. above sea-level at the western base of Mont Bayard, among the heights of the eastern Jura at the confluence of the Bienne and the Tacon. The cathedral of St. Pierre, once the abbey-church, dates from the 14th to the 18th centuries.

ST. CLOUD, a town of northern France, in the department of Seine-et-Oise, on the left bank of the Seine, 2 m. W. of the fortifications of Paris by road. Pop. (1926) 13,305. The town is named after Clodoald or Cloud, grandson of Clovis, whose tomb was discovered in a crypt near the present church. He had granted the domain to the bishops of Paris, who possessed it as a fief till the 18th century. At St. Cloud Henry III. and the king of Navarre (Henry IV.) established their camp during the League for the siege of Paris and there the former was assassinated. The castle, at that time a plain country house belonging to Pierre de Gondi, archbishop of Paris, was acquired in 1658 by the duke of Orleans, who built the palace which perished in 1870. It was at St. Cloud that Bonaparte executed the *coup d'état* of the 18th Brumaire (1799); after he became emperor the palace was his favourite residence, and there he celebrated his marriage with Marie Louise. In 1815 it was the scene of the signing of the capitulation of Paris. Seized by the Prussians at the beginning of the investment of Paris in 1870, St. Cloud was sacked during the siege. St. Cloud, built on a hill slope overlooking the river, the Bois de Boulogne and Paris, is one of the favourite resorts of the Parisians. Every year in September, at the time of the pilgrimage of St. Cloud, a fair lasting four weeks is held in the park which is famous for its beauty. Within its precincts are situated the national Sèvres porcelain manufactory.

ST. CLOUD, a city in the central part of Minnesota, U.S.A., on the Mississippi river, 65 m. N.W. of Minneapolis; the county seat of Stearns county. It is on Federal highway 10, and is served by the Great Northern and the Northern Pacific railways, and by motor bus lines in all directions. Pop. (1920) 15,873 (86% native white); (1930 Federal census) 21,000. The fertile surrounding country produces especially butter and grain. There are extensive ledges of granite in the vicinity, and nearly 2,000 carloads of finished stone, valued at $4,000,000, were shipped in 1927. The Great Northern has extensive shops. The aggregate factory output in 1927 was valued at $8,984,298. St. Cloud is the seat of the largest of the Minnesota State Teachers colleges (established 1869), and of the State Reformatory (1887), a United States Veterans Hospital (with 350 ac. of ground), a Roman Catholic cathedral, and several schools and charitable institutions under religious auspices. The assessed valuation of property is about $10,000,000. St. Cloud was settled in 1852, platted in 1854, incorporated as a village in 1868, and chartered as a city in 1889. Since 1912 it has had a commission form of government. Before the days of the railroads it was the terminus of the Hudson's Bay Company for unloading the furs brought down from the Red River valley in wooden ox-carts.

ST. CROIX or **SANTA CRUZ,** the largest of the West Indian Islands purchased from Denmark by the United States in 1916. It lies 65 m. S.E. of Puerto Rico, in 17° 40′ N. and 64° 14′ W., is 22 m. long, varies in breadth from 1 m. to 6 m., and has an area of 84 sq.m. Pop. 11,413. Hills parallel with the western coast culminate in Mount Eagle (1,164 ft.). The narrower part is also hilly, but the S. shore has marshy tracts with brackish lagoons. Sugar is the staple product, and near Christianstäd there is a central government factory. The planters are mostly English. The capital, Christianstäd (locally known as "Bassin"), is situated at the head of an inlet on the north coast, but its harbour is largely choked with mud. It is picturesque. The only other town, Frederickstäd, stands on an open roadstead on the W. coast. The climate is healthy, the mean annual temperature being 74° F and the average rainfall 45·7 in. per annum.

St. Croix was discovered in 1493 by Columbus, and owned in turn by Dutch, British and Spanish. In 1651 it was taken by France, and was given to the Knights of Malta in 1653. Denmark purchased it in 1733. Slavery was abolished in 1848 after a violent insurrection.

See Sir H. H. Johnston, *The Negro in the New World* (1910).

ST. CYR-L'ÉCOLE, a town of France in the department of Seine-et-Oise, 3 m. W. of Versailles at the end of the old park of Louis XIV. Pop. (1926) 4,953. Its importance is due to the famous military school (*école spéciale militaire*) in which officers for the cavalry and infantry are trained, established in 1808 in a convent where Racine's *Esther* and *Athalie* were first acted. The convent was suppressed at the Revolution.

ST. DAVID'S (TYDDEWI), a cathedral village-city of Pembrokeshire, Wales, situated near the sea to the south-east of St. David's head, the most westerly promontory of south Wales. Pop. (1921), 1,644. St. David's is 10m. from Netterson G.W.R. station, and about 16 m. S.W. from Fishguard. The little town, locally known as "the city," stands in a lofty position near the cathedral close, and consists of five streets focusing on the square, called Cross Keys, the ancient market place still possessing its market cross (restored 1873). The origin of the fine little cathedral and its village "city" in an area so remote under modern conditions is of special interest. North-west Pembrokeshire, like most western promontories of Britain, France and Spain, is remarkably rich in old stone monuments (menhirs, dolmens and stone circles), a fact pointing in all probability to its being on the coastwise and transpeninsular route frequented by prehistoric traders from the Mediterranean to Ireland. (*See* PEMBROKESHIRE.) The little boats of old were driven hither and thither at the mercy of wind and tide, so the coastland of St. David's head became dotted with alternative landing places, *e.g.*, Porth y Rhaw, St. Non's Bay, Porth Clais, Porth Stinian, Whitesand Bay, which seem to have made the neighbourhood important in pre-Christian times, as one may judge from folk tradition, monuments on the headland, etc.

The pre-Christian tradition was continued by the Celtic saints moving between Ireland and Wales. In early mediaeval days the same route grew important, as pilgrims moved to and from the shrine of St. Iago da Compostella in north-west Spain. (*See* Hartwell Jones, "Celtic Britain and the Pilgrim Movement," *Y Cymmrodor* 1912.) The little landing places on the shore now had Christian chapels, where prayers were possibly said for safe voyages. The most important ruins at present are those of St. Justinians. At a focus behind a group of these small ports, in the quiet sheltered, well-watered valley of the Alun, the fine cathedral of SS. David and Andrew was built, and on the high ground around, as if sheltering it still further, the "village-city" grew. Throughout the middle ages the cathedral was the centre of pilgrimage and the mediaeval roads (often marked by sacred wells) may be traced across Pembrokeshire focusing on St. David's. Two pilgrimages to St. David's were popularly thought to equal one to Rome itself. The early holders of the see ventured, while the central government was weak, to exercise metropolitan rights over much of south Wales, but the increasing power of the Norman penetration reached St. David's and Anselm's forcible appointment of Bernard—a Norman monk—to be bishop in 1115 made St. David's a suffragan see of Canterbury. A conciliatory step, it would appear, was the canonization of David about 1120. Gerald de Barri (Giraldus Cambrensis) strove vainly to regain the ancient power of St. David's from 1199–1203.

The cathedral church is partly built of a beautiful purple-hued

sandstone, quarried locally. Its proportions are: length (exclusive of the Trinity and Lady chapels), 254½ ft.; breadth of nave and aisles, 51½ ft.; breadth of transepts, including tower, 116 ft.; and height of central tower 116 feet. The earliest and main portion of the existing fabric was erected under Bishop Peter de Leia (1176–98) in the transitional Norman-English style. Bishop David Martyn (1290–1328) built the Lady chapel; Bishop Henry de Gower (1328–47) made many additions in the Decorated style, including the stone rood-screen and southern porch; and Bishop Edward Vaughan (1509–22) erected the Trinity chapel between the choir and Lady chapel. The cathedral suffered severely during the changes brought about by the Reformation and at the hands of Bishop William Barlow (1536–48) and again during the Civil Wars of the 17th century. Subsequent restorations took place. The interior of the nave, separated by six wide bays from the aisles, is singularly imposing with its triforium and clerestory. It possesses an elaborate roof of Irish oak, the gift of Treasurer Owen Pole (*c.* 1500). The nave is divided from the choir by Bishop Gower's fine stone screen, whilst the choir itself contains the richly carved stalls erected by Bishop Tully (1460–81), the episcopal throne, and an elegant oaken screen that serves to separate choir and presbytery. Bishop Vaughan's chapel contains fine Tudor fan-vaulting, and the Lady chapel good decorated sedilia. To the north of the cathedral is to be seen the ruined shell of the beautiful chapel with an adjoining tower, forming part of the college of St. Mary, founded by John of Gaunt and Bishop Adam Houghton in 1377.

On the west bank of the Alun stand the splendid ruins of the episcopal palace erected by Bishop Gower (*c.* 1342). The palace was built for residential purposes rather than for defence and occupies three sides of a quadrangle 120 ft. square, and, though roofless and deserted for nearly three centuries, retains most of its principal features. The great hall, 96 ft. by 33 ft., possesses a traceried wheel-window; the chief portal is still imposing; and the chapel retains its curious bell-turret; while the peculiar but graceful arcaded parapet of the roof extends intact throughout the whole length of the building. Partially dismantled by Bishop Barlow (*c.* 1540) the half-ruined palace was occasionally occupied by succeeding bishops prior to the Civil Wars.

The Close, 18 ac. in extent and extra-parochial, contains the deanery and other residences of the cathedral clergy, mostly occupying the sites of ancient buildings. It formerly owned four gateways, of which the South or Tower gate alone remains.

ST. DENIS, a suburb 9 kilometres north of Notre Dame de Paris, capital of an arrondissement in the department of Seine. Pop. (1926) 78,686. St. Denis, an important junction on the northern railway, stands in a plain on the right bank of the Seine, which is here joined by the canal of St. Denis. It has numerous metallurgical works, where railway material, naval engines and the like are constructed, distilleries of spirits, glassworks, potteries and manufactories of drugs, chemical products, oils, nickel plate and pianos. The name and fame of the town are derived from the abbey founded by Dagobert I. on the spot where St. Denis, the apostle of Paris, was interred.

St. Denis, the ancient *Catulliacum,* was a town of no pretensions till the foundation of its abbey, which became one of the most powerful in France. The rebuilding of the church, begun in the 12th century by Suger, was completed in the 13th century. Among the many domains of the abbey was the French Vexin. It was held during the later middle ages by the French kings and vassals of the abbey, and to this fact is due their adoption of the oriflamme or red banner of St. Denis as the royal standard. Louis XIV. reduced the abbey to the rank of a priory; and at the Revolution it was suppressed, the tombs being violated and the church sacked (1793). Louis XVIII. caused all the articles belonging to St. Denis to be brought back to their original site, and added numerous other monuments from the suppressed abbeys. But it was not till after 1848 that, under the direction of Viollet-le-Duc, the basilica recovered its original appearance. St. Denis, which was the key of Paris on the north, was more than once pillaged in the Hundred Years' War, suffering especially in 1358 and 1406. A sanguinary battle, in which the Catholic leader Constable Anne de Montmorency found victory and death, was fought between Huguenots and Catholics in the neighbourhood on Nov. 10, 1567.

The church exhibits the transition from the Romanesque to the Gothic style. The west front was built between 1137 and 1140. The right-hand tower is almost pure Romanesque; that on the left was Gothic, but its spire was struck by lightning in 1837. The porch formed by the first three bays contains some remains of the basilica of Pippin the Short and Charlemagne, by whom the church was rebuilt. The nave proper (235 ft. long and 57 wide) has seven bays, and dates, as well as most of the choir and transepts, from the reign of St. Louis. The secondary apse (*rond-point*) and its semicircular chapels (consecrated in 1144) are considered as the first perfected attempt at Gothic. The transepts have fine façades, the north of the 12th, the south of the 13th century, each with two unfinished towers; if the plan had been fully carried out there would have been six towers besides a central spire in lead. The church contains a series of tombs of the kings and princes of the royal houses of France. The most remarkable are those of Louis XII. and Anne of Brittany, executed from 1516 to 1532; of Henry II. and Catherine de' Medici, a masterpiece by Germain Pilon (1564–1583); of Louis of Orleans and Valentine of Milan, from the old church of the Celestines at Paris (1502–1515); of Francis I. and Claude of France, one of the most splendid tombs of the Renaissance, executed under the direction of Philibert Delorme (1550–1560); and that of Dagobert, which, though considerably dilapidated, ranks as one of the most curious of mediaeval (13th-century) works of art. In the apse some stained glass of the time of Suger remains. The crypt dates partly from the 10th or 11th century. In the centre is the vault where the coffin of the king used to lie until, to make room for that of his successor, it was removed to its final resting-place. It is at present occupied by the coffin of Louis XVIII., the last sovereign whose body was borne to St. Denis. Besides fine statues, the crypt contains the Bourbon vault, in which among other coffins are deposited the remains of Louis XVI. and Marie Antoinette.

See F. de Guilhermy, *Monographie de l'église royale de St. Denis* (Paris, 1848).

ST. DIÉ, a town of eastern France, capital of an *arrondissement* in the department of Vosges, 38m. N.E. of Épinal by rail. Pop. (1926) 15,365. St. Dié (*Deodatum, Theodata, S. Dèodati Fanum*) grew up round a monastery founded in the 7th century by St. Deodatus of Nevers, who retired to this place. In the 10th century the community became a chapter of canons. Among the extensive privileges enjoyed by them was that of coining money. Though they co-operated in building the town walls, the canons and the dukes of Lorraine soon became rivals for the authority over St. Dié. The institution of a town council in 1628, and the establishment in 1777 of a bishopric which appropriated part of their spiritual jurisdiction, greatly diminished the influence of the canons; and with the Revolution they were completely swept away. During the wars of the 15th, 16th and 17th centuries the town was repeatedly sacked. It was also partially destroyed by fire in 1065, 1155, 1554 and 1757. St. Dié is situated on the Meurthe in a basin surrounded by well-wooded hills. The cathedral has a Romanesque nave (12th century) and a Gothic choir; the portal of red stone dates from the 18th century. A fine cloister (13th century), containing a stone pulpit, communicates with the Petite-Église or Notre-Dame, 12th century Romanesque. St. Dié is the seat of a bishop and of a sub-prefect.

ST. DIZIER, a town of north-eastern France, in the department of Haute-Marne, 45 m. N.N.W. of Chaumont by rail, on the Marne and the Haute-Marne canal. Pop. (1926) 14,782. The town is an important centre of the iron trade. It dates from the 3rd century, when the relics of Bishop St. Didier were brought thither.

ST. DUNSTAN'S. St. Dunstan's is a charity for British soldiers, sailors and airmen blinded in or as a result of the World War, or in any subsequent military operations. The charity is registered under the Blind Persons Act, 1920, and incorporated under the Companies acts 1908 to 1917. The charity is governed by

an executive council elected annually by the governors and members, who are in the main the principal supporters and subscribers to its funds. The charity was founded in 1915 by Sir Arthur Pearson, himself blind during the last ten years of his life. Since his death Lady (Arthur) Pearson has occupied the office of president of the organization, and the executive head has been Captain Ian Fraser, himself an officer who was blinded in the war.

With the exception of about one hundred Scotsmen, who are cared for by Newington House, Edinburgh, a war charity similar to St. Dunstan's in its inception and conduct, practically all blinded officers, non-commissioned officers and men (numbering one hundred and nineteen officers and two thousand two hundred and five other ranks) of the United Kingdom, Dominions and Colonial forces, have come under the care of St. Dunstan's and its branches or affiliated organizations. St. Dunstan's and Newington House, Edinburgh, are recognized by the government departments concerned as the official centres for training, re-education, settlement and after-care of the blinded men, but both charities rely entirely upon voluntary support and receive no State aid. St. Dunstan's organization started in 1915 in a house in Regent's Park, called "St. Dunstan's Lodge" lent for the duration of the war, by the American financier, Otto Kahn. Many large establishments, some existing, some built for the purpose, were acquired to house the men during training, and the administrative offices of St. Dunstan's are still in one of these buildings.

Large sums of money have been spent upon special pensions and allowances; housing and equipment; grants in aid of financial difficulties, sickness, etc.; maternity grants; trading subsidies; holidays; amusements, etc. A Children's Fund also provides weekly allowances for, at this date (1928) some eighteen hundred children born to blinded ex-service men after their discharge from the forces. The capital resources of St. Dunstan's (1928) are about one million pounds, of which about one-half is ear-marked for special purposes. The income required to maintain St. Dunstan's services is £127,000 a year, of which less than one-fifth is provided by interest from investments.

STE. ANNE DE BEAUPRE, a village of Montmorency county, Quebec, Canada, at the junction of the Ste. Anne river with the St. Lawrence, and on the Quebec Railway, Light and Power Co., 22 m. below the city of Quebec. It stands in a rolling agricultural country, with hills in the background; and near by, on the Ste. Anne river, are beautiful falls and excellent fishing. For over two centuries Ste. Anne has been known as a Roman Catholic place of pilgrimage, and many miracles are still said to be performed through the intercession of the saint, the mother of the Virgin. The famous church and shrine were burnt down a few years ago but have been restored and pilgrimages are made from all over Canada and the United States.

SAINTE-BEUVE, CHARLES AUGUSTIN (1804–1869), French critic, was born at Boulogne-sur-Mer on Dec. 23, 1804. He was a posthumous child. His father, a native of Picardy, and controller of town-dues at Boulogne, was a man of literary tastes; his mother was half English, her father, a mariner of Boulogne, having married an Englishwoman. Charles Augustin was sent to a boarding school in Paris to attend the classes of the Collège Charlemagne, and then of the Collège Bourbon. He then studied medicine, but after four years abandoned it to join the staff of the new Liberal newspaper, *The Globe,* in which he published the excellent articles on the French poetry of the 16th century afterwards separately published as *Tableau historique et critique de la poésie française au XVI^e^ siècle* (2nd ed., 1842). In 1829 he made his first venture as a poet with the *Vie, poésies, et pensées de Joseph Delorme.* His own name did not appear; but Joseph Delorme, that "Werther in the shape of Jacobin and medical student," as Guizot called him, was the Sainte-Beuve of those days himself. In 1830 came his second volume of poems, the *Consolations.* But the critic in him grew to prevail more and more and pushed out the poet. Sainte-Beuve was at this time a devoted Catholic and a little later for a very short period a disciple of Lamennais. But he gradually separated from his Catholic friends, and at the same time a coldness grew up between him and Victor Hugo, whose warm friendship he had won by an early article on *Odes et Ballades.* He became the lover of Madame Hugo, and a definite separation between the former friends ensued in 1834. In 1831 the *Revue des deux mondes* was founded, and from the first Sainte-Beuve was one of the most active and important contributors. He brought out his novel of *Volupté* in 1834, his third and last volume of poetry, the *Pensées d'août,* in 1837. He had long meditated work on Port-Royal, which took shape in a series of lectures delivered at Lausanne in 1838. The book occupied him at intervals until 1848—*Port Royal* (5 vols. 1840–48; 5th ed., 1888–91).

In 1840 Victor Cousin, then minister of public instruction, appointed him one of the keepers of the Mazarin library, an appointment which gave him rooms at the library, and a competence, and leisure for study. With a Greek teacher, M. Pantasides, he read and re-read the Greek poets. Articles on Homer, Theocritus, Apollonius of Rhodes, and Meleager in the *Revue des deux mondes* were fruits of his new Greek studies. But in general his subjects were taken from the great literature of his own country. Seven volumes of *Portraits,* contributed to the *Revue de Paris* and the *Revue des deux mondes,* exhibit his work in the years from 1832 to 1848, a work constantly increasing in range and value. In 1844 he was elected to the French Academy as successor to Casimir Delavigne, and was received there at the beginning of 1845 by Victor Hugo.

In March 1848 was published an account of secret-service money distributed in the late reign, and Sainte-Beuve was put down as having received the sum of one hundred francs. The sum appears to have been in reality paid for alterations to a smoky chimney in the library, but Sainte-Beuve was annoyed at the imputation and resigned his chair. He lectured for a time at Liége, but returned to Paris within a year. Dr. Véron, the editor of the *Constitutionnel,* proposed to him that he should supply that newspaper with a literary article for every Monday; and thus the famous *Causeries du lundi* were started. Sainte-Beuve now lived in the small house in the Rue Montparnasse (No. 11), which he occupied for the remainder of his life, and where in 1850 his mother, from whom he seems to have inherited his good sense, tact and finesse, died at the age of eighty-six. For three years he continued writing every Monday for the *Constitutionnel;* then he passed, with a similar engagement, to the *Moniteur.* In 1857 his Monday articles began to be published in volumes, and by 1862 formed a collection in 15 volumes; they afterwards were resumed under the title of *Nouveaux lundis,* which now make a collection of 13 volumes more.

In 1854 he was nominated to the chair of Latin poetry at the college of France. He was rudely interrupted by the students, and resigned; he was then appointed lecturer on French literature at the École Normale Supérieure. Here he lectured for four years. During this period his contributions to the *Moniteur* were intermittent. He now returned to a regular Monday article for the *Constitutionnel.*

The Empire was tardy in acknowledging his merits, and it was not until 1865 that he received the senatorship with its income sufficient to make him independent, and his health was failing him. He could seldom attend the meetings of the senate; the part he took there, however, on two famous occasions—when the nomination of Ernest Renan to the college of France came under discussion in 1867, and the law on the press in the year following—offended the majority in that conservative assembly and delighted those who "belonged," to use his own phrase, "to the diocese of free thought." He gave further pleasure in this diocese by leaving the *Moniteur* at the beginning of 1869, and contributing to a Liberal journal, the *Temps.* This defection finally alienated him from the Bonapartists, and lost him the friendship of the Princess Mathilde. His literary activity suffered little abatement, but pain made him at last unable to sit to write; he could only stand or lie. He died in his house in the Rue Montparnasse on Oct. 13, 1869.

The root of Sainte-Beuve's criticism is his single-hearted devotion to truth. What he called "fictions" in literature, in politics, in religion, were not allowed to influence him. Some one had talked on his being tenacious of a certain set of literary opinions. "I hold very little," he answers, "to literary opinions; literary

opinions occupy very little place in my life and in my thoughts. What does occupy me seriously is life itself and the object of it." "I am accustomed incessantly to call my judgments in question anew, and to re-cast my opinions the moment I suspect them to be without validity." "What I have wished" (in *Port-Royal*) "is to say not a word more than I thought, to stop even a little short of what I believed in certain cases, in order that my words might acquire more weight as historical testimony." To all exaggeration and untruth, from whatever side it proceeded, he had an antipathy. "I turn my back upon the Michelets and Quinets, but I cannot hold out my hand to the Veuillots."

But Sainte-Beuve could not have been the great critic he was had he not had, at the service of this his love of truth and measure, the conscientious industry of a Benedictine. "I never have a holiday. On Monday towards noon I lift up my head, and breathe for about an hour; after that the wicket shuts again and I am in my prison cell for seven days." The *Causeries* were at this price. They came once a week, and to write one of them as he wrote it was indeed a week's work.

To mental independence, industry, measure, lucidity, his criticism adds the merit of happy temper and disposition. Sainte-Beuve has more, as a critic, than the external politeness which once at any rate distinguished his countrymen; he has a personal charm of manner due to a sweet and humane temper. He complained of *un peu de dureté,* "a certain dose of hardness," in the new generation of writers. The personality of an author had a peculiar importance for him; the poetical side of his subjects, however latent it might be, always attracted him and he always sought to extricate it. This was because he had the moderate, gracious, amiably *human* instincts of the true poetic nature. As a guide to bring us to a knowledge of the great personalities in French literature he is unrivalled.

BIBLIOGRAPHY.—*See* his "Ma Biographie" in *Nouveaux lundis,* xiii., *Lettres à la princesse* (1873); *Correspondance* (1877–78) and *Nouvelle Correspondance* (1880); the Vicomte d'Haussonville's *Sainte-Beuve* (1875); Scherer, *Études critiques sur la littérature contemporaine,* iv. (1863–95); G. Michaut, *Sainte-Beuve avant les Lundis* (1903); L. F. Choisy, *Sainte-Beuve, L'Homme et le poète* (1921); G. Michaut, *Sainte-Beuve* (1921); L. F. Mott, *Sainte-Beuve* (N.Y., 1925).

SAINTE-CLAIRE DEVILLE, ÉTIENNE HENRI (1818–1881), French chemist, was born on March 11, 1818, in the island of St. Thomas, West Indies, where his father was French consul. Together with his elder brother Charles he was educated in Paris at the Collège Rollin. In 1844, having graduated as doctor of medicine and doctor of science, he was appointed to organize the new faculty of science at Besançon, where he acted as dean and professor of chemistry from 1845 to 1851. He succeeded A. J. Balard at the École Normale, Paris, in 1851, and in 1859 became professor at the Sorbonne in place of J. B. A. Dumas (*q.v.*). He died at Boulogne-sur-Seine on July 1, 1881.

He began his experimental work in 1841 with investigations of oil of turpentine and tolu balsam, in the course of which he discovered toluene (*q.v.*). His most important work was in inorganic and thermal chemistry. In 1849 he discovered nitrogen pentoxide, the first of the so-called "anhydrides" of the monobasic acids to be isolated. In 1855 he devised a method by which aluminium (*q.v.*) could be prepared on a large scale by the aid of sodium, the manufacture of which he also developed. With H. J. Debray (1827–1888) he worked at the platinum metals, his object being on the one hand to prepare them pure, and on the other to find a suitable metal for the standard metre. With L. J. Troost he devised a method for determining vapour densities at temperatures up to 1,400° C, and, partly with F. Wöhler, he investigated the halides of silicon and boron. His best known contribution to chemistry is his work on the phenomena of reversible reactions (*see* CHEMICAL ACTION), which he included under the term of "dissociation." He first took up the subject about 1857, and it was during his important investigations in this field that he devised the apparatus known as the "Deville hot-and-cold tube."

ST. ELMO'S FIRE, the glow accompanying the brush-like discharges of atmospheric electricity which usually appears as a tip of light on the extremities of pointed objects such as church towers or the masts of ships during stormy weather. It is commonly accompanied by a crackling or fizzing noise.

The name St. Elmo is an Italian corruption, through *Sant' Ermo,* of St. Erasmus, the patron saint of Mediterranean sailors, who regard St. Elmo's fire as the visible sign of his guardianship.

See Hazlitt's edition of Brand's and Ellis's *Antiquities* (1905), *s.v.* "Castor and Pollux."

STE.-MARIE-AUX-MINES or **MARKIRCH,** a town of France in the department of Haut-Rhin intersected by the Lièprevette, an affluent of the Rhine. Pop. (1926) 7,375. The once productive silver, copper and lead mines of the neighbourhood were worked from the 9th till the 19th century. The main industries of the place are weaving and dyeing. The river was at one time the boundary between the German and French languages; the German-speaking inhabitants on the right bank were Protestants, and subject to the counts of Rappoltstein, while the French inhabitants were Roman Catholics, and under the rule of the dukes of Lorraine.

ST. EMILION, a town of south-western France, in the department of Gironde, 2½ m. from the right bank of the Dordogne and 27 m. E.N.E. of Bordeaux by rail. Pop. (1926) 918. The town derives its name from a hermit who lived here in the 7th and 8th centuries. The town has remains of ramparts of the 12th and 13th centuries. The parish, once collegiate, church dates from the 12th and 13th centuries. A Gothic cloister adjoins the church. A belfry (12th, 13th and 15th centuries) commanding the town is built on the terrace, beneath which are hollowed in the rock the oratory and hermitage of St. Emilion, and adjoining them a large ancient monolithic church. Remains of a monastery of the Cordeliers (15th and 17th centuries) and of a building (13th century) known as the Palais Cardinal, are also to be seen. St. Emilion is celebrated for its wines.

SAINTE-PALAYE, JEAN BAPTISTE LA CURNE (or LACURNE) **DE** (1697–1781), French scholar, was born at Auxerre on June 6, 1697. His father, Edme, had been gentleman of the bed-chamber to the duke of Orleans, brother of Louis XIV., a position which descended to his son. In 1724 he had been elected an associate of the Académie des Inscriptions et Belles-Lettres, and from this time he devoted himself exclusively to the work of this society. He began a series of studies on the chroniclers of the middle ages for the *Historiens des Gaules et de la France* (edited by Dom Bouquet): Raoul Glaber, Helgaud, the *Gesta* of Louis VII., the chronicle of Morigny, Rigord and his continuator, William le Breton, the monk of St. Denis, Jean de Venette, Froissart and the Jouvencel. His *Glossaire de la langue française* was ready in 1756, but remained in manuscript for more than a century. He died on March 1, 1781.

See the biography of La Curne, with a list of his published works and those in manuscript, at the beginning of the tenth and last volume of the *Dictionnaire historique de l'ancien langage françois, ou glossaire de la langue françoise depuis son origine jusqu'au siècle de Louis XIV.,* published by Louis Favre (1875–82).

SAINTES, a town of western France, capital of an *arrondissement* in the department of Charente-Inférieure, 47 m. S.E. of La Rochelle by the railway from Nantes to Bordeaux. Pop. (1926) 16,493. Saintes (*Mediolanum* or *Mediolanium*), the capital of the Santones, was a flourishing town before Caesar's conquest of Gaul; in the middle ages it was capital of the Saintonge. Christianity was introduced by St. Eutropius, its first bishop, in the middle of the 3rd century. Charlemagne rebuilt its cathedral. The Normans burned the town in 845 and 854. Richard Coeur de Lion was besieged and captured there by his father Henry II. In 1242 St. Louis defeated the English there, but the town was not permanently recovered from the English until the reign of Charles V. It has Roman remains, of which the best preserved is the arch of Germanicus, dating from the reign of Tiberius. This formerly stood on a Roman bridge destroyed in 1843, when it was removed and reconstructed on the right bank of the river. Ruins of baths and of an amphitheatre are also to be seen. The large amphitheatre dates probably from the close of the 1st or the beginning of the 2nd century and was capable of holding 20,000 spectators. Saintes was a bishop's see till 1790; the cathedral of St. Peter, built in the early 12th century, was rebuilt in

the 15th century, and again after it had been almost destroyed by the Huguenots in 1568. It has a 15th century tower. The church of St. Eutropius (6th century, rebuilt in the 11th, having had its nave destroyed in the Wars of Religion) stands above a large well-lighted crypt adorned with richly sculptured capitals and containing the tomb of St. Eutropius (4th or 5th century). The fine stone spire dates from the 15th century. Notre-Dame (11th and 12th centuries), has a noble clock-tower, and is now desecrated. The old *hôtel de ville* (16th and 18th centuries) contains a library. Small vessels ascend the river as far as Saintes, which carries on trade in grain, brandy and wine, has iron foundries, railway works, and manufactures earthenware and tiles.

ST. ÉTIENNE, an industrial town of east-central France, capital of the department of Loire, 310 m. S.S.E. of Paris and 36 m. S.S.W. of Lyons by rail. Pop. (1926) 171,280. At the close of the 12th century St. Étienne was a parish of the Pays de Gier belonging to the abbey of Valbenoîte. By the middle of the 14th century the coal trade was developing, and in the early 15th century Charles VII. allowed the town to build fortifications. The manufacture of fire-arms for the state was begun at St. Étienne under Francis I. and was put under the surveillance of state inspectors early in the 18th century. The manufacture grew rapidly. The first railways opened in France were the line between St. Étienne and Andrézieux on the Loire in 1828 and that between St. Étienne and Lyons in 1831. In 1856 St. Étienne became the administrative centre of the department.

St. Étienne stands on the Furens, which flows through it from south-east to north-west, partly underground, and is important for the silk manufacture. The town is the seat of a prefect, of tribunals of first instance and of commerce, of a chamber of commerce and of a board of trade-arbitrators, and has schools of mining, chemistry and dyeing, etc.

The town owes its importance chiefly to the coal-basin which extends between Firminy and Rive-de-Gier over an area 20 m. long by 5 m. wide, and is second only to those of Nord and Pas-de-Calais in France. The mineral is of two kinds—smelting coal, said to be the best in France, and gas coal. There are manufactures of ribbons, trimmings and other goods made from silk and mixtures of cotton and silk. This industry dates from the early 17th century and is carried on chiefly in small factories (electricity supplying the motive power). The attendant industry of dyeing is carried on on a large scale. The manufacture of steel and iron and of heavy iron goods such as armour-plating is important and of ironmongery generally. Weaving machinery, cycles, automobiles and agricultural implements are also made. The manufacture of fire-arms, carried on at the national factory under the direction of artillery officers, can turn out 480,000 rifles in the year. Private firms make both military rifles and sporting-guns, revolvers, etc. Other industries are the manufacture of elastic fabrics, glass, cartridges, liqueurs, hemp-cables, etc.

ST. EUSTATIUS and **SABA,** two islands in the Dutch West Indies. St. Eustatius lies 12 m. N.W. of St. Kitts in 17° 50′ N. and 62° 40′ W. It is 8 sq.m. in area and is composed of several volcanic hills and intervening valleys. Orangetown, on an open roadstead on the W., has a small export trade in yams and sweet potatoes. Pop. 1,086.

A few miles to the N.W. is the island volcanic cone of SABA, 5 sq.m. in extent rising abrupt'y to nearly 2,800 feet. The town, Bottom, on an old crater floor, can be approached from the shore 800 ft. below only by steps in solid rock known as the "Ladder." The best boats in the Caribbees are built here; the wood is imported and the vessels, when complete, are lowered over the face of the cliffs. Pop. 1,597. The islands form part of the colony of Curaçao (*q.v.*).

SAINT-ÉVREMOND, CHARLES DE MARGUETEL DE SAINT-DENIS, SEIGNEUR DE (1610–1703), was born at Saint-Denis-le-Guast, near Coutances, on April 1, 1610. He served through a great part of the Thirty Years' War, distinguishing himself at the siege of Landrecies (1637), when he was made captain. During his campaigns he studied the works of Montaigne and the Spanish and Italian languages. In 1639 he met Gassendi in Paris, and became one of his disciples. He was present at Rocroy, at Nordlingen and at Lerida. For a time he was personally attached to Condé, but offended him by a satirical remark and was deprived of his command in the prince's guards in 1648.

During the Fronde, Saint-Évremond was a steady royalist. The duke of Candale (of whom he has left a very severe portrait) gave him a command in Guienne, and Saint-Évremond, who had reached the grade of *maréchal de camp,* is said to have saved 50,000 livres in less than three years. He was one of the numerous victims involved in the fall of Fouquet. His letter to Marshal Créqui on the peace of the Pyrenees, which is said to have been discovered by Colbert's agents at the seizure of Fouquet's papers, seems a very inadequate cause for his disgrace. Saint-Évremond fled to Holland and to England, where he was kindly received by Charles II. and was pensioned. After James II.'s flight to France Saint-Évremond was invited to return, but he declined. Hortense Mancini, the most attractive of Mazarin's attractive group of nieces, came to England in 1670, and set up a *salon* for love-making, gambling and witty conversation, and here Saint-Évremond was for many years at home. He died on Sept. 29, 1703, and was buried in Westminster Abbey.

Saint-Évremond empowered Des Maizeaux to publish his works after his death, and they were published in London (2 vols., 1705), and often reprinted. His masterpiece in irony is the so-called *Conversation du maréchal d'Hocquincourt avec le père Canaye* (the latter a Jesuit and Saint-Évremond's master at school).

His *Oeuvres mêlées,* edited from the MSS. by Silvestre and Des Maizeaux, were printed by Jacob Tonson (London, 1705, 2 vols.; 2nd ed., 3 vols., 1709), with a notice by Des Maizeaux. His correspondence with Ninon de Lenclos, whose fast friend he was, was published in 1752; *La Comédie des académistes,* written in 1643, was printed in 1650. Modern editions of his works are by Hippeau (Paris, 1852), C. Giraud (Paris, 1865), and a selection (1881) with a notice by M. de Lescure.

ST. GALL, a canton in north-east Switzerland, bordered by the principality of Liechtenstein and by Vorarlberg (Austria). It entirely surrounds the canton of Appenzell, which formerly belonged to the abbots of St. Gall. Five other cantons lie along its north, west and south borders.

Its area (1923–24 determinations) is 777·2 sq.m., of which 88·3% are reckoned "productive," forests covering 163·2 sq.m. and vineyards 0·8 sq. mile. The altitude above sea-level varies from 1,309 ft. (the Lake of Constance) to 10,667 ft. (the Ringelspitz) in the extreme south. There are nearly 3 sq.m. of glaciers, but slightly over one-quarter of the unproductive area consists of lakes, including portions of the Lake of Constance, of the Wallensee, and of the Lake of Zürich, together with several small lakes wholly within its limits. The canton is mountainous in the south near its borders with the Grisons and Glarus, but towards Thurgau the surface is characterized by hummocky hill country. Considerable low-lying alluvial plains occur along the courses of the Linth and Rhine, particularly in those sections of the rivers which form, in part, its frontiers on the east and south-west. Within the canton, the most important streams are the upper River Thur and the lower and middle portions of its principal tributary, the Sitter. It has ports on the Lake of Constance (Rorschach) and of Zürich (Rapperswil), while Weesen is the chief town on the Wallensee. Probably the most fashionable watering-place is Ragatz, receiving the hot mineral waters (95° F) of Pfäfers by means of a 3 m. conduit. The main railway lines from Zürich past Sargans for Coire, and from Sargans past Rorschach for Constance skirt its borders, while the capital is on the direct railway line from Zürich past Wil to Rorschach, and communicates by rail with Appenzell and with towns in the Toggenburg (*q.v.*). In 1920 the population of the canton was 295,543, of whom 287,583 were German-speaking, 5,787 Italian-speaking and 927 French-speaking, while there were 174,234 Catholics, 118,863 Protestants and 1,131 Jews (practically all in the town of St. Gall). The estimated population for 1926 was 298,400. Its capital is St. Gall, pop. 65,650; the other most populous places being Rorschach (11,580), Altstätten (8,929), Gossau (8,344) and Wattwil (6,096). In the southern and more Alpine portion of the canton the inhabitants mainly follow pas-

toral pursuits, while in the central and northern regions agriculture is frequently combined with manufactures.

The canton is one of the most industrial in Switzerland. Cotton spinning is widely spread, though the characteristic industry is the manufacture of muslin, embroidery and lace, chiefly at the capital and at Altstätten; the value of the embroidery and lace exported from the canton, though fluctuating, normally amounts to about one-seventh of the total export trade of Switzerland. Ores of iron and of manganese are raised in the Gonzen mine near Sargans. The canton is divided into 14 administrative districts, which comprise 91 communes.

The existing Constitution dates from 1890. The legislature (*Grossrat*) of 173 deputies is elected on the principle of proportional representation. Each commune of 1,500 Swiss inhabitants or less has a right to one member, and as many more as the divisor 1,500 justifies. Members hold office for three years. The seven members of the executive (*Regierungsrat*) also hold office for three years and are elected by the combined communes. The two members of the federal *Ständerat* are named by the legislature, while the 15 members of the federal *Nationalrat* have, since 1911, been elected by a scheme of proportional representation, using the popular vote. The right of "facultative referendum" and of "initiative" as to legislative projects has, since 1875 and 1890 respectively, belonged to any 4,000 electors, but in case of "initiative" in constitutional matters (1861) 10,000 must sign the demand. The canton of St. Gall, a great part of which formerly belonged to the abbots of St. Gall, is one of the later political units, having been formed in 1803, from numerous districts, some of which, *e.g.*, Gaster, Uznach and Gams, had been controlled by the adjacent and older cantons since the 15th century.

ST. GALLEN (Fr. **ST. GALL**), capital of the Swiss canton of that name, is situated in the upland valley of the Steinach, 2,195 ft. above the sea-level. In 1920 its population was 70,437, of whom almost all were German-speaking, while the Protestants numbered 33,746, the Catholics (Roman or "Old"), 34,886, and the Jews, 1,017. In 1928 the estimated population was 64,600, the decrease being due to the decline of the embroidery trade.

St. Gallen owes its origin to St. Gall, an Irish hermit, who in 614, built his cell in the forest which then covered the site, and lived there till his death in 640. About the middle of the 8th century the collection of hermits' dwellings was transformed into a regularly organized Benedictine monastery. For the next three centuries this was one of the chief seats of learning and education in Europe. About 954 the monastery and its buildings were surrounded by walls as a protection against the Saracens, and this was the origin of the town.

In 1311 St. Gallen became a free imperial city, and about 1353 the gilds, headed by that of the cloth-weavers, obtained the control of the civic government, while in 1415 it bought its liberty from the German king Sigismund. This growing independence did not please the abbots, who had been made princes of the Empire in 1204, and there followed a long struggle between them and their rebellious subjects of St. Gallen and Appenzell. In 1411 the Appenzellers became "allies" of the Swiss confederation, as did the town of St. Gallen a few months later, this connection becoming an "everlasting" alliance in 1454, while in 1457 the town was finally freed from the abbot. After further conflicts, the abbot in 1490 concluded an alliance with the Swiss which reduced his position almost to that of a "subject district." The townsmen adopted the Reformation in 1524, and this new cause of difference further envenomed their relations with the abbots. Both abbot and town were admitted regularly to the Swiss diet, but neither succeeded in its attempts to be received a full member of the Confederation. In 1798 and finally in 1805 the abbey was secularized, while out of part of its dominions and those of the town the canton Säntis (now St. Gall) was formed, with St. Gallen as capital.

St. Gallen is by rail 9 m. S.W. of Rorschach, its port on the lake of Constance, and 53 m. E. of Zürich. The older or central portion of the town retains the air of a small rural capital, but the newer quarters present the aspect of a modern commercial centre. Its chief building is the abbey church of the celebrated old monastery (dating in its present form from 1756–1765). It has been a cathedral church (Catholic) since 1846. The famous library is housed in the former palace of the abbot, and is one of the most renowned in Europe by reason of its rich treasures of early mss. and printed books. Other portions of the monastic buildings are used as the offices of the cantonal authorities, and contain the extensive archives both of this monastery and of that of Pfäfers.

See *Dict. geogr. de la Suisse*, vol. iv. (1906).

SAINT-GAUDENS, AUGUSTUS (1848–1907), American sculptor, was born in Dublin, Ireland, on March 1, 1848, the son of a French father, a shoemaker by trade, and an Irish mother, and was taken to America in infancy. He was apprenticed to a cameo-cutter, studying in the schools of Cooper Union (1861) and the National Academy of Design, New York (1865–1866). His earliest work in sculpture, made upon the eve of his departure, in 1868, for Paris, was a bronze bust of his father, Bernard P. E. Saint-Gaudens. After some delay he was admitted as a pupil of Jouffroy in l'École des Beaux-Arts, and two years later, with his fellow-student Mercié, he went to Italy, where he remained three years. While in Rome he executed his statues "Hiawatha" and "Silence." Returning in 1873 to New York he made, the following year, an admirable bust of the statesman, William M. Evarts, and was commissioned by John La Farge to execute a relief of adoring angels for St. Thomas' Episcopal Church, New York, a work which immediately won the esteem of his brother artists. The church was destroyed by fire a few years later. His statue of Admiral Farragut, Madison Square, New York, was ordered in 1876, exhibited at the Paris salon of 1880 and unveiled in 1881. It was received with enthusiasm and from its first appearance Saint-Gaudens was recognized as a new leader in his art. To this period also belong the "Randall" of the "Sailors' Snug Harbour," Staten Island, and the beautiful caryatides for the Vanderbilt fireplace, preserved in the Metropolitan Museum.

At all times throughout his life the sculptor found diversion from more serious tasks in modelling portraits of friends in low relief. Among these we may note the medallions and placques of Bastien-Lepage and Dr. Henry Shiff (1880); Homer Saint-Gaudens and the children of Prescott Hall Butler (1881); Mrs. Stanford White (1884); Robert Louis Stevenson (1887); William M. Chase and the children of Jacob H. Schiff (1888); Kenyon Cox (1889), etc. Yet another form of sculpture was developed in his high-reliefs of Dr. Henry Bellows (1885) and Dr. McCosh (1889); and the lovely "Amor Caritas," which, with variations, long occupied his mind. His noble statue of Lincoln was unveiled in 1887 in Lincoln park, Chicago, and was at once accepted as the country's ideal. In Springfield, Mass., his unique "Deacon Chapin," known as "The Puritan," appeared also in 1887. The Adams memorial (1891) in Rock Creek cemetery, Washington, D.C., is considered by many to be Saint-Gaudens' greatest work; indeed not a few rate it as America's highest artistic achievement. The mysterious draped figure with shadowed face is often called "Grief," but the sculptor had no such intention; "Peace" or "Nirvana" better convey the meaning. The Garfield memorial in Fairmount park, Philadelphia, was completed in 1895. The Shaw memorial in Boston, a monument to Robert G. Shaw, colonel of a negro regiment in the Civil War, was begun in 1884 and occupied the master intermittently for more than 12 years, being dedicated in 1897. It is a large relief in bronze, measuring some 15 by 11 ft., and containing many marching soldiers, led by their young officer on horseback. The year 1897 saw likewise the completion of the "Logan" on a fiery steed, in Grant park, Chicago.

Another famous equestrian statue is the "General Sherman" which was begun in 1892 and dedicated in 1903. Standing at the entrance of Central park at 59th Street and Fifth Avenue, New York, this golden group of the mounted commander led by a beautiful winged "Victory" is one of the most impressive of the city's monuments. The "Sherman" was shown with other works of Saint-Gaudens at the Paris Exposition of 1900, receiving there the highest honours. The sculptor was made an officer of the Legion of Honour and corresponding member of the Institute of

France. A bronze copy of his "Amor Caritas" was purchased by the French Government. Other important works are the Peter Cooper memorial, New York; the "Parnell," in Dublin; the Phillips Brooks monument in Boston and a fine seated figure of Lincoln, recently erected on Chicago's lake front. Saint-Gaudens died at Cornish, N.H., on Aug. 3, 1907. He is rightly regarded as America's greatest sculptor and his work continues to exert a powerful and beneficent influence in the United States. In 1877 he married Augusta F. Homer and left a son, Homer Saint-Gaudens, now director of fine arts of the Carnegie Institute, Pittsburgh, Pa. His brother Louis (1854–1913) also a sculptor, assisted Augustus Saint-Gaudens in some of his creations.

See Royal Cortissoz, *Augustus Saint-Gaudens* (1907); Lorado Taft, *History of American Sculpture* (1903) and *Modern Tendencies in Sculpture* (1921); Kenyon Cox, *Old Masters and New* (1905); C. Lewis Hind, *Augustus Saint-Gaudens* (1908); Homer Saint-Gaudens, *The Reminiscences of Augustus Saint-Gaudens* (1913). (L. T.)

ST. GAUDENS, a town of France, capital of an arrondissement in the department of Haute-Garonne, 1 m. from the river Garonne, 57 m. S.S.W. of Toulouse, on the railway to Tarbes. Pop. (1926) 4,238. St. Gaudens derives its name from a martyr of the 5th century, at whose tomb a college of canons was established. It was important as capital of the Nébouzan, as the residence of the bishops of Comminges and for its cloth industry. The church, once collegiate, dates chiefly from the 11th and 12th centuries, but the main entrance is flamboyant Gothic.

SAINT-GERMAIN, COMTE DE (*c.* 1710–*c.* 1780) called *der Wundermann,* a celebrated adventurer. Of his parentage and place of birth nothing is definitely known; the common version is that he was a Portuguese Jew. He knew nearly all the European languages, and spoke German, English, Italian, French (with a Piedmontese accent), Portuguese and Spanish. Grimm affirms him to have been the man of the best parts he had ever known. He was a musical composer and a capable violinist. His knowledge of history was comprehensive, and his accomplishments as a chemist, on which be based his reputation, were in many ways real and considerable. He pretended to have a secret for removing flaws from diamonds, and to be able to transmute metals. The most remarkable of his professed discoveries was of a liquid which could prolong life, and by which he asserted he had himself lived 2,000 years.

Saint-Germain is mentioned in a letter of Horace Walpole's as being in London about 1743, and as being arrested as a Jacobite spy and released. Walpole says: "He is called an Italian, a Spaniard, a Pole; a somebody that married a great fortune in Mexico and ran away with her jewels to Constantinople; a priest, a fiddler, a vast nobleman." At the French court, where he appeared about 1748, he exercised for a time extraordinary influence and was employed on secret missions by Louis XV.; but, having interfered in the dispute between Austria and France, he was compelled in June 1760, on account of the hostility of the duke of Choiseul, to remove to England. He appears to have resided in London for one or two years, but was at St. Petersburg in 1762, and is asserted to have played an important part in connexion with the conspiracy against the emperor Peter III. in July of that year, a plot which placed Catherine II. on the Russian throne. He then went to Germany, where, according to the *Mémoires authentiques* of Cagliostro, he was the founder of freemasonry, and initiated Cagliostro into that rite. He was again in Paris from 1770 to 1774, and after frequenting several of the German courts he took up his residence in Schleswig-Holstein, where he and the Landgrave Charles of Hesse pursued together the study of the "secret" sciences. He died at Schleswig in or about 1780–1785, although he is said to have been seen in Paris in 1789.

Andrew Lang in his *Historical Mysteries* (1904) discusses the career of Saint-Germain, and cites the various authorities for it. Saint-Germain figures prominently in the correspondence of Grimm and of Voltaire. *See* also Oettinger, *Graf Saint-German* (1846); F. Bülau, *Geheime Geschichten und räthselhafte Menschen,* Band i. (1850–60); Lascelles Wraxall, *Remarkable Adventures* (1863); and U. Birch in the *Nineteenth Century* (January 1908).

SAINT-GERMAIN, CLAUDE LOUIS, COMTE DE (1707–1778), French general, was born on April 15, 1707, at the Château of Vertamboz. He entered the army, but left France, apparently on account of a duel, and fought in the armies of the elector palatine and the elector of Bavaria. Then, after a brief service under Frederick the Great of Prussia, he joined Marshal Saxe in the Netherlands, and was created a field-marshal of the French army. On the outbreak of the Seven Years' War (1756) he was appointed lieutenant-general, but he fell a victim to court intrigues and professional jealousy. He resigned his commission in 1760 and accepted an appointment as field-marshal from Frederick V. of Denmark, being charged in 1762 with the reorganization of the Danish army. On the death of Frederick in 1766 he returned to France, bought a small estate in Alsace near Lauterbach, and devoted his time to religion and farming. In October 1775 he was appointed minister of war by Louis XVI., but his efforts to effect economies and to introduce Prussian discipline in the French army brought on such opposition that he resigned in September 1777. He died in his apartment at the arsenal on Jan. 15, 1778.

ST. GERMAIN, TREATY OF (*see* also VERSAILLES, TRIANON, and NEUILLY, TREATIES OF). Austria and Hungary had up to 1918 formed a diplomatic unit, but in Oct. 1918 they were virtually two separate States. The Armistice of Nov. 3 still recognized Austria-Hungary as a diplomatic unit, but Austria was proclaimed a Republic Nov. 12, as was Hungary Nov. 16. The Armistice concluded by the Powers direct with Hungary (Nov. 13) recognized that Power's *de facto* independence of Austria.

All the Powers, except the United States, early asserted that the "Fourteen Points," etc., did not apply to the settlements with Austria and Hungary. In Jan. 1919 it was known that even Wilson favoured including in Italy part of the Slovene population of Istria and Carniola, and would make Italy further concessions. On April 14 he agreed to grant Italy the Tirol south of the Brenner Pass, with about 250,000 Germans, as well as the Trentino, as already agreed by France and Great Britain. It was known also that the Czechoslovak State would include over 3,000,000 Germans. Austria was to be reduced to some two-thirds of her German-speaking territories. In mid-April M. Clemenceau obtained from his Allies the further important decision to prohibit union between Austria and Germany without the unanimous consent of the Council of the League. This was embodied in the draft treaty with Germany of May 6, and formed article 80 of the Treaty of Versailles of June 28, appearing as article 88 of the Treaty of St. Germain, and article 72 of the Treaty of Neuilly.

On May 2 the Austrian delegation was invited to Paris. On June 2 they were presented with a very imperfect draft treaty, followed by a more detailed one on July 20. Austria made great protests, turning mainly on two points. She asserted the applicability of the "Fourteen Points" to her case, and her right therefore to retain all her German subjects. President Wilson alone was willing to extend the application of the "Fourteen Points" to Austria; the treaty assigned 3,500,000 Germans to Czechoslovakia, about 250,000 to Italy. The other main point of dispute was how far Austria must accept the responsibilities of old Austria-Hungary. The Allies finally decided that the Austrian Republic was not a new State but an old one lopped off certain outlying provinces and endowed with a new government. The Allies recognized this government *de facto* by accepting their credentials on May 22 and *de jure* on Sept. 10, by signing the treaty with them at St. Germain-en-Laye. It came into force on July 16 1920.

Part I. The Covenant, and Part XIII. Labour, are as in the Treaty of Versailles.

Part II. of the Austrian Treaty details the borders of the new Austrian State.

Part III. Political Clauses for Europe.—This deals with technical details such as the financial obligations of the former Austrian empire affecting Italy, Yugoslavia, Czechoslovakia and Rumania. Articles 49–50 arranged for a plebiscite in two areas of the Klagenfurt basin. This plebiscite, taken in 1920, went in Austria's favour. West Hungary, with about 333,000

souls, was transferred from Hungary to Austria but ultimately, in 1921, without its chief town (*see* BURGENLAND). Further clauses in Part III. dealt with the protection of racial and religious minorities. Article No. 88 prohibits Austria from alienating her independence (*i.e.*, joining Germany) otherwise than with the consent of the Council of the League of Nations.

Part IV. Austrian Interests Outside Europe.—As in the Treaty of Versailles this part provides for a total renunciation of State properties immovable and movable outside Europe, and also of treaties, capitulations, concessions, etc., in the following countries: Morocco, Egypt, Siam and China.

Part V. Military, Naval and Air Clauses followed the general lines of the similar clauses in the Treaty of Versailles but showed somewhat more consideration to Austria. A long-service voluntary force not exceeding 30,000 was allowed. The manufacture of arms, etc., was confined to a single factory (article 132). The naval clauses were very drastic; the whole Austro-Hungarian Navy was broken up or distributed among the Allies, Austria only retaining four patrol boats on her inland waters. The air clauses were as in the German Treaty.

Part VI. Prisoners of War and Graves, *Part XI.* Aerial Navigation, were as in the German Treaty, with a few very small alterations.

Part VII. Penalties provided for the trial before Allied military tribunals of Austrian offenders against the laws and customs of war. This provision was not executed.

Part VIII. Reparations; *Part IX.* Financial Clauses; *Part X.* Economic Clauses.—By article 177 Austria accepted responsibility for herself and her Allies for causing loss and damage to the Allied (Entente) Governments by the War. The rest of the "Reparation Chapter" followed the corresponding section in the German Treaty. No lump sum was fixed, but discretion was, in effect, given to the Reparation Commission to fix it. Austria handed over her whole commercial fleet and much livestock to the Allies. Czechoslovakia, Yugoslavia, Poland and Rumania had, however, to contribute to expenses incurred by the Allies in liberating their territory from Austria. The financial clauses involved many complex questions as to the allocation of pre-war debt and the distribution of war debts. All these provisions were somewhat relaxed by the Supreme Council on March 17 1921, and the process was completed by Austria placing her finances under control of the League in Sept. 1922 (*see* AUSTRIA).

Part XII. Ports, waterways and railways, merely stressed some points in the corresponding section of the German Treaty.

See *Treaty Series*, No. II (Cmd. 400 of 1919); also H. W. V. Temperley (ed.), *A History of the Peace Conference of Paris;* vol. iv. and v. (Institute of International Affairs, London, 1921).

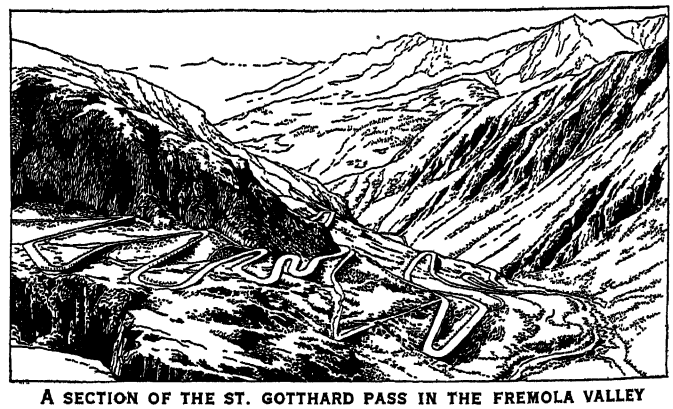
ST. GERMAIN-EN-LAYE, a town of northern France, in the department of Seine-et-Oise, 13 m. W.N.W. of Paris by rail. Pop. (1926) 19,355. Built on a hill on the left bank of the Seine and on the edge of a forest 10,000 to 11,000 ac. in extent, St. Germain has a bracing climate, which makes it a place of summer residence for Parisians.

A monastery in honour of St. Germain, bishop of Paris, was built in the forest of Laye by King Robert. Louis VI. built a castle close by. Burned by the English, rebuilt by Louis IX., and again by Charles V., this castle was completed by Francis I. A new castle was begun by Henry II. and completed by Henry IV.; it was subsequently demolished, except the so-called Henry IV. pavilion. The old castle has been restored. James II. of England died at St. Germain.

ST. GERMANS, a small town of Cornwall, England, situated on the Lynher creek, 9½ m. W. by N. of Plymouth by the G.W.R. Pop. of parish (1921) 1,986. St. Germans has associations with early Christianity in Britain, and is supposed to have been the original seat of the Cornish bishopric. It was the see of Bishop Burhwold, who died in 1027. Under Leofric, who became bishop of Crediton and Cornwall in 1046, the see was removed to Exeter. Bishop Leofric founded a priory at St. Germans and bestowed upon it half the lands which then constituted the bishops' manor of St. Germans. There was then a market on Sundays, but at the time of Domesday it had seriously declined. The bishop in 1311 obtained a grant of a market on Fridays and a fair at the feast of St. Peter ad Vincula. In 1343 the prior sustained his claim to a prescriptive market and fair at St. Germans. After the suppression the borough belonging to the priory remained with the crown until 1610. Meanwhile Queen Elizabeth created it a parliamentary borough. From 1563 to 1832 it returned two members to parliament. The town has a fine church dedicated to St. Germanus. In 1905 the first suffragan bishop of Truro was consecrated bishop of St. Germans. Pop. of rural district (1931) 11,821.

ST. GILLES, a town of southern France, in the department of Gard, on the canal from the Rhone to Cette, 12½ m. S.S.E. of Nîmes by road. Pop. (1926) 4,402. In the middle ages St. Gilles, the ancient *Vallis Flaviana,* was the seat of an abbey founded in the 7th century by St. Aegidius (St. Gilles). It acquired wealth and power under the counts of Toulouse, who added to their title that of counts of St. Gilles. The church was founded in 1116. The lower part of the fine Romanesque front (12th century) has three bays decorated with columns and bas-reliefs. There is a 12th century crypt. St. Gilles was the seat of the first grand priory of the Knights Hospitallers in Europe (12th century) and was their place of embarkation for the East. In 1226 the countship of St. Gilles was united to the crown. In 1562 the Protestants ravaged the abbey, which they occupied till 1622, and in 1774 it was suppressed.

ST. GOTTHARD PASS, an important motor and railway route from northern Europe to Italy. It takes its name from St. Gotthard, bishop of Hildesheim (d. 1038), but does not seem to be mentioned before the early 13th century, perhaps because the access to it lies through two very narrow Alpine valleys, much exposed to avalanches. The hospice on the summit is first mentioned in 1331, and from 1683 onwards was in charge of two Capuchin friars. But in 1775 the buildings near it were damaged by an avalanche, while in 1799–1800 everything was destroyed by the French soldiery. Rebuilt in 1834, the hospice was burnt in March 1905. The mule path (dating from about 1293) across the pass served for many centuries. The carriage-road was only constructed between 1820 and 1830. Beneath the pass is the St. Gotthard tunnel (pierced in 1872–1880, 9¼ m. in length, and attaining a height of 3,786 ft.), through which runs the railway (opened in 1882) from Lucerne to Milan (175½ m.). The railway runs first along the northern and eastern shores of Lake Lucerne, from Lucerne to Flüelen (32¼ m.), and then up the Reuss valley past Altdorf and Wassen, near which is the first of the famous spiral tunnels, to Göschenen (56 m. from Lucerne). Here the line enters the tunnel and gains,



A SECTION OF THE ST. GOTTHARD PASS IN THE FREMOLA VALLEY

at Airolo, the valley of the Ticino or the Val Leventina, which it descends, through several spiral tunnels, till at Biasca (38 m. from Göschenen) it reaches more level ground. Thence it runs past Bellinzona to Lugano (30½ m. from Biasca) and reaches Italian territory at Chiasso, 35 m. from Milan. The railway is now the property of the Swiss Government.

ST. HELENA (hĕl-ēn'ą), an island and British possession in the S. Atlantic, 15° 55′ 26″ S., 5° 42′ 30″ W. (Ladder Hill Observatory). Area 47 sq.m., extreme length, south-west to north-east 10¼ m., extreme breadth 8¼. The island is wholly of volcanic

origin, the activity being long extinct, whilst subaerial denudation has greatly modified it and marine erosion has formed perpendicular cliffs 450–2,000 ft. high on the east, north and west sides. Its principal feature, a semi-circular ridge of mountains, with the culminating summit of Diana's peak (2,704 ft.), is the northern rim of a great crater; the southern rim having been breached hypothetically forms the centre of the ring. From the crater wall outwards water-cut gorges stretch in all directions, widening as they approach the sea into valleys, some of which are 1,000 ft. deep. These valleys contain small streams. Springs of pure water are abundant. Along the enclosing hillsides caves have been formed by the washing out of the softer rocks. The lavas are basalts, andesites, trachytes and phonolites; there is much volcanic ash, tuff, scoriae, etc., and conspicuous features are formed by rocks, representing a late period of activity. Such features are Ass's Ears, Lot's Wife and the Chimney. There are several subsidiary craters. The only practicable landing-place is on the leeward side at St. James's bay. From the head of the bay a narrow valley extends for 1½ miles. The greatest extent of level ground is in the north-east of the island, where are the Deadwood and Longwood plains, over 1,700 ft. above the sea.

Although the island is within the tropics its climate is healthy and temperate. This is due to the south-east trade-wind, and to the effect of the cold waters of the South Atlantic current. The temperature varies on the sea level from 68° to 84° in summer and 57° to 70° in winter. The higher regions are about 10° cooler. The rainfall varies considerably.

Flora and Fauna.—St. Helena has three vegetation zones: (1) the coast zone, extending inland for 1 m. to 1½ m., now "dry, barren, soilless, lichen-coated, and rocky," with little save prickly pears, wire grass and *Mesembryanthemum;* (2) the middle zone (400–1,800 ft.), extending about three-quarters of a mile inland, with shallower valleys and grassier slopes—the English broom and gorse, brambles, willows, poplars and Scotch pines, being the prevailing forms; and (3) the central zone, about 3 m. long and 2 m. wide, the home, for the most part, of the indigenous flora. Of 38 flowering plants all save *Scirpus nodosus* are peculiar to the island; several indigenous plants are dying out. The indigenous flora shows affinities with African flora, but in recent years many species have become extinct. The exotic flora gives the island almost the aspect of a botanic garden. The oak, thoroughly naturalized, grows alongside of the bamboo and banana. Among other trees and plants are the common English gorse; *Rubus pinnatus, Hypochaeris radicata,* the *Buddleia Madagascariensis; Physalis peruviana;* the common castor-oil plant; and the pride of India. The flax (*Phormium tenax*) has been introduced in recent years. The peepul is the principal shade tree in Jamestown, and in Jamestown valley the date-palm grows freely. Orange and lemon trees, once common, are scarce.

St. Helena has no indigenous vertebrate land fauna. The only land groups well represented are the beetles and the land shells. T. V. Wollaston, in *Coleoptera Sanctae Helenae* (1877), shows that out of a total list of 203 species of beetles 129 are probably aboriginal and 128 peculiar to the island—an individuality perhaps unequalled in the world. More than two-thirds are weevils and a vast majority wood-borers, a fact which bears out the tradition of forests having once covered the island. A South American white ant (*Termes tenuis,* Hagen.), introduced from a slave-ship in 1840, soon became a plague at Jamestown. Practically everything had to be rebuilt with teak or cypress. Fortunately it cannot live in the higher parts of the island. Besides domestic animals the only land mammals are rabbits, rats and mice, the rats being especially abundant. Probably the only endemic land bird is the wire bird, *Aegialitis sanctae Helenae;* the averdevat, Java sparrow, cardinal, ground-dove, partridge (possibly the Indian *chukar*), pheasant and guinea-fowl are all common. There are no freshwater fish, beetles or shells. Of 65 species of sea-fish caught 17 are peculiar to St. Helena; economically the more important kinds are gurnard, eel, cod, mackerel, tunny, bullseye, cavalley, flounder, hog-fish, mullet and skulpin.

Population.—When discovered the island was uninhabited. The majority of the population are of mixed European (British, Dutch, Portuguese), East Indian and African descent—the Asiatic strain perhaps predominating, the majority of the early settlers having been previously members of the crews of ships returning to Europe from the East. From 1840 onward for a considerable period numbers of freed slaves of West African origin were settled here. Their descendants form a distinct element in the population. Since the substitution of steamships for sailing vessels and the introduction of new methods of preserving meat and vegetables the population has greatly diminished. The only town, in which live more than half the total population, is Jamestown. Longwood, where Napoleon died in 1821, is 3½ m. E. of Jamestown. The estimated population in 1925 was 3,747. A detachment of Royal Marine Artillery is stationed on the island.

Industries.—Less than a third of the area of the island is suitable for farming. The principal crop is potatoes. Cattle and sheep are raised but there is no outside market. The aloe (*Furcraea gigantea*) grows wild and the New Zealand flax (*Phormium tenax*), an introduced plant, is used in the manufacture of fibre. There are now seven mills engaged in the industry. In 1925, 1,500 ac. were under flax. Fish curing and lace making are also carried on. Trade is chiefly dependent upon the few ships that call at Jamestown—now mostly whalers. In 1925, the imports were valued at £57,805 and the exports at £47,476 of which £45,475 were from fibre and tow. St. Helena is in direct telegraphic communication with Europe and South Africa, and there is a regular monthly mail steamship service.

St. Helena is a crown colony. The governor (who also acts as chief justice) is aided by an executive council. He alone makes laws, called ordinances, but legislation can also be effected by the crown by order in council. The revenue in 1925 was £21,731 and the expenditure was £19,567. There is no public debt. Elementary education is provided in government and private schools. St. Helena is the seat of an Anglican bishopric established in 1859. Ascension and Tristan da Cunha are included in the diocese.

(J. I. P.; X.)

History.—The island was discovered on May 21, 1502, by the Portuguese João de Nova, on his voyage home from India, and by him named St. Helena. The Portuguese found it uninhabited, imported live stock, fruit-trees and vegetables, built a chapel and one or two houses, and left their sick there to be taken home, if recovered, by the next ship, but they formed no permanent settlement. Its first known permanent resident was Fernando Lopez, a Portuguese in India, who had turned traitor, and had been mutilated by order of Albuquerque. He preferred being marooned to returning to Portugal in his maimed condition, and was landed at St. Helena in 1513, with three or four negro slaves. By royal command he visited Portugal some time later, but returned to St. Helena, where he died in 1546. In 1584 two Japanese ambassadors to Rome landed at the island. The first Englishman known to have visited it was Thomas Cavendish, who touched there in June 1588 during his voyage round the world. Another English seaman, Captain Kendall, visited St. Helena in 1591, and in 1593 Sir James Lancaster stopped at the island on his way home from the East. In 1603 the same commander again visited St. Helena on his return from the first voyage equipped by the East India Company. The Portuguese had by this time given up calling at the island, which appears to have been occupied by the Dutch about 1645. The Dutch occupation was temporary and ceased in 1651, the year before they founded Cape Town. The British East India Company appropriated the island immediately after the departure of the Dutch, and they were confirmed in possession by a clause in their charter of 1661. The company built a fort (1658), named after the duke of York (James II.), and established a garrison in the island. In 1673 the Dutch succeeded in obtaining possession, but were ejected after a few months' occupation. Since that date St. Helena has been in the undisturbed possession of Great Britain, though in 1796 two ships anchored off Jamestown were carried off by the French. In 1673, the Dutch had been expelled by the forces of the Crown, but by a new charter granted in December of the same year the East India Company were declared "the true and absolute lords and proprietors" of the island. At this time, the inhabitants num-

bered about 1,000, of whom nearly half were negro slaves. In 1810 the company began the importation of Chinese from their factory at Canton. During the company's rule the island prospered: homeward-bound vessels, numbering hundreds in a year, anchored in the roadstead, and stayed for considerable periods refitting and revictualling. Large sums of money were thus expended in the island, where wealthy merchants and officials had their residence. The plantations were worked by slaves, who were subjected to very barbarous laws until 1792, when a new code of regulations ensured their humane treatment and prohibited the importation of any new slaves. Later it was enacted that all children of slaves born on or after Christmas Day 1818 should be free, and between 1826 and 1836 all slaves were set at liberty.

Among the governors appointed by the company to rule at St. Helena was one of the Huguenot refugees, Captain Stephen Poirier (1697–1707), who attempted unsuccessfully to introduce the cultivation of the vine. A later governor (1741–42) was Robert Jenkin (*q.v.*) of "Jenkin's ear" fame. Dampier visited the island twice in 1691 and 1701; Halley's Mount commemorates the visit paid by the astronomer Edmund Halley in 1676–78—the first of a number of scientific men who have studied on the island.

In 1815 the British Government selected St. Helena as the place of detention of Napoleon Bonaparte. He was brought to the island in October of that year and lodged at Longwood, where he died in May 1821. During this period the island was strongly garrisoned by regular troops, and the governor, Sir Hudson Lowe, was nominated by the Crown. After Napoleon's death the East India Company resumed full control of St. Helena until April 22, 1834, on which date it was in virtue of an act passed in 1833 vested in the Crown. As a port of call the island continued to enjoy a fair measure of prosperity until about 1870. Since that date the great decrease in the number of vessels visiting Jamestown has deprived the islanders of their principal means of subsistence. When steamers began to be substituted for sailing vessels and when the Suez Canal was opened (1869) fewer ships passed the island; of those that still pass the greater number are so well found that it is unnecessary for them to call. The withdrawal in 1906 of the small garrison, hitherto maintained by the imperial government, was another cause of depression, but during the World War (1914–18) a garrison was again sent to the island. During the Anglo-Boer war of 1899–1902 some thousands of Boer prisoners were detained at St. Helena, which has also served as the place of exile of several Zulu chiefs, an ex-sultan of Zanzibar and others. In 1922, Ascension Island, up to that time under the care of the Admiralty, was made a dependency of St. Helena.

BIBLIOGRAPHY.—General A. Beatson (governor 1808–13), *Tracts Relative to the Island of St. Helena* (1816); T. H. Brooke, *History of the Island of St. Helena . . . to 1823* (2nd ed., 1824), containing many early accounts of the island; Charles Darwin, *Geological Observations on Volcanic Islands* (1844); J. C. Melliss, *St. Helena: a Physical, Historical and Topographical Description of the Island, including its Geology, Fauna, Flora and Meterology* (1875); *Extracts from the St. Helena Records from 1673 to 1835* (compiled by H. R. Janisch, sometime governor, Jamestown, 1885); E. L. Jackson, *St. Helena* (1903). An annual report on the island is published by the Colonial Office, London. (R. L. A.; F. R. C.)

ST. HELENS, town and borough, Lancashire, England, 12 m. N.E. of Liverpool, on the L.M.S. and L.N.E. railways. Pop. (1931) 106,793. A canal communicates with the Mersey. The town is wholly of modern development. Besides the town hall and other public buildings and institutions there may be mentioned the Gamble Institute, a technical school and library. This is the principal seat in England for the manufacture of crown, plate, and sheet glass; there are also art glass works, copper smelting and refining works, chemical works, iron and brass foundries, potteries and patent medicine works. There are collieries in the neighbourhood. To the north are ruins of Windleshaw Abbey and St. Thomas' well. The town was incorporated in 1868, became a parliamentary borough in 1885 (returning one member) and a county borough in 1888.

ST. HELIER, the chief town of Jersey, the largest of the Channel Islands. Pop. (1921) 27,866. It lies on the south coast on the eastern side of St. Aubin's Bay. The harbour is flanked on the W. by a rocky ridge on which stands Elizabeth Castle, and on the east by a promontory on which stands Fort Regent. The parish church is a cruciform building with embattled tower, partly 14th century. It contains a monument to Major Peirson, who lost his life in opposing the French attack on Jersey in 1781. The French leader, Baron de Rullecourt, is buried in the churchyard. A large canvas by John Singleton Copley depicting the scene is in the National Gallery, London, and a copy is in the court house of St. Helier. This building (*la Cohue*), in Royal Square, is the meeting-place of the royal court and deliberative States of Jersey. Victoria College was opened in 1852 and commemorates a visit of Queen Victoria and the prince consort to the island in 1846. A house in Marine Terrace is distinguished as the residence of Victor Hugo (1851–1855). Elizabeth Castle dates from 1551–1590; and in 1646 and 1649 Prince Charles resided here. In 1649 he was proclaimed king, as Charles II., in Jersey by the royalist governor George Carteret. On coming to the throne he gave the island the mace which is still used at the meetings of the court and States. Close to the castle are remnants of a hermitage-chapel (9th or 10th century) traditionally connected with St. Helerius, which has given the name of the Hermitage to the rock on which it stands.

ST. HUBERT, a small town of Belgium in the province of Luxembourg and in the heart of the Ardenne. Pop. (1920) 3,519. Its abbey church contains the shrine of St. Hubert, and has an annual pilgrimage. According to tradition the church and a monastery attached to it were founded in the 7th century by Plectrude, wife of Pippin of Herstal. The second church was built in the 12th century, but burnt in the 16th century. The present building has been restored in modern times and presents no special feature. The spot where St. Hubert is supposed to have met the stag with the crucifix between its antlers is about 5 mi. from the town. St. Hubert is the patron saint of huntsmen.

ST. HYACINTHE, a city and port of entry of Quebec, Canada, and capital of St. Hyacinthe county, 32 m. E.N.E. of Montreal, on the left bank of the river Yamaska and on the Canadian National, Canadian Pacific, and Quebec, Montreal and Southern railways. Pop. (1931) 13,448. It is the seat of a Roman Catholic bishop, and contains a classical college, dairy school, two monasteries and several other educational and charitable institutions. It has manufactures of organs, leather, woollens and agricultural implements, and is an important distributing centre for the surrounding district.

ST. IMIER, a town in the west of the canton of Berne, Switzerland, and on the railway from Biel to La-Chaux-de-Fonds. It lies at the foot of Mont Soleil (4,230 ft.), which is ascended by a funicular railway. It is the centre of the watchmaking industry, a health resort, and a place for winter sports. The inhabitants, 7,442, are French-speaking and generally Protestant.

SAINTINE, JOSEPH XAVIER (1798–1865), French novelist and dramatist, whose real surname was BONIFACE, was born in Paris on July 10, 1798. In 1823 he produced a volume of poetry in the manner of the Romanticists, entitled *Poèmes, odes, épîtres*. In 1836 appeared *Picciola*, the story of the comte de Charney, a political prisoner in Piedmont, whose reason was saved by his cult of a tiny flower growing between the paving stones of his prison yard. This story is a masterpiece of the sentimental kind, and has been translated into many European languages. He produced many other novels and dramas, and died on Jan. 21, 1865.

ST. IVES, a market town, municipal borough and seaport of Cornwall, England, 8 m. N.E. of Penzance, on the G.W.R. Pop. (1931) 6,687. It lies near the west horn of St. Ives Bay on the north coast. The site has associations with Celtic Christianity and is supposed to take its name from St. Hya, or Ia, an Irish martyr, accompanying St. Piran on his missionary journey to Cornwall in the 5th century. St. Ives was a mere chapelry of Lelant, an unimportant member of the distant manor of Ludgvan Leaze (which in Domesday appears as Luduam), and did not grow in the middle ages. In order to augment the influence of the Tudors in Parliament, Philip and Mary in 1558 invested it with the privilege of returning 2 members. Its affairs were at that time administered by a headwarden, who after 1598 appears under the name of portreeve. In 1639 a charter of incorporation was

granted under which the portreeve became mayor with aldermen and burgesses. Provision was made for four fairs and for markets on Wednesdays and Saturdays, also for a grammar school. A new charter was granted in 1685. In 1832 St. Ives lost one of its members, and in 1885 it lost separate representation. The older streets near the harbour are narrow and irregular, but on the upper slopes a residential area has developed. The small harbour, built in 1767, has silted up and at the lowest tides is dry. The fisheries for pilchard, herring and mackerel are important. With the advent of the railway St. Ives has become an important summer resort.

ST. IVES, a market town and municipal borough in Huntingdonshire, England, mainly on the left bank of the Ouse, 5 m. E. of Huntingdon, by the L.N.E.R. Pop. (1931) 2,664. The river is crossed by an old bridge said to have been built by the abbots of Ramsey early in the 15th century. A building over the centre pier of the bridge was once used as a chapel. The causeway (1827) on the south side of the river is built on arches so as to assist the flow of the river in time of flood. The church of All Saints is Perpendicular, with earlier portions. Oliver Cromwell was a resident in St. Ives in 1634–1635. There is a considerable agricultural trade. St. Ives was chiefly noted for its fair, which was first granted to the abbot of Ramsey by Henry I. to be held on Monday in Easter week and eight days following. In the reign of Henry III. merchants from Flanders came to the fair, which had become so important that the king granted it to be continued beyond the eight days if the abbot agreed to pay a fee of £50 yearly for the extra days. The fair, with a market on Monday granted to the abbot in 1286, survives, and was purchased in 1874 by the corporation from the duke of Manchester. The town was incorporated in 1874.

ST. JEAN-D'ANGÉLY, a town of western France, in the department of Charente-Inférieure, 33 m. E. of Rochefort by rail. Pop. (1926) 5,702. St. Jean is named after the neighbouring forest of Angéry (*Angeriacum*). Pippin I. of Aquitaine in the 9th century established there a Benedictine monastery, afterwards reputed to possess the head of John the Baptist. This relic attracted hosts of pilgrims; a town grew up, took the name of St. Jean d'Angeri, afterwards d'Angély, was fortified in 1131, and in 1204 received a charter from Philip Augustus. The possession of the place was disputed between French and English in the Hundred Years' War, and between Catholics and Protestants at a later date. Louis XIII. took it from the Protestants in 1621 and changed its name to Bourg-Louis. St. Jean lies on the right bank of the Boutonne, which is navigable for small vessels.

ST. JEAN-DE-LUZ, a coast town of south-western France, in the department of Basses-Pyrénées, at the mouth of the Nivelle, 14 m. S.W. of Bayonne on a branch of the Southern railway. Pop. (1926) 5,775. From the 14th to the 17th century St. Jean-de-Luz enjoyed a prosperity due to its mariners and fishermen. Its vessels were the first to set out for Newfoundland in 1520. In 1558, the Spaniards attacked and burned the town. In 1627, however, it was able to equip 80 vessels, which succeeded in saving the island of Ré from the duke of Buckingham. In 1660 the treaty of the Pyrenees was signed at St. Jean-de-Luz. At that time the population numbered 15,000. The cession of Newfoundland to England in 1713, the loss of Canada, and the silting-up of the harbour contributed to the decline of the town's maritime trade. St. Jean-de-Luz is situated in the Basque country on the bay of St. Jean-de-Luz, the entrance to which is protected by breakwaters and moles. It has a 13th century church, the chief features of which are the galleries in the nave, which by the Basque custom, are reserved for men.

ST. JOHN, OLIVER (*c.* 1598–1673), English statesman and judge, was the son of Oliver St. John of Cayshoe, Bedfordshire, and great-grandson of the first Lord St. John of Bletso in 1559, and a distant cousin of the 4th baron who was created earl of Bolingbroke in 1624, and who took an active part on the parliamentary side in the Civil War, being killed at the battle of Edgehill. Oliver was educated at Queens' college, Cambridge, and was called to the bar in 1626. He appears to have got into trouble with the court in connection with a seditious publication, and to have associated himself with the future popular leaders John Pym and Lord Saye. In 1638, in a notable speech, he defended Hampden on his refusal to pay Ship Money. In the same year he married, as his second wife, Elizabeth Cromwell, a cousin of Oliver Cromwell, to whom his first wife also had been distantly related. The marriage led to an intimate friendship with Cromwell. St. John was member for Totnes in both the Short and the Long Parliament, where he acted in close alliance with Hampden and Pym, especially in opposition to the impost of Ship Money (*q.v.*). In 1641, with a view of securing his support, the king appointed St. John solicitor-general. None the less he took an active part in promoting the impeachment of Strafford and in preparing the bills brought forward by the popular party in the Commons, and was dismissed from office in 1643. On the outbreak of the Civil War, he became recognized as one of the parliamentary leaders. In the quarrel between the parliament and the army in 1647 he sided with the latter, and throughout enjoyed Cromwell's confidence.

In 1648 St. John was appointed chief justice of the common pleas. He refused to act as one of the commissioners for the trial of Charles. He had no hand in Pride's Purge, nor in the constitution of the Commonwealth. In 1651 he went to The Hague on an unsuccessful mission to negotiate a union between England and Holland, but in the same year he successfully conducted a similar negotiation with Scotland. After the Restoration he published an account of his past conduct (*The Case of Oliver St. John,* 1660), which saved him from any more severe vengeance than exclusion from public office. He retired to his country house in Northamptonshire till 1662, when he went to live abroad. He died on Dec. 31, 1673.

See the above-mentioned *Case of Oliver St. John* (1660), and St. John's *Speech to the Lords, Jan. 7th, 1640, concerning Ship-money* (1640). *See* also Mark Noble, *Memoirs of the Protectoral House of Cromwell,* vol. ii. (2 vols., 1787) and C. H. Firth's art. in *Dict. of Nat. Biog.,* vol. 1. (1897).

ST. JOHN, the capital of St. John county, New Brunswick, Canada, in 45° 1′ N., and 66° 3′ W., 481 m. from Montreal. Pop. (1931), 47,514. It is situated at the mouth of the St. John river on a rocky peninsula. With it are incorporated the neighbouring towns of Carleton and Portland.

St. John was visited in 1604 by the Sieur de Monts (1560–*c.* 1630) and his lieutenant Champlain, but it was not until 1635 that Charles de la Tour (d. 1666) established a trading post, called Fort St. Jean (*see* Parkman, *The Old Régime in Canada*), which existed under French rule until 1758, when it passed into the hands of Britain. In 1783 a body of United Empire Loyalists landed at St. John and established a city, called Parr Town until 1785, when it was incorporated with Conway (Carleton), under royal charter, as the city of St. John. It soon became and has remained the largest town in the province, but for military reasons was not chosen as the capital. (*See* FREDERICTON.) Its growth has been checked by several destructive fires, especially that of June 1877. It has since been rebuilt of stone.

The river enters the harbour through a rocky gorge, which is passable by ships during each ebb and flow of the tide. St. John is the Atlantic terminus of the Canadian Pacific Railway and one of the termini of the Canadian National Railways, and joins with Halifax in being one of the chief winter ports of the Dominion, the harbour being deep, sheltered, free from ice and always accessible, with 32 ft. of water at low tide and 58 to 60 ft. at high tide. It is the distributing centre for a large district, rich in agricultural produce and lumber. It has also an important fishery trade. There are textile works and engineering shops. Among the exports are timber, pulp, fish, cattle, apples, dairy produce, metal manufactures and motor cars.

ST. JOHN, one of the Virgin islands of the United States, formerly the Danish West Indies. It lies 4 m. E. of St. Thomas and is 10 m. long and 2½ m. wide; area, 21 square miles. It is a mass of rugged mountains, the highest of which is Camel mountain (1,270 ft.). Although one of the best watered and most fertile of the Virgin group, it has little commerce. It is a free port, and possesses in Coral bay the best harbour of refuge in the Antilles. The village of Cruxbay lies on the northern coast. Pop. (1930) 765.

ST. JOHN, a river of New Brunswick, Canada, rising in two branches, one in the State of Maine, U.S.A., and the other in the province of Quebec. The American branch, known as the Walloostook, flows N.E. to the New Brunswick frontier, where it turns S.E. and for 80 m. forms the international boundary. A little above Grand Falls the St. John enters Canada and flows through New Brunswick into the Bay of Fundy at St. John. Its total length is about 450 miles. It is navigable for large steamers as far as Fredericton (86 m.), and in spring and early summer for smaller vessels to Grand Falls (220 m.), where a series of falls and rapids form a descent of 70 or 80 feet. Above the falls it is navigable for 65 miles. It drains an area of 26,000 sq.m., of which half is in New Brunswick, and receives numerous tributaries, of which the chief are the Aroostook, Allagash, Madawaska (draining Lake Temiscouata in Quebec), Tobique and Nashwaak.

ST. JOHN OF JERUSALEM, KNIGHTS OF THE ORDER OF THE HOSPITAL OF, known also later as the KNIGHTS OF RHODES and the SOVEREIGN ORDER OF THE KNIGHTS OF MALTA. The history of this order divides itself naturally into four periods: (1) From its foundation in Jerusalem during the First Crusade to its expulsion from the Holy Land after the fall of the Latin kingdom in 1291; (2) from 1309–1310, when the order was established in Rhodes, to its expulsion from the island in 1522; (3) from 1529 to 1798, during which its headquarters were in Malta; (4) its development, as reconstituted after its virtual destruction in 1798, to the present day.

Early Developments.—Ever since Jerusalem became a centre of Christian pilgrimage, a hospital or hospice for pilgrims had existed there; and early in the 11th century one of these was restored, served by Benedictines, and later dedicated to St. John the Baptist. When, in 1087, the crusaders surrounded the Holy City, the head of this hospital was a certain Gerard or Gerald, who earned their gratitude by assisting them in some way during the siege. After the capture of the city he used his popularity to enlarge and reconstitute the hospital, and adopted for his order the Augustinian rule. Donations and privileges were thereafter showered upon the new establishment. In 1113 Pope Paschal II. took the order and its possessions under his immediate protection (bull of Feb. 15th to Gerard), his act being confirmed in 1119 by Calixtus II. and subsequently by other popes. Gerard was indeed, as Pope Paschal called him, the "institutor" of the order, if not its founder. It retained, however, during his lifetime its purely eleemosynary character. The armed defence of pilgrims may have been part of its functions, but its organization as an aggressive military force was the outcome of special circumstances—the renewed activity of the Saracens—and was the work of Raymond du Puy, who succeeded as grand master on the death of Gerard (3rd of September 1120). The statesmanlike qualities of Raymond du Puy rendered his long mastership epoch-making for the order; and from 1137 onwards they took a regular part in the wars of the Cross. During the Second Crusade Raymond was present at the council of the leaders held at Acre, in 1148, which resulted in the ill-fated expedition against Damascus. The failure before Damascus was repaired five years later by the capture of Ascalon (August 1153), in which the grand master and his knights had a conspicuous share.

Meanwhile, in addition to its ever-growing wealth, the order had received from successive popes privileges which rendered it, like the companion order of the Temple, increasingly independent of and obnoxious to the secular clergy. During the 30 years of Raymond's rule the Hospital, which Gerard had instituted to meet a local need, had become universal, and establishments were formed in East and West. After October 1158, when his presence is attested at Verona, this master builder of the order disappears from history; he died some time between this date and 1160, when the name of another grand master, Gilbert d'Assailly, appears.

Share in the Crusades.—The rule of the Hospital, as formulated by Raymond du Puy, was based upon that of the Augustinian Canons (*q.v.*). Its further developments, of which only the salient characteristics can be mentioned here, were closely analogous to those of the Templars (*q.v.*), whose statutes regulating the life of the brethren, the terms of admission to the order, the maintenance of discipline, and the scale of punishments, culminating in expulsion are, *mutatis mutandis,* closely paralleled by those of the Hospitallers.

In two important respects the Knights of St. John differed from the Templars. The latter were a purely military organization; the Hospitallers, on the other hand, were at the outset preponderatingly a nursing brotherhood, and, though this character was subordinated during their later period of military importance, it never disappeared. It continued to be a rule of the order that in its establishments it was for the sick to give orders, for the brethren to obey. The chapters were largely occupied with the building, furnishing, and improvement of hospitals, to which were attached learned physicians and surgeons, who had the privilege of messing with the knights. The revenues of particular properties were charged with providing luxuries (*e.g.,* white bread) for the patients, and the various provinces of the order with the duty of forwarding blankets, clothes, wine and food for their use. The Hospitallers, moreover, encouraged the affiliation of women to their order, which the monastic and purely military rule of the Templars sternly forbade. So early as the First Crusade a Roman lady named Alix or Agnes had founded at Jerusalem a hospice for women in connection with the order of St. John. Until 1187, when they fled to Europe, the sisters had devoted themselves to prayer and sick-nursing. In Europe, however, they developed into a purely contemplative order.

The grand-mastership of Gilbert d'Assailly was signalized by the participation of the Hospitallers in the abortive expeditions of Amalric of Jerusalem into Egypt in 1162, 1168 and 1169. The failure of the expedition to Egypt brought considerable odium on Gilbert d'Assailly, who resigned the grand mastership, probably in the autumn of 1170. Under the short rule of the grand master Jobert (d. 1177) the question of a renewed attack on Egypt was mooted; but the confusion reigning in the Latin kingdom and, not least, the scandalous quarrels between the Templars and Hospitallers, rendered all aggressive action impossible. In 1179 the growing power of the two military orders received its first set back when, at the instance of the bishops, the Lateran Council forbade them to receive gifts of churches and tithes at the hands of laymen without the consent of the bishops, ordered them to restore all "recent" gifts of this nature (*i.e.,* within ten years of the opening of the council), and passed a number of decrees in restraint of the abuse of their privileges.

A more potent discipline was to befall them, however, at the hands of Saladin, sultan of Egypt, who in 1186 began his systematic conquest of the kingdom. It was the Hospitallers who, with the other military orders, alone offered an organized resistance to his victorious advance. In May 1187 occurred the defeat of Tiberias, in which the grand master Gilbert des Moulins fell riddled with arrows; this was followed on July 4 by the still more disastrous battle of Hittin. The flower of the Christian chivalry was slain or captured; Hospitallers and Templars who fell into his hands Saladin massacred in cold blood. In October Jerusalem fell. The news of these disasters again roused the crusading spirit in Europe; the offensive against Saladin was resumed, the Christians concentrating their forces against Acre in the autumn of 1189. In the campaigns that followed, of which Richard I. of England was the most conspicuous hero, and which ended in the recovery of Acre and the sea-coast generally for the Latin kingdom, the Hospitallers played a prominent part; and during the following decade there was a steady restoration and development of the property and privileges of the order, notwithstanding renewed quarrels with the Templars, and the establishment—in face of the protests of the Hospitallers—of the Teutonic knights as a separate order. An increasing secularisation of their spirit can now be traced. In 1236 Pope Gregory IX. thought it necessary to threaten both them and the Templars with excommunication, to prevent their forming an alliance with the Assassins, and in 1238 issued a bull in which he inveighed against the scandalous lives and relaxed discipline of the Hospitallers.

Events were soon to expose the order to fresh tests. In the midst of the strife of parties, in which the fatal weakness of the

Christian cause lay, came the news of the invasion of the Chorasmians. In August the Tatar horde took and sacked Jerusalem. In October, it overwhelmed the Christian host at Gaza. Amid the general ruin that followed this defeat, the Hospitallers held out in the fortress of Ascalon, until forced to capitulate in October 1247. In 1249 they took part in the Egyptian expedition of St. Louis of France, only to share in the crushing defeat of Mansurah (February 1250). At the instance of St. Louis, after the conclusion of peace, 25 Hospitallers, together with the grand master, were released.

Upon the withdrawal of St. Louis from the Holy Land (April 1254), a war of aggression and reprisals broke out between Christians and Muslims; and no sooner was this ended by a precarious truce than the Christians fell to quarrelling among themselves, and the Hospitallers and Templars actually fought on opposite sides. In spite of so great a scandal and of the hopeless case of the Christian cause, the possessions of the order were largely increased, both in the Holy Land and in Europe.

The menace of a new Tatar invasion led to serious efforts to secure harmony in the kingdom. In 1258 the Templars, Hospitallers, and Teutonic knights decided to submit their disputes to arbitration, a decision which bore fruit in 1260 in the settlement of their differences in Tripoli and Margat. The concord was badly needed; for Bibars, having in 1260 driven back the Tatars and established himself in the sultanate of Egypt, began the series of campaigns which ended in the destruction of the Latin kingdom. Antioch fell in 1268 and the great fortress of Krak in 1271. The crusade of Prince Edward of England did little to avert the ultimate fate of the kingdom, and with it that of the Hospitallers in the Holy Land. This was merely delayed by the preoccupations of Bibars elsewhere, and by his death in 1277. In May 1285 Margat was lost, and Tripoli in April 1289. In May 1291 the Muslims captured Acre, the last hope of the Christians in the Holy Land. The headquarters of the Hospital were moved to Cyprus, and the problem of reorganization was taken in hand. Guillaume de Villaret, who became grand master in 1296, secured immense additions of property and privileges in Europe from the pope and many kings and princes, and effected a drastic reorganization of the order promulgated in a series of statutes between 1300 and 1304.

The Knights in Rhodes.—The history of the order for the next fifty years is very obscure. Certain changes, however, took place which profoundly modified its character. Hitherto the order had been a cosmopolitan society, in which the French element had tended to predominate; henceforth it became a federation of national societies united only for purposes of commerce and war. To the headship of each national organization was attached one of the great dignitaries of the order, which thus came to represent, not the order as a whole, but the interests of a section. The motive of this change was probably fear of the designs of Philip IV. of France and his successors to which point had been given by the fate of the Templars, and the consequent desire to destroy the preponderance of the French element.

The character and aims of the order were also profoundly affected by their newly acquired sovereignty. The Hospitallers ruled an island too narrow to monopolize their energies, but occupying a position of vast commercial and strategic importance. Close to the Anatolian mainland, commanding the outlet of the Archipelago, and lying in the direct trade route between Europe and the East, Rhodes had become the chief distributing point in the lively commerce which, in spite of papal thunders, Christian traders maintained with the Mohammedan states; the Hospitallers were thus divided between their duty as sovereign, which was to watch over the interests of their subjects, and their duty as Christian warriors, which was to combat the infidel. In view of the fact that the crusading spirit was everywhere declining, it is not surprising that their policy was henceforth directed less by religious than by political and commercial considerations. Not that they altogether neglected their duty as protectors of the Cross. Their galleys policed the narrow seas; their consuls in Egypt and Jerusalem watched over the interests of pilgrims; their hospitals were still maintained for the service of the sick and the destitute. But, side by side with this, secularization proceeded apace. Even towards the infidel the attitude of the knights was necessarily influenced by the fact that their supplies of provisions were mainly drawn from the Muslim mainland. By the 15th century their crusading spirit had grown so weak that they even attempted to negotiate a commercial treaty with the Ottoman sultan; the project broke down on the refusal of the knights to accept the sultan's suzerainty.

Their history during the two centuries of the occupation of Rhodes, so far as its general interest for Europe is concerned, is that of a long series of naval attacks and counter-attacks; its chief outcome, for which the European states owed a debt of gratitude but ill acknowledged, the postponement for some two centuries of the appearance of the Ottomans as a first-rate naval power in the Mediterranean. The Ottoman peril, however, grew ever more imminent, and in 1395, under their grand master Philibert de Naillac, the Hospitallers shared in the disastrous defeat of Nicopolis; and this was followed in a few years by the loss of Smyrna. It was after this disaster that the knights built, on a narrow promontory jutting from the mainland opposite the island of Kos, the fortress of St. Peter the Liberator. The castle, which still stands, its name corrupted into Budrun (from Bedros, Peter), was long a place of refuge for Christians fleeing from slavery. Some years later the position of the order as a Mediterranean sea-power was strengthened by commercial treaties with Venice, Pisa, Genoa, and even with Egypt (1423). The zenith of its power was reached a few years later, when, under the grand master Jean Bonpar de Lastic, it twice defeated an Egyptian attack by sea (1440 and 1444). A new and more imminent peril, however, arose with the capture of Constantinople by the Turks in 1453, for Mohammed II. had announced his intention of making Rhodes his next objective. After a long series of naval battles had been carried on by the Hospitallers, the dreaded sultan Suleiman the Magnificent directed his attack on Rhodes. In 1522 he besieged the island, reinforcements failed, the European powers sent no assistance, and in 1523 the knights capitulated, and withdrew with all the honors of war to Candia (Crete). The emperor Charles V., when the news was brought to him, exclaimed, "Nothing in the world has been so well lost as Rhodes!" But he refused to assist the grand master in his plans for its recovery, and instead, five years later (1530), handed over to the Hospitallers the island of Malta and the fortress of Tripoli in Africa.

The Knights in Malta.—The settlement of the Hospitallers in Malta was contemporaneous with the Reformation, which profoundly affected the order. In England the refusal of the grand prior and knights to acknowledge the royal supremacy led to the confiscation of their estates by Henry VIII., and, though not formally suppressed, the English organization practically ceased to exist. The knights of Malta, as they came to be known, none the less continued their vigorous warfare. In 1550 they defeated the redoubtable corsair Dragut, but in 1551 their position in Tripoli, always precarious, became untenable and they capitulated to the Turks and concentrated their forces in Malta. On May 18, 1565, the Ottoman fleet appeared before the city, and one of the most famous sieges in history began. It was ultimately raised in September, on the appearance of a large relieving force despatched by the Spanish viceroy of Sicily, after 25,000 of the enemy had fallen. The memory of La Vallette, the hero of the siege, who died in 1568, is preserved in the city of Valletta, which was built on the site of the struggle.

In 1571 the knights shared in the victory of Lepanto; but this crowning success was followed during the 17th century by a long period of depression, due to internal dissensions and culminating during the Thirty Years' War, the position of the order being seriously affected by the terms of the peace of Westphalia (1648). The character of the order at this date became more exclusively aristocratic, and its wealth, partly acquired by commerce, partly derived from the contributions of the commanderies scattered throughout Europe, was enormous. The wonderful fortifications, planned by French architects and improved by every grand master in turn, the gorgeous churches, chapels and *auberges*, the great library founded in 1650, were the outward and visible

signs of the growth of a corresponding luxury in the private life of the order. Nevertheless, under Raymond Perellos (1697–1720) and Antonio Manoel (1722–1736), the knights restored their prestige in the Mediterranean by victories over the Turks. In 1741 Emmanuele Pinto, a man of strong character, became grand master. He expelled the Jesuits, resisted papal encroachments on his authority and, refusing to summon the general chapter, ruled as a despot. Emanuel, prince de Rohan, who was elected grand master in succession to Francesco Jimenes de Texada in 1775, made serious efforts to revive the old spirit of the order; and the last great expedition of the Maltese galleys was worthy of its noblest traditions; they were sent to carry supplies for the sufferers from the great earthquake in Sicily. They had long ceased to be effective fighting ships, and survived mainly as gorgeous state barges in which the knights sailed on ceremonial pleasure trips.

The French Revolution was fatal to the order. Rohan made no secret of his sympathy with the losing cause in France, and Malta became a refuge-place for the *émigrés*. In 1792 the vast possessions of the order in France were confiscated; six years later the Directory resolved on the forcible seizure of Malta itself. With this the history of the order of St. John practically ends. Efforts were, however, made to preserve it. Efforts to restore the order through Russian influence failed; and a chapter now granted the right of nomination to the pope, who appointed Giovanni di Tommasi grand master. From his death in 1805 until 1879, when Leo XIII. restored the title of grand master in favour of Fra Giovanni Ceschi a Santa Croce, the heads of the order received only the title of lieutenant master. In 1814 the French knights summoned a chapter general and elected a permanent commission for the government of the order, which was recognized by the Italian and Spanish knights, by the pope and by King Louis XVIII. In the Italian states much of the property of the order was restored at the instance of Austria, and in 1841 the emperor Ferdinand founded the grand priory of Lombardo-Venetia.

Present Constitution of the Order.—The "Sovereign Order of Malta" is now divided into the Italian and German "langues," the Knights of Malta, or national organizations, both under the Sacred Council (Sagro consiglio) at Rome. The Italian "langue" embraces the grand priories of Rome, Lombardy and Venice, and Sicily; the German "langue" consists of (1) the grand priory of Bohemia, (2) the association of the honorary knights (*Ehrenritter*) in Silesia, (3) the association of *Ehrenritter* in Westphalia and the Rhine country, (4) knights admitted individually under stated conditions.

In addition to the Sovereign Order of the Knights of Malta, there exist two Orders of St. John of Jerusalem of Protestant origin:—the Prussian *Johanniterorden* and the English Order of St. John of Jerusalem. Of these the Prussian order has the most interesting history. At the Reformation the master and knights of Brandenburg adopted the new religion. They continued, however, like other *Ritterstifter*, to enjoy their corporate rights; they even continued to acknowledge the jurisdiction of the grand preceptor of the German langue, in so far as the confirmation of official appointments was concerned, and to send their contributions to the common fund of the order. All members of the order must be of noble birth and belong to the Evangelical Church. The cross worn is of white enamelled gold with four black eagles between the arms; a white linen cross is also sewn on the left breast of the red tunic which forms part of the uniform. The order has founded, and supports, many hospitals.

The English "langue," though deprived of its lands, had never been formally suppressed. In 1826–1827 the commission instituted by the French knights in 1814, which was aiming at taking advantage of the Greek War of Independence to reconquer Rhodes or to secure some other island in the Levant, suggested the restoration of the English "langue," obviously with the idea of securing the help of Great Britain for their project. The negotiations resulted in articles of convention formally reviving the English "langue." For fifty years this was all the official recognition obtained by this curious and characteristic sham-Gothic restoration of the Romantic period. The English "langue," however, though somewhat absurd, did good service in organizing hospital work, notably in the creation of the St. John's Ambulance Association, and this work was recognized in high quarters, the princess of Wales (afterwards Queen Alexandra) becoming a lady of justice in 1876 and the duke of Albany joining the order in 1883. In 1888 Queen Victoria granted a charter formally incorporating the order, the headquarters of which had been established in the ancient gateway of the priory at Clerkenwell. The sovereign is its supreme head and patron, the heir to the throne for the time being its grand prior.

BIBLIOGRAPHY.—For further study of the subject the work of J. D. Le Roulx is of fundamental importance. In 1883 he published *Les Archives de l'Ordre de Saint-Jean*, an analysis of the records preserved at Malta. This was followed in 1904 by his monumental *Cartulaire général des Hospitaliers de Saint-Jean de Jérusalem* (1100–1310), 4 vols. folio. This gives (1) all documents anterior to 1120, (2) all those emanating from the great dignitaries of the order, (3) all those emanating from popes, emperors, kings and great feudatories, (4) those which fix the date of the foundation of particular commanderies, (5) those regulating the relations of the Hospitallers with the lay and ecclesiastical authorities and with the other military orders, (6) the rules, statutes and customs of the order. Hitherto unpublished documents (from the archives of Malta and elsewhere) are published in full; those already published, and the place where they may be found, being indicated in proper sequence. Based on the *Cartulaire* is Le Roulx's *Les Hospitaliers en Terre Sainte et en Chypre* (Paris, 1904), an invaluable work in which many hitherto obscure problems have been solved. It contains a full list of published authorities. Of English works may be mentioned J. M. Kemble's Historical introduction to *The Knights Hospitallers in England* (Camden Soc., London, 1857); W. Porter, *Hist. of the Knights of Malta* (2 vols. 1858, new ed. 1883); Bedford and Holbeche, *The Order of the Hospital of St. John of Jerusalem* (1902), for the modern order.

ST. JOHN'S, a town and port of entry of Quebec, Canada, and capital of St. John's county, 27 m. S.E. of Montreal by rail, on the river Richelieu and at the head of the Chambly canal. Pop. (1931), 11,256. A large export trade in lumber, grain and farm produce is carried on, and its mills and factories produce flour, silk, pottery, hats, etc. Three railways, the Canadian National, Canadian Pacific and Central Vermont, enter St. John's. On the opposite bank of the river is the flourishing town of St. Jean d'Iberville (usually known simply as Iberville), connected with St. John's by several bridges.

ST. JOHN'S, the capital of Newfoundland, situated on the east coast of the island, in the peninsula of Avalon, in 47° 33′ 54″ N., and 52° 40′ 18″ W. It is the most easterly city of the American continent. Pop. (1928), 40,059, mostly of Irish descent and Roman Catholics. It stands on rising ground on the north side of a land-locked harbour, which opens suddenly in the lofty coast. The entrance, known as The Narrows, guarded by Signal Hill (520 ft.) and South Side Hill (620 ft.), is about 1,400 ft. wide, narrowing to 600 ft. between Pancake and Chain Rocks. At the termination of The Narrows the harbour trends suddenly to the west, thus completely shutting out the ocean swell. The port has sufficient water for vessels of 30 ft. draught. There is good wharf accommodation, with a graving and a floating dock.

St. Johns was first settled by Devonshire fishermen early in the 16th century. It was twice sacked by the French, and captured by them in the Seven Years' War (1762), but recaptured in the same year, since when it has remained in British possession. Both in the War of American Independence and in that of 1812 it was the headquarters of the British fleet. The old city, built entirely of wood, was twice destroyed by fire (1816–1817 and 1846). Half of it was again swept away in 1892, but new and more substantial buildings have been erected, among which the Anglican and Roman Catholic Cathedrals stand out. Education is in the hands of the various religious bodies. St. Johns practically monopolizes the commerce of the island, being the centre of the cod, seal and whale fisheries. The chief industries are connected with the fitting out of the fishing vessels, or with the disposal and manufacture of their catch. Nearly all the commerce of the island is sea-borne. The town imports iron, coal, cattle and general produce and exports fish, oil, wood pulp and paper.

SAINT JOHNSBURY, a town of north-eastern Vermont, U.S.A., the county seat of Caledonia county, and a village of the

same name; 34 m. E.N.E. of Montpelier, on the Passumpsic river and Federal highways 2 and 5. It is served by the Canadian Pacific, the Maine Central and the St. Johnsbury and Lake Champlain railways. Pop. (1920) 8,708; 1930 Federal census 7,920. It is the home of the Fairbanks platform scale, invented here in 1830 by Thaddeus Fairbanks (*q.v.*) and manufactured here since 1837, and of the largest maple-sugar plant in the country. The town was settled in 1786 by Dr. Jonathan Arnold, and was named after Jean Hector St. John de Crèvecoeur, author of *Letters of an American Farmer* (1782). The village was incorporated in 1853. Since 1923 the town has had a city manager form of government.

ST. JOHN'S WORT, in botany, the general name for species of *Hypericum* (family Guttiferae), especially *H. perforatum,* small shrubby plants with slender stems, sessile opposite leaves which are often dotted with pellucid glands, and showy yellow flowers. *H. Androsaemium* is Tutsan (Fr. *tout saine*), so called from its healing properties. *H. calycinum* (Rose of Sharon), a creeping plant with large almost solitary flowers 3 to 4 in. across, is a plant of south-east Europe which has become naturalized in Great Britain in various places in hedges and thickets. The genus comprises about 200 species of herbs, shrubs, and small trees, native mostly to temperate and subtropical regions. Some 30 species, chiefly herbaceous, are found in North America, widely distributed across the continent but most numerous in the eastern States and adjacent Canada. Many species are cultivated.

ST. JOSEPH, a city of south-western Michigan, U.S.A., on Lake Michigan, at the mouth of the St. Joseph river and immediately west of Benton Harbor; a port of entry and the county seat of Berrien county. It is on Federal highways 12 and 31, and is served by the Michigan Central and the Pere Marquette railways, interurban trolleys and motor-bus lines, and lake steamers. The population was 7,251 in 1920 (20% foreign-born white) and was 8,349 in 1930 by the Federal census. The two cities, connected by a wide thoroughfare and a ship-canal, are practically one community, with a combined population estimated at 30,000 in 1928, which is doubled in summer by visitors in search of health and recreation at the mineral springs and many resorts of the region. The surrounding country is the famous Michigan fruit belt. The traffic of the harbour in 1927 amounted to 36,211 tons, valued at $4,945,900. St. Joseph has a great variety of manufacturing industries, producing 83 different articles and employing 3,700 workers. The offices and central institution of the Michigan Children's Home society are here. In 1679 La Salle built Ft. Miami on or near the site of St. Joseph. The present city was settled in 1829, incorporated as a village in 1836, and chartered as a city in 1891.

ST. JOSEPH, a city of north-western Missouri, U.S.A., on the east bank of the Missouri river, 68 m. N. of Kansas City; a port of entry and the county seat of Buchanan county. It has a municipal airport (150 ac.) and is a station on the Chicago-Dallas airway; is on Federal highways 36 and 71; and is served by the Burlington Route, the Chicago Great Western, the Missouri Pacific, the Rock Island, the Santa Fe, the Union Pacific and two terminal switching railways. Pop. (1920) 77,939 (86% native white), 80,935 in 1930 by the Federal census. The city covers 13·86 sq.m., on bluffs above the river (graded down considerably in the business section), at an altitude of 967 ft. The parks (823 ac.) and boulevards, representing an investment of $4,000,000, contain much natural beauty and facilities for all the usual outdoor sports and recreations. There are 36 public and 11 parochial schools; 94 churches; hotels with 2,000 guest-rooms; and hospitals with 600 beds. The assessed valuation of property for 1927 was $81,869,870. Just east of the city is a State hospital for the insane (1874). St. Joseph is an important transportation, manufacturing and commercial centre. The railroads entering the city have 50,543 m. of track; paved highways run in every direction; and the headquarters and maintenance shops of the company operating the Chicago-Dallas airway service are located here. The wholesale business for 1926 was estimated at nearly $200,000,000; retail sales at $69,000,000; and the value of the manufactures produced within the city in 1927 was $49,610,610. The stock yards (in South St. Joseph) received 4,053,975 animals in 1926, of which 2,879,069 were used by the local packing-plants. Receipts of grain amounted to 27,818,069, of which nearly half was consumed in the local mills. Among the leading manufactures, after meat and cereal products (including pancake flour), are writing tablets, candy, ice-cream cones, structural iron, marble and machinery. Bank debits for 1926 aggregated $748,425,000.

In 1826 Joseph Robidoux, a French half-breed, established an Indian trading-post here, known as Blacksnake Hills. After the "Platte Purchase" in 1836 other settlers came in, and in 1843 Robidoux laid out a town, which he named in honour of his patron saint. It became the county seat in 1846 and in 1851 was chartered as a city. It developed early into an important trading centre, and was a busy outfitting point during the years of heavy travel by prospectors and other emigrants to the Rocky mountains and the Pacific coast. On April 3, 1860, the first rider of the "Pony Express" galloped out of St. Joseph (the eastern terminus of the service during the 17 months of its operation), and a year later Lincoln's inaugural address was carried through to Sacramento (nearly 2,000 m.) in 7 days and 17 hours. During the Civil War St. Joseph was held continuously by the Unionists, but local sentiment was bitterly divided. After the war a period of rapid development set in, which increased the population from 8,932 in 1860 to 19,565 in 1870, and so on to 77,403 in 1910.

SAINT-JUST, ANTOINE LOUIS LÉON DE RICHEBOURG DE (1767–1794), French revolutionary leader, was born at Decize in the Nivernais on Aug. 25, 1767. At the outbreak of the Revolution he was elected an officer in the National Guard of the Aisne. He assumed a stoical demeanour united to a tyrannical policy. He entered into correspondence with Robespierre, who, flattered by his worship, admitted him to his friendship. Thus supported, Saint-Just became deputy to the National Convention, where he made his first speech on the condemnation of Louis XVI.—gloomy, fanatical, remorseless in tone—on Nov. 13, 1792. In the Convention, in the Jacobin club, and among the populace he was dubbed the "St. John of the Messiah of the People." In the name of the Committee of Public Safety he drew up reports to the Convention upon the absorbing themes of the overthrow of the party of the Gironde (report of July 8, 1793), of the Hébertists, and finally, of that denunciation of Danton which consigned him and his followers to the guillotine. In Saint-Just's hands these so-called reports furnished the occasion for a display of fanatical daring, of gloomy eloquence, and of undoubted genius. Camille Desmoulins said of Saint-Just—the youth with the beautiful countenance and the long fair locks—"He carries his head like a Holy Sacrament." "And I," savagely replied Saint-Just, "will make him carry his like a Saint Denis." The threat was not vain: Desmoulins accompanied Danton to the scaffold.

Saint-Just proposed that the National Convention should, through its committees, direct all military movements and all branches of the Government (report of Oct. 10, 1793). This was agreed to, and Saint-Just was despatched to Strasbourg to superintend the military operations. It was suspected that the enemy without was being aided by treason within. Saint-Just "organized the Terror," and soon the heads of all suspects sent to Paris were falling under the guillotine. But there were no executions at Strasbourg, and Saint-Just repressed the excesses of J. G. Schneider, who, acting as public prosecutor to the revolutionary tribunal of the Lower Rhine, had ruthlessly applied the Terror in Alsace. Schneider was sent to Paris and guillotined. The conspiracy was defeated, the frontier was delivered and Germany invaded. On his return Saint-Just was made president of the Convention. Later, with the army of the North, he placed before the generals the dilemma of victory over the enemies of France or trial by the dreaded Revolutionary tribunal; and before the eyes of the army itself he organized a force specially charged with the slaughter of those who should seek refuge by flight. Success again crowned his efforts, and Belgium was gained for France (May, 1794).

Meanwhile affairs in Paris looked gloomier than ever, and Robespierre recalled Saint-Just to the capital. Saint-Just proposed a dictatorship as the only remedy for the convulsions of society. At last, at the famous sitting of the 9th Thermidor, he

ventured to present as the report of the committees of General Security and Public Safety a document expressing his own views, a sight of which, however, had been refused to the other members of committee on the previous evening. Then the storm broke. He was vehemently interrupted, and the sitting ended with an order for Robespierre's arrest (*see* ROBESPIERRE), which entailed that of Saint-Just. On the following day, July 28, 1794, 22 men, nearly all young, were guillotined. Saint-Just maintained his proud self-possession to the last.

See *Oeuvres de Saint-Just, précédées d'une notice historique sur sa vie* (1833–34); E. Fleury, *Études révolutionnaires* (2 vols., 1851), with which *cf.* articles by Sainte-Beuve (*Causeries du lundi*, vol. v.), Cuvillier-Fleury (*Portraits politiques et révolutionnaires*); E. Hamel, *Histoire de Saint-Just* (1859), which brought a fine to the publishers for outrage on public decency; F. A. Aulard, *Les Orateurs de la Législative et de la Convention* (2nd ed., 1905); M. Lenéru, *Saint-Just* (1922). The *Oeuvres complètes de Saint-Just* were edited with notes by C. Vellay (1908).

ST. JUST (St. Just in Penwith), a small town of Cornwall, England, 7 m. W. of Penzance. Pop. of urban district (1931) 4,356. The town lies in a wild district 1 m. inland from Cape Cornwall, which is 4 m. N. of Land's End.

ST. KILDA (Gaelic *Hirta*, "the western land"), largest of a small group of about sixteen islets of the Outer Hebrides, Inverness-shire, Scotland. It is included in the civil parish of Harris, and is situated 40 m. W. of North Uist. It measures 3 m. from E. to W. and 2 m. from N. to S. Except at the landing-place on the south-east, the cliffs rise sheer out of deep water, and on the north-east side the highest eminence in the island, Conagher, forms a precipice 1,220 ft. high.

The inhabitants, an industrious Gaelic-speaking community (110 in 1851 and 45 in 1928), are decreasing in numbers. The island is practically cut off from the world for 8 months of the year. It has been in the possession of the Macleods for hundreds of years. In 1779 the chief of that day sold it, but in 1871 Macleod of Macleod bought it back.

ST. KITTS or **ST. CHRISTOPHER,** an island in the British West Indies, forming, with Nevis and Anguilla, one of the presidencies in the colony of the Leeward islands. It is a long oval with a narrow neck of land projecting from the south-eastern end; total length 23 m., area 63 sq.m. Mountains traverse the central part from N.W. to S.E., the highest being Mount Misery (3,771 feet). The island is well watered, fertile and healthy, and its climate is cool and dry (temperature between 78° and 85° F; average annual rainfall 38 in.). The rim of land formed by the skirts of the mountains, and the valley of Basseterre are cultivable. The higher slopes of the hills afford pasturage: the summits are crowned with dense woods. Sugar, molasses, cotton, salt, coffee and tobacco are the chief products; horses and cattle are bred. Primary education is compulsory. The principal towns are Old Road, Sandy Point and the capital Basseterre, which lies on the S.W. coast (pop. about 7,000). A good macadamized road encircles the island. The local legislature consists of 6 official and 6 unofficial members nominated by the Crown. St. Kitts was discovered by Columbus in 1493 and first settled by Sir Thomas Warner in 1623. Five years later it was divided between the British and the French, but at the Peace of Utrecht in 1713 it was entirely ceded to the British Crown. Population, mostly negroes, 22,415.

SAINT-LAMBERT, JEAN FRANÇOIS DE (1716–1803), French poet, was born at Nancy on Dec. 26, 1716. He entered the army and, when Stanislaus Leszczynski was established in 1737 as duke of Lorraine, he became an official at his court at Lunéville. He left the army after the Hanoverian campaign of 1756–57, and devoted himself to literature, producing a volume of descriptive verse, *Les Saisons* (1769), now never read, many articles for the *Encyclopédie*, and some miscellaneous works. He was admitted to the Academy in 1770. His fame, however, comes chiefly from his amours. He was already high in the favour of the marquise de Boufflers, Stanislaus's mistress, whom he addressed in his verses as *Doris* and *Thémire*, when Voltaire in 1748 came to Lunéville with the marquise de Châtelet. Her infatuation for him and its fatal termination are known to all readers of the life of Voltaire. His subsequent liaison with Madame d'Houdetot, Rousseau's Sophie, proved permanent. He published in 1798 the *Principe des moeurs chez toutes les nations ou catéchisme universel*, and published his *Oeuvres philosophiques* two years before his death on Feb. 9, 1803. Madame d'Houdetot survived until Jan. 28, 1813.

See G. Maugras, *La Cour de Lunéville* (1904) and *La Marquise de Boufflers* (1907); also the literature dealing with Rousseau and Voltaire.

ST. LAWRENCE. The river St. Lawrence, in North America, with the five fresh-water inland seas (*see* GREAT LAKES), Superior, Michigan, Huron, Erie and Ontario, forms one of the great river systems of the world, having a length of 2,100 m. from the source of the river St. Louis (which rises near the source of the Mississippi and falls into the head of Lake Superior) to Cape Gaspé, where it empties into the Gulf of St. Lawrence. The river is here considered as rising at the foot of Lake Ontario, where the name St. Lawrence is first applied to it.

The river, to the point where it crosses 45° N. in its north-westerly course, forms the boundary line between the State of New York and the province of Ontario; thence to the sea it is wholly within Canadian territory, running through the province of Quebec. At Point des Monts, 260 m. below Quebec, it is 26 m. wide, and where it finally merges into the Gulf of St. Lawrence, 150 m. farther on, it is 90 m. wide, this stretch being broken by the large island of Anticosti, lying in the mouth. The character of the river banks varies with the geological formations through which it runs. Passing over the Archaean rocks of the Laurentian from Kingston to Brockville the shores are very irregular, and the river is broken up by protrusions of granite and gneiss into a large number of picturesque islands, "The Thousand Islands," frequented as a summer resort. From Brockville to Montreal the river runs through flat-bedded Cambro-Silurian limestones, with rapids at several points, which are run by light-draught passenger boats. For the up trip the rapids are avoided by canalization. From Montreal to Three Rivers the course is through an alluvial plain over-lying the limestones, the river at one point expanding into Lake St. Peter, 20 m. long by 10 m. wide, with a practically uniform depth of 10 feet. Below Three Rivers the banks grow gradually higher until, after passing Quebec through a cleft in slate rocks of Cambrian age, the river widens, washing the feet of the Laurentian mountains on its north shore; while a more moderately hilly country, terminating in the Shickshock mountains of the Gaspé Peninsula, skirts its south shore.

From Kingston, at the head of the river, to Montreal (170 m.), navigation is limited to vessels of 14 ft. draught. From Montreal to Quebec (160 m.), a ship channel has been dredged to a depth of 30 ft.; below Quebec the river is navigable by vessels of any draught. The locks of the present canals are 45 ft. wide, with an available depth of 14 ft. and a minimum length of 270 ft.; but plans are under consideration for a new ship canal allowing vessels of 25 or 30 ft. draught to enter Lake Ontario, from which the new Welland canal of the same depth leads to the Upper Lakes.

In the stretch between Montreal and Quebec the ship channel is a national work, and improvements have been undertaken to secure everywhere a minimum depth of 30 ft. and a width of 450 feet. The river from Kingston to the sea is well supplied with aids to navigation. In the dredged portions lights are arranged in pairs of leading lights on foundations sufficiently high and solid to resist the pressure of ice movement, and there is an elaborate system of fog alarms, lighted and other buoys, as well as telegraphic, wireless and telephonic communication, storm signal, weather and ice-reporting stations and a life-saving service.

Montreal, at the head of ocean navigation, the largest city in Canada, is an important distributing centre for all points in western Canada, and enjoys an extensive shipping trade with the United Kingdom. Quebec is the summer port used by the largest steamers in the Canadian trade. There are numerous flourishing towns on the river, from Kingston, a grain transferring port, to the sea. Large quantities of lumber are handled at mills along the river.

A natural highway between all points west of the Maritime Provinces and Europe, the St. Lawrence permits ocean traffic to penetrate 1,000 m. into the heart of the country. It is, moreover, the shortest freight route from the Great Lakes to Europe. From Buffalo to Liverpool via New York involves rail or barge canal transport of 496 m. and an ocean voyage of 3,034 nautical miles. Via Montreal there is a 14-ft. transport of 348 m. and river and ocean voyage of 2,772 nautical miles. From Quebec to Liverpool by Cape Race is 2,801 nautical miles, while the route by Belle Isle, more nearly a great circle course, usually taken between July and October, is only 2,633 nautical miles. On the other hand the St. Lawrence is not open in winter and the average time between the arrival of the first vessel at Montreal from sea and the departure of the last ocean vessel is seven months. From Kingston to Quebec the river freezes every winter, except at points where the current is rapid. Below Quebec, although there is border ice, the river never freezes. Efforts have been made to lengthen the season of navigation by using specially constructed steamers to break the ice; and it is claimed that the season of navigation could be materially lengthened, and winter floods prevented by keeping the river open to Montreal. Winter ferries are maintained at Quebec, between Prince Edward island and Nova Scotia, and between Newfoundland and Sydney, Cape Breton.

The river above tide water is not subject to excessive flooding, the maximum rise in the spring and early summer months, chiefly from northern tributaries from the Ottawa eastward, being 10 feet. The Great Lakes serve as impounding reservoirs for the gradual distribution of all overflows in the west. At Montreal, soon after the river freezes, there is a local rise of about 10 ft. in the level in the harbour, caused by restriction of the channel by anchor ice; and in the spring when the volume is augmented, this obstruction leads to a further rise. To prevent flooding of the lower parts of the city a dike was built in 1887 along the river front, which prevented a serious flooding in 1899.

Tides enter the Gulf of St. Lawrence from the Atlantic chiefly through Cabot strait (between Cape Breton and Newfoundland), which is 75 m. wide and 250 fathoms deep. The tide entering through Belle Isle strait, 10 m. wide and 30 fathoms deep, is comparatively little felt. The greatest range is attained in Northumberland strait and in Chaleur bay, where it amounts to 10 feet. At the entrance to the estuary at Anticosti it has again the oceanic range of about 6 ft., and proceeds up the estuary with an ever-increasing range, which attains its maximum of 19 ft. at the lower end of Orleans island, 650 m. from the ocean at Cabot strait. At Quebec, 30 m. farther up, the range is nearly as great; but at 40 m. above Quebec it is largely cut off by the Richelieu Rapids, and finally ceases to be felt at Three Rivers, at the lower end of Lake St. Peter, 760 m. from the ocean.

The St. Lawrence provides ample water-power, which is being increasingly used, and from Lake Superior to the gulf there are numerous points on its tributaries where power has been developed.

Nearly all the rivers flowing into the St. Lawrence below Quebec are stocked with salmon. In the salt water of the gulf and lower river, mackerel, cod, herring, smelt, sea-trout, striped bass and other fish are caught for market.

The St. Lawrence is spanned by the following railway bridges: (1) A truss bridge near Cornwall. (2) A truss bridge with a swing at Coteau Landing. (3) A cantilever bridge at Caughnawaga. (4) The Victoria Jubilee bridge, 6,592 ft. long by 67 ft. wide, with 25 spans, double railway and trolley tracks, driveways and sidewalks. (5) A cantilever bridge, having a central span of 1,800 ft., crosses the river at a point 7 m. above Quebec. The southern half of the superstructure, while in course of erection in August 1907, fell, killing 78 men, and necessitating a serious delay in the completion of the work.

Discovery of St. Lawrence.—The St. Lawrence was discovered by Jacques Cartier, commissioned by the king of France to explore and trade on the American coast. Cartier entered the strait of Belle Isle in 1534; but Breton fishermen had previously resorted there in summer and penetrated as far as Brest, 11 leagues west of Blanc Sablon, the dividing line between Quebec and Labrador. Cartier circled the gulf, but missed the entrance to the river. On his second voyage in 1536 he named a bay on the north shore of the gulf, which he entered on Aug. 10, the feast of St. Lawrence, *Baye Sainct Laurens*, and the name gradually extended over the whole river, though Cartier himself always wrote of the River of Canada. Early in September, he reached "Canada," now Quebec, and on Oct. 2 reached Hochelaga, now Montreal. No permanent settlement was then made. The first, Tadousac, at the mouth of the Saguenay, was established by Champlain in 1603, and Quebec was settled by him in 1608. Between that time and 1616 Champlain explored the whole river system as far west as Lake Huron, reaching it by way of the Ottawa river, and taking possession of the country in the name of the king of France. It became British by the treaty of Paris, in 1763.

See S. E. Dawson, *The St. Lawrence, its Basin and Border Lands* (New York, 1905) (historical); *St. Lawrence Pilot* (7th ed., Hydrographic Office, Admiralty, London, 1906); *Sailing Directions for the St. Lawrence River to Montreal* (United States Hydrographic Office publication, No. 108 D, Washington, 1907); *Annual Reports* of the Canadian Departments of Marine and Fisheries, Public Works, and Railways and Canals, Ottawa; *Transactions* (Royal Society, Canada, 1898–99), vol. iv. sec. iii.; T. C. Keefer on "Ice Floods and Winter Navigation of the St. Lawrence," *Transactions* (Canadian Society of Civil Engineers, Presidential Address of W. P. Anderson, on improvements to navigation on St. Lawrence, 1904). (W. P. A.)

ST. LEGER, SIR ANTHONY (*c.* 1496–1559), lord deputy of Ireland, eldest son of Ralph St. Leger, a gentleman of Kent, was educated abroad and at Cambridge. He quickly gained the favour of Henry VIII., and was appointed in 1537 president of a commission for inquiring into the condition of Ireland. In 1540 he was appointed lord deputy of Ireland. His first task was to repress disorder, and he at once proceeded with severity against the Kavanaghs, permitting them, however, to retain their lands, on their accepting feudal tenure on the English model. By a similar policy he exacted obedience from the O'Mores, the O'Tooles and the O'Conors in Leix and Offaly; and having conciliated the O'Briens in the west and the earl of Desmond in the south, the lord deputy carried an act in the Irish parliament in Dublin conferring the title of king of Ireland on Henry VIII. and his heirs. Conn O'Neill, who in the north had remained sullenly hostile, was brought to submission by vigorous measures. For the most part, however, St. Leger's policy was one of moderation and conciliation—rather more so, indeed, than Henry VIII. approved. St. Leger's personal influence was proved by an outbreak of disturbance when he visited England in 1544, and the prompt restoration of order on his return some months later. St. Leger retained his office under Edward VI., and again effectually quelled attempts at rebellion by the O'Conors and O'Byrnes. From 1548 to 1550 he was in England. He was recalled from Ireland in 1551. Under Mary he was again lord deputy from 1553 to 1556, when he was recalled on a charge of falsifying accounts. He died (March 16, 1559) before the investigation was completed.

His great-grandson, SIR WILLIAM ST. LEGER, took part in "the flight of the earls" (*see* O'NEILL) in 1607, and spent several years abroad. Having received a pardon from James I. and large grants of land in Ireland, he was appointed president of Munster by Charles I. in 1627. He supported Strafford, actively assisting in raising and drilling the Irish levies destined for the royalist service. In the great rebellion of 1641 he executed martial law in his province with the greatest severity, hanging large numbers of rebels, often without much proof of guilt. He was still struggling with the insurrection when he died at Cork on July 2, 1642.

A biography of Sir Anthony St. Leger will be found in *Athenae Cantabrigienses*, by C. H. Cooper and T. Cooper (Cambridge, 1858); *see* also *Calendar of State Papers relating to Ireland, Hen. VIII.–Eliz.*; *Calendar of Letters and Papers of the Reign of Henry VIII.*; *Calendar of State Papers* (*Domestic Series*), *Edward VI.–James I.*; *Calendar of Carew MSS.*; J. O'Donovan's edition of *Annals of Ireland by the Four Masters* (7 vols., Dublin, 1851); Richard Bagwell, *Ireland under the Tudors* (3 vols., London, 1885–90); J. A. Froude, *History of England* (12 vols., London, 1856–70). For Sir William St. Leger, see *Strafford's Letters and Despatches* (2 vols., London, 1739); Thomas Carte, *History of the Life of James, Duke of Ormonde* (6 vols., Oxford, 1851); *History of the Irish Confederation and the War in Ireland*,

edited by Sir J. T. Gilbert (Dublin, 1882–91).

ST. LEONARDS, EDWARD BURTENSHAW SUGDEN, 1ST BARON (1781–1875), lord chancellor of Great Britain, was the son of a hairdresser of Duke street, Westminster, and was born on Feb. 12, 1781. After practising for some years as a conveyancer, he was called to the bar at Lincoln's Inn in 1807, having already published his well-known treatise on the *Law of Vendors and Purchasers* (14th ed., 1862). His parliamentary career was noticeable for his opposition to the Reform bill of 1832. He was appointed solicitor-general in 1829, was lord chancellor of Ireland in 1834, and again from 1841 to 1846. Under Lord Derby's first administration in 1852 he became lord chancellor and was raised to the peerage as Lord St. Leonards. In this position he devoted himself with energy and vigour to the reform of the law; in 1855 he was offered the great seal again, but had to refuse. He died at Boyle farm, Thames Ditton, on Jan. 20, 1875.

Lord St. Leonards was the author of various important legal publications, many of which have passed through several editions. *See* J. R. Atlay, *Lives of the Victorian Chancellors,* vol. ii.

ST. LIZIER-DE-COUSERANS, a village of south-western France in the department of Ariège on the right bank of the Salat, 1 m. N.N.W. of St. Girons. Pop. (1926) 502. St. Lizier, in ancient times one of the 12 cities of Novempopulania under the name of *Lugdunum Consoranorum,* was later capital of the Couserans and seat of a bishopric (suppressed at the Revolution) to the holders of which the town belonged. It has a cathedral of the 12th and 14th centuries with a fine Romanesque cloister, and also remains of Roman ramparts. The old episcopal palace (17th century) and the adjoining church (14th and 17th centuries), once the cathedral with its fine chapter-hall (12th century) remain. The Salat is crossed by a bridge of the 12th or 13th century.

ST. LÔ, a town of north-western France, capital of the department of Manche, 47½ m. W. by S. of Caen by rail. Pop. (1926) 9,511. St. Lô, called *Briovera* in the Gallo-Roman period, owes its present name to St. Lô (Laudus), bishop of Coutances (d. 568). In the middle ages St. Lô became an important fortress and a centre for the weaving industry. In 1574, the town, which had embraced Calvinism, was stormed by the Catholics and many of its inhabitants massacred. In 1800 it was made capital of its department in place of Coutances. In the *hôtel-de-ville* is the "Torigni marble," the pedestal of an ancient statue, the inscriptions on which relate chiefly to the annual assemblies of the Gallic deputies held at Lyons under the Romans.

ST. LOUIS, the chief city of Missouri, U.S.A., is situated in a central position in the Mississippi drainage system, on the west bank of the river, about 20 m. below its confluence with the Missouri, 200 m. above the influx of the Ohio, and about 1,270 m. above the Gulf of Mexico. Area, 61·37 sq.m.; pop. (1890) 451,770; (1900) 575,238; (1910) 687,029; (1920) 772,897; (1930) 821,960 by Federal census. In 1920 the foreign born were 103,239 and negroes 69,854.

Physical Features.—The city spreads along the river front for about 19 m. and westward about 7 miles. Near the river the land rises rapidly for about ⅓ m. and then gradually, the uplands in the western part of the city being about 300 ft. above high-water mark. The city is divided into sections by shallow valleys which furnish natural routes for railroads, of which 20 enter from the east and eight from the west. The river front and these transportation routes have been the principal determining factors in the situation of industrial areas. The intervening uplands and adjacent regions are occupied by business and residential districts.

City Zones.—From 1840 to 1880 the river front was the busiest part of the city. Along the central part for 3·7 m. stretches the levee. Wharves, warehouses, wholesale and jobbing houses, lumber yards, and manufacturing plants are crowded together on the rapidly rising ground between the river and Fourth street. When the railroads took the place of the river as the principal means of transportation, the importance of the levee declined; but it is an important wholesale and manufacturing district, for several of the main railroad lines from the north and south enter along the river, and many long established businesses have remained near the river. The streets here are narrow and often poorly paved. Most of the buildings are old and ill adapted to modern commerce. River traffic has undergone somewhat of a revival, due to the establishment by the Government of a line of steel barges between St. Louis and New Orleans; barge rates are somewhat lower than railroad rates. Municipal and Government docks and warehouses have been built for the reviving river transportation.

Beginning at Fourth street and extending west to 14th on high ground between Market and Morgan streets, is the skyscraper business district. The largest retail establishments, several of them department stores, are on Olive street and Washington avenue. In this district are commercial hotels, theatres, clubs, office buildings, wholesale houses and factories. Excepting 12th street, the streets are narrow and traffic badly congested. The downtown district is extending westward. In 1923 a bond issue of $87,352,500 for public improvements was voted, including $6,000,000 for a memorial plaza and building, $5,000,000 for a municipal auditorium, and $4,000,000 for a new court house. The plaza will extend from Market street to Olive street and from 12th to 15th streets making a remarkable civic centre. At the south end are the City Hall, municipal courts and jail; at the west the Public library. Facing 12th between Market and Chestnut streets, is the new court house. Adjacent to the downtown retail district on every side are wholesale and jobbing houses, warehouses and factories. Here are most of the plants which produce shoes and shoe-making machinery, garments, drugs and medicines. To the west of the downtown district, spreading out like a fan and extending as far as Grand avenue, in the '70s was the finest residential district. This has become a shabby-looking region, densely inhabited by negroes and foreigners, but factories, warehouses, automobile sales rooms and commercial hotels are becoming predominant. In 1923 $2,600,000 were voted for a Union station plaza and $8,650,000 for street widening. Olive street has been widened from near Grand Avenue to 12th street.

Industrial Development.—St. Louis is the fifth American manufacturing city. Its advantageous position near the sources of supply of raw materials, the proximity of a vast thickly populated area and of the soft coal fields of Illinois, railroad facilities, and Mississippi electric power make it a natural centre for large industrial plants, and for jobbing and wholesale houses. There are over 3,000 factories employing about 190,000 people. Leading industries are assembling and manufacturing automobiles, shoes, drugs, chemicals, tobacco, brick, terra cotta and other clay products, railway and street cars, stoves, ranges and furnaces, steel and lead, hardware, various kinds of machinery, clothing, boxes and woodenware products. St. Louis is one of the largest centres of shoe manufacture in the United States. It is one of the largest of all markets for furs, hides, wool, horses and mules, hardwood, pine, cotton, grain, dry goods, millinery and men's hats. It is a centre for the manufacture of poultry and live stock feed and of meat packing. The total value of factory products in 1927 was $937,416,402. New industrial areas on the outskirts have developed rapidly since 1915. The metropolitan area contains over a million people, and the outlying regions are growing more rapidly than the city proper. Metropolitan St. Louis is a rapidly expanding industrial unit, but the outlying communities oppose enlarging the city boundary. Most of the water front is industrial. Stretching to the northward near the river is the North Broadway industrial section. Beginning in the levee district and running for about 5 m. to the south is the South Broadway industrial section. The extreme southern part of the city near the river is Carondelet, a third industrial area, with large grain elevators. South of downtown St. Louis is the Mill Creek section. Here a creek was dammed to furnish power for a mill, and a small lake, Chouteau's pond, was formed. When the first railroad from St. Louis to the westward was projected the valley was selected as a natural road-bed. Chouteau's pond was drained and filled in, and a giant sewer constructed. The Union station occupies a site once covered by water. The valley is now crossed by a dozen viaducts; below are railroad tracks and along these for several miles are warehouses, factories, lumber yards, elevators and stockyards.

Adjoining the Mill Creek section at the west and running south-west is the River des Péres industrial section, served by two railroads. South of this is the Oak Hill section which has grown up along a branch line of the Missouri Pacific Railroad. Many industries have abandoned their old sites and established plants on the north-western rim of the city in the Harlem Creek drainage basin. Some of the automobile and stove factories cover many acres. Adjacent to the industrial sections are densely populated tenement districts where most of the unskilled foreign born and negro labourers live. The industrial area includes several cities on the Illinois side, such as East St. Louis, National city, Madison and Granite city. The population of the east side industrial area was (1920) 101,210 (66,767 in East St. Louis). South of East St. Louis is the Cahokia power plant, which supplies power to many St. Louis industrial plants.

The Eads bridge, the first across the Mississippi at St. Louis, was completed in 1874, but was not successful until 1889, when the Terminal Railroad association was formed. In 1928 it controlled 410 m. of track, the Eads and Merchant's bridges, and the Union station, and had 200 locomotives. The McKinley bridge, built by the Illinois Traction company, is independent. In 1918 the St. Louis Municipal (or free) bridge was completed, but because of failure on the part of the city and the Terminal Railroad association to come to agreement, the "free bridge" was not used by the railroads.

Education.—The first permanent kindergarten and kindergarten training school in connection with public schools in the United States was established in St. Louis in 1873. The city maintains (1928) the Harris Teachers' college for white students, the Sumner Teachers' college for coloured students, five high schools for white and two for coloured children, four junior high schools, one vocational school, 114 elementary schools for white and 20 for coloured children, an educational museum, material from which is available for object lessons in various branches of study in all public schools, and a large stadium for high school athletics. The registration in the high schools for 1926–27 was 15,050; in the vocational and intermediate schools 3,783; and in the elementary schools 112,699. There were 3,091 in the department of instruction. The schools cost the city over $12,650,000 (56.6% of this for supervisors' and teachers' salaries). The Roman Catholic Church maintains nine high or college preparatory schools and many elementary schools. In or near St. Louis there are several excellent private schools.

Washington university (1853) is the leading institution of higher learning in St. Louis. The institution is made up of the college of liberal arts, the schools of engineering, architecture, business and public administration, graduate studies, law, medicine, dentistry and nursing, the Henry Shaw school of botany, the St. Louis school of fine arts, the extension division and the summer school. Most of the buildings are in the Tudor-Gothic style of architecture, and are of Missouri granite with Bedford stone trimmings. The faculty numbers about 500; the students, about 7,000. The endowment is nearly $16,000,000. The institution is non-sectarian. St. Louis university is a Jesuit institution founded (1818) as a Latin academy. It became a university in 1832. It is the parent school of six other prominent Jesuit colleges in the Middle West. The university is composed of the college of arts and sciences, schools of divinity, medicine, law, philosophy and science, dentistry, commerce and finance, and education, the graduate school, and a normal school, the last being at Florissant, Missouri. In addition St. Louis university has merged with it nine colleges, several of which are located in St. Louis county. The faculty numbers about 400, and the students, exclusive of those in the merged colleges, about 2,500.

Other institutions of higher learning in St. Louis or its suburbs are the Principia (Christian Scientist, 1898), Christian Brothers college (Roman Catholic, 1851), Concordia Theological seminary (Evangelical Lutheran, 1839), Xenia Theological seminary (United Presbyterian, 1920), Eden Evangelical college (German Evangelical Synod of North America, 1850), Kenrick Theological seminary (Roman Catholic, 1894), and Benton College of Law (1896).

Libraries and Museums.—St. Louis is well supplied with libraries. In addition to the libraries of Washington and St. Louis universities, there are: the Public library (726,427 books and 352,989 pamphlets), with 7 branch libraries in its own buildings, three in schools, and seven in rented or given quarters; the Mercantile library (167,619 vols.); the Missouri Historical Society, housed in the Jefferson Memorial in Forest park, possesses a collection of nearly 50,000 vols. and about 500,000 mss. which pertain primarily to the history of the Mississippi valley. The society also maintains an archaeological and historical museum and houses the Lindbergh trophies and medals.

An association of music lovers maintains a symphony orchestra. In Forest park is the open air municipal theatre, which seats 10,000. The City Art Museum in Forest park houses a valuable collection of paintings, statuary, tapestries and other works of art. The Artists' guild offers prizes to encourage artists and gives frequent art exhibits.

Newspapers; Water Supply.—The chief newspapers are the *Post-Dispatch,* the *Globe-Democrat,* the *Star* and the *Times.* Important foreign language newspapers are the *Westliche Post, Arbeiter-Zeitung, Il Pensiero* and *El Videka.* One of the largest music publishing houses in the United States is here. The chief hospitals are the Barnard Free Skin and Cancer, Barnes, Jewish, St. Louis Children's, St. Luke's, St. Mary's and the Shriners (for crippled children). There are two city hospitals.

The water works are near Chain of Rocks park in the extreme northern part of the city, where large settling basins and a filtering plant are located. The Mississippi is the source of supply. Since 1923 additional water works have been built at Howard's Bend on the Missouri river about 30 m. above its mouth, with a reservoir at Olivette.

Parks and Public Buildings.—The most notable park is Forest park (1,380 ac.), portions of which have been left wild. The western part was used for the Louisiana Purchase exposition of 1904. In the park are the City Art Museum, Jefferson Memorial, Field house, Municipal theatre, two public golf links, tennis courts, baseball and soccer fields and zoological gardens. Other large parks are Tower Grove (276 ac.), Carondelet (180 ac.), O'Fallon (166 ac.), Fairground (131.46 ac.) and Francis (60 ac.). The Missouri Botanical garden (125 ac.), one of the finest in the country, was a gift to the city from Henry Shaw (1800–89), who also endowed the botanical school of Washington university.

The city maintains over 50 small parks, gardens and playgrounds, and the Buder Recreation camp (139.05 ac.) at Valley park in St. Louis county. Of historical interest are the Old Cathedral (Catholic) and the old courthouse, the latter being the scene of the Dred Scott trial. In the settlement of estates in *ante bellum* days, slaves were often sold from the courthouse steps. The most imposing public buildings are the City Hall, new court house, Public library, Union market, Union station, Federal building, Art museum, and Jefferson memorial. Of the business buildings, the most satisfying architecturally are the Mercantile Trust, the Bell Telephone, and the Federal Reserve bank. The best churches architecturally are the New Cathedral (Roman Catholic), the Westminster Presbyterian, Christ Church Cathedral (Episcopalian), Second Baptist, St. John's Methodist Episcopal, First Church of Christ Scientist and Temple Israel.

Government.—In 1840 a police force composed of a captain, three lieutenants and 28 privates was organized. In 1841 the boundaries were enlarged and the city was divided into five wards. In 1842 voting by ballot was introduced, and an engineering department composed of the city engineer, street commissioner, and superintendent of the water works was established. A health department was created in 1843. The following year the tax-paying qualification for voters was removed. In 1859 an amendment to the charter provided that the city council was to be a one chamber body called the common council to be composed of 20 members, two from each of the wards. In 1861 the legislature established the metropolitan police of St. Louis, and placed it under the control of a board of police commissioners appointed by the governor. The mayor was an ex-officio member of the

board. The police department was then made independent of city Government. In 1866 the council was again made bi-cameral. In 1871 the number of wards was increased to at least 12.

Up to 1876 St. Louis and St. Louis county were a judicial unit, and jointly controlled the court house, jail, insane asylum and poor farm. By an act of the State legislature in 1875 provision was made for the separation of the city and county, for the city to extend its boundaries, and for a new charter. In 1876 the provisions were carried into effect. The court house, jail, insane asylum, and poor farm became the property of the city and the old county debt became a city obligation. Under the charter of 1876 the city was divided into 28 wards. The mayor was to hold office for four years and was given extensive power of appointment. The municipal assembly was bi-cameral, being composed of a council of 13 and a house of delegates composed of one member from each ward. The mayor appointed a board of public improvements composed of the street, sewer, water, harbour and wharf and park commissioners. Each commissioner was head of a department. The charter also provided for a health department, for an elective school board of 28, one from each ward, for a board of assessors, and a board of equalization.

In 1914 a new charter went into force. Under this charter the mayor holds office for four years and is given large powers of appointment and supervision. The board of aldermen is made up of a president and 28 aldermen, who hold office for four years. The board is a legislative body and has large powers, especially over money bills. The mayor appoints the members of the board of public service; this is composed of the president of the board and directors of public utilities, of streets and sewers, of public welfare and of public safety. Each is the head of a department. The department of finance is headed by a comptroller; the law department is headed by the city counsellor. The charter provides for two city courts, for a board of standardization, a board of estimate and apportionment, and a city plan commission. One of the reasons for the adoption of a new charter was the desire to safeguard the city against the machinations of politicians and political rings. To effect this, provisions were introduced for the recall of officials, for the initiation of legislation by petitions signed by 5% of the voters, and for the referendum upon ordinances if called for by 2% of the registered voters.

HISTORY

In 1762 Gilbert Antoine de St. Maxent and Pierre Laclede Liguest, merchants of New Orleans, organized a firm which obtained from the French governor of Louisiana a licence to trade with the Missouri river Indians. On Feb. 14, 1764, a party of workmen headed by Auguste Chouteau landed at the site selected by Laclede for his trading post and on the following day began work. In addition to Laclede's original party, settlers came from Cahokia; others who desired to escape from English rule in the Illinois country came, and at the end of the first year 40 families were living at St. Louis. The town was named in honour of Louis XV., whose patron saint was St. Louis, but for many years it was locally known as Laclede's village, and as Paincourt. Within its borders and in the general neighbourhood were several mounds erected by a prehistoric people.

Spanish Period.—In 1765, when the British military took possession of the Illinois country east of the Mississippi, St. Ange, the French commandant, retired with his soldiers to St. Louis, and continued to rule over that part which had been ceded to Spain in 1762, but over which Spain had not, in 1765, asserted her authority. St. Ange was left in control by the Spanish until Feb. 7, 1770, when he was superseded by Don Pedro Piernas, the first Spanish lieutenant governor of Upper Louisiana.

In 1772 the village had a population of 399 whites and 198 slaves. During the administration of St. Ange only one street had a name, the rue Royale, which now bears the prosaic name of Main street. Later the road which ran to the Bonhomme settlement (Walnut street) was known as the rue Bonhomme; Market street was the rue de la Tour; Second street, rue de l'Eglise. Modern Third street ran along rising ground in the rear of the village; there the barns were located and it was known as the rue des Granges. West and north-west of the village lay the common fields, a fenced area in which each settler could, by permission secure a lot for tillage. To the south and south-west the settlers enclosed a large tract for common pasturage and wood supply.

Excepting the Spanish officials, soldiers, and a few traders, the inhabitants were French, and all were Catholics. Families intermarried to such an extent that it is said that at the time of the transfer to the United States, two-thirds of the inhabitants were related. The traders carried on an extensive traffic with the Indian tribes along the Mississippi and Missouri rivers, and monopolized the trade with the Osage. Several large fortunes were made in furs and many families of St. Louis trace their ancestry back to the French fur traders of Spanish days. The great market was New Orleans; thither the inhabitants shipped their surplus flour and packs of furs. Of the early traders the most prominent were the Chouteaus, Auguste and Pierre, who for many years enjoyed a monopoly of the Osage trade and built up a substantial fortune.

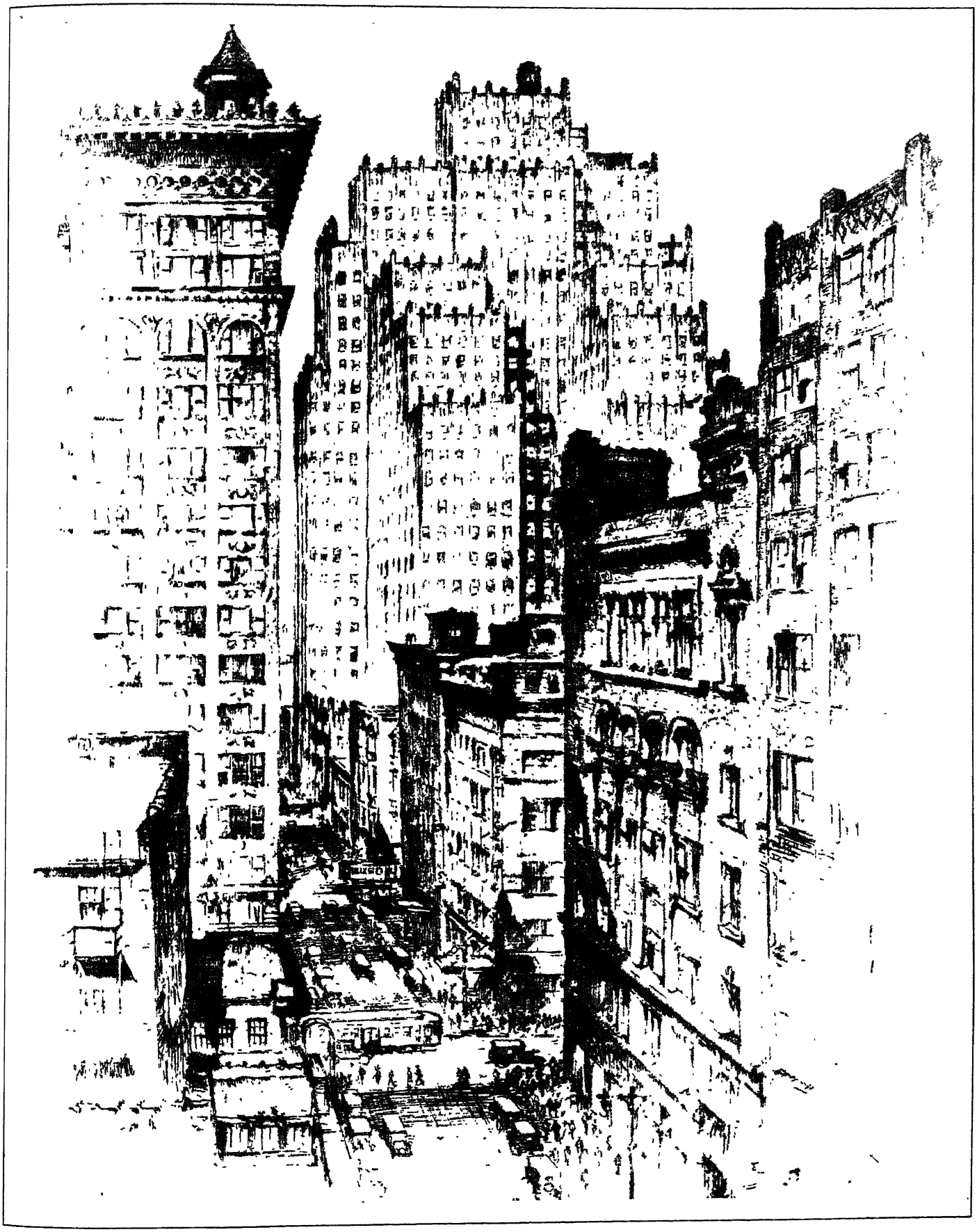
In May 1780 a force of British regulars and Indians descended on the city, but the Spanish soldiery and the settlers beat off the invaders. In 1803 about half of the inhabitants of Upper Louisiana were Americans, but few became residents of St. Louis. Under Spanish rule the town grew very slowly and at the close of the régime contained only 180 houses, most of which were scattered along two streets which ran parallel with the river.

Under American Control.—On March 9, 1804, De Lassus, the Spanish lieutenant governor, formally delivered Upper Louisiana to Captain Amos Stoddard of the United States army, who had been authorized to act as agent and commissioner of the French Republic as well as agent of the United States. In 1804 Congress created the District of Louisiana and placed it under the jurisdiction of the officers of Indiana Territory. St. Louis became the governmental headquarters for the District. In 1805 the District of Louisiana was cut off from the jurisdiction of Indiana and made into the Territory of Louisiana. St. Louis was again chosen as the seat of government. In 1812 the Territory of Missouri was created, with St. Louis still the territorial capital.

From Town to City.—In 1808, on petition of two-thirds of the inhabitants, the territorial officers incorporated the town, and a board of trustees composed of two French inhabitants and three Americans was elected. The same year the *Louisiana Gazette* was established, this being the first newspaper west of the Mississippi river. The publication of the territorial laws in 1808 marked the appearance of the first book to be printed in what is now the State of Missouri. The total revenue of the town government in 1810 was only $529.68; by 1815 the population probably did not exceed 2,600. Not until 1819 were primitive fire engines supplied by private subscription. The same year Market street from Main to the levee was paved. In 1821, at the time of the admission of Missouri to the Union, there were 621 buildings and a population of 5,600. In 1822 the State legislature incorporated St. Louis as a city. During the territorial period the composition of the population had undergone a distinct change. The French element, although still socially and financially prominent, was being engulfed by people from Virginia and Kentucky, but there was also a sprinkling of New Englanders, and the Irish were numerous enough in 1819 to form a Hibernian Benevolent society.

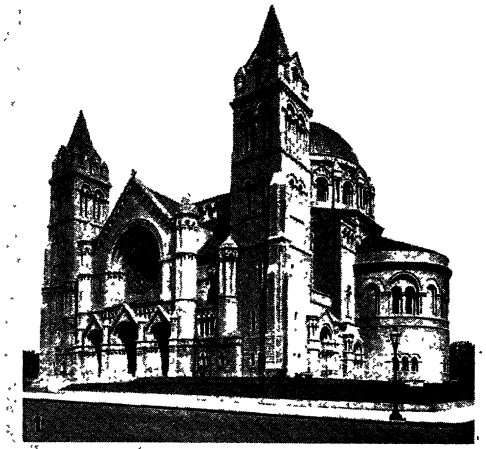
Fur Trade.—The fur trade continued to be a principal source of wealth. Up to 1809, with the exception of the original firm of Maxent, Laclede and Company, and the later Clamorgan company, the trade had been largely a matter of individual enterprise, aided occasionally by special concessions such as the Chouteau monopoly of the Osage trade.

But in 1807 Manual Lisa ascended the Missouri river and built a post at the mouth of the Big Horn and, in 1809, formed the Missouri Fur company. A rival organization headed by William H. Ashley in 1822 founded the Rocky Mountain Fur company; the American Fur company, of which John Jacob Astor was the principal figure established an office in St. Louis in 1822 and soon became the dominant factor in the fur trade. Astor retired in 1834 and the western department of the company was sold to Pratte, Chouteau and company. This organization continued to

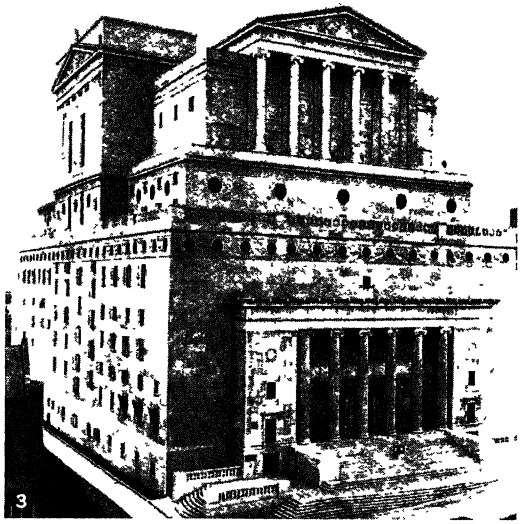


MODERN BUILDINGS IN ST. LOUIS

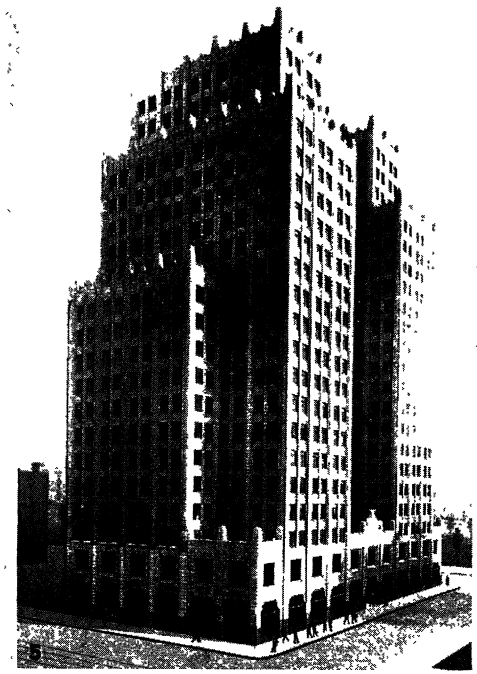
A view of Tenth Street, from an etching by Anton Schutz, showing in the background the Southwestern Bell Telephone Building (*see* Plate I.), one of the largest of recent business buildings in St. Louis

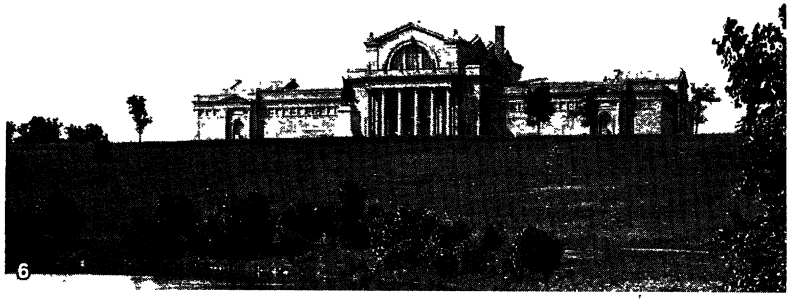














BY COURTESY OF THE ST. LOUIS CHAMBER OF COMMERCE

BUILDINGS OF ST. LOUIS

1. The Roman Catholic Cathedral (1914). Barnett, Haynes & Barnett, St. Louis, architects
2. The Jefferson Memorial, Forest Park (1913). Isaac S. Taylor, St. Louis, architect
3. The Masonic Temple (1926). Thomas C. Young and Albert B. Groves, architects
4. Aerial view of St. Louis, showing in the foreground the river frontage along the Mississippi
5. The Missouri Pacific Building. E. M. Tucker, architect; Mauran, Russell and Crowell, associates
6. The City Art Museum in Forest Park. Cass Gilbert, architect
7. Building of the Southwestern Bell Telephone Co. (1926). Mauran, Russell and Crowell, architects; I. R. Timlin, associated architect

control most of the western fur trade until 1860. St. Louis was also the outfitting place for much of the trade with the North Mexican provinces.

Immigration and River Trade.—After 1812 St. Louis attracted many settlers including a large foreign element, which, in the '20s and '30s was predominantly German. The failure of the reform movement of 1848 brought another tide of German migration. In 1840 the population was 16,469; after that the growth was rapid, the population in 1850 being 77,860 and ten years later 160,773. In 1817 steamboats began to operate to St. Louis, in 1832, 80 steamboats arrived; in 1838, 154, and in 1845, 213. In 1854 St. Louis ranked third in enrolled tonnage among American cities. After that the river traffic increased tremendously; in 1860 5,178 vessels arrived at St. Louis and 5,218 departed, the total tonnage for the year being 844,039.

In the '30s St. Louis, like other towns in the West, became interested in the development of railroads. The Pacific Railroad Company, the parent of the Missouri Pacific, was organized in 1850; the line was begun in 1851, and the first 40 m. were opened to Franklin, Mo., two years later. In 1855 it reached Jefferson city, and Sedalia in 1861. A south-western branch of the Missouri Pacific was opened to Rolla in 1861. The St. Louis and Iron Mountain railway, incorporated in 1851, was opened from St. Louis to Pilot Knob, Mo., in 1858. The St. Louis, Kansas City and Northern railway was completed as far as Macon, Mo., in 1859. Thus before the Civil War St. Louis became the terminal for four western railroads. The Ohio and Mississippi railroad, to Cincinnati, was completed in 1857; it connected with the Baltimore and Ohio railroad, thus giving St. Louis rail access to the Atlantic coast.

By 1860 the city extended for about 6½ m. along the river front and reached westward between 3 and 4 miles. Most of the houses were built of brick, as were many of the sidewalks. Soft coal was used as fuel, frequently creating a pall of smoke. Missouri was a slave State, but only 1,500 slaves were owned in St. Louis and most of these were in domestic service. The Germans and the newcomers from the North were abolitionists. Many of the business men, regardless of their views on the slavery question, were opposed to secession. They feared that a break in the Union would be injurious to business, and felt that it was vital to St. Louis to have the Mississippi river under the control of the United States.

Civil War Period.—Soon after Lincoln's election it became evident that Governor Jackson was a secessionist and intended to take the State out of the Union. He was backed by a secessionist legislature. The State Government authorized the election of delegates to assemble in convention to consider the question of the secession of Missouri. The delegates concluded that there was no adequate cause for Missouri to dissolve her connection with the Union.

The next step of the Unionists was to prevent the St. Louis arsenal from falling into the hands of the secessionists. Capt. Nathaniel Lyon, with the assistance of the "Wide Awakes," who had been transformed into military companies known as "home guards," succeeded in protecting the arsenal and in shipping most of its guns to Illinois. The governor then authorized the assembly of militia near St. Louis. A camp, named after the governor, was laid out on the western outskirt of the city. Lyon and Blair believed that the purpose of the establishment of Camp Jackson was the seizure of the city. On May 10, 1861, Lyon sent three columns of home guards to capture the camp. The force was overwhelming and Frost, the commander, surrendered without a struggle. An unfortunate outbreak of violence occurred while the prisoners were under guard and about 25 people, several of them civilians, were killed or wounded. For 48 hours the citizens were in a state of panic, but when no other acts of violence occurred, the excitement subsided, and those who had fled returned to their homes.

After the Camp Jackson episode the wavering took a firm stand on one side or the other. But it soon became evident that the city was overwhelmingly Unionist in sentiment. Lynch's "slave pen," a place where adult slaves had been sold at auction, was closed, and the slave pen where children were sold was soon transformed into a military prison. Eminent citizens hoped that the warring factions in the State might be brought into agreement by a conference of the leaders. On June 11 Gov. Jackson and Gen. Sterling Price met Blair and Lyon in a conference at the Planters' hotel, but no agreement was reached. The governor hastened to Jefferson City, issued a call for 50,000 troops, and then evacuated the capital.

Throughout the Civil War St. Louis remained a Unionist stronghold. There Gen. John C. Frémont, in command of the western department, established his headquarters, and from there Gen. Hallock directed movements in the Mississippi valley. Thousands of troops were encamped in and about the city. For many months St. Louis was under martial law; thousands of prisoners of war, and some 40,000 refugees were cared for during the war. St. Louis was the headquarters of the Western Sanitary commission which had charge of much of the war relief work.

Cultural Development.—For a quarter of a century after the Civil War the city was the centre of a remarkable philosophic and cultural movement. Its inspirer was Henry Conrad Brokmeyer (1826–1906), who later became prominent in State politics and was lieutenant governor of Missouri in 1876–1880. Brokmeyer, a Prussian from Minden, came to St. Louis in 1856. He made a translation of Hegel's *Logic,* but it was never published. Brokmeyer attracted William T. Harris, a brilliant graduate of Yale university, who taught in the St. Louis schools during 1858–67 and was superintendent of schools during 1867–80. Brokmeyer and Harris gathered about them a group of idealistic thinkers and formed a philosophical society which became the sponsor of *The Journal of Speculative Philosophy* (1867–93), the first periodical of the sort in English. For many years Harris, its editor, was the foremost exponent of Hegelian philosophy in the United States.

Economic Progress.—After the Civil War St. Louis grew with unusual rapidity; by 1870 the population was 310,864. In ten years it had almost doubled; St. Louis had become the principal distribution point for the Mississippi valley. But it soon found its supremacy challenged by Chicago, when the railroads made Chicago the terminal for lines to the Pacific coast. After 1870 the Mississippi and Ohio rivers gradually lost their importance as highways and the railroads became the great carriers of interstate commerce.

Since 1870 the history of St. Louis has been mainly economic. It has retained its prominence as a wholesale centre and has also become one of the greatest manufacturing cities in the world.

Louisiana Purchase Exposition.—In 1898 a site on the western outskirts of the city was selected for an exposition to celebrate the 100th anniversary of the purchase of Louisiana from France. The grounds covered 1,240 ac., of which 250 were under roof. The total cost, apart from individual exhibitions, was about $42,500,000, of which the National Government contributed $5,000,000 and the city and citizens of St. Louis $10,000,000. The exposition was opened to the public in 1904. During the seven months of its existence, 12,804,616 paid admissions were collected, and total admissions were 19,694,855. When the exposition closed the company had a favourable balance of about $1,000,000. Two permanent buildings remain from it, the Jefferson Memorial, the home of the Missouri Historical Society, and the Art building.

BIBLIOGRAPHY.—G. Anderson, *Story of a Border City during the Civil War* (1908); F. L. Billon, *Annals of St. Louis . . . under the French and Spanish Dominations* (1886); F. L. Billon, *Annals of St. Louis in its Territorial Days from 1804 to 1821* (1888); J. R. Cable, "Bank of the State of Missouri," Columbia university, *Studies in History, Economics, and Public Law,* Vol. cii., No. 2; R. Crawford, *The Immigrant in St. Louis* (1916); *Encyclopaedia of the History of St. Louis* (1899); L. Houck, *History of Missouri* (1908); L. Houck, *Spanish Régime in Missouri* (1909); I. Lippincott, "A Century and a Half of Fur Trade in St. Louis," in Washington university, *Studies,* iii.; R. J. Rombauer, *The Union Cause in St. Louis in 1861* (1909); J. T. Scharf, *History of St. Louis City and County* (1883); E. H. Shepard, *Early History of St. Louis and Missouri . . . 1673–1843* (1870); Eugene Smith, *Annual Statement of the Trade and Commerce of St. Louis for the Year 1923, reported to the Merchants' Exchange of St. Louis* (1924); M. S. Snow, "City Government of St. Louis," Johns Hopkins university, *Studies in Historical and Political Science,* 5th

Series, No. 4; M. S. Snow, *History of the Development of Missouri and Particularly of St. Louis* (1908); W. B. Stevens, *St. Louis, the Fourth City, 1764–1909* (1909); L. F. Thomas, "Localization of Business Activities in Metropolitan St. Louis," Washington university, *Studies,* New Series, No. 1. (T. M. M.)

ST. LOUIS, the capital of the French colony of Senegal, West Africa, with a population of 18,000, of whom 1,000 are Europeans. St. Louis, known to the natives as N'dar, is 163 m. by rail N.N.E. of Dakar and is situated on an island 11½ m. above the mouth of the Senegal river, near the right bank, there separated from the sea by a narrow strip of sand called the Langue de Barbarie. This strip of sand is occupied by the villages of N'dar Toute and Guet N'dar. Three bridges connect the town with the villages; and the Pont Faidherbe, 2,132 ft. long, affords communication with Bouetville, a suburb on the left bank, and the terminus of the railway to Dakar. The mouth of the Senegal being obstructed by a shifting bar of sand, the steamships of the great European lines do not come up to St. Louis; passengers embark and land at Dakar, on the eastern side of Cape Verde. From July to the end of September—that is during flood-time—the water over the bar is, however, deep enough to enable smaller vessels to reach St. Louis without difficulty.

St. Louis was founded in 1659 by Dieppe merchants known as the *Compagnie normande.* It is the oldest colonial establishment in Africa belonging to France. (*See* SENEGAL.) Its modern development dates from 1854. The town, however, did not receive municipal government till 1872. All citizens, irrespective of colour, can vote. From 1895 to 1903 St. Louis was not only the capital of Senegal, but the residence of the governor-general of French West Africa. There is active trade with all the countries watered by the Senegal and the middle Niger. St. Louis is connected with Brest by a direct cable, and with Cadiz via Canary Islands.

See R. Rousseau, "Le site et les origines de Saint-Louis" (*La Géographie,* vol. xliv., 1925).

ST. LOUIS-SAN FRANCISCO RAILWAY COMPANY, popularly known as "The Frisco," was incorporated on Aug. 28, 1916, as successor to a company formed in 1876, having for its purpose the construction of a railroad from St. Louis, Mo., to the Pacific coast. This original plan, however, did not fully materialize. The present railroad comprises a total of 5,801 m. of road, extending from St. Louis and Kansas City, Mo., through Missouri, Kansas, Oklahoma, Arkansas into Texas, and crossing the Mississippi river at Memphis, Tenn., it passes through Tennessee, Mississippi, Alabama and Florida to the port of Pensacola on the Gulf of Mexico. The railway serves a rapidly developing section of the United States. The more important industries in the territory are iron and steel and other manufactures in St. Louis and Kansas City, Mo., Memphis, Tenn. and Birmingham, Ala.; the mid-continent oil fields; coal mining; lead and zinc mining; live stock raising; grain and cotton growing; and fruit and dairying in the great Ozark region.

The company's capital structure consisted (1928) of $65,543,200 common stock, $49,157,400 preferred stock, and $285,542,200 bonds and equipment obligations, a total capital liability of $400,242,800. Capitalizable assets amount to $450,000,000. Gross revenues for the five years ending Dec. 31, 1927, averaged $91,704,000; surplus after all charges, except dividends, averaged $6,393,000; the corporate surplus as of Dec. 31, 1927, was $27,203,196. (J. M. KU.)

ST. LUCIA, the largest of the British Windward Islands, West Indies, in 14° N. 61° W., 24 m. S. of Martinique and 21 m. N.E. of St. Vincent. Area 233 sq.m., length 42 m., maximum breadth 12 m.; coast-line 150 m. long. It is considered one of the loveliest of the West Indian islands. It is a mass of mountains, rising steeply from the water, their summits bathed in perpetual mist.

The Pitons (2,720 and 2,680 ft.) are the chief natural feature—two immense pyramids of rock rising abruptly from the sea, their slopes, inclined at an angle of 60°, being clothed on three sides with densest verdure. In the south-west is Soufrière (about 4,000 ft.) a volcano with crater 3 ac. in area strewn with sulphur and cinders. The climate is humid, the rainfall varying from 70 to 120 in. per annum, with an average temperature of 80° F. The soil is deep and rich; the main products exported are sugar cocoa, logwood, nutmegs, mace, coconuts and copra, limejuice and lime oil. Bananas are an increasing cultivation. Snakes, including the deadly *fer de lance,* formerly prevalent, have been almost exterminated by the introduction of the mongoose. Only about a third of the island is cultivated, the rest being crown land under virgin forest, abounding in timber suitable for cabinet work. The total value of imports in 1925 was £277,013, of exports, £243,207, including bunker coal £77,399. Imports from British Empire £153,055, from United States £96,045, including coal £39,562. Exports to British empire £139,884.

Education is denominational, assisted by government grants. There are 49 schools, mostly Roman Catholic. Agriculture is taught. St. Lucia is controlled by an administrator (responsible to the governor of the Windward Islands), assisted by an executive council. The legislature consists of administrator and council of nominated members. Revenue, 1925, £75,555; expenditure £85,082. The law of the island preserves modified laws of the French monarchy.

Castries, the capital, on the north-west coast, has an excellent land-locked harbour, with a concrete wharf 650 ft. in length. It was for a time the principal coaling station of the British fleet in the West Indies, was strongly fortified, and has been the military headquarters. The troops were removed and the military works abandoned in 1905. The tonnage of steamships calling at the port in 1925 was 545,473. Pop. (1921) 5,899. Soufrière, a small town in the south, is the only other centre of any importance.

The bulk of the inhabitants are negroes, speaking a French *patois,* but English is gradually replacing it. There is a small colony of East Indian coolies, and the white inhabitants are mostly creoles of French descent. Total population (est. 1925) is 55,099.

History.—St. Lucia was probably discovered by Columbus in 1502, and named after the saint on whose day it was sighted. The Dutch are said to have built a fort there; but the first attempt to settle was made by Englishmen in 1605, when most of them were killed by the Carib inhabitants. From this time until the island became definitely a British possession in 1814 it was the scene of fiercely recurring struggles between England and France; and 13 British regiments gained the right to inscribe the name "St. Lucia" on their colours. In the first half of the 17th century it was included in royal grants made by the kings of England and France; but English settlers were long deterred by the unlucky reputation which St. Lucia gained after a second disastrous attempt at colonization in 1638, frustrated by sickness and native hostility. The French were more successful, sending settlers from Martinique in 1650, by whom a treaty was made with the Caribs ten years later. England defeated the French shortly afterwards, and regained the island, but it was restored by the Peace of Breda in 1667. Another British settlement under a grant of 1722 was frustrated by France. In 1748 the two nations agreed to regard St. Lucia as neutral. In 1762 it was captured by Rodney and Monckton, only to be given up once more at the Peace of Paris. In 1778 it again surrendered to the British who used its harbours as a naval base; and it was from Gros Islet bay that Rodney sailed before his famous victory over de Grasse in April 1782. Between 1782 and 1803 the possession of St. Lucia passed six times between England and France, England having to suppress a vigorous Revolutionist part, aided by insurgent slaves, before gaining possession in 1803, confirmed by a final cession in 1814. From this time the island was administered as a Crown colony—under Barbados from 1838–85; but after an unsuccessful petition by some of the inhabitants in 1920–21, for the substitution of representative Government, the revised constitution of 1924 introduced an elective element into the legislative council.

French influence on the development of St. Lucia has been very great, and is illustrated by the preponderance of the Roman Catholic Church and the survival of a French *patois.* In the years following 1763 French planters came from St. Vincent and Grenada and formed cotton and sugar plantations. In 1772 the population was said to number 15,000, mostly slaves. In 1834, when the

slaves were emancipated there were in St. Lucia over 13,000 negro slaves, 2,600 free negroes and 2,300 whites. Prosperity was greatly retarded by the frequent wars, by epidemics of cholera and smallpox, and by the decline of the sugar-cane industry. Improvement came with the increase of banana and cocoa cultivation, and a wider range of agriculture.

See H. H. Breen, *St Lucia: historical, statistical and descriptive* (1844); Sir C. P. Lucas, *Historical Geography of the British Colonies* (1905); and the annual reports issued by the Colonial Office. *See* also under WEST INDIES.

ST. MAIXENT (L'École), a town of western France, in the department of Deux-Sèvres, on the Sèvre Niortaise, 15 m. N.E. of Niort by rail. Pop. (1926) 4,095. The fine abbey church, built from the 12th to the 15th century, was in great part destroyed by the Protestants in the 16th century and rebuilt from 1670 to 1682 in flamboyant Gothic. There is a Romanesque nave and a lofty 15th century tower over the west front. The crypt contains the tomb of Saint Maxentius, second abbot of the monastery, which was founded about 460. The prosperity of the town was at its height after the promulgation of the edict of Nantes, when it numbered 12,000 inhabitants.

ST. MALO, a seaport of western France, capital of an arrondissement in the department of Île-et-Vilaine, 51 m. N.N.W. of Rennes by rail. Pop. (1926) 12,383.

In the 6th century the island on which St. Malo stands was the retreat of Abbot Aaron, who gave asylum in his monastery to Malo (Maclovius or Malovius), a Cambrian priest, who afterwards became bishop of Aleth (now St. Servan); the see was transferred to St. Malo only in the 12th century. In the 17th century the maritime power of St. Malo attained some importance. In November 1693 and July 1695 the English vainly bombarded it. The St. Malo shipowners financed the Rio de Janeiro expedition of Duguay-Trouin in 1711, and also lent the king large sums for carrying on the war of the Spanish Succession. In June 1758 the English inflicted great loss on the royal shipping in the harbour of St. Servan, but another expedition in the following September received a complete check. In 1778 and during the wars of the Empire the St. Malo privateers resumed their activity. In 1789 St. Servan was separated from St. Malo and in 1801 St. Malo lost its bishopric.

St. Malo is situated on the English Channel on the right bank of the estuary of the Rance at its mouth. It is a garrison town surrounded by ramparts which include portions dating from the 14th, 15th and 16th centuries, but as a whole were rebuilt at the end of the 17th century and restored in the 19th century. The most important of the gates are that of St. Vincent and the Grande Porte, defended by two massive 15th-century towers. The granite island on which St. Malo stands communicates with the mainland on the north-east by a causeway known as the "Sillon" (furrow), commanded by the old 14th and 15th century castle, flanked with four towers, one of which, the great keep, is an older and loftier structure. In the sea round about lie other granite rocks, which have been turned to account in the defences of the coast. The rocks and beach are continually changing their appearance, owing to the violence of the tides; spring-tides sometimes rise 50 ft. above low-water level, and the sea sometimes washes over the ramparts. The harbour of St. Malo lies south of the town in the creek separating it from the neighbouring town of St. Servan. Including the contiguous and connected basins belonging to St. Servan, it comprises an outer basin, a tidal harbour, two wet-docks and an inner reservoir, affording a total length of quayage of over 2 m. The wet-docks have a minimum depth of 13 to 15 ft. on sill, but the tidal harbour is dry at low water. The great bulk of trade is with England, the exports comprising large quantities of fruit, dairy-produce, early potatoes and other vegetables and slate. The principal imports consist of coal and timber. The Southern railway maintains a regular service of steamers between Southampton and St. Malo. The port carries on shipbuilding and equips a fleet for the Newfoundland cod-fisheries. The industries also include iron- and copper-founding and the manufacture of portable forges and other iron goods and rope. The town is the seat of a sub-prefect and has a tribunal of commerce.

St. Malo is largely frequented for sea-bathing, but not so much as Dinard, on the opposite side of the Rance. The town presents a tortuous maze of narrow streets and small squares lined with high and sometimes quaint buildings. Above all rises the stone spire (1859) of the cathedral, a building begun in the 12th century but added to and rebuilt at several subsequent periods.

SAINT-MARC GIRARDIN (1801–1873), French politician and man of letters, whose real name was MARC GIRARDIN, was born in Paris on Feb. 22, 1801. After a brilliant university career in Paris he began in 1828 to contribute to the *Journal des Débats,* on the staff of which he remained for nearly half a century. At the accession of Louis Philippe he was appointed professor of history at the Sorbonne and master of requests in the Conseil d'État. Soon afterwards he exchanged his chair of history for one of poetry, continuing to contribute political articles to the *Débats,* and sitting as deputy in the chamber from 1835 to 1848. He was charged in 1833 with a mission to study German methods of education, and issued a report advocating the necessity of newer methods and of technical instruction. In 1844 he was elected a member of the Academy. During the revolution of February 1848 Girardin was for a moment a minister, but after the establishment of the republic he was not re-elected deputy. After the war of 1870–71 he was returned to the Bordeaux assembly by his old department—the Haute Vienne. His Orleanist tendencies and his objections to the republic were strong, and though he at first supported Thiers, he afterwards became a leader of the opposition to the president. He died on April 1, 1873, at Morsang-sur-Seine, before Thiers was actually driven from power.

His chief work is his *Cours de littérature dramatique* (1843–1863), a series of lectures better described by its second title *De l'usage des passions dans le drame.*

See Hatzfield and Meunier, *Les Critiques littéraires du XIXe siècle* (1894).

SAINT-MARTIN, LOUIS CLAUDE DE (1743–1803), French philosopher, known as "le philosophe inconnu," the name under which his works were published, was born at Amboise on Jan. 18, 1743. While in garrison at Bordeaux he came under the influence of Martinez de Pasquales, who taught a species of mysticism drawn from cabbalistic sources, and endeavoured to found a secret cult with magical or theurgical rites. In 1771 Saint-Martin left the army to become a preacher of mysticism, first in Paris, and then in England, Italy, Switzerland and the French provinces. At Strasbourg in 1788 he met Charlotte de Boecklin, who introduced him to the writings of Jacob Boehme, and inspired in him a semi-romantic attachment. He was brought up a strict Catholic, and always remained attached to the church, although his first work, *Of Errors and Truth,* was placed upon the Index. He died at Aunay, near Paris, on Oct. 23, 1803.

His chief works are a translation of the works of Boehme; *Lettre à un ami sur la Révolution Française; Eclair sur l'association humaine; De l'esprit des choses; Ministère de l'homme-esprit.* Other treatises appeared in his *Oeuvres posthumes* (1807). Saint-Martin's ideal society was "a natural and spiritual theocracy," in which God would raise up men of mark, who would regard themselves strictly as "divine commissioners" to guide the people.

See A. J. Matter, *Saint-Martin, le philosophe inconnu* (1862); A. Franck, *La Philosophie mystique en France à la fin du dix-huitième siècle* (1866); A. E. Waite, *The Life of Louis Claude de Saint-Martin* (1901). There are English translations of *The Ministry of Man the Spirit* (1864) and of *Select Correspondence* (1863) by E. B. Penny.

ST. MARTIN, an island in the West Indies, about 5 m. S. of the British island of Anguilla in 18° N. and 63° W. It is 38 sq.m. in area and nearly triangular in form, composed of conical hills, culminating in Paradise Peak (1,920 ft.). It is the only island in the Antilles owned by two European powers; 17 sq.m. in the N., belonging to France, form a dependency of Guadeloupe, while the rest, belonging to Holland, is a dependency of Curaçao. Sugar, formerly its staple, has been succeeded by salt. The chief town of the French area is Marigot, a free port on the W. coast; of the Dutch, Philipsburg, on the S. St. Martin was first occupied by French freebooters in 1638, but ten years later the division between France and Holland was peaceably made. The inhabitants, mostly English-speaking negroes, numbered in 1924, 4,284 in the

French part, and in the Dutch about 5,000.

ST. MARYLEBONE: *see* MARYLEBONE, ST.

SAINT MARYS, a city of Auglaize county, Ohio, U.S.A., on the Saint Marys river, 85 m. W.N.W. of Columbus. It is served by the New York Central, the Nickel Plate and electric railways. Pop. (1920) 5,679 (97% native white); 1930 Federal census, 5,433. It is in the gas and oil region of the state, and has various manufacturing industries. A mile west is Lake Saint Marys (17,600 ac.), constructed as a reservoir to supply the Miami and Erie canal (abandoned about 1900), and now developed as a pleasure resort.

Saint Marys is on the site of a Shawnee village, where James Girty (captured in Pennsylvania when a boy of 13 by a French and Indian force and adopted by the Shawnees) established a trading post in 1782. For this reason the place was for some years called Girty's Town. Ft. Saint Marys was built in 1784 or 1785 by Gen. Wayne; Ft. Barbee in 1812 by Col. Joshua Barbee at the instance of Gen. Harrison. The town was laid out in 1823 and became a city in 1903.

SAINT MARYS, a borough of Elk county, Pennsylvania, U.S.A., on Elk creek and Federal highway 120, at an altitude of 1,700 ft.; served by the Pennsylvania and the Pittsburgh, Shawmut and Northern railways. Pop. (1920) 6,967; (1930) 7,433. The borough was incorporated in 1848.

ST. MAWES, seaport and market town, in Cornwall, England, on an arm of Falmouth Harbour. Pop. (1921) 1,057. There is a considerable fishing industry. The harbour is guarded by a large circular castle, *vis-à-vis* with that of Pendennis near Falmouth, and dating from the same period (Henry VIII.).

ST. MICHAEL'S (*São Miguel*), the largest island in the Portuguese archipelago of the Azores. Pop. (1911), 116,286; area, 297 sq.m. *See* AZORES.

ST. MICHAEL'S MOUNT, a lofty pyramidal island, exhibiting a curious combination of slate and granite, rising 400 yds. from the shore of Mount's bay, Cornwall, England. It is united with Marazion by a natural causeway passable only at low tide. If its questionable identity with the Mictis of Timaeus and the Ictis of Diodorus Siculus be allowed, St. Michael's Mount is one of the most historic spots in the west of England. It was possibly held by a religious body in the Confessor's time and given by Robert, count of Mortain, to Mount St. Michael, of which Norman abbey it continued to be a priory until the dissolution of the alien houses by Henry V., when it was given to the abbess and Convent of Syon. It was a resort of pilgrims, encouraged by Pope Gregory (11th century). The Mount was captured by Henry Pomeroy in the reign of Richard I. John de Vere, earl of Oxford, seized it and held it against the king's troops in 1473. Perkin Warbeck occupied it in 1497. Humphry Arundell, governor of St. Michael's Mount, led the rebellion of 1549. During the reign of Queen Elizabeth it was given to Robert, earl of Salisbury, by whose son it was sold to Sir Francis Basset, whose brother, Sir Arthur Basset, held it against the parliament until July 1646. It was sold in 1659 to Colonel John St. Aubyn and is now the property of his descendant Lord St. Leven, who has a residence in the castle. The chapel is extra-diocesan.

Many relics are preserved in the castle. The chapel of St. Michael, a beautiful 15th-century building, has an embattled tower. A few houses are built on the hillside facing Marazion, and a spring supplies them with water. The harbour, widened in 1823 to allow vessels of 500 tons to enter, has a pier dating from the 15th century. Pop. (1921) 59.

ST. MIHIEL, a town of north-eastern France, in the department of Meuse, on the right bank of the Meuse and the Canal de l'Est, 23 m. S. by E. of Verdun by rail. Pop. (1926) 4,366. St. Mihiel is famous for its Benedictine abbey of St. Michael, founded in 709. The abbey buildings (occupied by the municipal offices) date from the end of the 17th century and the beginning of the 18th century, and the church from the 17th century. The church of St. Étienne, chiefly in the flamboyant Gothic style, contains a magnificent Holy Sepulchre by Ligier Richier. St. Mihiel formerly possessed fortifications and two castles, destroyed in 1635.

Battle of St. Mihiel, 1918.—In his first conference with the commander-in-chief of the French armies, Gen. Pershing visualized the reduction of the St. Mihiel salient as the first American operation in the World War. In accordance with studies made at his headquarters in Sept. 1917, he planned that the decisive American effort would be against the German railroad system north and east of the Meuse river and the ore deposits in the vicinity of Metz and Longwy, with the elimination of the St. Mihiel salient as a necessary preliminary. Though early American control of the Woevre sector was agreed (May 19, 1918) the demands for American troops to assist the Allies in meeting the Germans elsewhere limited further steps along these lines to the creation of supply installations. At Bombon, on July 24, the commanders-in-chief, having determined to maintain the offensive, accepted Gen. Pershing's proposal that his army should undertake to reduce the St. Mihiel salient before the autumn rains began about the middle of September. This operation harmonized with the Château Thierry offensive and the British and French attacks against the Amiens and Ypres-Lys salients, made in order to free strategic railroads, preparatory to more extended operations. The counter-offensives against the Marne and Amiens salients in July and Aug. had gained such advantages that it was apparent the emergency which justified the dispersion of American divisions had passed. On Aug. 9, final decision was given for the immediate assembly of the American army for an attack against the St. Mihiel salient.

The American troops in France—at this time, over 1,200,000—were sufficient for the offensive, but they were dispersed along the front from Switzerland to the Channel. While the I. Army Headquarters, two corps and corps troops and seven divisions were operating in the Marne offensive, other American divisions were holding sectors in the Vosges and Lorraine and several were training as reserves behind the British front. To assemble these combat and service troops into an army and undertake a major operation within the short period available and with the staffs so recently organized was an extremely difficult task. Deficiencies in artillery, aviation and special troops, caused by shipment of an undue proportion of infantry and machine guns to assist the Allies, were largely met by the French. While the I. American army was given a distinct and independent mission, Gen. Pershing suggested, as expedient, that it should function under the nominal direction of Gen. Petain, the French commander-in-chief, in order to assure co-ordination on the part of the French armies adjacent to the I. army and to provide French units needed at the outset for supply services. To all intents and purposes the I. army was entirely independent of French command, as all plans were prepared and all movements and operations ordered by the commander of the I. army. The initial battle plan approved by Marshal Foch by Aug. 17, contemplated as an ultimate objective the general line: Marieulles (east of the Moselle), the heights south of Gorzé, Mars la Tour, Etain and the employment of 25 divisions under Gen. Pershing's personal direction. In furtherance of this plan, the scattered divisions, corps and service troops were first gathered in areas about Chaumont and Neufchâteau and then, beginning Aug. 28, the army advanced to its battle position.

The I. American army took command of the front from Port-Sur-Seille (east of the Moselle) to Watronville (north of Les Eparges) from the II. and VIII. French Armies on Aug. 30. On this day, at I. American Army headquarters (Ligny en Barrios), Marshal Foch discussed with Gen. Pershing a general plan for future operations and proposed employing American divisions under French command in the Champagne and Meuse-Argonne regions with a material reduction of the St. Mihiel forces in order to make available American troops for these new operations. Gen. Pershing could not accept such plans as they would require the immediate separation of the recently formed I. American army into several groups delaying further the formation of a distinct American army. Moreover, an enormous amount of preparations had already been made in supplies and munitions and in construction of roads, railroads, regulating stations and other installations for the supply of the army on a particular front. While willing to accept the employment of the American army as a unit where desired, Gen. Pershing would not entertain proposals for its dis-

ruption. At a later conference on Sept. 2, the employment of the American army as a unit was conceded and a decision reached to the effect that after reducing the St. Mihiel salient, the I. American army would attack by Sept. 25 between the Meuse river and Argonne forest (*see* MEUSE-ARGONNE BATTLE). As a result of these decisions, the depth of the St. Mihiel operation was limited to the line Vigneulles, Thiaucourt, Regnieville. The number of divisions to be used was reduced and the time shortened. There were 15 American divisions (each equal in size to two French divisions) and 4 French divisions available, 6 of which would be in reserve. Furthermore, two Army Corps headquarters and corps troops, practically all army artillery and aviation, and the 1st, 2nd and 4th divisions, the first two destined for a leading part in the St. Mihiel attack, were all due to be withdrawn and started for the Meuse-Argonne by the fourth day of the battle.

The salient had been held by the Germans since Sept. 1914. It covered the most sensitive section of the enemy's position on the western front; *i.e.*, the Mézières-Sedan-Metz railroad and the Briey Iron Basin; it threatened the entire region between Verdun and Nancy, and interrupted the main railroad line from Paris to the east. Its primary strength lay in the natural defensive features of the terrain itself. The western face of the salient extended along the rugged, heavily wooded eastern heights of the Meuse; the southern face followed the heights of the Meuse for 8 kilometers to the east and then crossed the plain of the Woevre, including within the German lines the detached heights of Loupmont and Mont Sec which dominated the plain and afforded the enemy unusual facilities for observation. The enemy had reinforced the positions by every artificial means during a period of four years. Having concentrated by night movements over 600,000 men on the battle-field, the troops of the I. Army were deployed in attack positions on the night of Sept. 11. On the south face of the salient was the I. Corps (4 divisions in line) extending from the Moselle westward. On its left was the IV. Corps (3 divisions in line) with left facing Mont Sec. These two corps were to deliver the main attack, the advance pivoting on the centre of the I. Corps. The left of the IV. Corps was to advance toward the heart of the salient where contact would be made with the V. Corps from the west. On the western face of the salient lay the V. Corps (3 divisions in line) extended from Mouilly via Les Eparges to Watronville. While the centre division made a deep advance to gain contact with the IV. Corps on the south, the rest of the corps was to limit its advance while covering the flanks of the centre division. Between the IV. and V. Corps around the apex of the salient, the II. French Corps (3 divisions in line) covering 40 km., had the mission of attacking to hold the enemy in the salient. American artillery and aviation were greatly augmented by French artillery and aviation and assisted indirectly by the British independent air force located south of Nancy. The heavy artillery could reach the railroads entering Metz.

Gen. Foch's Army Detachment C held the salient on Sept. 12 with 8 divisions in line and 3 divisions in immediate reserve. While the Germans had an inkling of a possible American attack as early as Sept. 1, the magnitude and imminence were not suspected. An American ruse at Belfort, which comprised extensive preparation for an attack in that region, proved misleading to the enemy. A decision having been made to withdraw in face of a serious attack at St. Mihiel, preparations for a deliberate and methodical withdrawal were under way, some dismounted batteries having been displaced, when the Americans launched their attack at dawn on Sept. 12.

After four hours' violent artillery preparation, accompanied by small tanks, the I. and IV. Corps advanced. The infantry of the V. Corps attacked at 8 A.M. The operation was carried out with entire precision. Just after daylight of the 13th, elements of the V. and V. Corps joined at Vigneulles, 18 km. N.E. of St. Mihiel. The enemy was overwhelmed and all objectives were reached on the afternoon of Sept. 13. During the 14th and 15th, while the two German counter-attacks were repulsed by the I. Corps, the Americans advanced along the Moselle to the line Jaulny-Pagny sur Moselle. On Sept. 14–16, local operations continued, American patrols advancing to Dampvitoux, eastern edge of Etang de Lachaussee, Jonville and Fresnes-en-Woevre. The energy and swiftness with which the operation was carried out enabled the Americans to smother the opposition to such an extent that they suffered less than 7,500 casualties during the actual period of the advance. During the battle the Germans engaged four new divisions and drew into local reserve several other divisions.

The Americans captured nearly 16,000 prisoners (over 4,000 in the salient proper), 443 guns and large stores of material and supplies. The moral result of the victory was striking. An American army had suddenly appeared and crushed the enemy in one of his strongest positions. No form of propaganda could overcome the depressing effect on the enemy of this demonstration of ability to organize a large American force in so short a time and drive it successfully through its defences. The strength of the I. American Army in the battle totalled over 500,000 Americans and 100,000 French, approximately 2,900 cannon, 400 tanks and 1,000 aeroplanes. (H. A. DR.; J. J. P.)

ST. MORITZ, the loftiest (6,037 ft.) and the most populous village of the Upper Engadine in the Swiss canton of the Grisons. In 1920 it had a population of 2,614, 1,296 being German-speaking, 632 Ladin- (*q.v.*) and 560 Italian-speaking, while 1,321 were Protestants and 1,251 Roman Catholics. It is built above the north shore of the lake of the same name (formed by the Inn), and is by rail 56 m. from Coire by the Albula railway. The village is about 1 m. north of the baths, an electric tramway connecting the two. Both are now much frequented by foreign visitors. The baths (chalybeate, sparkling with free carbonic acid) were already much resorted to in the 16th century.

ST. NAZAIRE, a town of France, capital of an arrondissement in the department of Loire-Inférieure, 40 m. W.N.W. of Nantes by rail and 29 m. by river. Pop. (1926) 35,256. According to remains discovered on excavating the docks, St. Nazaire seems to occupy the site of the ancient *Corbilo,* placed by Strabo among the more important maritime towns of Gaul. At the close of the 4th century the site of Corbilo was occupied by Saxons, and, their conversion to Christianity being effected one or two hundred years later by St. Felix of Nantes, the place took the name of St. Nazaire. Under the Second Empire it was chosen as the site of the new harbour for Nantes, because the ascent of the Loire was becoming difficult. St. Nazaire, on the Loire at its mouth, is a modern town. It possesses a granite dolmen 10 ft. by 5 ft. resting horizontally on two other stones. The harbour, accessible to largest ships, is separated from the estuary by a narrow strip of land, and comprises an outer harbour and entrance, two floating docks, three graving docks, and the extensive shipbuilding yards of the Loire Company and of the General Transatlantic Company whose steamers connect St. Nazaire with Mexico, the Antilles and the Isthmus of Panama. Ships for the navy and the mercantile marine are built, and there are important steel-works, blast furnaces, forges, and steam saw-mills. The town is the seat of a sub-prefect, and has a board of trade-arbitrators, a chamber of commerce and a tribunal of commerce.

ST. NEOTS (pronounced St. Neets), a market town in the southern parliamentary division of Huntingdonshire, England, on the right bank of the Ouse, 51½ m. N. of London by the L.N.E.R. Pop. of urban district (1931), 4,314. A stone bridge crosses the river, built in 1589 from the ruins of a former priory. The parish church of St. Mary is a fine Perpendicular building of the later 15th century. The original oak roof is noteworthy.

ST. NICOLAS, town, province of West Flanders, Belgium, 12 m. south-west of Antwerp, a railway junction on the Antwerp-Ghent line, with linen manufactories of its own, and the central market of Waes; formerly barren and bleak downs, it is now highly productive. Pop. (1925) 35,840.

ST. NICOLAS or ST. NICOLAS DU PORT, a town of north-eastern France, in the department of Meurthe-et-Moselle, on the left bank of the Meurthe, 8 m. S.E. of Nancy by rail. Pop. (1926) 5,073. The town has a fine Gothic church (15th and 16th century), possessing a finger-joint of St. Nicolas formerly the object of pilgrimages which were themselves the origin of well-known fairs. The fairs declined after 1635, when the Swedes sacked the town. Important salt-workings are nearby.

ST. OMER, a town and fortress of northern France, capital of an arrondissement in the department of Pas-de-Calais, 42 m. W.N.W. of Lille on the railway to Calais. Pop. (1926) 16,747.

Omer, bishop of Thérouanne, in the 7th century established the monastery of St. Bertin, from which that of Notre Dame was an offshoot. In the 9th century the village which grew up round the monasteries was named St. Omer. In 1559 St. Omer became a bishopric and Notre-Dame was raised to the rank of cathedral. The town and monastery were surrounded by walls by 980. Situated on the borders of frequently disputed territories, St. Omer long continued subject to siege and military disaster. In 1071 Philip I. and Count Arnulf III. of Flanders were defeated at St. Omer by Robert the Frisian. In 1127 the town received a communal charter from William Clito, count of Flanders. In 1493 it came to the Low Countries as part of the Spanish dominion. In 1677, after 17 days' siege, Louis XIV. forced the town to capitulate; and the peace of Nijmwegen permanently confirmed the conquest. In 1711 St. Omer, on the verge of surrendering to Prince Eugene and the duke of Marlborough, owing to famine, was saved by the daring of Jacqueline Robin, who brought provisions into the place. St. Omer ceased to be a bishopric in 1801.

At St. Omer begins the canalized portion of the Aa, which reaches the sea at Gravelines, and under its walls connects with the Neuffossé canal, which ends at the Lys. There are two harbours outside and one within the city. The old cathedral belongs almost entirely to the 13th, 14th and 15th centuries. A heavy square tower finished in 1499 surmounts the west portal. The church contains interesting paintings, a colossal statue of Christ seated between the Virgin and St. John (13th century, originally belonging to the cathedral of Thérouanne) and the cenotaph of St. Omer (13th century). The richly decorated chapel in the transept contains a wooden figure of the Virgin (12th century), the object of pilgrimages. Some arches and a lofty tower are all that remain of the abbey church of St. Bertin. St. Sepulchre (14th century) has a beautiful stone spire and stained-glass windows. There is a fine collection of records in the town hall, which was built of the materials of the abbey of St. Bertin. There are several houses of the 16th and 17th centuries; of the latter the finest is the Hôtel Colbert, once the royal lodging. St. Omer is the seat of a sub-prefect, of a court of assizes, of a tribunal of commerce, of a chamber of commerce, and of a board of trade arbitrators. It was the British Headquarters during part of the World War. The industries include the manufacture of linen goods, sugar, soap, tobacco-pipes and mustard, the distilling of oil and liqueurs, dyeing, salt-refining, malting and brewing.

The suburb of Haut Pont to the north of St. Omer is inhabited by a special stock, which has remained faithful to the Flemish tongue, its original costume and its peculiar customs, and is distinguished by honesty and industry. The ground which these people cultivate has been reclaimed from the marsh, and the *lègres* (*i.e.*, the square blocks of land) communicate with each other only by boats floated on the ditches and canals that divide them. At the end of the marsh, on the borders of the forest of Clairmarais, are the ruins of the abbey founded in 1140 by Thierry d'Alsace, to which Thomas Becket betook himself in 1165.

SAINTONGE, one of the old provinces of France, of which Saintes (*q.v.*) was the capital, was bounded on the north-west by Aunis, on the north-east by Poitou, on the east by Angoumois, on the south by Guienne, and on the west by Guienne and the Atlantic. It now forms a small portion of the department of Charente and the greater part of that of Charente Inférieure. Originally occupied by the Gaulish *Santones,* whose name it preserves, the district subsequently formed part of Aquitania Secunda. It formed the bishopric of Saintes and was divided into two *pagi: Santonicus* (whence Saintonge) and *Alienensis* (Aunis). Divided between the kings of England and France in 1259 it was wholly ceded to the king of England in 1360, but reconquered by Du Guesclin in 1371. Up to 1789 it was in the same *gouvernement* with Angoumois, but for judicial purposes Saintonge was under the parlement of Bordeaux and Angoumois under that of Paris.

See D. Massiou, *Histoire politique, civile et religieuse de la Saintonge et de l'Aunis* (6 vols. 1836–39; 2nd ed., 1846); P. D. Rainguet, *Biographie saintongeaise* (1852). *See* also the publications of the *Société des archives hist. de la Saintonge et de l'Aunis* (1874 *seq.*).

ST. PANCRAS, a northern metropolitan borough of London, England, bounded east by Islington, south-east by Finsbury, south by Holborn and west by St. Marylebone and Hampstead, and extending north to the boundary of the county of London. Population (1931) 198,113. In the centre of the borough are Camden Town and Kentish Town and the three great railway termini of Euston, St. Pancras and King's Cross, with their extensive goods depôts and adjacent hotels. To the south of this lies the residential district of Bloomsbury, one mainly of boarding houses and private hotels, and with several fine squares. Still further south is a shopping district adjoining the main shopping thoroughfares. North of the railway stations are the residential districts adjoining Hampstead Heath and Regent's Park, including Gospel Gate, part of Highgate and the Holly Lodge Estate (the property of the late Baroness Burdett-Coutts), which was bought in 1923 for a garden suburb. In the northern part also are considerable open spaces, the largest of which are Waterlow Park, part of Regent's Park, Parliament Hill and Fields (bought for the public in 1886) and Ken Wood, purchased in 1919. The last contains Ken Wood House, with a noted collection of pictures.

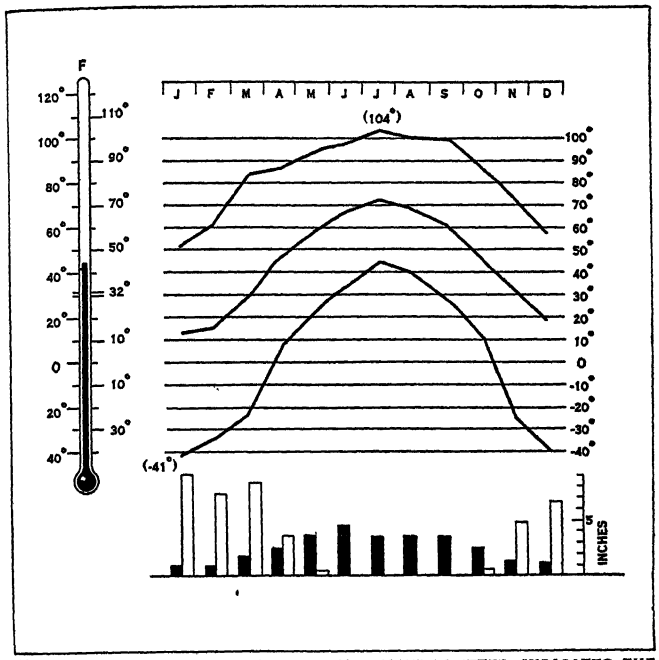
A thoroughfare, called successively Tottenham Court Road, Hampstead Road, High Street Camden Town, Kentish Town Road, and Highgate Road, runs from south to north; Euston Road crosses it in the south, and Camden Road and Chalk Farm Road branch from it at Camden Town. The parish church of St. Pancras in the Fields, near Pancras Road, has lost its ancient character owing to reconstruction, though retaining several early monuments. Among institutions, University College, Gower Street, was founded in 1826, and provides education in all branches common to universities excepting theology. With the department of medicine is connected the University College Hospital (1833) opposite the College. There are several other hospitals; among them the Royal Free Hospital (Gray's Inn Road); the North-west London hospital, Kentish Town; and, in Euston Road, the British (Forbes Winslow memorial) hospital for mental disorders, British hospital for skin diseases; and the Elizabeth Garrett Anderson Hospital for Women. The site of the Foundling Hospital (in the old Lamb's Conduit Fields) has been purchased for a playground for children, the hospital having moved to the country.

Other institutions are the London School of Medicine for Women, the Royal Veterinary College and the Aldenham Technical Institute. The Passmore Edwards Settlement, named for its principal benefactor, was founded largely through the instrumentality of Mrs. Humphrey Ward. Near Regent's Park is the site of Cumberland Market which has long been closed. The parliamentary borough of St. Pancras has north, south-east and west divisions, each returning one member. A large number of the inhabitants of the borough, particularly in the central part are employed in work connected with the railways. There are also furniture and piano-making industries which employ many people.

St. Pancras is mentioned in Domesday as belonging to the chapter of St. Paul's Cathedral, in which body the lordship of the manors of Cantelows (Kentish Town) and Totenhall (Tottenham Court) was invested. Camden Town takes its name from Baron Camden (d. 1794), lord chancellor under George III. King's Cross was so called from a statue of George IV., erected in 1830, greatly ridiculed and removed in 1845, but an earlier name, Battle Bridge, is traditionally derived from the stand of Queen Boadicea against the Romans, or from one of Alfred's contests with the Danes.

SAINT PAUL, the capital city of Minnesota, U.S.A., a port of entry, the judicial seat of Ramsey county, and Federal headquarters for the State; near the head of navigation on the Mississippi river, 2,150 m. from its mouth, just below and east of Minneapolis. It is on Federal highways 10, 12, 55, 61 and 65; has direct airmail service to Chicago, connecting there with the transcontinental airways; and is served by the Burlington Route, the Chicago Great Western, the Chicago, Milwaukee, St. Paul and Pacific, the Chicago, St. Paul, Minneapolis and Omaha, the Great

Northern, the Minneapolis and St. Louis, the Northern Pacific, the Rock Island, the Soo Line, and electric interurban railways, a terminal switching and belt line, motor coach and truck lines in all directions, and river barges. The population was 234,698 in 1920, of whom 51,595 were foreign-born white (largely from the Scandinavian countries, Germany and Canada); 1930 Federal census 271,606. The "Twin Cities" and their immediate suburbs constitute a great urban community of about 800,000.



WEATHER GRAPH OF SAINT PAUL. THE THERMOMETER INDICATES THE ANNUAL MEAN TEMPERATURE; THE MIDDLE CURVE SHOWS THE MONTHLY MEAN TEMPERATURE; THE CURVES ABOVE AND BELOW, THE HIGHEST AND LOWEST EVER RECORDED. THE COLUMNS INDICATE THE NORMAL MONTHLY PRECIPITATION: (BLACK), TOTAL PRECIPITATION (INCLUDING MELTED SNOW); (WHITE) SNOWFALL

Transportation Facilities.—Saint Paul is picturesquely located on a series of benches or terraces of irregular breadth and height, reaching a maximum of 266 ft. above the level of the river, and merging in an elevated rolling plateau. It occupies 55 sq.m., mostly on the north (or "east") bank of the Mississippi, but including an area in a bend of the river on the south side, opposite the heart of the business district. Six highway bridges and several used by railways cross the river within the city limits, connecting the main part of the city with the "west" side, and connecting Saint Paul with Minneapolis. Because of the irregular nature of the terrain and the numerous railways entering the city, there are 67 other bridges spanning railroad tracks and valleys. Saint Paul is indeed "the port of entry to the Great North-west." The nine railway systems, with 23 lines originating or terminating here, have an aggregate mileage of 59,508 m., one-fourth of the total railway mileage of the United States. They enter the city along the foot of the bluffs, or through a narrow valley giving access to the highlands back of the city. All use the fine Union Depot, completed in 1926 at a cost of $15,000,000. A switching and interchange railway, serving all the lines, handles 500,000 cars in a year. After a long period during which the river, originally the principal artery of commerce, had scarcely been used, regular barge service on the Upper Mississippi was again inaugurated (by the Inland Waterways Corporation) in the summer of 1927. By 1928 bi-weekly sailings to and from Saint Louis (where connection is made with the lower river fleet) were provided by 60 steel barges and 4 towboats. There are three municipal terminals for handling general cargo, grain, coal and ore. Twenty motor-truck lines and numerous bus lines operate in and out of the city in all directions. On the south bank of the river, opposite the river terminal, and little more than a mile from the Court House, the principal railway freight terminals, and the Bus depot, is the municipal airport (150 ac.), northern terminus of the airmail service. Two of the transcontinental railways have their general offices in Saint Paul, as well as the Chicago, St. Paul, Minneapolis and Omaha, and it is the north-western headquarters for the U.S. Railway Mail Service.

Buildings and Parks.—Dominating the view as the city is approached from the south and the east is the State capitol, standing on high ground north of the business district, a magnificent structure of Minnesota granite and white Georgia marble, with a massive central dome, designed by Cass Gilbert, and completed in 1905 at a cost of $4,500,000. There are many other fine public buildings, housing offices of the Federal, county and city Governments. Hotels, banks, office buildings and department stores are large and modern in style. The municipal auditorium, with its $60,000 organ paid for by 30,000 contributions, is ingeniously arranged so that it can be transformed in a few minutes from a theatre seating 4,000 and several smaller halls into an arena with room for 10,000 auditors. The residential sections of the city, mostly on high ground, are beautiful with trees, shrubbery and wide lawns. The most noted street, Summit Avenue, 200 ft. wide, winds for part of its length along the edge of the bluff, commanding fine views of the river gorge and the lower terraces of the city. Adjoining the city on the south-west is the Ft. Snelling Military Reservation of 2,000 ac., an important modern army post and the site of a U.S. Veterans Hospital (completed 1927). The picturesque original fort, built in 1822, still stands high on the bluff. The city's park system covers 2,243 acres. It includes 74 neighbourhood playgrounds and breathing-spaces and several large parks (up to 600 ac.) connected by drives and river boulevards. Harriet island, opposite the business section of the city, has been made a pleasure ground. Two of the parks contain large lakes and golf courses, and there are 53 lakes in the county. Indian Mounds Park (named from the Sioux burial-mounds which it encloses) on Dayton's Bluff, commands a magnificent view of the Mississippi. Next to it are the grounds of the State Fish Hatchery, one of the best equipped in the country. On the northern edge of the city, bounded by it on three sides, are the 260 ac. grounds and beautiful buildings (owned by the State) of the Minnesota Agricultural Society, the scene of the annual State fair, the largest one in the United States, with an attendance in 1927 of 442,886.

Schools and Churches.—In the north-western corner of the city, adjoining the fair grounds, is the farm campus (419 ac.) of the State university, where the schools of agriculture and the main agricultural experiment station are located. Saint Paul is the seat also of Macalester college (Presbyterian; founded in 1853 as Baldwin Institute); Hamline university (Methodist Episcopal, chartered 1854); the College of St. Thomas (Roman Catholic, 1885); the College of St. Catherine (Roman Catholic, 1909); Bethel Theological Seminary (Baptist), Luther Theological Seminary, Phalen Luther Seminary, and St. Paul Theological Seminary (Roman Catholic); the St. Paul College of Law; and a number of secondary and special training schools under various auspices, including one for the training of laboratory technicians. The public schools are housed in 82 buildings, most of them modern in construction, and the amount paid in teachers' salaries is about $2,500,000 a year. The public library occupies an entire block. In one wing is the valuable Hill Reference library, maintained by the heirs of James J. Hill, and part of his famous gallery of paintings, which included the best collection of the Barbizon school in America. The Law Library of the State (75,000 volumes) is housed in the capitol and the collection of the Minnesota Historical Society (115,000 volumes) has a fine building of its own. Five daily newspapers are published, one of them in German. The *Pioneer-Press*, established in 1853, is one of the oldest newspapers in the North-west. Saint Paul is the see of a Roman Catholic archdiocese. The Cathedral of Saint Paul is one of the notable ecclesiastical structures of the country. There are 225 churches, representing all the principal faiths and denominations. The charitable agencies which depend for support on voluntary contributions are financed through a joint annual campaign which raises about $600,000. The Community Chest and several of the larger philanthropic agencies are housed in a central administra-

tion building provided by the Amherst H. Wilder Charity, a trust fund of about $3,800,000, established in 1910 for the benefit of the poor of the city.

Administration.—Saint Paul operates under a charter adopted in 1912 and effective Jan. 1, 1914, establishing a commission form of government. Elections are held biennially. The voters elect a mayor, a comptroller, and six councilmen or commissioners; three justices of the peace, two municipal judges, and four constables. The mayor assigns each commissioner to one of the six departments of government (public safety, public works, public utilities, parks and public buildings, finance and education) as its administrative head. The mayor is *ex officio* president of the council, and has the veto power over its acts, but they may be passed over his veto by four votes. The comptroller is also the Civil Service Commissioner. In 1921 a proposal to change back to the Federal form of Government was defeated at the polls. A City Planning Board was created in 1918. In 1922 it submitted a general city plan, and in 1924 a zoning ordinance was adopted. In comparison with other large American cities, Saint Paul, like its neighbour Minneapolis, has a low general death rate, a low infant mortality, little illiteracy, a small number of children employed for wages, a high percentage in school, a high percentage of home ownership, and an index figure for cost of living which is below the average. The assessed valuation of property for 1927 was $268,016,536.

Trade and Manufactures.—Saint Paul has always been a natural distributing centre for the North-west. Its wholesale and jobbing trade amounts to $750,000,000 annually. Imports for the customs district in 1927 were valued at $7,274,060. It is the third largest millinery jobbing centre of the country, and has for many years been the leading wholesale centre in the North-west for furs, shoes, drugs, groceries, cigars and hardware. The stock-yards at South Saint Paul (adjoining the city limits of Saint Paul), where the meat-packing industry is concentrated, rank third among the livestock markets of the country. Since 1910 the importance of Saint Paul as a manufacturing city has increased rapidly, until in 1927 its aggregate factory output was valued at $160,330,540. The largest single industry is the great assembling plant of the Ford Motor Company, its largest manufacturing unit outside of Detroit, occupying 200 ac. on the river, at the government high dam, and costing altogether some $16,000,000 to construct. The first unit was opened on May 8, 1925, and $40,000,000 worth of finished products were turned out by the end of 1926. In 1928 it had a force of 2,500 employees, and was producing an average of 5,500 cars a month. Among the other leading industries are railway car building and repair of rolling stock, foundries and machine shops, and the manufacture of fur goods, shoes, clothing, hats and caps, grass carpets, refrigerators, machinery, soft drinks, law books and farm publications, paper products, paints and varnishes, sandpaper, butter, candy and coke. Flour-milling has increased rapidly in recent years. One of the bakeries, with a capacity of 6,000 pound-loaves of bread per hour, is equipped with automatic machinery which takes the dough from the mixing-machine and carries it, untouched by a human hand, through all the processes until the baked loaf is wrapped for shipping. The city has an important agricultural industry in the production of mushrooms, which are raised in large quantities in the caves in the sandstone bluffs on the west side of the river. Saint Paul has 32 banks, with total resources of $185,084,125. Debits to individual accounts in 1927 amounted to $2,054,516,413. The Federal Land Bank and the Federal Intermediate Credit Bank for the North-west, both located in Saint Paul, made agricultural loans in 1927 aggregating $138,000,000.

History.—The site of Saint Paul was known to the Indians as *Innijiska,* the White Rock. It was occasionally used as a camping place, but it was not until about 1800 that an Indian village was established here. The first white visitor of record was the Jesuit missionary, Father Louis Hennepin, in 1680, but probably the traders Radisson and Groseilliers were here in 1658. La Salle mentions the locality in a letter written in 1682. In 1766 Jonathan Carver (*q.v.*) of Connecticut made an adventurous journey by way of Mackinac across Wisconsin and into Minnesota, and his heirs claimed the entire site of Saint Paul and much adjacent territory on the ground of an alleged grant made to him by the Indians. In 1805 Lieut. Zebulon M. Pike, sent by Jefferson to take possession of the region, bought most of the ground now occupied by the city, as well as the Ft. Snelling reservation, from the Sioux for 60 gal. of whiskey and a few presents, to which Congress later added $2,000 in cash. In 1823 the first steamboat made its way up the river. In 1837 the site was opened to settlement. By 1840 there were about 200 settlers, mainly French, living by hunting, fishing and trading. To them came Father Lucien Gaultier, and under his guidance they built a church of logs in 1841 on the crest of the bluff and dedicated it to Saint Paul. The place came to be known as Saint Paul's Landing, later shortened to Saint Paul. On the organization of the Territory of Minnesota in 1849, the village of 32 houses was designated as the capital. It was incorporated as a city in 1854.

ST. PAUL, a volcanic island in the southern Indian ocean, in 38° 42′ 50″ S., 77° 32′ 29″ E., 60 m. S. of Amsterdam island, belonging to France. The island was attached to the general government of Madagascar by decree (1924) at the same time as other islands of the southern seas. The two islands belong to two separate eruptive areas characterized by quite different products; and the comparative bareness of St. Paul contrasts with the dense vegetation of Amsterdam. On the north-east of St. Paul, which has an area of 2¾ sq.m., is a land-locked bay, representing the old crater, with its rim broken down on one side by an explosion, forming a natural harbour. The highest point is 862 ft. above the sea. Inaccessible cliffs occur on the south-west side. The oldest rocks are a trachyte which occurs at Nine Pin rock; this was followed by an extrusion of basalts, then by basic lavas, scoriae, palagonite tuffs, and basaltic ashes and finally basalt flows proceeded from the crater. The only remaining indications of volcanic activity are the warm springs and emanations of carbon dioxide. The island is uninhabited but the waters are well stocked with fish (*see* C. Vélain, "St. Paul et Amsterdam," *Annales de Géographie,* t. ii., p. 329).

ST. PAUL'S ROCKS, a number of islets in the Atlantic, nearly 1° N. of the equator and 540 m. from South America, in 29° 15′ W. The whole space occupied does not exceed 1,400 ft. in length by about half as much in breadth. Besides sea-fowl the only land creatures are insects and spiders. Fish are abundant, seven species being collected by the "Challenger." Darwin considered the rocks not of volcanic origin; later investigators maintain that they probably are eruptive.

ST. PETER, a city of southern Minnesota, U.S.A., on the west bank of the Minnesota river, 75 m. S.W. of Minneapolis; the county seat of Nicollet county. It is served by the Chicago and North Western and the Chicago, St. Paul, Minneapolis and Omaha railways, and by motor bus lines. The population was 4,811 in 1930. St. Peter is an important grain and lumber market, and is the seat of a State hospital for the insane and of Gustavus Adolphus college (Swedish Evangelical Lutheran, 1862). The city was founded about 1852, incorporated as a village in 1865, and chartered as a city in 1891. In 1857 a bill making it the State capital passed the legislature, but was not signed by the governor.

ST. PETER PORT, the chief town of Guernsey, one of the Channel Islands. Pop. (1921) 16,215. It lies picturesquely on a steep slope above its harbour, on the east coast of the island. The harbour is enclosed by breakwaters, the southernmost of which connects with the shore and continues beyond an islet on which stands Castle Cornet (12th century). A sea wall extends more than a mile towards the port of St. Sampson's, which is connected with St. Peter Port by an electric tramway. To the south of the town is Fort George. The old boundaries of the town are marked by five stones. St. Peter's, the town church, standing low by the side of the quay, dates from various periods, with possible remnants of Norman walls, and has fine details of the 14th and 15th centuries. The Elizabeth college for boys was founded by Queen Elizabeth. Hauteville house, the residence of Victor Hugo from 1856 to 1870, is preserved as he left it, and the authorities of the city of Paris are now its trustees. Among other works which he produced in this island fastness was *Les Travailleurs de la Mer*

(1863), unsurpassed even among the works of its author for splendour of imagination and for pathos.

The original harbour was built under King Edward I., if not earlier; it was added to under Queen Elizabeth, and outside this harbour lay a roadstead, landward of the islet of Castle Cornet. Most of this roadstead was enclosed by breakwaters in the mid 19th century, and the large harbour thus formed has had its quayage increased (in 1928) by the building of a jetty projecting out into the pool. A large export trade in fruit, vegetables and flowers is carried on.

ST. PETERSBURG: *see* LENINGRAD.

SAINT PETERSBURG, a city of Pinellas county, Florida, U.S.A., on the west coast, 20 m. S.W. of Tampa; served by the Atlantic Coast Line and the Seaboard Air Line railways and ocean steamship lines. The population was 47,829 in 1927 (special enumeration under supervision of Federal Census Bureau); 1930, 40,425 (Federal census). The city covers 105 sq.m. (55 sq.m. of land) on the southern tip of the Pinellas peninsula, with the Gulf of Mexico on the west and Tampa bay on the south and east; it is connected with the mainland by the Gandy automobile bridge (7 m. long) and with the Gulf beaches by a great causeway. It has 33 m. of water front (6 m. owned by the city), a municipal landing field, 100 hotels, an assessed valuation of $157,040,300, and a commission form of government. The setting is sub-tropical, the climate mild and equable, with an average of only six or seven days in the year on which there is no sunshine. The post-office is an "open-air" building, an unenclosed arcade around the outside forming the corridors for the public. The city is a summer and a winter resort, and a shipping point for fish, fruit and winter vegetables. The commerce of its harbour amounted in 1927 to 494,852 tons; and its manufacturing industries had an output in 1927 valued at $4,194,871. There were fishermen and citrus-growers living on the peninsula long before the railroad reached it in 1885. A town government was organized in 1887 and the city was chartered in 1903. In 1900 the population was 1,575; in 1920, 14,237; in 1925 (State census), 26,847 (31% negroes); and in 1928 it was estimated at 53,300.

SAINT-PIERRE, BERNARDIN DE (1737–1814), French man of letters, was born at Havre on Jan. 19, 1737. He was educated at Caen and at Rouen, and became an engineer. According to his own account he served in the army, taking part in the Hesse campaign of 1760, but was dismissed for insubordination, and, after quarrelling with his family, was in some difficulty. He appeared at Malta, St. Petersburg, Warsaw, Dresden, Berlin, holding brief commissions as an engineer and rejoicing in romantic adventures. He came back to Paris in 1765 poorer than he set out. He came into possession of a small sum at his father's death, and in 1768 he set out for the Isle of France (Mauritius) with a government commission, and remained there three years, returning home in 1771. On his return from Mauritius he was introduced to D'Alembert and his friends, but he was most attracted to J. J. Rousseau, of whom in his last years he saw much, and on whom he formed both his character and his style. His *Voyage à l'Île de France* (2 vols., 1773) gained him a reputation as a champion of innocence and religion, and in consequence, through the exertions of the bishop of Aix, a pension of 1,000 livres a year. The *Études de la nature* (3 vols., 1784) was an attempt to prove the existence of God from the wonders of nature.

His masterpiece, *Paul et Virginie*, appeared in 1789 in a supplementary volume of the *Études*, and his second great success, much less sentimental and showing not a little humour, the *Chaumière indienne*, not till 1790. In 1792 he married a very young girl, Félicité Didot, who brought him a considerable dowry. For a short time in 1792 he was superintendent of the Jardin des Plantes, and on the suppression of the office received a pension of 3,000 livres. In 1795 he became a member of the Institute. After his first wife's death he married in 1800, when he was sixty-three, another young girl, Désirée Pelleport, and is said to have been very happy with her. On Jan. 21, 1814 he died at his house at Eragny, near Pontoise.

Paul et Virginie has been pronounced gaudy in style and unhealthy in tone. Bernardin's merit lies in his breaking away from the arid vocabulary which more than a century of classical writing had brought upon France, in his genuine preference for the beauties of nature, and in his attempt to describe them faithfully. After Rousseau, and even more than Rousseau, Bernardin was in French literature the apostle of the return to nature, though both in him and his immediate follower Chateaubriand there is still much mannerism and unreality.

Aimé Martin, disciple of Bernardin and the second husband of his second wife, published a complete edition of his works in 18 volumes (1818–20), afterwards increased by seven volumes of correspondence and memoirs (1826). *Paul et Virginie*, the *Chaumière indienne*, etc. have often been separately reprinted. *See* also Arvède Barin's *Bernardin de Saint Pierre* (1891).

SAINT-PIERRE, CHARLES IRÉNÉE CASTEL, ABBÉ DE (1658–1743), French writer, was born at the Château de Saint-Pierre l'Église near Cherbourg on Feb. 18, 1658. His father was *bailli* of the Cotentin, and Saint-Pierre was educated by the Jesuits. In Paris he frequented the salons of Madame de la Fayette and of the marquise de Lambert. He was presented to the abbacy of Tiron, and was elected to the Academy in 1695. In the same year he gained a footing at court as almoner to Madame. But in 1718, in consequence of the political offence given by his *Discours sur la polysynodie*, he was expelled from the Academy. He died in Paris on April 29, 1743.

Saint-Pierre's works are almost entirely occupied with an acute criticism of politics, law and social institutions. They had a great influence on Rousseau, who left elaborate examinations of some of them, and reproduced not a few of their ideas in his own work. His *Projet de paix perpétuelle*, which was destined to exercise considerable influence on the development of the various schemes for securing universal peace which culminated in the Holy Alliance, was published in 1713 at Utrecht, where he was acting as secretary to the French plenipotentiary, the Abbé de Polignac.

His works were published at Amsterdam in 1738–40 and his *Annales politiques* in London in 1757. A discussion of his principles, with a view to securing a just estimation of the high value of his political and economic ideas, is given by S. Siégler Pascal in *Un Contemporain égaré au XVIII^e siècle. Les Projets de l'abbé de Saint-Pierre, 1658–1743* (Paris, 1900).

ST. PIERRE and **MIQUELON,** the largest islands of two small groups 10 m. off the south coast of Newfoundland; united area about 93 sq.m. Both islands are rugged masses of granite, with a few small streams and lakes, a thin covering of soil and scanty vegetation. Area of St. Pierre group, 10 sq.m.; pop. (1921), 3,419. Area of Miquelon group, 83 sq.m.; pop. (1921), 499.

The islands were occupied by the French in 1660, and fortified in 1700. In 1702 they were captured by the British, and held till 1763, when they were given back to France as a fishing station. They are thus the sole remnant of the French colonies in North America. Taken by the English in 1778, restored to France in 1783, again captured and depopulated by the English in 1793, recovered by France in 1802 and lost in 1803, the islands have remained in undisputed French possession since 1814 (Treaty of Paris). Their importance is due to their proximity to the great Banks, which makes them the centre of the French Atlantic cod fisheries. Fishing lasts from May till October, when the population of the island is greatly increased. Two-thirds of the vessels are fitted out from St. Pierre, the chief town on the islands, the remainder coming from St. Malo, Cancale and other French coast towns. Primary education is free, with two schools for boys and three for girls, besides private schools. A Governor, since 1921, organizes the various public services, with the aid of a consultative council of administration and the municipal councils. St. Pierre has cable communication with Europe and America.

See Henrique, *Les Colonies françaises*, t. ii. (Paris, 1889); Levasseur, *La France*, t. ii. (Paris, 1893); *L'Année coloniale*, yearly since 1899, contains statistics and a complete bibliography; St. Pierre and Miquelon (Foreign Office Handbooks) 1920; *Annuaire des Îles de St. Pierre et Miquelon* (St. Pierre).

ST. POL, COUNTS OF. The countship of St. Pol-sur-Ternoise in France (department of Pas-de-Calais) belonged in the 11th and 12th centuries to a family surnamed Candavène. Elizabeth, heiress of this house, carried the countship to her husband, Gaucher de Châtillon, in 1205. By the marriage of Mahaut de Châtillon with Guy VI. of Luxembourg, St. Pol passed to the

house of Luxembourg. It was in possession of Louis of Luxembourg, constable of France, who was beheaded in 1475. The constable's property was confiscated by Louis XI., but was subsequently restored in 1488 to his granddaughters, Marie and Françoise of Luxembourg. Marie (d. 1542) was countess of St. Pol, and married François de Bourbon, count of Vendôme. Their son, François de Bourbon, count of St. Pol (1491–1545), was one of the most devoted and courageous generals of Francis I. Marie, daughter of the last-mentioned count, brought the countship of St. Pol to the house of Orleans-Longueville. In 1705 Marie of Orleans sold it to Elizabeth of Lorraine-Lillebonne, widow of Louis de Melun, prince of Épinoy, and their daughter married the prince of Rohan-Soubise, who thus became count of St. Pol. (M. P.)

ST. POL-DE-LÉON, a town of north-western France, in the department of Finistère, about 1 m. from the shore of the English Channel, and 13½ m. N. of Morlaix by the railway to Roscoff. Pop. (1926) 3,689. In the 6th century a Welsh monk, Paul, became bishop of the small town of Léon, and lord of the domain in its vicinity, which passed to his successors and was increased by them. St. Pol-de-Léon is a quaint town with several old houses. The cathedral (13th and 14th centuries) is largely in the Gothic style. The west front has a projecting portico and two towers with granite spires. Within the church there are beautifully carved stalls of the 16th century, a wooden shrine containing the bell of St. Pol-de-Léon, said to cure headache and diseases of the ear, and a huge baptismal font, popularly regarded as the stone coffin of Conan Meriadec, king of the Bretons. Notre Dame du Kreizker is mainly late 14th century. Fishing is carried on.

ST. PÖLTEN, an old town and bishopric in Lower Austria, lies on the left bank of the Traisen, a tributary of the Danube. Inhabited since the Roman period, the modern town grew up around an abbey founded there in the 9th century and dedicated to St. Hippolytus, whose name in corrupted form was adopted for the town. St. Pölten is an important railway junction and has a considerable development of industries, notably cotton-spinning and the manufacture of iron and hardware. In addition, several religious institutions have grown up around the old abbey church. Pop. (1923), 23,000.

SAINT PRIEST, EMMANUEL LOUIS MARIE GUIGNARD, VICOMTE DE (1789–1881), French politician, third son of the following, took part in the invasion of France in 1814. At the Restoration he was in the service of the duke of Angoulême, and during the Hundred Days tried to raise Dauphiné in the royal cause. He served in Spain in 1823, and after two years at Berlin became French ambassador at Madrid, where he negotiated in 1828 the settlement of the Spanish debt. After the July revolution Frederick VII. made him a grandee of Spain with the title of duke of Almazan. He arranged the escapade of the duchess of Berry in Provence in 1832, and was imprisoned for 10 months. He arranged an asylum in Austria for the duchess, and returned to Paris, where he was a leader of legitimist society until his death at Saint Priest, near Lyon on Feb. 26, 1881.

SAINT PRIEST, FRANÇOIS EMMANUEL GUIGNARD, CHEVALIER, then COMTE DE (1735–1821), French statesman, was born at Grenoble on March 12, 1735. He entered the army at the age of fifteen, leaving it in 1763 with the grade of colonel. After four years as representative of the court of France at Lisbon, he went to Constantinople, where he remained, with a short interval, until 1785, and married Wilhelmina von Ludolf, daughter of the Neapolitan ambassador. After a few months at the Hague, he joined Necker's ministry as minister without portfolio, and in Necker's second cabinet held office as minister of the interior until Dec. 1790. In 1795 he joined the comte de Provence at Verona as minister of the household. He followed the exiled court to Blankenburg and Mittau, retiring in 1808 to Switzerland.

He wrote *Mémoires sur l'ambassade de France en Turquie et le commerce des français dans le Levant* (ed. C. Schefer, 1877); and *Examen des assemblées provinciales* (1787).

ST. PRIVAT, a village of Lorraine, 7 miles N.W. of Metz. The village and the slopes to the west played a great part in the battle of Gravelotte (Aug. 18, 1870). (*See* METZ and FRANCO-GERMAN WAR.) At St. Privat occurred the famous repulse of the Prussian Guard by Marshal Canrobert's corps.

ST. QUENTIN, a manufacturing town of northern France, capital of an arrondissement in the department of Aisne, 32 m. N.N.W. of Laon by rail. Pop. (1926) 48,525. St. Quentin (anc. *Augusta Veromanduorum*) stood at the meeting-place of five military roads. In the 3rd century it was the scene of the martyrdom of Gaius Quintinus. The date of the foundation of the bishopric is uncertain, but about 532 it was transferred to Noyon. Towards the middle of the 7th century St. Eloi (Eligius), bishop of Noyon, established a collegiate chapter at St. Quentin's tomb, which became a famous place of pilgrimage. The importance of the town was increased during the middle ages by the rise of its cloth manufacture. The town was surrounded by walls in 883. It became under Pippin, grandson of Charlemagne, one of the principal domains of the counts of Vermandois, and in 1080 received from Count Herbert IV. a charter which was extended in 1103. From 1420 to 1471 St. Quentin was occupied by the Burgundians. In 1557 it was taken by the Spaniards (*see* below). Two years later the town was restored to the French, and in 1560 it was assigned as the dowry of Mary Stuart. During the Franco-Prussian War St. Quentin repulsed the German attacks of Oct. 8, 1870; and in January 1871 it was the centre of the great battle fought by General Faidherbe. In the World War St. Quentin was held by the Germans from the end of Aug. 1914 to Oct. 1, 1918. For the battles of St. Quentin, *see* below.

The town stands on the right bank of the Somme, at its junction with the St. Quentin canal (which unites the Somme with the Scheldt) and the Crozat canal (which unites it with the Oise). The collegiate church of St. Quentin, a fine Gothic building of the 12th, 13th, 14th and 15th centuries, damaged during the war, was reopened in 1920. It has no west façade but terminates at that end in a tower and portal of Romanesque architecture; it has double transepts. The choir (13th century) has remains of a choir-screen of the 14th century. Under the choir is a crypt of the 11th century, containing the tombs of St. Quentin (Quintin) and his fellow-martyrs Victoricus and Gentianus. The hôtel-de-ville of St. Quentin (only slightly damaged), is a Gothic building of the 14th, 15th and 16th centuries, with a flamboyant façade, adorned with curious sculptures. St. Quentin is the seat of a sub-prefect, of a tribunal of commerce, of a board of trade-arbitrators, and a chamber of commerce. The town has recovered its industrial activity and is the centre of a district which manufactures cotton and woollen fabrics. St. Quentin produces chiefly window-curtains and carries on the spinning and preliminary processes and the bleaching and finishing. Other industries are the making of embroideries by machinery and by hand, and the manufacture of iron goods, machinery and chemical products. Trade is in grain, flax, cotton and wool.

1. **Battle of 1557.**—An army of Spaniards under Emmanuel Philibert of Savoy, invading France from the Meuse, joined an allied contingent of English troops under the walls of St. Quentin, which was then closely besieged. Admiral Coligny threw himself into the town, and the old Constable Montmorency prepared to relieve it. On St. Lawrence's Day, Aug. 10, the relieving column reached the town without difficulty, but time was wasted in drawing off the garrison, for the pontoons intended to bridge the canal had marched at the tail of the column, and when brought up were mismanaged. The besiegers, recovering from their surprise, formed the plan of cutting off the retreat of the relieving army. Montmorency had thrown out the necessary protective posts, but at the point which the besiegers chose for their passage the post was composed of poor troops, who fled at the first shot. Thus, while the constable was busy with his boats, the Spanish army filed across the Bridge of Rouvroy, some distance above the town, with impunity, and Montmorency, in the hope of executing his mission without fighting, refused to allow the cavalry under the duc de Nevers to charge them, and miscalculated his time of freedom. The Spaniards, enormously superior in force, cut off and destroyed the French gendarmerie who formed the vanguard of the column, and then headed off the slow-moving infantry south of Essigny-le-

Grand. Around the 10,000 French gathered some 40,000 assailants with forty-two guns. The cannon thinned their ranks, and at last the cavalry broke in and slaughtered them. Yet Coligny gallantly held St. Quentin for seventeen days longer, Nevers rallied the remnant of the army and, garrisoning Péronne, Ham and other strong places, entrenched himself in front of Compiègne, and the allies, disheartened by a war of sieges and skirmishes, came to a standstill. Soon afterwards Philip, jealous of the renown of his generals and unwilling to waste his highly trained soldados in ineffective fighting, ordered the army to retreat (Oct. 17), disbanded the temporary regiments and dispersed the permanent corps in winter quarters.

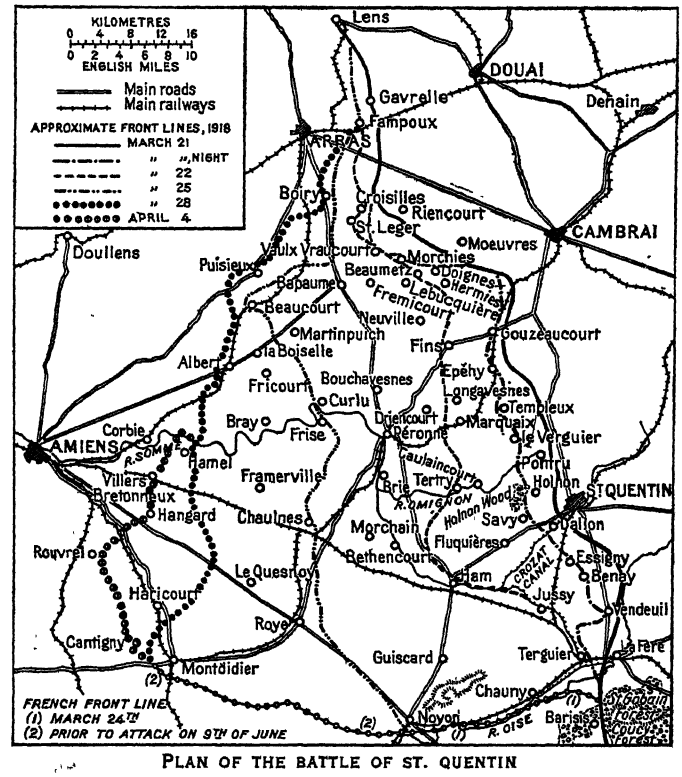
2. **The Battle of 1871.**—This was fought between the German I. Army under General von Goeben and the French commanded by General Faidherbe. The latter concentrated about St. Quentin on Jan. 18, and took up a defensive position on both sides of the Somme Canal. The Germans, though inferior in numbers, were greatly superior in discipline and training, and Goeben boldly decided to attack both wings of the French together on the 19th. The attack took the customary enveloping form. After several hours' fighting it was brought to a standstill, but Goeben, using his reserves in masterly fashion, drove a wedge into the centre of the French line between the canal and the railway, and followed this up with another blow on the other bank of the canal, along the Ham road. This was the signal for a decisive attack by the whole of the left wing of the Germans, but the French offered strenuous resistance, and it was not until four o'clock that Faidherbe made up his mind to retreat. By skilful dispositions and orderly movement most of his infantry and all but six of his guns were brought off safely, but a portion of the army was cut off by the victorious left wing of the Germans, and the defeat, the last act in a long-drawn-out struggle, was sufficiently decisive to deny to the defenders any hope of taking the field again without an interval of rest and reorganization. Ten days later the general armistice was signed. (*See* further FRANCO-GERMAN WAR.)

ST. QUENTIN, BATTLE OF, 1918. This is the name commonly given to the first phase of the great offensive of the Germans in 1918, by which they hoped to gain a military decision before the inflow of American reinforcements, the exhaustion of their food supplies under the stranglehold of the British Navy, and the obvious weakening of their allies could definitely turn the scales against them. The strategic conditions under which the offensive of March 21, 1918, was launched on the front north and south of St. Quentin are recounted under WORLD WAR, and the succeeding phases in the articles LYS, BATTLE OF THE; CHEMIN DES DAMES, BATTLE OF THE, and MARNE, SECOND BATTLE OF THE.

At 4.30 A.M. on March 21, 1918, the sudden crash of some 6,000 German guns heralded the breaking of a storm which, in grandeur of scale, of awe and of destruction, surpassed any other in the World War. By nightfall a German flood had inundated forty miles of the British front; a week later it had reached a depth of nearly forty miles, and was almost lapping the outskirts of Amiens, and in the ensuing weeks the Allied cause itself was almost submerged. These weeks rank with that of the Marne in 1914 as the two gravest crises of the World War. In them Germany came desperately near to regaining that lost chance, and best chance, of victory, which she had forfeited in early September, 1914. Why, when the Allies had made so little visible impression on the German front in two years of constant offensive, were the Germans able to tear a huge hole in the Allied front within a few days? Why, as this breach so far exceeded in size the dream-aims of its Allied forerunners, did it fail to obtain any decisive results? In seeking the answer to these "whys" lies the prime historical interest of the battle of St. Quentin, 1918.

The Opposing Forces.—Between Nov. 1, 1917 and March 21, 1918, the German divisions on the western front were increased from 146 to 192, troops being withdrawn from Russia, Galicia, Italy and the East. By these means the German armies in the West were reinforced by no less than 18,492 officers and 553,794 other ranks. Finally it was decided to make available 62 divisions for the main attack. These troops were systematically trained in new tactics of mobile warfare behind the front, while every effort was made to conceal the actual area of attack, which extended from near Lens in the north to a little south of La Fère.

The opposing line on this front was held, except for a few miles in the north, by the III. (Byng) and V. (Gough) British Armies respectively. The front of the III. Army extended from just south of the village of Gavrelle to half a mile north of Gouzeaucourt (26½ m.), and on March 21 was held by 10 divi-



PLAN OF THE BATTLE OF ST. QUENTIN

sions in line and seven in reserve. The V. Army front (42 m.), extended on a recent relief of the French (*see* WORLD WAR), ran from the right of the III. Army to the village of Barisis, a little south of the river Oise, between the forests of Coucy and St. Gobain. On this extended front there were 11 divisions in line and three in reserve.

German Plan.—The attack was to be carried out by four armies:— (a) XVII. Army (Below), comprising 17 divisions, was to attack on the frontage Gavrelle-Moeuvres. (b) II. Army (Marwitz), comprising 18 divisions, was to attack from Moeuvres to Pontru (north of St. Quentin). (c) XVIII. Army (Hutier), comprising 24 divisions was to attack from Pontru to Vendeuil (south of St. Quentin). (d) VII. Army (Gayl) was to demonstrate with three divisions against La Fère.

The motive of this plan, devised by Ludendorff, now the directing brain of the German war-machine, was that the main strength of the German effort should be exerted north of the Somme—with the aim of driving the British Army back towards the coast and of cutting it off from the French—while the Somme and the XVIII. Army guarded the Germans' southern flank. This plan was radically changed in execution because Ludendorff gained rapid success where he desired it little and failed to gain success where he wanted it most.

To mystify the enemy as to the frontage selected for the main attack, subsidiary operations were prepared all along the Allied front, in Flanders, Champagne and the Argonne. From March 14 onwards the crown prince's army group was to bombard the enemy's headquarters on his front and make a show of bringing up reinforcements, and Gallwitz's army group was to carry out an attack on Verdun up to the point of engaging his infantry. The forming up for deployment of the attacking armies was begun on March 10, the divisions being organized in groups normally in a depth of three lines. The first or assault line was made the strongest, and was moved close up to the

front on March 20. The second line of divisions was some three to five km. in rear, and the third seven to ten km. behind the second line; the third line was to be held in reserve under the higher command, and was only to be used as the operations developed.

The Prelude.—On the British side, while the seriousness of the menace was appreciated, there was an apparently well-grounded belief in the power of the defence to stop a German attack. But these defensive calculations, like so many offensive actions throughout the previous three years, underrated the infinite value of surprise, which for three thousand years of recorded warfare has proved the master-key to victory. The real significance of the Cambrai attack on Nov. 20 previous had been that the British had revived the use of such a key, forging it from an amalgam of armour and the caterpillar tank. Unhappily, the effect of this tank key was largely lost because when inserted in the lock they had not the power to turn it fully, through exhausting their strength in the Passchendaele mud. (*See* YPRES, BATTLES OF, 1917.)

In the German counter-attack of Nov. 30 Ludendorff had used a key similar in principle if different in design—a short, sharp bombardment with gas and smoke shell, followed up by an inrush of infantry, specially trained in the new infiltration tactics. It would seem that by the following March the British had not sufficiently taken this lesson to heart. For, just as were the V. Army's subsequent excuses of weak numbers and a long line, the command had expressed ample confidence beforehand in its power to resist the onslaught. As a result, when the original front was forced, an inadequate preparation and co-ordination of the measures to block the enemy's path further back was revealed. The Army Command had failed to arrange for the blowing up of certain causeways and G.H.Q. had not given it a definite order. Worse still was the confusion caused by the fact that in the case of the more important railway bridges, this duty was entrusted to the railway authorities instead of the local commanders, and in this way the vital railway bridge at Peronne was allowed to fall undestroyed into German hands.

If this was good luck for the Germans, their thorough and skilful preparations for the initial assault had earned them success—although here again fortune favoured them. Ludendorff's solution for breaking the deadlock was a compound of wider frontages of attack, new infantry tactics, and, above all, for surprise, a lavish use of gas in a brief but intense artillery bombardment. For it, masses of artillery were brought up close to the front line in concealment, and against the V. Army front opened fire without preliminary ranging. This was to be followed by the infiltration of many dispersed little groups of automatic rifles and machine-guns. But the effect of the gas-gained surprise was immensely increased by nature, which in the early hours of March 21 provided a thick mist, which cloaked the infiltrating assailants as much as it masked the defending machine-guns. Without this aid it is questionable how far the German tactical surprise would have succeeded, and in this lay the essential inferiority of the German method of surprise, which still depended on unarmoured infantry, compared with the British surprise at Cambrai, and later, on Aug. 8, 1918, which was achieved by armoured machines.

The Attack, March 21.—While the bombardment, with a lavish mixture of gas and smoke shell, opened at 4.30 A.M. the German infantry attack did not begin until 9.40 A.M., when a general move forward was made under the cover of a creeping barrage, supplemented by low-flying aircraft. The British outpost zone was overrun almost everywhere by midday, but this was inevitable, and had been foreseen. But the northern attack met such stubborn resistance against the right of Byng's III. Army that it had not seriously penetrated the main battle zone even by the night of the 22nd, and, despite putting in successive reinforcements, the capture of Vaulx-Vraucourt was then the high-water mark of its progress. On most parts of Gough's V. Army front the battle-zone resistance was just as firm, but the flood found a way through on the 21st near La Fère, on the extreme right, at Essigny and Ronssoy. The resistance of the 21st Division at Epéhy for a time checked this last breach from spreading northward, but it began to crumble so deeply that the neighbouring sectors were affected. Southward, near St. Quentin, the line sagged still more deeply, and on the night of the 22nd Gough felt compelled to order a general retirement to the line of the Somme.

On the 23rd Ludendorff gave the XVIII. Army, his left or southern wing, a limited permission to exploit this opportunity along the line of least resistance. But for several days he still pinned his faith and reserve strength to his right wing, despite the relatively small progress of his XVII. Army in the north and by the enforced postponement of its intended supplementary attack towards Arras, where Byng had anticipated the blow by a partial withdrawal. When the postponed blow was attempted on the 28th it collapsed under a storm of fire from the expectant defence. No fog came to the German aid. At last Ludendorff threw his weight into the push along the Somme westward, although he still held his left wing in a tight rein. But by that time the new surge towards Amiens was almost as stagnant, its impetus slackening far less because of the resistance than because of the exhaustion of the German troops and the difficulty of supply in so rapid and deep an advance. This was accentuated because their route had taken them across the desert formed by the old battlefields of 1916. On March 30 and April 4 they made fresh attempts, but the effect was and could only be local. For the resistance in the south had been given time, and relief from pressure, to harden into a crust which the belated intervention of fresh German reserves could not break.

On April 4 the great battle to all intents and purposes came to an end. The initial success had been great; since March 21 from a base of 74 m. a penetration of no less than 38 m. had been effected; the ground lost in 1916 and abandoned in 1917 had been more than made good, and vast quantities of stores as well as 90,000 prisoners and 1,200 guns had been captured. The British Armies had been seriously defeated, and 20 French divisions had been drawn into the battle; yet, in spite of the fact that 90 German divisions had been engaged, neither the transition to a war of movement nor the separation of the British and French forces had been achieved.

Conclusion.—The supreme features of this great offensive are, first, the immensity of its outward results compared with any previous offensive in the west; second, its ineffectiveness to attain decisive results. For the first it would be both unjust and untrue to blame the defending troops. They achieved miracles of heroic endurance, and the prolonged resistance in most of the battle zone is the proof. The real cause of the subsequently rapid flow-back lay in the frequent breakdown of control and communication. During three years of trench warfare the British had built up an elaborate and complex system, largely dependent on the telephone, and when the static suddenly became fluid they paid the inevitable penalty of violating those fundamental axioms of war—simplicity and flexibility.

On the German side, Arras was the actual rock on which their plan broke, and by which their advance was diverted into less profitable channels. It is possible that military conservatism cost them dear. For Colonel Bruchmüller, the famous artillery battle-piece "producer," brought from the eastern front for this offensive, has revealed that while Hutier's army carried out his surprise bombardment designs, Below's in the north clung to their old-fashioned methods, refusing to dispense with preliminary ranging. But if Hutier scored at the outset, his onrush slackened as his supplies and reinforcements failed with the distance covered, and when due tribute has been paid to the sturdy resistance, the German advance is seen really to have beaten itself.

(B. H. L. H.)

ST. RÉMY (-DE-PROVENCE), a town of south-eastern France in the department of Bouches-du-Rhône, 15 m. N.E. of Arles by road. Pop. (1926) 3,253. It lies to the north of the range of hills named the Alpines or Alpilles in a valley of olive trees. The church has a 14th-century spire. About a mile to the south are Gallo-Roman relics of the ancient Glanum, destroyed about 480, including a triumphal arch and a fine three-storeyed mauso-

leum. Near by is the old priory of St. Paul-de-Mausole with a Romanesque church and cloister.

ST. RIQUIER, a town of northern France, in the department of Somme, 8 m. N.E. of Abbeville by rail. Pop. (1926) 963. St. Riquier (originally *Centula*) was famous for its abbey, founded about 625 by Riquier (*Richarnis*), son of the governor of the town. It was enriched by King Dagobert and prospered under the abbacy of Angilbert, son-in-law of Charlemagne. The fine Flamboyant church of the 15th and 16th centuries has a richly sculptured west front. The treasury, among other valuable relics, possesses a copper cross said to be the work of St. Eloi (Eligius). In 1544 the town was burnt by the English, an event which marks the beginning of its decline.

SAINTS, BATTLE OF THE. This battle was fought between the fleets of England and France in the channel between the islands of Dominica and Guadeloupe on April 12, 1782. It takes its name from the Saints Is. in the channel. The French had 35 battleships under the Comte de Grasse based on Martinique, and their object was to give the British fleet the slip, and capture Jamaica. The British fleet of 36 ships was based on St. Lucia and was under Rodney.

The British Admiral kept close watch on the French movements. When, therefore, on April 8, the signal came that the French were out, the British were immediately after them on a northerly course. At dawn on April 9 the British van, under Hood, was close to de Grasse, who was forced to order his store-ships to make for Guadeloupe, sending two of his battleships to protect them. Hood was soon in action with the French rear, and his position was awkward in that he only, of the English, had made the Saints passage, the centre and rear being becalmed under the lee of Dominica. De Grasse was thus in a position to attack him with all his force, but he merely cannonaded his enemy from a distance. The British van suffered enough to make it necessary subsequently for it to change places with the rear, under Drake, but the arrival of Rodney caused de Grasse to withdraw, and the French battleship *Cato* was put out of action.

During the ensuing night and day the French gained somewhat and seemed likely to get clear away, but on the night of the 10th two battleships, the *Jason* and the *Zélé,* collided and the former was so seriously injured that de Grasse had to part with her. It would have been better for him had he dispensed with the *Zélé* also, for on the 11th she fell far behind the rest of the fleet, and it became clear that she would fall a victim to the British unless de Grasse turned to help her. This he did; and thus a general action was joined on April 12, the French by then having only 30 effective ships. The two fleets approached one another on opposite courses with the wind from the east; the British were sailing roughly north and the French south, the latter being the nearer to the wind. The fight began early, and by 10 o'clock the moment for the British to get on the same course as the French had arrived.

Rodney, however, never issued orders to this effect for, at this juncture, the wind shifted four points to the south. This meant that gaps appeared in the French line, and, more important, the English could turn to starboard and sail through them. Rodney and his flag-captain, Sir Charles Douglas, both grasped the possibilities of the situation, and the former decided to risk it. There were no signals for the movement so, relying on the force of example, Rodney took his flagship, the *Formidable,* stationed in the centre, through a convenient gap in the rear of the French centre. He was followed by the five ships immediately astern, all raking the French as they passed. A similar movement took place in the rear. Captain Affleck, in the *Bedford,* passing through the head of the same French squadron, was followed by Hood with the entire British rear. The French were thus broken into three bodies, de Grasse, in the *Ville de Paris,* with other ships of the centre being isolated between the two points of intersection, and, after a gallant defence, captured.

Rodney's officers blamed him for not putting up a more energetic pursuit, but he preferred to make sure of cutting the enemy off from their base. Actually the bad morale of the French, and the complete scattering of their fleet, rendered either alternative nugatory.

BIBLIOGRAPHY.—G. B. Mundy, *Life of Rodney* (1830); D. Hannay, *Letters of Hood* (1895); J. K. Laughton, *Letters of Lord Barham,* vol. i. & ii. (1907–10); Geoffrey Callender, *Sea Kings of Britain* (1917); W. M. James, *"The British Navy in Adversity"* (1926).

(G. A. R. C.; J. G. B.)

SAINT-SAËNS, CHARLES CAMILLE (1835–1921), French composer, was born in Paris on Oct. 3, 1835. For a short time he studied composition under Halévy, and in 1852, and again in 1864, competed without success for the Grand Prix de Rome. In 1853, when only eighteen, he was appointed organist at the Church of St. Merry, and from 1861 to 1877 was organist at the Madeleine, in succession to Lefébure-Wély. In 1867 his cantata "Les Noces de Prométhée" won a prize at the International Exhibition of that year but his first operas *La Princesse jaune* (1872) and *Le Timbre d'argent* (1877) had no great success. It was with his brilliantly effective "symphonic poems" *Le Rouet d'Omphale, La Danse Macabre, Phaéton* and *La Jeunesse d'Hercule* that he first attracted general attention as a composer, though his powers as a pianist had been recognised from the first. His success as a dramatic composer was however not long delayed.

Through the influence of Liszt, his Biblical opera *Samson et Dalila* was brought out at Weimar in 1877 when its merits were immediately recognised, though it was not until 1890 that it was first heard in France; namely at Rouen. This work, generally accepted as his operatic masterpiece, had been begun as far back as 1869, and an act had been heard at one of Colonne's concerts in 1875. The following year it was given in Paris at the Eden Theatre, and finally in 1892 it was produced at the Grand Opera, where it has remained ever since, one of the most attractive works of the *répertoire.* Its Biblical subject prevented its performance in London until 1909, when it was given at Covent Garden with great success. None of his works is better calculated to exemplify the dual tendencies of his style. The first act, with its somewhat formal choruses, suggests the influence of Bach and Handel, and is treated rather in the manner of an oratorio. The more dramatic portions of the opera are not uninfluenced by Meyerbeer, while in the Dalila music there are occasional suggestions of Gounod. But though Saint-Saëns was an eclectic he put the stamp of his own individuality on every scene of the opera.

After the production of *Samson et Dalila* Saint-Saëns stood at the parting of the ways and compromised to some extent between the traditional style of the French school and the newer Wagnerian methods. As the result none of his later operas—*Etienne Marcel* (Lyons, 1879), *Henry VIII.* (Grand Opéra, 1883), *Proserpine* (Opéra-Comique, 1887), *Ascanio* (Grand Opéra, 1890), *Phryné* (Opéra-Comique, 1893), *Las Barbares* (Grand Opéra, 1901) achieved anything like the success of *Samson et Dalila.* But Saint-Saëns by no means confined his attentions to the stage, his compositions including examples in almost every department of the art. Among these may be mentioned the oratorios and cantatas *Oratorio de Noël, Les Noces de Prométhée, Le Déluge, La Lyre et la Harpe;* three symphonies; the four symphonic poems previously named; five pianoforte concertos; three violin concertos; the ballet *Zavotte*; many chamber works; a Mass and a Requiem, besides a quantity of piano and organ music, and many songs. His literary works in turn include *Harmonie et mélodie, Portraits et souvenirs,* and *Problèmes et mystères,* besides a volume of poems, *Rimes familières.* He died in Algiers on Dec. 16, 1921.

SAINTSBURY, GEORGE EDWARD BATEMAN (1845–), English man of letters, was born at Southampton on Oct. 23, 1845. He was educated at King's college school, London, and at Merton college, Oxford (B.A. 1868), and spent six years in Guernsey as senior classical master of Elizabeth college (1868–74). From 1874 to 1876 he was headmaster of the Elgin educational institute. He began his literary career in 1875 as a critic for the *Academy,* and for ten years was actively engaged in journalism, becoming an important member of the staff of the *Saturday Review.* From 1895 to 1915 he was professor of rhetoric and English literature at Edinburgh university. Saintsbury's work bears the mark of his vast range of reading. Among the most important of his many works are his *Short History of French Literature* (1882; 6th ed., Oxford, 1901); *A Short History of*

English Literature (1898; 3rd ed., 1903); an edition of the *Minor Caroline Poets* (3 vols., 1905–21); *A History of Criticism* (3 vols., 1900–04); *A History of English Prosody* (3 vols., 1906–21); *The History of English Criticism* (1911); and *A History of the French Novel* (1917–19).

ST. SERVAN, a town of western France, in the department of Ille-et-Vilaine, on the right bank of the Rance, south of St. Malo, from which it is separated by the Anse des Sablons, a creek 1 m. wide. Pop. (1926) 10,546. The "Cité" occupies the site of the city of Aleth, which at the close of the Roman empire supplanted Corseul as the capital of the Curiosolites. Aleth was not christianized till the 6th century, when St. Malo became its first bishop. At the Revolution St. Servan became a separate commune from St. Malo. North of the town there is a wet-dock, forming part of the harbour of St. Malo. The dock is used chiefly by coasting and fishing vessels, a fleet starting annually for the Newfoundland cod-fisheries.

SAINT-SIMON, CLAUDE HENRI DE ROUVROY, COMTE DE (1760–1825), French socialist, was born in Paris on Oct. 17, 1760. He fought in the War of American Independence, was imprisoned in the Luxembourg during the Terror, and, on his release, amassed a small fortune by land speculation. He was also the originator of schemes to unite the Atlantic and Pacific by a canal, and to construct a waterway from Madrid to the sea. He continued his experiments throughout his life with the result that he was completely impoverished, and for some years before his death he was obliged to work nine hours a day to earn £40 a year. In 1823 he attempted suicide. He died two years later, on May 19, at Paris. Although a prolific writer his work attracted little attention while he lived and it was only after his death that his influence became considerable.

As a thinker Saint-Simon was deficient in system, clearness and consecutive strength; but his influence on modern thought is undeniable, both as the historic founder of French socialism and as suggesting much of what was afterwards elaborated into Comtism. Apart from the details of his socialistic teaching, his main ideas are simple, and are at once a reaction against the French Revolution and the militarism of Napoleon. So far was he from advocating fresh social revolt that he appealed to Louis XVIII. to inaugurate the new order of things. In opposition, however, to the feudal and military system, he advocated an arrangement by which the industrial chiefs should control society. In place of the mediaeval church the spiritual direction of society should fall to the men of science. What Saint-Simon desired, therefore, was an industrialist state directed by modern science in which universal association should suppress war, and society should be organized for productive labour by the most capable men. The social aim is to produce things useful to life.

Although the contrast between labour and capital is not emphasised by Saint-Simon, the cause of the poor is discussed, and in his greatest work, *The New Christianity,* it takes the form of a religion. It was this development of his teaching that occasioned his final quarrel with Comte. Previous to the publication of the *Nouveau Christianisme,* Saint-Simon had not concerned himself with theology; but here, beginning with a belief in God he endeavours to resolve Christianity into its essential elements and finally propounds this precept—"The whole of society ought to strive towards the amelioration of the moral and physical existence of the poorest class; society ought to organize itself in the way best adapted for attaining this end." This principle became the watchword of the entire school of Saint-Simon.

Of the disciples who propagated his doctrines the most important were Olinde Rodrigues, and Barthélemy Prosper Enfantin (*q.v.*), who together had received Saint-Simon's last instructions. Their first step was to establish a journal, *Le Producteur,* but it was discontinued in 1826. The sect, however, had begun to grow, and before the end of 1828, had meetings not only in Paris but in many provincial towns. An important departure was made in 1828 by Amand Bazard, who gave a "complete exposition of the Saint-Simonian faith" in a long course of lectures at Paris, which were well attended. His *Exposition de la doctrine de St. Simon* (2 vols., 1828–1830), which is by far the best account of it, won more adherents. The second volume was chiefly by Enfantin, who along with Bazard stood at the head of the society, but who was superior in metaphysical power, and was prone to push his deductions to extremities. The revolution of July (1830) brought a new freedom to the socialist reformers. A proclamation was issued demanding the community of goods, the abolition of the right of inheritance, and the enfranchisement of women. Early next year the school obtained possession of the *Globe* through Pierre Leroux (*q.v.*), who had joined the school, which now numbered some of the ablest and most promising young men of France.

The members formed themselves into an association arranged in three grades, and constituting a society or family, which lived out of a common purse in the Rue Monsigny. Before long, however, the sect was split by dissensions between Bazard, a man of logical and solid temperament, and Enfantin, who desired to establish a fantastic sacerdotalism with lax notions as to the relation of the sexes. After a time Bazard seceded, together with many of the strongest supporters of the school. A series of extravagant entertainments given by the society during the winter of 1832 reduced its financial resources and discredited it in character. They finally removed to Ménilmontant, to a property of Enfantin, where they lived in a communistic society, distinguished by a peculiar dress. Shortly after the chiefs were tried and condemned for proceedings prejudicial to the social order; and the sect was broken up (1832).

Saint-Simonism.—In the doctrine of the followers of Saint-Simon we find a great advance on the confused views of the master. In the philosophy of history they recognize epochs of two kinds, the critical or negative and the organic or constructive. The former, in which philosophy is the dominating force, is characterized by war, egotism and anarchy; the latter, which is controlled by religion, is marked by the spirit of obedience, devotion and association. The two spirits of antagonism and association are the social principles whose prevalence determines the character of an epoch. The spirit of association, which tends more and more to prevail over its opponent, is to be the keynote of the social development of the future. Under the present system the industrial chief exploits the proletariat, the members of which, though nominally free, must accept his terms under pain of starvation. The only remedy for this is the abolition of the law of inheritance, and the union of all the instruments of labour in a social fund, which shall be exploited by association. Society thus becomes sole proprietor, intrusting to social groups and social functionaries the management of the various properties. The right of succession is transferred from the family to the state.

The school of Saint-Simon insists strongly on the claims of merit; they advocate a social hierarchy in which each man shall be placed according to his capacity and rewarded according to his works. This is, indeed, a most special and pronounced feature of the Saint-Simon socialism, whose theory of government is a kind of spiritual or scientific autocracy, degenerating into the fantastic sacerdotalism of Enfantin. With regard to the family and the relation of the sexes the school of Saint-Simon advocated the complete emancipation of woman and her entire equality with man. The "social individual" is man and woman, who are associated in the exercise of the triple function of religion, the state and the family. In its official declarations the school maintained the sanctity of the Christian law of marriage. Connected with these doctrines was their famous theory of the "rehabilitation of the flesh," deduced from the philosophic theory of the school, which was a species of Pantheism, though they repudiated the name. On this theory they rejected the dualism so much emphasized by Catholic Christianity in its penances and mortifications, and held that the body should be restored to its due place of honour.

An excellent edition of the works of Saint-Simon and Enfantin was published by the survivors of the sect (47 vols., Paris, 1865–78). Of his other works the most important are, *Lettres d'un habitant de Genève* (1802); *Du Système Industriel* (1821); *Catéchisme des Industriels* (1823–24); *Nouveau Christianisme* (1825). *See* also Georges Weill, *Un Précurseur du socialisme, Saint-Simon et son oeuvre* (Paris, 1894), and a history of the *École Saint-Simonienne,* by the same author

(1896); G. Dumas, *Psychologie de deux messies positivistes St. Simon et Comte* (1905); G. Brunet, *Mysticisme social de Saint-Simon* (1925); E. N. Butler, *The St-Simonian Religion in Germany* (1926); and M. Leroy, *Vie véritable de Saint-Simon* (1925).

SAINT-SIMON, LOUIS DE ROUVROY, DUC DE (1675–1755), French soldier, diplomatist and writer of memoirs, was born at Versailles on Jan. 16, 1675. The peerage granted to his father, Claude de St. Simon, is the central fact in his history. The boy had for godfather and godmother Louis XIV. and the queen. After some tuition by the Jesuits (especially by Sanadon, the editor of Horace), he joined the *mousquetaires gris* in 1692. He was present at the siege of Namur, and the battle of Neerwinden. At this time he chose to begin the crusade of his life by instigating, if not bringing, an action on the part of the peers of France against Luxembourg, his victorious general, on a point of precedence. He fought, however, another campaign or two (not under Luxembourg), and in 1695 married Gabrielle de Durfort, daughter of the maréchal de Lorges, under whom he latterly served. He seems to have regarded her with respect and affection; and she sometimes succeeded in modifying his aristocratic ideas. But as he did not receive the promotion he desired he flung up his commission in 1702. Louis took a dislike to him, and it was with difficulty that he was able to keep a footing at court. He was, however, intensely interested in all the transactions of Versailles, and by dint of a most heterogeneous collection of instruments, ranging from dukes to servants, he managed to obtain the extraordinary secret information which he has handed down.

His own part appears to have been entirely subordinate. He was appointed ambassador to Rome in 1705, but the appointment was cancelled before he started. At last he attached himself to the duke of Orleans and, though this was hardly likely to conciliate Louis's goodwill to him, it gave him at least the status of belonging to a definite party, and it eventually placed him in the position of tried friend to the acting chief of the state. He was able, moreover, to combine attachment to the duke of Burgundy with that to the duke of Orleans. Both attachments were no doubt all the more sincere because of his undying hatred to "the bastards," that is to say, the illegitimate sons of Louis XIV. It does not appear that this hatred was founded on moral reasons or on any real fear that these bastards would be intruded into the succession. The true cause of his wrath was that they had precedence of the peers.

The death of Louis seemed to give Saint-Simon a chance of realizing his hopes. The duke of Orleans was at once acknowledged regent, and Saint-Simon was of the council of regency. But he had little real influence with the regent. In 1721 he was appointed ambassador to Spain to arrange for the marriage (not destined to take place) of Louis XV. and the infanta. His own account of the cessation of his intimacy with Orleans and Dubois, the latter of whom had never been his friend, is, like his own account of some other events of his life, obscure. But there can be little doubt that he was practically ousted by the favourite. He survived for more than thirty years; but little is known of his life. His wife died in 1743, his eldest son a little later; he had other family troubles, and he was loaded with debt. When he died, at Paris on March 2, 1755, he had almost entirely outlived his own generation, and the prosperity of his house.

Saint-Simon was an indefatigable writer, and he began very early to set down in black and white all the gossip he collected, all his interminable legal disputes of precedence, and a vast mass of unclassified and almost unclassifiable matter. Most of his manuscripts came into the possession of the government, and it was long before their contents were published in anything like fulness. Saint-Simon, though careless and sometimes even ungrammatical, ranks among the most striking memoir-writers of France, the country richest in memoirs of any in the world. He has been compared to Tacitus, and for once the comparison is just. In the midst of his enormous mass of writing, phrases scarcely inferior to the Roman's occur frequently, and here and there are passages of sustained description equal, for intense concentration of light and life, to those of Tacitus or of any other historian. As may be expected from the vast extent of his work, it is in the highest degree unequal. But he is at the same time not a writer who can be "sampled" easily, inasmuch as his most characteristic phrases sometimes occur in the midst of long stretches of quite uninteresting matter. The interest of the *Memoirs*, independent of the large addition of positive knowledge which they make, is one of constant surprise at the novel and adroit use of word and phrase. Some of Macaulay's most brilliant portraits and sketches of incident are adapted and sometimes almost literally translated from Saint-Simon.

The first edition of Saint-Simon (some scattered pieces may have been printed before) appeared in 1788. It was a mere selection in three volumes and was much cut down before it was allowed to appear. Next year four more volumes made their appearance, and in 1791 a new edition, still further increased. The whole, or rather not the whole, was printed in 1829–1830 and reprinted some ten years later. The real creator of Saint-Simon, as far as a full and exact text is concerned, was M. Chéruel, whose edition in 20 volumes dates from 1856, and was reissued again revised in 1872. The standard edition is that edited by A. de Boislisle for the *Grands Ecrivains de la France* Series. For criticism on Saint-Simon there is nothing better than Sainte-Beuve's two sketches in the 3rd and 15th volumes of the *Causeries du lundi*. The latter was written to accompany M. Chéruel's first edition. In English by far the most accurate treatment is in a Lothian prize essay by E. Cannan (Oxford and London, 1885).

ST. THOMAS, an incorporated city and port of entry of Ontario, Canada, capital of Elgin county, on Kettle creek, 13 m. S. of London and 8 m. N. of Lake Erie. Pop. (1931) 15,430. It is an important station on the Canadian National, Michigan Central, London and Pt. Stanley, Pere Marquette, Wabash Railroad, and Canadian Pacific railways. It has numerous schools, a collegiate institute, and Alma ladies' college. The Michigan Central railway shops, car-wheel foundry, flour, flax and planing mills are the principal industries.

ST. THOMAS (São Tomé), a volcanic island in the Gulf of Guinea immediately north of the equator (0° 23′ N.) and in 6° 40′ E. With the island of Principe (Prince's island, *see* below), and the small territory of Sarame around the fortress of São João Batista of Ajudá, on the coast of Dahomey, it forms the Portuguese province of S. Tomé and Principe. From the Gabun, the nearest point of the mainland of Africa, St. Thomas is distant 166 m., and from Cameroon 297 m. The length of the island is 32 m., the breadth W. to E. 21 m.; the area 400 sq.m.

From the coast the land rises towards lofty mountains (St. Thomas over 7,000 ft.). Malaria is common in the lower regions, but the unhealthiness of the island is largely due to the absence of hygienic precautions and to alcoholism. Conditions are now being improved. Manufacture of brandy is to cease at the end of 1929. During the dry season (June to September) the temperature ranges in the lower parts between 66·2° and 80·6° F, and in the higher parts between 57·2° and 68°; in the rainy season it ranges between 69·8° and 89·6° in the lower parts, and between 64·4° and 80·6° in the higher parts. On Coffee mount (2,265 ft.) the mean of ten years was 68·9°, the maximum 90·5° and the minimum 47·3°. The heat is tempered by the equatorial ocean current. The rainfall is very heavy save on the north coast, but has steadily decreased of recent years, simultaneously with disafforestation.

Communications.—There are 200 kilometres of good motor roads, and 500 km. of Decauville line are in use. A State railway of 19 km. runs from S. Tomé to Vila da Trindade and the Milagrosa plantation; 45 km. more are being laid. S. Tomé and Principe are connected with Europe by cable. S. Tomé has a wireless station communicating directly with Cape Verde, Angola, etc. Telephone lines link the capital with the principal settlements and plantations. Two Portuguese and one German steamship line maintain a monthly service, and other ships call frequently.

Agriculture and Trade.—The soil is extremely fertile, and three-fifths of the island is covered with forest. Among the products are oranges, lemons, figs, mangroves, and, in the lower districts, the vine, pineapple, guava and banana. The first object of cultivation was sugar, and to this the island owed its prosperity in the 16th century. Sugar has been displaced by coffee, and, principally, cocoa, introduced in 1795 and 1822 respectively. The cocoa zone lies between 650 and 2,000 ft. above the sea. Four-fifths of the total production of the island is cocoa. In 1907 the export of cocoa (including that from Principe) was over 24,000

tons, about a sixth of the world's supply. In 1912 it had risen to 35,706 tons, the Province then ranking as the second producing country in the world. 125,000 acres are under cocoa. In 1906 and 1918 plant diseases gave much trouble. These are now controlled; but labour difficulties and, especially, the severe competition of the west coast of Africa, particularly Nigeria, have caused a great diminution, production being now 15,000 tons.

Vanilla and cinchona bark both succeed well, the latter at altitudes of from 1,800 to 3,300 ft. In 1905, 125 tons of bark were exported. Production has since diminished. Rubber, cinnamon, camphor and the kola-nut are grown. Coffee, of splendid quality, reached its maximum production in 1902, when S. Tomé produced 1,769,959 kg. and Principe 247 kg. Products of the oil-palm in 1921 were 2,808,664 kg.

The chief exports in 1925, in order of their importance, were (in kilos): cocoa 20,861,000; coconut 3,338,000; coffee 171,-953; and cinchona 70,807. In the same year imports (in tons) were, in order of importance: maize 2,635; rice 2,069; dried fish 1,830; and beans 1,674. In 1927 the chief exports from S. Tomé were (in kilos): cocoa, 15,767,156, valued at $76,755,155.00; and coconut, 2,997,316, valued at $4,419,045.25. From Principe: cocoa 1,000,692, value $5,355,171.53; and coconut, 395,480, value $588,476.56. Imports in 1925 (both islands) were valued at $31,195,326.00 (£1-$97,382), and exports at $68,513,874.00, a favourable balance of £383,218 ($ here means escudos, not dollars).

For 1926–27, the budget was balanced at revenue 10,213,658 escudos, and expenditure 9,173,658 escudos ordinary and 1,040,000 extraordinary. A new customs tariff protects Portuguese products, especially beer, cement (1,000 tons used annually), wines and distilled liquors.

Population.—At the last census, the inhabitants of S. Tomé were returned at 53,969, of whom 19,751 were natives, 32,817 imported labourers and 1,401 were classed as Europeans. The inhabitants, apart from the Europeans, consist (i.) of descendants of the original settlers, who were convicts from Portugal, slaves and others from Brazil, and negroes from the Gabun and other parts of the Guinea coast. They are known as "natives" and use a Negro-Portuguese "lingua de S. Tomé." (ii.) On the south-west coast are Angolares—some 3,000 in number—descendants of 200 Angola slaves wrecked at Sete Pedras in 1544. They retain their Bunda speech and customs, and are expert fishermen and canoemen. (iii.) Contract labourers from Cape Verde, Kabinda, etc., and Angola. These form the bulk of the population. In 1891, before the great development of the cocoa industry, the population was only 22,000. According to Aug. Chevalier (in *Occidente*, May 20, 1910), the population of St. Thomas and Principe combined in Dec. 1909 was 68,221, the "natives" being given at over 23,000.

St. Thomas, capital and chief port of the province, residence of the governor and of the Curador (the legal guardian of the serviçaes, *i.e.*, labourers), is situated on Chaves bay on the north-east coast. It is the starting point of a railway 9 m. long, which connects with the Decauville railways on the cocoa estates. Material has been acquired for the installation of a water supply; and plans are being made to supply the town and plantations with electricity produced by water power from the Contador river.

History.—St. Thomas was discovered in 1470 by the Portuguese navigators João de Santarem and Pero de Escobar, who in the beginning of the following year discovered Ano Bom ("Good Year"). They found St. Thomas uninhabited. The first attempts at colonization were João de Paiva's in 1485; but nothing permanent was accomplished till 1493, when a body of criminals and of young Jews were sent to the island, and the present capital was founded by Alvaro de Carminha, in about 1500.

In the middle of the 16th century there were over 80 sugar mills on the island, which then had a population of 50,000; but in 1567 the settlement was attacked by the French, and in 1574 the Angolares began raids which only ended with their subjugation in 1693. In 1595 there was a slave revolt; and from 1641 to 1644 the Dutch, who had plundered the capital in 1600, held possession of the island. The French did great damage in 1709; the sugar trade had passed to Brazil and internal anarchy reduced St. Thomas to a deplorable state. It was not until the later half of the 19th century that prosperity began to return.

The greatly increased demand for cocoa which arose in the last decade of the century led to the establishment of many additional plantations. Planters, however, were handicapped by the scarcity of labour. The difficulty was met by the recruitment of indentured natives from Angola, as many as 6,000 being brought over in one year. The mortality among these labourers was great, but they were well treated on the plantations. No provision was, however, made for their repatriation, while the great majority were brought by force from remote parts of central Africa and had no idea of the character of the agreement into which they were compelled to enter. The system was denounced in both Portugal and Great Britain as indistinguishable from slavery, though slavery had been abolished in Portuguese dominions in 1878. In March 1909 certain firms, British and German, as the result of investigations made in Angola and St. Thomas, refused any longer to import cocoa from St. Thomas or Principe islands unless the recruitment of labourers for the plantations was made voluntary. Representations to Portugal were made by the British government, and the Lisbon authorities stopped recruitment entirely from July 1909 to February 1910, when it was resumed under new regulations. British consular agents were stationed in Angola and St. Thomas to watch the working of these regulations. As one means of obviating the difficulties encountered in Angola the recruitment of labourers from Mozambique was begun in 1908, the men going out on a yearly contract.

The plantations are now well equipped and administered, with good houses and good labourers' quarters. There is an excellent medical service, government doctors visit all labour centres weekly, and there are special health regulations for the plantations. The labourers are well fed. In S. Tomé, mortality among negro labourers on plantations, in 1923–27, was 27·6 per 1,000, including infant mortality and accidents in work, as against a total mortality for the Province of 40 per 1,000. In 1927, 4,900 labourers, recruited in Angola, entered the colony. Many were repatriated to Angola, Mozambique and Cape Verde, after finishing their contracts. The number of labourers at the end of the year was 3,000 more than at the beginning. Recruiting is from Angola, Cape Verde and Mozambique. Labourers are contracted in their country of origin, in the presence of the authorities, for two or three years. On termination of their contracts, they are repatriated, unless they wish to re-engage. They are fed, lodged and clothed by the employers. Generally half of their earnings is treated as deferred pay, and paid on their return home, in the country of origin. Fulfilment of contracts is supervised by a State department, with a branch in Principe.

BIBLIOGRAPHY.—B. S. G. Lisboa, *S. Thomé* (1908); W. A. Cadbury, *Labour in Portuguese West Africa* (2nd ed., London, 1910); *A ilha de S. Thomé* (Lisbon, 1907); *The Boa Entrada Plantations* (Edinburgh, 1907); and British Consular Reports. *See* also A. Negreiros, *Historia ethnographica da Ilha de S. Thomé* (Lisbon, 1895) and *Ile de San Thomé* (Paris, 1901); C. Gravier "Mission scientifique à l'île de San Thomé" *Nouv. Arch. Miss. Scient. t. xv.* (Paris, 1907); A. Pinto de Miranda Guedes, "Viação em S. Thomé," *B. S. G. Lisboa* (1902); also *Boletim da Agencia Geral das Colonias* (Lisbon, monthly), and *Monografia das Colonias Portuguezas* (Agencia Geral das Colonias, Lisbon). (H. BP.)

ST. THOMAS, an island in the West Indies, and the most important, commercially, of the Virgin island group purchased by the United States from Denmark in 1917. St. Thomas is also the name of the principal port and harbour of the Virgin islands, situated near the middle of the southern coast of the island.

St. Thomas island lies in 18° 20′ N. and 64° 55′ W., 40 m. east of Porto Rico, 1,442 m. south, 20° E. from New York city and 1,020 m. from the Panama Canal. It is 12 m. long, varies in width from 1 m. to 3 m., and has an area of 27·12 sq.m., or 17,357 acres. It is of volcanic origin. The main ridge, peaks of a submerged range, extends east and west the length of the island. Its hills are steep and rocky and sparsely covered with vegetation, the original timber having been cut away for lumber and charcoal. Two summits, Crown mountain and Signal hill, rise above 1,500 feet. Many of the spurs of the ridge slope down to the shore and form protected bays where the buccaneers of the 17th and 18th

centuries found refuge. The climate is salubrious, particularly during the first quarter of the year when the trade winds blow. The mean temperature is 78° F, the thermometer rarely falling below 64° and rarely rising above 91°. The average rainfall is 38·23 in.; the driest weather is in March and the rainy season in October and November. Drinking water is stored in cisterns owing to the dearth of wells. After the abolition of slavery in 1848 agriculture became decadent. There were in 1925 but 63 plantations under cultivation. The U.S. Department of Agriculture established an experiment station in 1928. In 1917 there were 10,191 inhabitants, of whom 76% were congregated in St. Thomas city. Descendants of negro slaves made up 87% of the total. For general government *see* VIRGIN ISLANDS. An improved code of American laws was adopted by the colonial council for the municipality of St. Thomas in 1921. Pop. 1930, 9,834.

St. Thomas island was discovered and named by Columbus on his second voyage in 1493. The first colony was planted in 1657 by the Dutch who soon after abandoned it and migrated to New Amsterdam (New York). The Danes arrived and took formal possession in 1666 but their first colony also failed. The Danish West India Company dispatched an expedition under Governor Jorgen Iversen which landed in St. Thomas harbour on May 25, 1672, and effected a permanent settlement. Later Huguenot refugees from St. Kitts were granted asylum. In 1755 the king of Denmark acquired the company's rights and made the harbour a free port. The island was temporarily seized by England in 1801–02, and again held by her in 1807–15, but was restored to and held by Denmark until 1917 when it was acquired by the United States.

The chief value of the island is the harbour of St. Thomas, one of the best in the Antilles. It is perfectly landlocked, with a bottle-necked entrance, and has a deserved reputation for refuge. It commands the gateway to the Caribbean through the Virgin passage, and is a port of call for passenger steamers from New York and European ports bound for the Panama Canal, Central America, etc., via the lesser Antilles. There are ample coaling facilities, oil reservoirs, ship-yards and machine shops, floating docks and wharves with electric cranes.

The city of St. Thomas, the seat of government for the Virgin islands, lies on three low spurs of the island ridge, dubbed "Foretop, maintop and mizzentop." There is a single level street parallel to the water-front, forming a common base for three cone-shaped clusters of white dwellings on the dull green background of the ridges. On Government hill is the most attractive residence section, the location affording constant enjoyment of the breezes and panorama. Of the total population of 7,747 in 1917, 7,027 were coloured and 720 white. The official and commercial classes compose a small, exclusive and harmonious caste. English is the prevailing language, but Danish, Dutch, French and Spanish are also common. Though the city was formally christened Charlotte Amalia (in honour of the consort of Christian V.) by the Danes, it became known in general usage as St. Thomas, which name was officially adopted by the U.S. Geographic Board in 1921.

See U.S. Census Bureau, *Census of the Virgin Islands of the United States* (1918); L. K. Zabriskie, *The Virgin Islands* (1918); T. De Booy and J. Faris, *The Virgin Islands* (1918), and *Reports* (annual) of the governors.

ST. TROND, town, province of Limburg, Belgium, 18 m. north-west of Liége in an important strategic position near the frontier. Pop. (1925) 16,157.

ST. VINCENT, JOHN JERVIS, EARL OF (1735–1823), British admiral, was the second son of Swynfen Jervis, solicitor to the admiralty, and treasurer of Greenwich hospital. He was born at Meaford, Staffordshire, on Jan. 9, 1735, and entered the navy on Jan. 4, 1749. He became lieutenant on Feb. 19, 1755, and served in that rank till 1759, taking part in the conquest of Quebec. He was made commander of the "Scorpion" sloop in 1759, and post-captain in 1760. During the peace he commanded the "Alarm" (32) in the Mediterranean, and when he was put on half pay he travelled in Europe, taking professional notes everywhere. While the War of American Independence lasted, he commanded the "Fourroyant" (80) in the Channel, taking part in the battle of Ushant (1778) (*see* KEPPEL, VISCOUNT) and in the various reliefs of Gibraltar. His most signal service was the capture (April 19, 1782) of the French "Pégase" (74) after a long chase. In 1783 he entered parliament as member for Launceston, and in the general election of 1784 as member for Yarmouth. In politics he was a strong Whig. On Sept. 24, 1787, he attained flag rank, and was promoted vice-admiral in 1793. From 1793 till 1795 he was in the West Indies co-operating with the army in the conquest of the French islands. On his return he was promoted admiral. In November 1795 he took command in the Mediterranean, where he maintained the blockade of Toulon, and aided the allies of Great Britain in Italy.

But in 1796 the occupation of Italy by the French armies closed all the ports to his ships, and Malta was not yet in the possession of Great Britain. Then the addition of the Spanish fleet to the French altered the balance of strength in the Mediterranean. The Spaniards were very inefficient, and Jervis would have held his ground, if one of his subordinates had not taken the extraordinary course of returning to England, because he thought that the dangerous state of the country required that all its forces should be concentrated at home. He was therefore obliged to act on the instructions sent to him and to retire to the Atlantic, withdrawing the garrisons from Corsica and other places. His headquarters were now on the coast of Portugal, and his chief duty was to watch the Spanish fleet at Cadiz. On Feb. 14, 1797, he gained a most complete victory against heavy odds. (*See* ST. VINCENT, BATTLE OF.) The determination to fight, and the admirable discipline of his squadron, which was very largely the fruit of his own care in preparation, supply the best proof that he was a commander of a high order. For this victory, which came at a very critical time, he was made an earl and was granted a pension of £3,000. His qualities as a disciplinarian were soon to be put to a severe test. In 1797 the grievances of the sailors, which were of old standing, and had led to many mutinies of single ships, came to a head in the great general mutinies at Spithead and the Nore. Similar movements took place on the coast of Ireland and at the Cape of Good Hope. (*See* NAVY AND NAVIES: *History*.) The spirit spread to the fleet under St. Vincent, and there was an undoubted danger that some outbreak would take place in his command. The peril was averted by his foresight and severity. He had always taken great care of the health of his men, and was as strict with the officers as with sailors. It must in justice be added that he was peculiarly fitted for the work. He carried his strictness with his officers to an extent which aroused the actual hatred of many among them, and exasperated Sir John Orde (1751–1824) into challenging him to fight a duel. Yet he cannot be denied the honour of having raised the discipline of the navy to a higher level than it had reached before; he was always ready to promote good officers, and the efficiency of the squadron with which Nelson won the battle of the Nile was largely due to him. His health broke down under the strain of long cruising, and in June 1799 he resigned his command.

When St. Vincent's health was restored in the following year he took the command of the Channel fleet, into which he introduced his own rigid system of discipline to the bitter anger of the captains. But his method was fully justified by the fact that he was able to maintain the blockade of Brest for 121 days with his fleet. In 1801 he became first lord and held the office till Pitt returned to power in 1803. His administration is famous in the history of the navy, for he now applied himself to the very necessary task of reforming the corruptions of the dockyards. Naturally he was fiercely attacked in and out of parliament. His peremptory character led him to do the right thing with the maximum of dictation at Whitehall as on the quarter-deck of his flagship. He also gave an opening to his critics by devoting himself so wholly to the reform of the dockyards that he neglected the preparation of the fleet for war. He would not recognize the possibility that the peace of Amiens would not last. Pitt made himself the mouthpiece of St. Vincent's enemies, mainly because he considered him as a dangerous member of the party which was weakening the position of England in the face of Napoleon. When Pitt's second ministry was formed in 1803, St. Vincent

refused to take the command of the Channel fleet at his request. After Pitt's death he resumed the duty with the temporary rank of admiral of the fleet in 1806, but held it only till the following year. After 1810 he retired to his house at Rochetts in Essex. The rank of admiral of the fleet was conferred on him in 1821 on the coronation of George IV., and he died on March 14, 1823. Lord St. Vincent married his cousin Martha Parker, who died childless in 1816. There is a monument to him in St. Paul's Cathedral, and portraits of him at different periods of his life are numerous. The earldom granted to Jervis became extinct on his death, but a viscounty, created for him in 1801, passed by special remainder to Edward Jervis Ricketts (1767–1857), the second son of his sister Mary who had married William Henry Ricketts, of Longwood, Hampshire. The 2nd viscount took the name of Jervis, and the title is still held by his descendants. (D. H.)

The *Life* by J. S. Tucker (2 vols.), whose father had been the admiral's secretary (marred by excessive eulogy). *See* W. N. Anson, *Life of John Jervis, Admiral Lord St. Vincent* (1913); also W. L. Clowes, *The Royal Navy* . . . vol. iv. The life by Captain Brenton is rather inaccurate. The *Naval Career of Admiral John Markham* contains an account of the reforms in the navy. His administrations produced a swarm of pamphlets. Many mentions of him will be found in the correspondence of Nelson.

ST. VINCENT, one of the British Windward islands in the West Indies, lying about 13° 15′ N., 61° 10′ W., west of Barbados and south of St. Lucia. It is about 18 m. long by 11 in extreme width, and has an area of 140 sq.m. Beautifully wooded volcanic hills form the backbone of the island and have picturesque valleys. The highest summit is the volcano called the Soufrière (3,500 ft.) in the north, the disastrous eruption of which in May 1902 devastated the most fertile portion of the island, a gently sloping tract lying to the north, called the Carib Country. The climate of St. Vincent is fairly healthy and in winter very pleasant; the average annual rainfall exceeds 100 in., and the temperature ranges from 88° F in Aug. to 66° in Dec. and January. The capital of the island is Kingstown, beautifully situated on the south-west coast near the foot of Mount St. Andrew.

The population of the island in 1921 was 44,447; there are still a few Caribs of mixed blood, most of the aboriginal Caribs having been deported to British Honduras in 1797. Kingstown has a population of about 3,800. The present constitution dates from 1877, when the legislative council, consisting of four official and four nominated unofficial members, was formed. The principal products of the island are arrowroot, cassava starch, molasses, cotton, cacao, coconuts and copra, ground nuts and spices. The average annual value of exports from 1896 to 1906 was £63,157, in 1924 the value was £150,862. In 1899 a scheme was begun, with a grant of £15,000 from the Imperial treasury, for settling the labouring population, distressed by the failure of the sugar estate industry, as peasant proprietors.

St. Vincent is generally stated to have been discovered on St. Vincent's day, the 22nd of January 1498 by Columbus. Its Carib inhabitants remained undisturbed for many years. In 1627 Charles I. granted the island to the earl of Carlisle; in 1672 it was re-granted to Lord Willoughby, having been previously (1660) declared neutral. In 1722 a further grant of the island was made, to the duke of Montague, and then the first serious effort at colonization was checked by French insistence on neutrality confirmed by the treaty of Aix-la-Chapelle (1748). In 1762 General Monckton occupied the island; the treaty of Paris in 1763 confirmed the British possession, and settlement proceeded in spite of the refusal of the Caribs to admit British sovereignty. After some fighting in 1773 a treaty was concluded with them, when they were granted lands in the north of the island as a reserve. In 1779 the island was surrendered to the French, but it was restored to Britain by the treaty of Versailles (1783). In 1795 the Caribs rose, assisted by the French, and were only subdued by Sir Ralph Abercromby in 1796, after which the majority of them were deported. The emancipation of negro slaves in the island took place in 1838; in 1846 Portuguese labourers were introduced, and in 1861 East Indian coolies. St. Vincent suffered from a violent hurricane in 1780, and the Soufrière was in eruption in 1821. Severe distress was occasioned by the hurricane of the 11th of September, 1898, from which the island had not recovered when it was visited by the eruption of the Soufrière in May 1902. This eruption was synchronous with that of Mont Pelé in Martinique (*q.v.*). There were earthquakes in the following July, and further eruptions on Sept. 3 and Oct. 15, and on March 22, 1903.

ST. VINCENT, BATTLE OF, fought on the 14th of February 1797, between the British and Spanish fleets, the most famous and important of many encounters which have taken place at the same spot. The battle first revealed the full capacity of Nelson, which was well known in the navy, to all his countrymen. In 1796 the Spanish government had made the disastrous alliance with the French republic, which reduced its country to the level of a pawn in the game against England. The Spanish fleet, which was in a complete state of neglect, was forced to sea. It consisted of 27 sail of the line under the command of Don José de Córdoba—fine ships, but manned in haste by drafts of soldiers, and of landsmen forced on board by the press. Even the flagships had only about eighty sailors each in their crews. Cordoba was drifting about with his unmanageable ships in two confused divisions separated from one another, in light winds from the west and west-south-west, at a distance of from 25 to 30 m. S.W. of the Cape. While in this position he was sighted by Sir John Jervis, of whose nearness to himself he was ignorant, and who had sailed from Lisbon to attack him with only 15 sail of the line. Jervis did not hesitate to give battle. Six Spanish ships were to the south of him, separated by a long interval from the others which were to the south-west. The British squadron was formed into a single line ahead, and was steered to pass between the two divisions of the Spaniards. The six vessels were thus cut off. A feeble attempt was made by them to molest the British, but being now to leeward as Jervis passed to the west of them, and being unable to face the rapid and well directed fire to which they were exposed, they sheered off. One only ran down the British line, and passing to the stern of the last ship succeeded in joining the bulk of her fleet to windward. As the British line passed through the gap between the Spanish divisions ships were tacked in succession to meet the windward portion of the enemy. If this movement had been carried out fully, all the British ships would have gone through the gap and the Spaniards to windward would have been able to steer unimpeded to the north, and perhaps to avoid being brought to a close general action. Their chance of escape was baffled by the independence and promptitude of Nelson. His ship, the "Captain" (74), was the third from the end of the British line. Without waiting for orders he made a sweep to the west and threw himself across the bows of the Spaniards. His movement was seen and approved by Jervis, who then ordered the other ships in his rear to follow Nelson's example. The British force was thrown bodily on the enemy. As the Spanish crews were too utterly unpractised to handle their ships, and could not carry out the orders of their officers which they did not understand, their ships were soon driven into a herd, and fell on board of one another. Their incompetence as gunners enabled the "Captain" to assail their flagship, the huge "Santissima Trinidad" (130), with comparative impunity. The "San Josef" (112), and the "San Nicolas" (80), which fell aboard of one another, were both carried by boarding by the "Captain." Four Spanish ships, the "Salvador del Mundo" and "San Josef" (112), the "San Nicolas" (80), and the "San Isidro" (74), were taken. The "Santissima Trinidad" is said to have struck, but she was not taken possession of. By about half-past three the Spaniards were fairly beaten. More prizes might have been taken, but Sir John Jervis put a stop to the action to secure the four which had surrendered. The Spaniards were allowed to retreat to Cadiz. Sir John Jervis was made Earl St. Vincent (*q.v.*) for his victory. The battle, which revealed the worthlessness of the Spanish navy, relieved the British government from a load of anxiety, and may be said to have marked the complete predominance of its fleet on the sea. (D. H.)

AUTHORITIES.—A very interesting account of the battle of Cape St. Vincent, *A Narrative of the Proceedings of the British Fleet, etc.* (London, 1797), illustrated by plans, was published immediately afterwards by Colonel Drinkwater Bethune, author of the *History of the Siege of*

Gibraltar, who was an eyewitness from the "Lively" frigate. *See* also James's *Naval History* (London, 1837); Captain Mahan, *The Influence of Sea Power on the French Revolution and Empire* (London, 1892); Professor Geoffrey Callender, *The Naval Side of British History* (1924).

ST. VITUS'S DANCE or **CHOREA**, a disorder of the nervous system characterized mainly by involuntary jerking movements of the muscles throughout almost the entire body (*see* NEUROPATHOLOGY). This name was originally applied to epidemic outbursts of mental and physical excitement which occurred among the inhabitants of some parts of Germany in the middle ages. Sufferers from this dancing mania were wont to resort to the chapels of St. Vitus (more than one in Swabia), the saint being believed to possess the power of curing them.

Chorea occurs particularly between the ages of nine and twelve and is twice as frequent in girls as in boys. Fright, ill-usage, insufficient feeding, overwork or anxiety, are among the most common exciting causes especially when associated with family tendency to nervous disease; occasionally it complicates pregnancy. The connection of chorea with rheumatism is now universally recognized, and is shown by its frequent occurrence before, after or during attacks of rheumatic fever in young persons, and by the liability of the heart to suffer in a similar way in the two diseases.

The symptoms sometimes develop suddenly but are usually preceded by changes in disposition and general health. The first thing indicative of the disease is awkwardness or fidgetiness of manner together with restlessness. In walking, too, slight dragging of one limb may be noticed. The convulsive muscular movements usually first show themselves in an arm or a leg, and may remain localized; in all cases the disorderly symptoms are more marked on one side than on the other. The child with fully developed chorea, when awake, is never still, but is constantly twitching the body, limbs or face. These symptoms are aggravated when purposive movements are attempted or when the child is watched. When the tongue is protruded it comes out in a jerky manner and is immediately withdrawn, the jaws at the same time closing suddenly and sometimes with considerable force. Speech, swallowing and locomotion suffer from muscular inco-ordination. In short, the whole muscular system is deranged in its operations, and the term "insanity of the muscles" not inaptly expresses the condition. The involuntary muscles appear scarcely affected in this disease; the rhythmic movements of the heart, for example, are not as a rule impaired. But the heart may suffer from conditions similar to those in rheumatism.

This disease occasionally assumes a very acute and aggravated form, in which the disorderly movements are so violent as to render the patient liable to be injured, and to necessitate forcible control of the limbs, or the employment of anaesthetics. Such cases are very grave, if, as is common, they are accompanied with sleeplessness, and they may prove rapidly fatal by exhaustion.

It is doubtful whether any drug has much control over the disease, which under suitable hygienic conditions tends to recover of itself after one or two months or perhaps longer. Ruhräh, recognizing the importance of rest, recommends a modified Weir-Mitchell treatment. Of medicinal remedies the most serviceable appear to be zinc, arsenic and iron, especially the last two, which act as tonics to the system and improve the condition of the blood. In view of the connection of chorea with rheumatism, salicylate of soda in large doses has been recommended. In long-continued cases much benefit will be obtained by change of air and moderate gymnastic exercises. Massage and electricity may be beneficial.

In the acute form of chorea, where the convulsive movements are unceasing and violent, the only measures available are the use of chloral or chloroform inhalation to produce insensibility and muscular relaxation, but the effect is only palliative.

SAINT-WANDRILLE, a village of north-western France, in the department of Seine-Inférieure, 28 m. west-north-west of Rouen by rail. It is celebrated for the ruins of its Benedictine abbey. The abbey was founded in the 7th century by St. Wandrille. In the 13th century it was burnt down, and the rebuilding was not completed till the 16th century. Later it was practically destroyed by the Huguenots, and again restored. The demolition of the church was begun at the time of the Revolution. The abbey church belongs to the 13th and 14th centuries; portions of the nave walls supported by flying buttresses are standing, and the windows and vaulting of the side aisles are in fair preservation. There is a cloister, from which a Renaissance door opens into the refectory, containing a richly ornamented *lavabo*. The refectory has graceful windows.

SAIONJI, KIMMOCHI, PRINCE (1849–), Japanese statesman, was born in October, 1849, at Kyoto. When less than 20 years of age, he took part in the councils which led to the Restoration, and at 19 was commander-in-chief of an imperial army. In 1881 he commenced his official career, and in the following year accompanied Ito to Europe and the United States to investigate the parliamentary system. In 1885 he was appointed minister to Austria; three years later he became vice-president of the house of peers and was raised to the privy council in 1894. In the same year he received the portfolio of education in the second Ito cabinet. In July 1903 he became the leader of the Seiyu-Kai and in 1906 formed his first cabinet as prime minister; he was again premier from 1911 to 1912. In 1919 he represented Japan as chief envoy at the Peace Conference and was invested with the grand order of merit. He was made prince in 1920 in recognition of his services in war and peace.

SAIS (Egyptian *Sai*), an ancient city of the Egyptian Delta, lying westward of the Thermuthiac or Sebennytic branch of the Nile. It was the capital of the 5th nome of Lower Egypt and must have been important from remote times. In the 8th century B.C. Sais held the hegemony of the Western Delta, while Bubastite families ruled in the east and the kings of Ethiopia in Upper Egypt. At the time when invasions by the Assyrians drove out the Ethiopian Taracus again and again, the chief of the twenty princes to whom Esarhaddon and Assur-bani-pal successively entrusted the government was Niku, king of Sais and Memphis. His son Psammetichus (*q.v.*) was the founder of the XXVIth Dynasty. Although the main seat of government was at Memphis, Sais remained the royal residence throughout this flourishing dynasty. Neit, the goddess of Sais, was identified with Athena, and Osiris was worshipped there in a great festival.

The brick enclosure wall of the temple is still plainly visible near the little village of Sa-el-hagar (Sa of stone) on the east bank of the Rosetta branch; otherwise only crude brick ruins and rubbish heaps remain on the site, but a few relics conveyed to Alexandria and Europe in the Roman age have come down to our day, notably the inscribed statue of a priest of Neit who was high in favour with Psammetichus III., Cambyses and Darius. Bronze figures of deities are now the most interesting objects to be found at Sa-el-hagar.

SAISSET, BERNARD (d. *c.* 1314), French bishop, was abbot of Saint Antonin de Pamiers in 1268. Boniface VIII., detaching the city of Pamiers from the diocese of Toulouse in 1295, made it the seat of a new bishopric and appointed Saisset to the see. Of a headstrong temperament, Saisset as abbot brought to an end (1297) the struggle with the counts of Foix, begun two centuries before, for the lordship of the city of Pamiers, which had been shared between the counts and abbots by the feudal contract of *pariage*. As an ardent Languedocian he hated the French, and opposed Philip IV. But when he tried to organize a general rising of the south, he was denounced to the king, perhaps by his old enemies the count of Foix and the bishop of Toulouse. Philip IV. charged Richard Leneveu, archdeacon of Auge in the diocese of Lisieux, and Jean de Picquigni, vidame of Amiens, to make an investigation, which lasted several months. Saisset was on the point of escaping to Rome when the vidame of Amiens surprised him by night in his episcopal palace. He was brought to Senlis, and on Oct. 24, 1301, appeared before Philip and his court. He was charged with high treason, and Philip tried to obtain from the pope the canonical degradation of Saisset. Boniface VIII., instead, ordered the king in December 1301 to free the bishop, in order that he might go to Rome to justify himself. At the same time, he sent the famous bulls *Salvator mundi*, a sort of repetition of *Clericis laicos*, and *Ausculta fili*, which opened a new stage of the quarrel between the pope and king. In the heat of the new struggle Saisset was forgotten. He

had been turned over in February 1302 into the keeping of Jacques des Normands, the papal legate, and was ordered to leave the kingdom at once. He lived at Rome until after the incident at Anagni. In 1308 the king pardoned him, and restored him to his see. He died, still bishop of Pamiers, about 1314.

See Dom Vaissete, *Histoire générale de Languedoc,* ed. Privat, t. ix. pp. 216–310; *Histoire littéraire de la France,* t. xxvi. pp. 540–547; E. de Rozière, *Le Passage de Pamiers,* in Bibliothèque de l'École des Chartes (1871); Ch. V. Langlois in Lavisse's *Histoire de France,* t. iii., pt. ii., pp. 142–146.

SAITO, MINORU, VISCOUNT (1858–), Japanese sailor and administrator, was born a commoner, at Iwate Ken. He joined the navy in 1873, and was rapidly promoted, being gazetted commander in 1897. The discipline of the Japanese navy, strict as it was, still left something to be desired, and when he became captain in 1898, Saito declared his intention of revising some of the existing regulations and enforcing a stricter observance of others. In the same year he was appointed vice-minister of the navy under Admiral Count Yamamoto. Two years later he was gazetted rear-admiral in recognition of his valuable services in the development of the navy along Western lines. He was promoted to vice-admiral in 1904 and became admiral in 1912. He received several decorations for his services in the Russo-Japanese war, where he profited by his experience as naval aide-de-camp to the Emperor in the Chino-Japanese conflict. He was minister for the navy in 1913 and 1914. After the upheaval of the Koreans in 1919 under the rule of Marshal Hasegawa, Baron Saito was appointed governor-general of Korea. His chief concern was education; there were only 250 schools in the peninsula at the time of his appointment, but by 1926, there were nearly five times that number. He was created baron in 1907, and was raised to the rank of viscount in 1925. He was appointed chief delegate to the naval disarmament conference at Geneva in 1927. He resigned the post of governor-general of Korea soon after the conference.

SAJO or **MOHI, BATTLE OF THE,** 1241. This was the decisive battle in which the Mongols under Sabutai and Batu overthrew the Hungarian army under Bela, and thereby gained undisputed possession of Hungary, a conquest voluntarily abandoned next year (*see* MONGOL CAMPAIGNS). The date of the battle is usually reckoned as April 10, 1241, but other estimates place it on April 27, or even early in May. A week before the three wide-circling columns of the Mongol main army had converged and joined hands on the Danube near Gran, the Hungarian capital. Sabutai fell back slowly, luring Bela after him, away from the protection of the Danube. Meanwhile Sabutai had reconnoitred an ideal battle-ground in the plain of Mohi, a natural amphitheatre surrounded by the Sajo river and the famous hills of Tokay. After six days' pursuit the Hungarian army, including large contingents of Germans, Croats and French Knights Templar, camped here, while their apparently retreating foe crossed the river and disappeared out of sight. The Mongol plan was that while Batu fixed the Hungarians by a frontal attack across the river, Sabutai was to execute a wide manoeuvre back to the river, cross it lower down where he had reconnoitred a deep but fordable passage, and then fall upon the enemy's rear. During the night Batu turned on his track, and before dawn his advanced guard seized the bridge over the river to his front. The fire of catapults and archers covered the crossing of the main body. Then he moved forward to the attack and the battle was being hotly contested when, some hours later, Sabutai's surprise blow suddenly took the Hungarians in rear, dislocating both their formation and *moral.* The disruption of their host followed, and the fragments took flight, to shrink progressively under the Mongol pursuit, closely sustained for two days. Thousands were cut down on the field itself, the Knights Templar falling to the last man, but Bela, deserting his followers to their fate, made good his escape.

SAKA or **SHĀKA,** the name of various tribes which invaded India from Central Asia. More accurately, it denotes the tribe which invaded India 140–130 B.C. They are the Sacae of classical authors and the Se of the Chinese, representing an original Sek or Sök. The Chinese state that they were a pastoral people in the neighbourhood of the modern Kashgar. About 160 B.C. they were driven southward by the advance of the Yue-Chi (*q.v.*) from the east. One portion appears to have settled in western Afghanistan, hence called Sakasthāna, in modern Persian Seistan. The other section occupied the Punjab and possessed themselves of Sind, Gujarat, and Malwa. The rulers of these provinces bore the title of satrap (kshatrapa or chhatrapa) and were apparently subordinate to a king who ruled over the valley of Kabul and the Punjab. In 57 B.C. the Sakas were attacked simultaneously by Parthians from the west and by the Malava clans from the east and their power was destroyed.

Nothing is known of the language or race of the Sakas. Like many invaders of India at this period they adopted Buddhism.

See P. Gardner, *Coins of Greek and Scythian Kings in India* (1886); O. Franke, *Beiträge aus chinesischen Quellen zur Kenntnis der Turkvölker und Skythen* (1904); Vincent Smith, *Early History of India* revised by S. M. Edwardes (1924).

SAKAI, a pre-Dravidian people of the Malay peninsula (*see* RACES OF MANKIND; ASIA: *Further Asia*). The wilder tribes live on jungle fruits and game hunted with the blowgun (*q.v.*); the more civilized grow yams, maize, sugar-cane, rice and sago.



BY COURTESY OF THE FIELD MUSEUM OF NATURAL HISTORY

A SAKAI HUNTER WITH HIS BLOWGUN

See Skeat and Blagden, *Pagan Tribes of the Malay Peninsula* (1906). (J. H. H.)

SAKÉ, national beverage of Japan. In nature it stands midway between beer and wine. It is made chiefly from rice (*see* BREWING), by fermentation with the mould Aspergillus oryzae. Saké contains 12 to 15% of alcohol and about 3% of solid matter (extractives), 0·3% of lactic acid, a small quantity of volatile acid, 0·5% of sugar and 0·8% of glycerin. There are about 20,000 saké breweries in Japan, and the annual output is about 150 million gallons. Saké is a yellowish-white liquid, its flavour somewhat resembling that of madeira or sherry. (*See* WINE.)

SAKHALIN, an island in the North Pacific, 600 m. long, 16 to 105 broad, area 24,560 sq.m., lying between 45° 57′ N., and 54° 24′ N., separated from the mainland by the narrow, shallow strait of Tartary or Mamiya strait, which often freezes in winter in its narrowest part. By the treaty of Portsmouth (U.S.A.) 1905, the part south of 50° N., became Japanese, and that to the north, Russian. During the Civil War and war of intervention following the 1917 revolution, the Japanese occupied the whole island and did not evacuate the northern part until 1925. This northern territory forms three fifths of the island and is part of the Far Eastern administrative area (*q.v.*). Structurally also it is linked with the mainland and not with the volcanic Japanese islands; native legends record it as a peninsula separated by a cataclysm. Sakhalin is imperfectly surveyed. Sokolov reports a western range in the Japanese part, dying down at 51° 45′ N., and a second system starting from Cape Terpyeniya, in the Japanese part, containing the highest elevations, and reaching 51° N., where it is intersected by the valley of the Tym and passes to the western side, containing the Engiz-pal mass, closely related to Mount Tiara near the eastern sea. Estimates of the maximum heights in the eastern chain vary between 2,000 and 5,516 ft. The western hills (Mount Kitoisi 2,478 ft.) are less rounded than those on the east. The valleys of the Poronaya and Tym rivers stretch northward from the Gulf of Patience, and there are narrow sandy coastal plains. The lower course of the Tym lies in barren tundra land, and its upper course is impeded by rapids: the southward flowing Poronaya is navigable for about 30 m. There are other short rivers and numerous freshwater lakes, as well as salt lagoons near the coast. Sometimes the bays at the river mouths are temporarily converted into freshwater lakes by barriers thrown up by heavy seas, and later washed away again.

The whole island has a cold, foggy climate, with heavy rainfall in summer, and bitter cold and severe storms in winter. Snow falls

from October to May and may remain in places till July, while on the high land it re-commences in August; drifts may be 7 ft. deep. Drift ice is found along both coasts in the north and appears as late as July. The west coast conditions are somewhat moderated by a branch of the Kuro Siwo coming up the Gulf of Tartary, though cold, dense fogs are as prevalent here as in the east.

Fauna and Flora.—The north of the island, and the higher land is bleak tundra and much of the island is forested, coniferous trees prevailing on the mountains; amongst them is found the Kurilian bamboo. The coniferous passes into mixed deciduous in the river valleys, and there is a dense undergrowth of wild rose, berry-bearing plants and spiraea. The soil is unfavourable to agriculture and the vegetative period is at most 100 days, so that, with the exception of a few cereals, potatoes and vegetables grown on a patch of alluvial soil round Klyuch in the more sheltered central part, cultivation does not exist.

Bears, squirrels, pole-cat, ermine, sable, otter, glutton, marten, fox, elk and musk-deer are hunted and trapped. The bird life is varied and includes circumpolar and subtropical types, as well as those characteristic of the east of Asiatic Russia. Vipers, mosquitoes, horse- and sand-flies are pests. Fishing is the most common occupation and fish is almost the sole diet of many natives; vast quantities are exported to Japan for manure. Whales are numerous in the southern seas and the bêche-de-mer or trepang is caught for export.

Population.—The native tribes include Gilyaks, Oroke and Tungus, with Ainus in the Japanese part; for a description of the tribes of the Russian part *see* FAR EASTERN AREA. The Russians first settled on the island in 1857, and from 1875 to 1905 owned the whole of it. They established five penal settlements, to which convicts of the worst type were sent and afterwards liberated in the region, a policy from which much social disorder resulted; the penal settlement was abolished in 1907. The population in the Russian part in 1926 was about 12,000 and included many Japanese and Koreans. Malaria and scurvy are everywhere prevalent.

Industries.—During their occupation of the island up to 1925, the Japanese markedly developed the coal mining industry: this coal, which is of good quality and abundant, was first worked in 1859. In 1894 naphtha, long known to the natives, was investigated by the Russians and found to be practically free from benzine and most valuable. The naphtha and coal are being worked by a Japanese concession (1928). Iron and gold also exist and amber is cast up on the eastern shores. The Japanese also developed the timber industry of the district, which is, however, at present not prosperous (*see* FAR EASTERN AREA). There are railways in the Japanese part, but none in the Russian, except short lines linking the Alexandrovsk coal mines with the sea.

Steamers run from Vladivostok and Nikolaevsk-on-Amur to the chief town, Alexandrovsk (*q.v.*), from the end of April to October. Between October and December and from mid-March to April, there is no communication except by telegraph. Between these dates dog sledges cross the frozen sea from Nikolaevsk to Alexandrovsk. The island was under Chinese dominion till the 19th century. Martin Gerritz de Vries in the 17th century, La Pérouse (1787), Krusenstern (1805) visited it, but thought it a peninsula. A Japanese, Maimiya Rinzo, discovered the Strait of Tartary and the Russian navigator Nevelskoi in 1849 established it as possible for navigation.

See N. B. Arkhipov, *The Far Eastern Area* (1926); P. I. Polevoi, *Sakhalin* (1914).

SAKI, the name of a group of tropical American monkeys nearly allied to the uakaris (*q.v.*). The sakis, which form the genus *Pithecia,* are characterized by their long bushy and non-prehensile tails, distinct whiskers and beard, and the elongated hair on the crown of the head, which may either radiate from a point in the centre, or be divided by a median parting. They are very delicate animals and normally silent (*see* PRIMATES).

SAKTISM. The worship of *Sakti,* or female energy, is believed to be derived from lower cults prevalent in north-east Bengal and Assam. The principal Sakti shrine is situated at Kamakshya (? the fulfilment of lust) on the summit of a hill two miles west of Gauhati. In Indian speculation the male principle is often regarded as quiescent, while the female principle is active and creative, a view which it may be noted is found in the physiological ideas of the Ba Ila, who hold that the male element is an inert creature but upon the female depend all the generative functions (*Ila-speaking Peoples,* 1920, vol. i. p. 227). A close connection exists with Tantrism, the ritual for which includes the *pancamakara,* the five elements, beginning with *m, madya, mâmsa, matsya, mudrâ, maithuna* (wine, meat, fish, parched grain, copulation). Apart from this, caste restrictions are minimized, girl widows may remarry, women are honoured.

The most popular Sakti worship relates to Durga and Kali and there is ample evidence that human sacrifice is in theory an essential element of the ritual.

See Sir C. Eliot, *Hinduism and Buddhism* (1922).

SAL (*Shorea robusta*), a valuable timber tree the wood of which resembles teak. Large forests of sal occur in India, where the tree is widely planted and officially protected. The genus *Shorea* (family Dipterocarpaceae) contains about 90 species found in India, Ceylon and thence eastward to the Philippines.

SALA, GEORGE AUGUSTUS HENRY (1828–1895), English journalist, was born in London, on Nov. 24, 1828. He was educated in Paris and London. In his earlier years he did odd jobs in scene-painting and book illustration. He wrote articles and stories for Charles Dickens in *Household Words* and *All the Year Round,* and in 1856 Dickens sent him to Russia as a special correspondent. Sala engaged in many journalistic enterprises, but he is best known for his journalism on the *Daily Telegraph,* with which he became connected in 1857. For that paper he did his most characteristic work, whether as a foreign correspondent in all parts of the world, or as a writer of leaders or special articles. In 1892, when his reputation was at its height, he started a weekly paper called *Sala's Journal,* but it was a disastrous failure; and in 1895 he had to sell his library of 13,000 volumes. Lord Rosebery gave him a civil list pension of £100 a year. He died at Brighton on Dec. 8, 1895.

See *The Life and Adventures of George Augustus Sala, written by himself* (2 vols., 1895).

SALAD, a preparation of fresh or cooked vegetables or other ingredients, eaten cold, and served with a dressing of which oil, vinegar and salt are essential ingredients. The word comes from Med. Lat. *salata,* salted, pickled, *salare,* to sprinkle with *salt.*

Salads are prepared from raw green leaves and stems such as lettuces, watercress and endive, but many varieties are also made from fresh fruits and cold cooked vegetables. Cold fish, poultry, game, meat and eggs, may likewise be included.

The preparation of lettuce, endive, watercress, small cress and corn salad needs care. For salad green leaves are best when young and should be gathered early before the sun is up and kept in a cool place until needed. Soaking in cold water for ½ hour before use makes them crisp. Each leaf should be separated and washed thoroughly. Watercress needs special care in cleansing, and small cress should have the black seed cases removed and should be kept in small bunches. After cleansing, the plants should be well drained in a salad basket, on a cloth on a sieve, or in a colander, or they can be shaken lightly in a cloth. The leaves may well be broken with the fingers or cut with a fruit knife; a steel knife must never be used or both colour and flavour will be spoilt. Chives, radishes, tomatoes and celery, cabbage, cucumbers and onion are in this class, as they are used raw. Chives may be chopped or whole; radishes cut in slices or whole; celery used in pieces or shredded, when it curls and makes a pretty garnish; tomatoes cut in slices or quarters; cucumbers in slices, cubes or shreds, cabbage shredded, green peppers shredded; chopped or sliced canned pimento is much used, as cubes or shredded.

Among fruits used for salads are bananas cut in slices, apples cut in cubes, oranges in slices or in natural divisions, pineapples and pears in cubes, cherries and plums, stoned, whole or in halves, grapefruit in sections, kumquats whole and shredded, grapes (seeded). Cold cooked vegetables useful in salads are also numerous, *e.g.,* peas, beans, carrots, turnips, potatoes, artichokes, beet-

root and cauliflower buds, asparagus tips, brussels sprouts, spinach or other greens, okra, whole boiled onions. Care must be taken when cooking these, as if overcooked they will break up and become too soft; they may be cut in cubes, shreds or slices. Occasionally raw grated carrot is used.

Salad Dressings.—(1) The simple French dressing of oil and vinegar, seasoned with pepper, salt, mustard and sugar. This may be further flavoured with chopped tarragon, chervil, parsley, shalot, onion or chives. This dressing is used for green salads and for fruit and vegetable salads when served with poultry and cold meats. Cubes of apple with a French dressing are delicious with cold meat. Use at least twice as much oil as vinegar, seasoning to taste. Mix all in a basin and pour over the salad, mixing thoroughly; or mix from the oil and vinegar cruets directly on to the prepared salad, pouring the oil over the leaves first, for the vinegar is apt to make them flabby and it runs off them, whereas the oil coats them and then holds the vinegar; mix thoroughly.

(2) Mayonnaise (*see* also SAUCES). This dressing is used when a salad is to be served as a separate course, *e.g.*, salmon mayonnaise, and for the more elaborate salads.

Garnishes.—Hard-boiled egg in slices or yolk of egg rubbed through a wire sieve and the white chopped, the two being placed in alternate groups; beetroot in fancy shapes, cucumber crimped and cut in slices, celery shredded and made to curl by keeping in cold water 30 minutes before use, the small heart of a lettuce, bunches of mustard and cress.

For fruit salad, a syrup flavoured with lemon, liqueurs or wine is made, and to this fruits of all descriptions are added.

(E. G. C.)

SALADE, SALLET or **SALET,** a head-piece introduced in the early 15th century replacing the heavy helmet. Its essential features were its smooth rounded surface, like an inverted bowl, and its long projecting neck guard. Usually there was no movable vizor, but the front fixed part covered most of the face, a slit being left for the eyes. (*See* HELMET.)

SALADIN (Arab. *Sala-ud-din,* "Honouring the Faith") (1138–1193), first Ayyubite sultan of Egypt, was born at Tekrit in 1138. The brilliance of his career was only made possible by the condition of the East in the 12th century. Such authority as remained to the orthodox caliph of Baghdad (*see* CALIPHATE) or the heretical Fatimites (*q.v.*) of Cairo was exercised by their viziers. The Seljukian empire had, after 1076, been divided and subdivided among Turkish atabegs. The Latin kingdom of Jerusalem had existed since 1089 only because it was a united force in the midst of disintegration. Gradually, however, Christian enthusiasm had aroused a counter enthusiasm among the Muslims. Zengi, atabeg of Mosul, had inaugurated the sacred war by his campaigns in Syria (1137–46). Nur-ed-din, his son, had continued his work by further conquests in Syria and Damascus, by the organization of his conquered lands, and, in 1157, by "publishing everywhere the Holy War." The opportunity of Saladin lay therefore in the fact that his lifetime covers the period when there was a conscious demand for political union in the defence of the Mohammedan faith. By race Saladin was a Kurd of Armenia. His father, Ayyub (Job), and his uncle Shirkuh, sons of a certain Shadhy of Ajdanakan near Dawin, were both generals in Zengi's army. In 1139 Ayyub received Baalbek from Zengi, in 1146 he moved, on Zengi's death, to the court of Damascus. In 1154 his influence secured Damascus to Nur-ed-din and he was made governor. Saladin was therefore educated in the most famous centre of Muslim learning, and represented the best traditions of Muslim culture.

His career falls into three parts, his conquests in Egypt 1164–74, the annexation of Syria 1174–87, and lastly the destruction of the Latin kingdom and subsequent campaigns against the Christians, 1187–92. The conquest of Egypt was essential to Nur-ed-din. It was a menace to his empire on the south, the occasional ally of the Franks and the home of the unorthodox caliphs. His pretext was the plea of an exiled vizier, and Shirkuh was ordered to Egypt in 1164, taking Saladin as his lieutenant. The Christians under Count Amalric immediately intervened and the four expeditions which ensued in 1164, 1167, 1168 and 1169 were duels between Christians and Saracens. They resulted in heavy Christian losses, the death of Shirkuh and the appointment of Saladin as vizier. His relations towards the unorthodox caliph Nur-ed-din were marked by extraordinary tact. In 1171 on the death of the Fatimite caliph he was powerful enough to substitute the name of the orthodox caliph in all Egyptian mosques. The Mohammedan religion was thus united against Christianity. To Nur-ed-din he was invariably submissive, but from the vigour which he employed in adding to the fortifications of Cairo and the haste with which he retreated from an attack on Montréal (1171) and Kerak (1173) it is clear that he feared his lord's jealousy.

In 1174 Nur-ed-din died, and the period of Saladin's conquests in Syria begins. Nur-ed-din's vassals rebelled against his youthful heir, es-Salih, and Saladin came north, nominally to his assistance. In 1174 he entered Damascus, Emesa and Hamah; in 1175 Baalbek and the towns round Aleppo. The next step was political independence. He suppressed the name of es-Salih in prayers and on the coinage, and was formally declared sultan by the caliph in 1175. In 1176 he conquered Saif-ud-din of Mosul beyond the Euphrates and was recognized as sovereign by the princes of north Syria. In 1177 he returned by Damascus to Cairo, which he enriched with colleges, a citadel and an aqueduct. From 1177 to 1180 he made war on the Christians from Egypt, and in 1180 reduced the sultan of Konia to submission. From 1181–83 he was chiefly occupied in Syria. In 1183 he induced the atabeg Imad-ud-din to exchange Aleppo for the insignificant Sinjar and in 1186 received the homage of the atabeg of Mosul. The last independent vassal was thus subdued and the Latin kingdom enclosed on every side by a hostile empire.

In 1187 a four years' truce was broken by the brilliant brigand Raynald of Châtillon, and thus began Saladin's third period of conquest. In May he cut to pieces a small body of Templars and Hospitallers at Tiberias, and, on July 4, inflicted a crushing defeat upon the united Christian army at Hittin. He then overran Palestine, on Sept. 20 besieged Jerusalem and on Oct. 2, after chivalrous clemency to the Christian inhabitants, crowned his victories by entering and purifying the Holy City. In the kingdom only Tyre was left to the Christians. Probably Saladin made his worst strategical error in neglecting to conquer it before winter. The Christians had thus a stronghold whence their remnant marched to attack Acre in June 1189. Saladin immediately surrounded the Christian army and began the famous siege.

Saladin's lack of a fleet enabled the Christians to receive reinforcements and thus recover from their defeats by land. On June 8, 1191, Richard of England arrived, and on July 12 Acre capitulated without Saladin's permission. Richard followed up his victory by an admirably ordered march down the coast to Jaffa and a great victory at Arsuf. During 1191 and 1192 there were four small campaigns in southern Palestine when Richard circled round Beitnuba and Ascalon with Jerusalem as objective. In January 1192 he acknowledged his impotence by renouncing Jerusalem to fortify Ascalon. Negotiations for peace accompanied these demonstrations, which showed that Saladin was master of the situation. Though in July Richard secured two brilliant victories at Jaffa, the treaty made on the 2nd of September was a triumph for Saladin. Only the coast line was left to the Latin kingdom, with a free passage to Jerusalem; and Ascalon was demolished. The union of the Mohammedan East had beyond question dealt the death-blow to the Latin kingdom. Richard returned to Europe, and Saladin returned to Damascus, where on March 4, 1193, after a few days' illness, he died. He was buried in Damascus and mourned by the whole East.

The character of Saladin and of his work is singularly vivid. In many ways he was a typical Mohammedan, fiercely hostile towards unbelievers—"Let us purge the air of the air they breathe" was his aim for the demons of the Cross,—intensely devout and regular in prayers and fasting. He showed the pride of race in the declaration that "God reserved this triumph for the Ayyubites before all others." His generosity and hospitality were proved in his gifts to Richard and his treatment of captives. He had the Oriental's power of endurance, alternating with violent and emotional courage. Other virtues were all his own, his extreme gentle-

ness, his love for children, his flawless honesty, his invariable kindliness, his chivalry to women and the weak. Above all he typifies the Mohammedan's utter self-surrender to a sacred cause. His achievements were the inevitable expression of his character. He was not a statesman, for he left no constitution or code to the East; his empire was divided among his relatives on his death. As a strategist, though of great ability, he cannot be compared to Richard. As a general, he never organized an army. "My troops will do nothing," he confessed, "save when I ride at their head and review them." His fame lives in Eastern history as the conqueror who stemmed the tide of Western conquest on the East, and turned it definitely from East to West, as the hero who momentarily united the unruly East, and as the saint who realized in his personality the highest virtues and ideals of Mohammedanism.

AUTHORITIES.—The contemporary Arabian authorities are to be found in Michaud's *Recueil des historiens des Croisades* (Paris, 1876). This contains the work of Baha-ud-din (1145–1234), diplomatist, and secretary of Saladin, the general history of Ibn-Athir (1160–1233), the eulogist of the atabegs of Mosul but the unwilling admirer of Saladin, and parts of the general history of Abulfeda. The biography of the poet Osema ibn Murkidh (1095–1188), edited by Derenbourg (Paris, 1886), gives an invaluable picture of Eastern life. Later Arabian authorities are Ibn Khallikan (1211–1282) and Abu-Shama (born 1267). Of Christian authorities the following are important, the history of William of Tyre (1137–1185), the *Itinerarium peregrinorum*, probably the Latin version of the *Carmen Ambrosii* (ed. by Stubbs, "Rolls" series, London, 1864), and the *Chronique d'outremer*, or the French translation of William of Tyre's history and its continuation by Ernoul, the squire of Balian, seigneur of Ibelin, 1228. The best modern authority is Stanley Lane-Poole's *Saladin* ("Heroes of the Nations" series, London, 1903). *See* also the bibliography to CRUSADES. (W. F. K.)

SALAMANCA, a frontier province of eastern Spain, formed in 1833 out of the southern part of the ancient kingdom of Leon, and bounded on the north by Zamora and Valladolid, east by Ávila, south by Cáceres and west by Portugal. Pop. (1920) 321,615; area, 4,829 square miles. Salamanca belongs almost entirely to the basin of the Duero (Portuguese *Douro, q.v.*), its principal rivers being the Tormes, which after a course of 135 m. flows into the Duero; the Yeltes and the Agueda, also tributaries of the Duero; and the Alagon, an affluent of the Tagus. The southern border is partly defined along the crests of the Gredos and Gata ranges, but the highest point is La Alberca (5,692 ft.) in the Sierra de Peña de Francia, a little farther north. Forests of oak, pine, beech and chestnut cover a wide area in the south and south-west. Of the forty-nine Spanish provinces only Badajoz, Cáceres and Teruel have a larger number of live stock. Gold is found in the streams, and iron, lead, copper, zinc, coal and rock crystal in the hills, but the mines are only partially developed, and it is doubtful if the deposits would repay exploitation on a larger scale. Besides the capital, Salamanca (*q.v.*) and the town of Ciudad Rodrigo (*q.v.*), Béjar (9,244) is the only town of more than 5,000 inhabitants. The railways from Zamora, Medina, Plasencia and Peñaranda converge upon the capital, whence two lines go westward into Portugal—one via Barca d'Alva to Oporto, the other via Villar Formoso to Guarda.

SALAMANCA, the capital of the Spanish province of Salamanca (anc. *Salmantica* or *Elmantica*), on the right bank of the river Tormes, 2,648 ft. above sea-level and 172 m. by rail N.W. of Madrid. Pop. (1920) 32,414.

The town was of importance as early as 222 B.C., when it was captured by Hannibal from the Vettones; and it afterwards became under the Romans the ninth station on the Via Lata from Merida to Saragossa. It passed successively under the rule of the Goths and the Moors, till the latter were finally driven out about 1055. About 1100 many foreign settlers were induced by Alphonso VI. to establish themselves in the district, and the city was enlarged by Count Raymond of Burgundy. The *Fuero de Salamanca*, a celebrated code of civil law, probably dates from about 1200. Thenceforward, until the second half of the 16th century, the prosperity of the university rendered the city one of the most important in Spain.

Salamanca is the centre of a network of railways which radiate north to Zamora, north-east to Medina, east to Peñaranda, south to Plasencia, west-south-west to Guarda in Portugal, and west to Oporto in Portugal. The river is here crossed by a bridge 500 ft. long built on twenty-six arches, fifteen of which are of Roman origin, while the remainder date from the 16th century. The city is still much the same in outward appearance as when its tortuous streets were thronged with students. The university was naturally the chief source of wealth to the town, the population of which in the 16th century numbered 50,000, nearly 8,000 of whom were students. Its decay of course reacted on the townsfolk, but it fortunately also arrested the process of modernization. The ravages of war alone have wrought serious damage, for the French in their defensive operations in 1811–1812 almost destroyed the western quarter. The magnificent Plaza Mayor, built by Andres Garcia de Quiñones at the beginning of the 18th century, and capable of holding 20,000 people to witness a bullfight, is one of the finest squares in Europe. It is surrounded by an arcade of ninety arches on Corinthian columns, one side of the square being occupied by the municipal buildings. The decorations of the façades are in the Renaissance style, and the plaza as a whole is a fine sample of Plateresque architecture.

The University.—Salamanca is still rich in educational establishments. It still keeps up its university, with the separate faculties of letters, philosophy, sciences, law and medicine; its university and provincial public library, with many thousand volumes and mss.; its Irish college, provincial institute, superior normal school, ecclesiastical seminary (founded in 1778), economic and other learned societies, and very many charitable foundations. The city has still its 25 parishes, 25 colleges, and as many more or less ruinous convents, and 10 yet flourishing religious houses. The university, the oldest in the Peninsula, was founded about 1230 by Alphonso IX. of Leon, and refounded in 1242 by St. Ferdinand of Castile. Under the patronage of the learned Alphonso X. its wealth and reputation greatly increased (1252–1282), and its schools of canon law and civil law attracted students even from Paris and Bologna. In the 15th and 16th centuries it was renowned throughout Europe. Here Columbus lectured on his discoveries, and here the Copernican system was taught long before it had won general acceptance. But soon after 1550 a period of decline set in.

Principal Buildings.—The old cathedral is a cruciform building of the 12th century, begun by Bishop Jerónimo, the confessor of the Cid (*q.v.*). Its style of architecture is that Late Romanesque which prevailed in the south of France, but the builder showed much originality in the construction of the dome, which covers the crossing of the nave and transepts. The inner dome is made to spring, not from immediately above the arches, but from a higher stage of a double arcade pierced with windows. The thrust of the vaulting is borne by four massive pinnacles, and over the inner dome is an outer pointed one covered with tiles. The Capilla de Talavera is used as a chapel for service according to the Mozarabic rite, which is celebrated there six times a year. On the north of and adjoining the old church stands the new cathedral, built from designs by Juan Gil de Ontañon. Though begun in 1509 the work of construction made little progress until 1513, when it was entrusted to Ontañon under Bishop Francisco de Bobadilla; though not finished till 1734, it is a notable example of the late Gothic and Plateresque styles. Its length is 340 ft. and its breadth 160 ft. The treasury is very rich, and amongst other articles possesses a custodia which is a masterpiece of goldsmith's work, and a bronze crucifix of undoubted authenticity, which was borne before the Cid in battle.

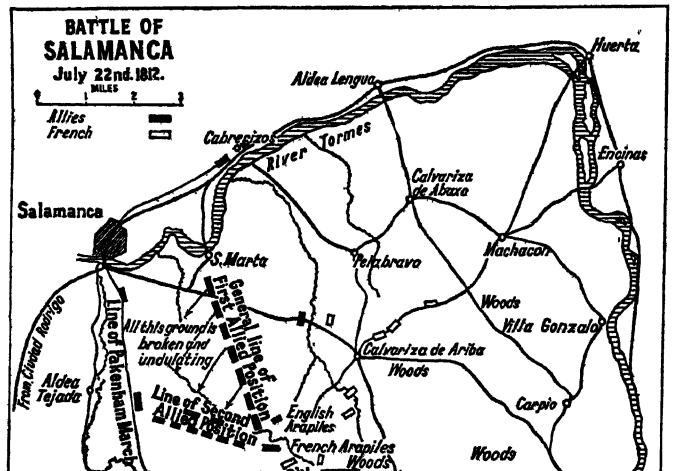
Of the university buildings the façade of the library is a peculiarly rich example of late 15th-century Gothic. The cloisters are light and elegant; the grand staircase ascending from them has a fine balustrade of foliage and figures. The Colegio de Nobles Irlandeses was built in 1521 from designs by Pedro de Ibarra. The double arcaded cloister is a fine piece of work of the best period of the Renaissance. The Jesuit College is an immense and ugly Renaissance building begun in 1614 by Juan Gomez de Mora. The Colegio Viejo, also called San Bartolomé, was rebuilt in the 18th century, and now serves as the governor's palace. The Dominican convent of San Esteban shows a mixture

of styles from the 13th century onwards. The church is Gothic with a Plateresque façade of great lightness and delicacy. The convent of the Agustinas Recoletas, begun by Fontana in 1616, is in better taste than any other Renaissance building in the city. The church is rich in marble fittings and contains several fine pictures of the Neapolitan school, especially the Conception by J. Ribera (1588–1656) over the altar. The convent of the Espiritu Santo has a good door by A. Berruguete (*c.* 1480–1561). Many of the private houses are untouched examples of the domestic architecture of the times in which they were built.

See B. Dorado, *Compendio histórico de la ciudad de Salamanca* (Salamanca, 1863); M. Villar y Macias, *Historia de Salamanca* (3 vols., Salamanca, 1887); H. Rashdall, *Universities of Europe in the Middle Ages*, vol. ii. pt. 1. (London, 1895); E. Esperabé, *Historia pragmática e interna de la Universidad de Salamanca* (2 vols. Salamanca, 1914–17). (X.)

Battle of Salamanca, 1812. (For the operations which preceded this battle *see* PENINSULAR WAR.)—On July 22, 1812 the Allied army under Wellington (about 46,000 with 60 guns) was drawn up south of Salamanca, the left resting on the river Tormes, with a division under Pakenham on the north bank at Cabrerizos. Wellington's object was to cover Salamanca and guard his communications through Ciudad Rodrigo with Portugal. The French under Marshal Marmont (about 42,000 with 70 guns) were collecting towards Wellington's right, stretching southwards from Calvariza de Ariba. The country generally is undulating.

Until the morning of the battle it had been uncertain whether Marmont wished to reach Salamanca by the right or left bank of the Tormes, or to gain the Ciudad Rodrigo road, but Wellington now felt that the latter was his real objective. At daylight there was a rush by both armies for the two commanding hills of the Arapiles; the Allies gained the northern (since termed the "English"), and the French the southern (since termed the "French") Arapiles. While Marmont was closing up his forces, a complete change of position was carried out by Wellington. Pakenham was directed to march through Salamanca, crossing the Tormes, and move under cover to a wood near Aldea Tejada, while Wellington took up a line under cover of a ridge between Arapiles and Aldea Tejada. By noon his old right had become his left, and he was



nearer to the Ciudad Rodrigo road, flanking Marmont should he move towards it.

It was not Wellington's wish (*Despatches*, July 21, 1812) to fight a battle "unless under very advantageous circumstances." He knew that large reinforcements were nearing the French, and, having determined to fall back towards Portugal, he began to pass his baggage along the Ciudad Rodrigo road. Marmont, about 2 P.M., seeing the dust of his baggage column, ignorant of his true position, and anxious to intercept his retreat, ordered two divisions under Maucune to push westward, while he himself attacked Arapiles. Maucune moved off, flanked by some cavalry and fifty guns, leaving a gap between him and the rest of the French. Wellington instantly took advantage of this. Directing Pakenham to attack the head of the leading French division, and a Portuguese brigade (Pack) to occupy the enemy by assaulting the south (or French) Arapiles, he prepared to bear down in strength upon Maucune's right flank. The French attack upon Arapiles was after hard fighting repulsed; and, at about 5 P.M., Maucune's force, when in confusion from the fierce attack of Pakenham and Wellington in front and flank and suffering severely, was suddenly trampled down "with a terrible clamour and disturbance" (Napier) by an irresistible charge of cavalry under Sir Stapleton Cotton. This counterstroke decided the battle, Marmont's left wing being completely broken. The French made a gallant but fruitless effort to retrieve the day, and repulsed Pack's attack upon the French Arapiles; but, as the light waned, Clausel, Marmont being wounded, drew off the French army towards Alba de Tormes and retired to Valladolid. Both armies lost heavily, the Allies about 6,000, the French some 15,000 men, 12 guns 2 eagles and several standards. The rout would have been even more thorough had not the castle and ford at Alba de Tormes been evacuated by its Spanish garrison without Wellington's knowledge.

Salamanca was a brilliant victory, and followed as it was by the capture of Madrid, it severely shook the French domination in Spain. (C. W. Ro.)

SALAMANCA, a city of Cattaraugus county, New York, U.S.A., 52 m. S. by E. of Buffalo, on the Allegany river. It is served by the Buffalo, Rochester and Pittsburgh, the Erie and the Pennsylvania railways and by interurban trolleys and motor-bus lines. Pop. (1920) 9,276 (86% native white); 1930 Federal census 9,577. Salamanca has a charming location, on both sides of the river, at an altitude of 1,390 ft., with wooded hills on the horizon. It lies in the Allegany Indian Reservation, and all land is held under a 99-year lease, authorized by Congress in 1892. The city has railroad shops, furniture factories and various other manufacturing industries. It is within a few miles of the Allegany State park of 65,000 ac., still largely covered with virgin forests. The first settlement here was made in 1815. The village of Salamanca was incorporated in 1879, and in 1913 the city was formed by the consolidation of Salamanca and West Salamanca. The name is that of a Spanish banker who was a large stockholder in the railroad built through the county in 1862.

SALAMANDER. Salamanders in the restricted sense (genus *Salamandra*) are allies of the newts, but of exclusively terrestrial habits, indicated by the less compressed tail. The genus is restricted to the western parts of the Palaearctic region and represented by four species: the spotted salamander, *S. maculosa*, the well-known black and yellow creature inhabiting central and south Europe, north-west Africa, and south-west Asia; the black salamander, *S. atra*, restricted to the Alps; *S. caucasica* from the Caucasus, and *S. luschani* from Asia Minor. Salamanders, far from being able to withstand the action of fire, as was believed by the ancients, are only found in damp places. They often emerge in great numbers in misty weather or after thunderstorms. Although harmless to man, the large glands on their smooth, shiny bodies secrete a milky poison, which protects them from many enemies. The bright coloration of *S. maculosa* is therefore probably of warning function.

The two well-known European species pair on land, the male clasping the female at the arms, and the impregnation is internal. Long after pairing the female gives birth to living young. *S. maculosa*, which lives at low altitudes (up to 3,000ft.), deposits her young, 10 to 50 in number, in the water, in springs or cool rivulets, and these young at birth are similar to small newt larvae, and provided with external gills. *S. atra*, on the other hand, inhabits more hilly regions, up to 9,000ft. Such altitudes not being, as a rule, suitable for larval life in the water, the young are retained in the uterus until after metamorphosis. Only two young, rarely three or four, are born, and may measure as much as 50mm. at birth, the mother measuring only 120. The fertilized eggs are large and numerous, as in *S. maculosa*, but only one develops in each uterus, the embryo being nourished on the other eggs, the embryos of which break down into a soupy "vitelline mass." The embryo passes through three stages—(1) still enclosed within the

egg membrane and living on its own yolk; (2) free, within the vitelline mass, which is swallowed by the mouth; (3) there is no more vitelline mass, but the embryo develops long external gills, which serve for a nutritive exchange through the maternal uterus, these gills functioning in the same way as the chorionic villi of the mammalian embryo's placenta. Embryos, in the second stage, if artificially released from the uterus, are able to live in water, but the uterine gills soon wither and are shed and are replaced by other gills similar to those in the larva of *S. maculosa*. Conversely, if *S. maculosa* is forced to breed without access to water, the development of the embryos becomes closely similar to that of *S. atra*. (*See* AMPHIBIA.)

BIBLIOGRAPHY.—H. Gadow, *Amphibia* (*Cambridge Natural History*); E. R. Dunn, *Salamanders of the family Plethodontidae* (1926); E. Schwalbe, *Zeitschr. für Biol.* (1896 and 1897).

SALAMIS, an island of Greece in the Saronic Gulf of the Aegean Sea, extending along the coasts of Attica and Megaris, and enclosing the Bay of Eleusis between two narrow straits on the W. and S. Its area is 36 sq.m., its greatest length in any direction 10 m.; its extremely irregular shape gives rise to the modern popular name Κουλλοῦρι, *i.e.*, baker's crescent. In Homer Salamis was the home of the Aeginetan prince Telamon and his sons Ajax and Teucer, and this tradition is confirmed by the position of the ancient capital of the island opposite Aegina. It subsequently passed into the hands of the Megarians, but was wrested from them about 600 B.C. by the Athenians under Solon (*q.v.*) and definitely awarded to Athens by Sparta's arbitration. Though Attic tradition claimed Salamis as an ancient possession the island was not strictly Athenian territory; a 6th-century inscription shows that it was treated either as a cleruchy or as a privileged foreign dependency. The town of Salamis was removed to an inlet of the east coast opposite Attica. In 480 Salamis became the base of the allied Greek fleet after the retreat from Artemisium, while the Persians took their station along the Attic coast off Phalerum. Through the stratagem of the Athenian Themistocles the Greeks were enclosed in the straits by the enemy, who had wheeled by night across the entrance of the east channel and detached a squadron to block the west outlet. The Greeks had thus no resource but to fight, while the Persians could not utilize their superior numbers, and as they advanced into the narrow neck of the east strait were thrown into confusion. The allies, among whom the Athenians and Aeginetans were conspicuous, seized this opportunity to make a vigorous attack which probably broke the enemy's line. After waging a losing fight for several hours the Persians retreated with a loss of 200 sail and of an entire corps landed on the islet of Psyttaleia in the channel; the Greeks lost only 40 ships out of more than 300. During the Peloponnesian War Salamis served as a repository for the country stock of Attica. About 350 Salamis obtained the right of issuing copper coins. In 318 Cassander placed in it a Macedonian garrison which was finally withdrawn through the advocacy of the Achaean statesman Aratus (232). The Athenians thereupon supplanted the inhabitants by a cleruchy of their own citizens. By the 2nd century A.D. the settlement had fallen into decay. In modern times Salamis, which is chiefly peopled by Albanians, has regained importance through the transference of the naval arsenal to Ambelaki near the site of the ancient capital. Excavations in this region have revealed large numbers of late Mycenaean tombs.

AUTHORITIES.—Strabo, pp. 383, 393–394; Pausanias i. 35–36; Plutarch, *Solon*, 8–10; Aeschylus, *Persae*, 337–471; Herodotus viii. 40–95; Diodorus xi. 15–19; Plutarch, *Themistocles*, 11–15; W. Goodwin, *Papers of the American School of Classical Studies at Athens*, I. p. 237 ff. (Boston, 1885); G. B. Grundy, *Great Persian War* (London, 1901), ch. ix.; B. V. Head, *Historia numorum* (Oxford, 1887), pp. 328–329; A. Wilhelm in *Athenische Mitteilungen* (1898), pp. 466–486; W. Judeich, *ibid.* (1899), pp. 321–338; C. Horner, *Quaestiones Salaminiae* (Basle, 1901); H. Raase, *Die Schlacht bei Salamis* (Rostock, 1904); R. W. Macan, Appendix to *Herodotus vii.–ix.* (London, 1908); J. Beloch in *Klio* (1908). (M. C.)

SALAMIS, the principal city of ancient Cyprus, situated on the east coast north of the river Pedias (Pediaeus). It had a good harbour, well situated for commerce with Phoenicia, Egypt and Cilicia, which was replaced in mediaeval times by Famagusta (*q.v.*), and is wholly silted now. Its trade was mainly in corn, wine and oil from the midland plain, and in salt from the neighbouring lagoons. Traditionally, Salamis was founded after the Trojan War (*c.* 1180 B.C.) by Teucer from the island Salamis, off Attica, but there was a Mycenaean colony somewhat earlier.

A king Kisu of Silna (Salamis) is mentioned in a list of tributaries of Assur-bani-pal of Assyria in 668 B.C., and Assyrian influence is seen in terra-cotta figures from a shrine excavated in 1890–1891. Salamis seems to have been the principal Hellenic power in the island. The revolts against Persia in 500 B.C., 386–380 B.C. and 352 B.C. were led respectively by its kings Onesilas, Evagoras (*q.v.*) and Pnytagoras. In 306 B.C. Demetrius Poliorcetes won a great naval victory here over Ptolemy I. of Egypt. Under Egyptian and Roman administration Salamis flourished greatly, though the seat of government was at New Paphos (*see* PAPHOS). But it was greatly damaged in the Jewish revolt of A.D. 116–117; suffered repeatedly from earthquakes, and was wholly rebuilt by Constantius II. (A.D. 337–361) under the name Constantia. There was a large Jewish colony, and a Christian community was founded by Paul and Barnabas in A.D. 45–46. Barnabas was himself a Cypriote, and his reputed tomb, discovered in A.D. 477, is still shown near the monastery of Ail Barnába. St. Epiphanius was archbishop A.D. 367–402. The Greek city was destroyed by the Arabs under the Caliph Moawiya in 647; Christian survivors migrated to the neighbouring Ammochostos (*see* FAMAGUSTA).

See W. H. Engel, *Kypros* (Berlin, 1841; classical allusions); J. A. R. Munro and H. A. Tubbs, *Journ. Hellenic Studies*, xii. 59 ff., 298 ff. (site and monuments); British Museum, *Excavations in Cyprus* (London, 1899; Mycenaean tombs); G. F. Hill, *Brit. Mus. Cat. Coins of Cyprus* (London, 1904; coins); J. L. Myres, *Archaeologia*, lxvi. 159–178 ("Prison of St. Catharine"); E. Oberhummer in Pauly-Wissowa (*s.v.*). (J. L. MY.)

SAL AMMONIAC or **AMMONIUM CHLORIDE,** the earliest known salt of ammonia (*q.v.*), was formerly much used in dyeing and metallurgic operations.

The name *Hammoniacus sal* (from ἄμμος sand) occurs in Pliny, who relates that it was applied to a kind of fossil salt found below the sand, in a district of Cyrenaica. The general opinion is, that the sal ammoniac of the ancients was the same as that of the moderns; but the imperfect description of Pliny is far from being conclusive. The native sal ammoniac of Bucharia, described by Model and Karsten, and analysed by M. H. Klaproth, has no resemblance to the salt described by Pliny. The same remark applies to the sal ammoniac of volcanoes. Dioscorides, in mentioning sal ammoniac, makes use of a phrase quite irreconcilable with the description of Pliny, and applicable rather to rock-salt than to our sal ammoniac. Sal ammoniac, he says, is peculiarly prized if it can be easily split into rectangular fragments. Finally, we have no proof whatever that sal ammoniac occurs near the temple of Jupiter Ammon, or in any part of Cyrenaica, so it is improbable that the name is derived from Ammon, and it seems that the term sal ammoniac was applied as indefinitely by the ancients as most of their other chemical terms. In any case there can be no doubt that it was well known to the alchemists as early as the 13th century.

Egypt is the country where sal ammoniac was first manufactured, and thence Europe for many years was supplied with it. This commerce was first carried on by the Venetians, and afterwards by the Dutch. In 1716 C. J. Geoffroy read a paper to the French Academy, showing that sal ammoniac must be formed by sublimation; but his opinion was opposed so violently by W. Homberg and N. Lemery, that the paper was not printed. In 1719 D. Lemaire, the French consul at Cairo, sent the Academy an account of the mode of manufacturing sal ammoniac in Egypt. The salt, it appeared, was obtained by simple sublimation from soot. In the year 1760 Linnaeus communicated to the Royal Society a correct detail of the whole process, which he had received from Dr. F. Hasselquist, who had travelled in that country as a naturalist. The dung of black cattle, horses, sheep, goats, etc., which contains sal ammoniac ready formed, is collected during the first four months of the year, when the animals feed on the spring grass, a kind of clover. It is dried and sold to the common

people as fuel. The soot from this fuel is carefully collected and sold to the sal ammoniac makers, who work only during the months of March and April, for it is only at that season of the year that the dung is fit for their purpose.

The composition of this salt (NH_4Cl) seems to have been first discovered by J. P. Tournefort in 1700. The experiments of C. J. Geoffroy in 1716 and 1723 were still more decisive, and those of H. L. Duhamel de Monceau, in 1735, left no doubt upon the subject. Thomson first deduced its composition synthetically from his observation that when hydrochloric acid gas and ammonia gas are brought in contact with each other, they always combine in equal volumes.

The first attempt to manufacture sal ammoniac in Europe was made, about the beginning of the 18th century, by Goodwin, a London chemist, who appears to have used the mother lye of common salt and putrid urine as ingredients. The first successful manufacture of sal ammoniac in Great Britain was established in Edinburgh about the year 1760. It was first manufactured in France about the same time by A. Baumé. It is now obtained from the ammoniacal liquor of gas works by distilling the liquor with milk of lime and passing the ammonia so obtained into hydrochloric acid. The solution of ammonium chloride so obtained is evaporated and the crude ammonium chloride purified by sublimation. The salt volatilizes (mostly in the form of a mixed vapour of the two components, which reunite on cooling), and condenses in the dome in the form of a characteristically fibrous and tough crust.

The pure salt has a sharp saline taste and is readily soluble in water. It readily volatilizes, and if moisture be rigorously excluded, it does not dissociate, but in the presence of mere traces of water it dissociates into ammonia and hydrochloric acid (H. B. Baker, 1895). (*See* also DRYNESS, CHEMICAL.)

Sal ammoniac (ammonium chloride, British and United States pharmacopoeiae) as used in medicine is a white crystalline odourless powder having a saline taste. It is soluble in 3 parts of cold water and in 50 parts of 90% alcohol. It is incompatible with carbonates of the alkalis. The dose is 5 to 20 gr. Ammonium chloride has a different action and therapeutic use from the rest of the ammonium salts. It possesses only slight influence over the heart and respiration, but it has a specific effect on mucous membranes as the elimination of the drug takes place largely through the lungs, where it aids in loosening bronchial secretions. This action renders it of the utmost value in bronchitis and pneumonia with associated bronchitis. The drug may be given in a mixture with glycerine or liquorice to cover the disagreeable taste or it may be used in a spray by means of an atomizer. Though ammonium chloride has irritant properties which may disorder the stomach, yet if its mucous membrane be depressed and atonic the drug may improve its condition, and it has been used with success in gastric and intestinal catarrhs of a subacute type and is given in doses of 10 grains half an hour before meals in painful dyspepsia due to hyperacidity. It is also an intestinal and hepatic stimulant and a feeble diuretic and diaphoretic, and has been considered a specific in some forms of neuralgia.

SALANDRA, ANTONIO (1853–), Italian statesman, was born at Troia, Puglia, in 1853. He first entered parliament as member for Lucera, and from the beginning of his political career was a Liberal of the right wing. When Baron Sonnino became treasury minister in the Crispi cabinet of 1893, Salandra was chosen under-secretary in that department. He was minister of finance in the first Sonnino cabinet of 1906 and treasury minister in the second (1909–10). When, in March 1914, Giolitti resigned, Salandra was called upon to form the new cabinet, and in June he had to face a revolutionary outbreak in the Marches, Romagna and elsewhere. He was premier on the outbreak of the World War, and it was the Salandra cabinet which took the momentous decision of proclaiming Italy's neutrality, in spite of the existence of the Triple Alliance, because it was considered that as Austria had failed to fulfil her obligations under the treaty, no *casus foederis* had arisen.

In May 1915 Salandra assumed the still greater responsibility of bringing Italy into the war on the side of the Allies. On resigning office in June 1916, in consequence of the Austrian offensive in the Trentino, he continued to support both the Boselli and the Orlando cabinets. During the disturbed period from 1919 to 1922 Salandra upheld the principles of orthodox Liberalism, and opposed the policy of the various cabinets who truckled to the extremists. He succeeded Tittoni as Italian delegate on the League of Nations Council and Assembly, and represented the Italian thesis in the Italo-Greek conflict arising from the massacre of the Tellini mission in Epirus in Aug. 1923. The Fascist movement was supported from the first by Salandra, but he did not join the Fascist party, and when he felt that Fascism was incompatible with the old Liberal tradition, especially after Mussolini's speech of Jan. 3, 1925, he withdrew his support, without, however, abandoning the Chamber. Subsequently his opposition became considerably attenuated, and in 1928 on the proposal of Mussolini, he was created a senator.

SALARIA, VIA, an ancient highroad of Italy, which ran from Rome by Reate and Asculum to Castrum Truentinum (Porto d'Ascoli) on the Adriatic coast, a distance of 151 m. Its first portion was the route by which the Sabines came to fetch salt from the marshes at the mouth of the Tiber. Of its course through the Apennines considerable remains exist.

See T. Ashby in *Papers of the British School at Rome,* iii. 3–38; N. Persichetti, *Viaggio archeologico sulla Via Salaria* (Rome, 1893); and in *Römische Mitteilungen* (1903), 276 *seq.;* (1908) 275, (1909) 121, 208 and T. Ashby, *ibid.* (1912) 222, for full accounts of the road.

SALAR JUNG, SIR (1829–1883), Indian statesman of Hyderabad, born in 1829, descendant of a family of officials under the Adil Shahi kings of Bijapur, then under the Delhi emperors and lastly under the Nizams. Sir Salar Jung's personal name was Mir Turab Ali; he was styled by native officials of Hyderabad the Mukhtaru 'l-Mulk, and commonly known as the Nawab Sahib. He succeeded his uncle Suraju 'l-Mulk as prime minister of Hyderabad in 1853. Salar Jung disciplined Arab mercenaries, the more valuable part of the Nizam's army, and employed them against the rapacious nobles and bands of robbers who had annihilated the trade of the country. He then constituted courts of justice at Hyderabad, organized the police force, constructed and repaired irrigation works, and established schools. On the outbreak of the Mutiny he supported the British, and although unable to hinder an attack on the residency, he warned the British minister that it was in contemplation. The attack was repulsed; the Hyderabad contingent remained loyal, and their loyalty served to ensure the tranquillity of the Deccan. Salar Jung took advantage of the preoccupation of the British government with the Mutiny to push his reforms more boldly, and when the Calcutta authorities were again at liberty to consider the condition of affairs his work had been carried far towards completion. During the lifetime of the Nizam, Afzulu'd-dowla, Salar Jung was considerably hampered by his master's jealous supervision. When Mir Mahbub Ali, however, succeeded his father in 1869, Salar Jung, at the instance of the British government, was associated in the regency with the principal noble of the state, the Shamsu 'l-Umara or Amir Kabir, and enjoyed an increased authority. In 1876 he visited England with the object of obtaining the restoration of Berar. Although he was unsuccessful, his personal merits met with full recognition. He died of cholera at Hyderabad on the 8th of February 1883.

See *Memoirs of Sir Salar Jung,* by his private secretary, Syed Hossain Bilgrami, 1883.

SALDANHA BAY, an inlet on the south-western coast of South Africa, 63 m. by sea N. by W. of Cape Town, forming a land-locked harbour. The northern part of the inlet is known as Hoetjes Bay. It has accommodation for a large fleet with deep water close inshore, but the arid nature of the country caused it to be neglected. From Kalabas Kraal on the Cape Town-Clanwilliam railway, a narrow gauge line runs via Hopefield to Hoetjes Bay—126 m. from Cape Town.

Saldanha Bay is so named after Antonio de Saldanha, captain in Albuquerque's fleet which visited South Africa in 1503.

SALDERN, FRIEDRICH CHRISTOPH VON (1719–1785), Prussian soldier and military writer, entered the army in

1735, and was transferred to the Guards in 1739. As one of Frederick's aides-de-camp he was the first to discover the approach of Neipperg's Austrians at Mollwitz. He commanded a guard battalion at Leuthen, again distinguished himself at Hochkirch and was promoted major-general. In 1760 at Liegnitz Frederick gave him four hours in which to collect, arrange and despatch the spoils of the battle, 6,000 prisoners, 100 wagons, 82 guns and 5,000 muskets. His complete success made him a marked man even in Frederick's army. At Torgau, Saldern and Möllendorf (*q.v.*) with their brigades converted a lost battle into a great victory by their desperate assault on the Siptitz heights. The manoeuvring skill, as well as the iron resolution, of the attack, has excited the wonder of modern critics, and after Torgau Saldern was accounted the "completest general of infantry alive" (Carlyle). In the following winter, however, being ordered by Frederick to sack Hubertusburg, Saldern refused on the ground of conscience. Nothing was left for him but to retire, but after the peace the general was at once made inspector of the troops at Magdeburg. In 1766 he became lieutenant-general. Saldern was a pedant of the most pronounced type. In one of his works he discussed at great length the question between 76 and 75 paces to the minute as the proper cadence of infantry. "Saldern-tactics" contributed powerfully to the disaster of Jena in 1806. His works included *Taktik der Infanterie* (Dresden, 1784) and *Taktische Grundsätze* (Dresden, 1786), and were the basis of the British "Dundas" drill-book.

See Küster, *Charakterzüge des Generalleutenants von Saldern* (1792).

SALE, GEORGE (*c.* 1697–1736), English Orientalist, was the son of a London merchant. In 1720 he was admitted a student of the Inner Temple, but subsequently practised as a solicitor. Having studied Arabic for some time in England, he became, in 1726, one of the correctors of the Arabic version of the New Testament, begun in 1720 by the Society for Promoting Christian Knowledge, and subsequently took the principal part in the work. He made an extremely paraphrastic, but, for his time, admirable English translation of the Koran (1734 and often reprinted), and had a European reputation as an Orientalist. He died on Nov. 13, 1736.

SALE, SIR ROBERT HENRY (1782–1845), British soldier, entered the 36th Foot in 1795, and went to India in 1798, as a lieutenant of the 12th Foot. He served in the operations against Tippoo Sahib, against the raja of Travancore (1808–09) and in the expedition to Mauritius (1810). After some years he became major in the 13th, with which regiment he was for the rest of his life associated. In the Burmese War he led the 13th in all the actions up to the capture of Rangoon, in one of which he killed the enemy's leader in single combat. In the concluding operations of the war, being now lieutenant-colonel, he commanded a brigade, and at Malown (1826) he was severely wounded. In 1838, on the outbreak of the Afghan War, Sale was assigned to the command of the 1st Bengal brigade of the army assembling on the Indus. His column arrived at Kandahar in April 1839, and in May it occupied the Herat plain. The Kandahar force next set out on its march to Kabul, and a month later Ghazni was stormed, Sale in person leading the storming column and distinguishing himself in single combat. The place was well provisioned, and on its supplies the army finished its march to Kabul easily. He was left, as second-in-command, with the army of occupation, and in the interval between the two wars conducted several small campaigns ending with the action of Parwan which led directly to the surrender of Dost Mohammed.

By this time the army had settled down to the quiet life of cantonments, and Lady Sale and her daughter came to Kabul. But the policy of the Indian Government in stopping the subsidy to the frontier tribes roused them into hostility, and Sale's brigade received orders to clear the line of communication to Peshawar. After severe fighting Sale entered Jalalabad on Nov. 12, 1841. Ten days previously he had received news of the murder of Sir Alexander Burnes, along with orders to return with all speed to Kabul. These orders he, for various reasons, decided to ignore; suppressing his personal desire to return to protect his wife and family, he gave orders to push on, and on occupying Jalalabad at once set about making the old and half-ruined fortress fit to stand a siege. There followed a close and severe investment. At last Pollock and the relieving army appeared, only to find that the garrison had on April 7, 1842, relieved itself by a brilliant and completely successful attack on Akbar's lines. Pollock and Sale after a time took the offensive, and after the victory of Haft Kotal, Sale's division encamped at Kabul again.

At the end of the war Sale received the thanks of parliament. In 1845, as quartermaster-general to Sir H. Gough's army, Sale again took the field. At Moodkee (Mudki) he was mortally wounded, and he died on Dec. 21, 1845. His wife, who shared with him the dangers and hardships of the Afghan war, was amongst Akbar's captives. Amongst the few possessions she was able to keep from Afghan plunderers was her diary (*Journal of the Disasters in Afghanistan,* London, 1843).

See Gleig, *Sale's Brigade in Afghanistan* (London, 1846); Kaye, *Lives of Indian Officers* (London, 1867); W. Sale, *Defence of Jellalabad* (London, 1846); Regimental History of the 13th Light Infantry.

SALE, a town of Tanjil county, Victoria, Australia, the principal centre in the agricultural Gippsland district, on the river Thomson, 127½ m. by rail E.S.E. of Melbourne. Pop. (1921), 3,769. It is the seat of the Anglican bishop of Gippsland, and contains the cathedral of the Roman Catholic bishop of Sale. Sale is the head of the Gippsland lakes navigation, the shipping being brought from the lakes to the town by canal.

SALE, an urban district in the Altrincham parliamentary division, Cheshire, England, 5 m. S.W. of Manchester. Pop. (1931), 28,063. It is served by the L.M.S. Cheshire lines and G.W. and L.M.S. joint railways. It is a large residential suburb of Manchester, and there are numerous large villas. Market gardening for the supply of Manchester is carried on in the district.

SALÉ (SLĀ), a seaport on the Atlantic coast of Morocco, on the north side of the Bu Ragrag, opposite Rabat (*q.v.*). Salé, inhabited by a native bourgeoisie, contains numerous Muslim sanctuaries, mosques, *zaouïas, medersas* and tombs of saints. Salé was, in the middle ages, the most important merchant port and entrepôt of the west coast. In the 17th century it became an independent republic, a great centre of corsairs. Various French and English expeditions tried, without much success, to put an end to it. The population is 20,965, of which 18,090 are Muslim, 1,806 Jews and 1,069 Europeans.

SALEM, a city and district of British India, in the Madras presidency. The city is on both banks of the river Tirumanimuttar, 3 m. from a station on the Madras railway, 206 m. S.W. of Madras city. Pop. (1921) 52,244. There is a considerable weaving industry. Its situation in a green valley between the Shevaroy and Jarugumalai hills is picturesque.

The DISTRICT OF SALEM has an area of 6,912 sq.m. Except towards the south it is hilly, with extensive plains lying between the several ranges. It consists of three distinct tracts, formerly known as the Talaghat, the Baramahal and the Balaghat. The Talaghat is situated below the Eastern Ghats on the level of the Carnatic generally; the Baramahal includes the whole face of the Ghats and a wide piece of country at their base; and the Balaghat is situated above the Ghats on the tableland of Mysore.

The western part of the district is mountainous. Amongst the chief ranges are the Shevaroys, the Kalrayans, the Melagiris, the Kollimalais, the Pachamalais and the Yelagiris.

The population in 1921 was 2,112,030. The principal crops are millets, rice, pulses, mangoes, and oil-seeds. Coffee is grown on the Shevaroy hills. The chief irrigation work is the Barur tank system. The Madras railway runs through the district, with two narrow-gauge branches. The chief industry is cotton-weaving, and magnesite and steatite are worked, and there are iron and steel works. The district was acquired partly by the treaty of peace with Tippoo Sultan in 1792 and partly by the partition treaty of Mysore in 1799.

SALEM, a city of Massachusetts, U.S.A., on the coast, 15 m. N.E. of Boston; a port of entry, one of the county seats of Essex county, and a city of great historic interest. It is served by the Boston and Maine railroad. Pop. 42,697 in 1920 (26% foreign-born white), was 43,353 in 1930 by the Federal census. The city's area of 8·2 sq.m. comprises a peninsula projecting toward the

north-east between Marblehead and Beverly, Winter island (connected with the neck of the peninsula by a causeway), and some territory on the mainland. The commerce of its harbour (almost entirely receipts of coal) amounted in 1927 to 461,377 tons, valued at $2,840,318. Its manufactures (including cotton goods, boots and shoes, leather, and silverware) were valued in 1927 at $30,165,824. Salem is the seat of a State normal school (1854) and an exceptional number (in proportion to its size) of charitable institutions and societies under religious and other private auspices. The assessed valuation of property for 1927 was $56,087,900.

Salem is one of the oldest cities in New England, and has preserved an unusual number of historic and literary landmarks. In the centre of the city is the Common (8 ac.). On a bluff projecting into South river is the old Burying point, set aside in 1637, with stones dating back to 1673; and in Broad street is another old burial ground, laid out in 1655. The famous India (or Crowninshield's) wharf is now a coal pocket. The custom house (described by Hawthorne in the introduction to *The Scarlet Letter*) was built in 1818–19; the oldest of the three court-houses, which has great monolithic Corinthian columns, in 1839–41; the city hall, in 1837. There are many old dwellings built by ship-owners before the Revolution; and still more dating from the early years of the 19th century, when large fortunes were made in privateering. Many are of the gambrel type, and they are rich in beautiful doorways, doorheads, and other fine architectural details. Among the houses of special interest are the birthplace of Nathaniel Hawthorne (built before 1692); the "house of seven gables," now in use as a social settlement; the "witch house," where Jonathan Corwin is said to have held preliminary examinations in the witchcraft trials. The Essex institute (1848) and the Peabody museum (in the East Indian Marine hall, built in 1824) contain rich collections relating to colonial life.

Salem was founded in 1626 by Roger Conant (1593–1679) as a commercial venture, partly agricultural and partly to provide a wintering-place for the Banks fishermen. The name was probably chosen in allusion to Psalm lxxvi. 2. In 1628 a patent for the territory was granted by the New England council to the Dorchester Company, which promptly sent out a small colony under John Endecott as governor. This patent was superseded in 1629 by the charter for the Colony of Massachusetts Bay. Endecott continued as governor until the arrival (1630) of John Winthrop, who soon moved the seat of government to Charlestown and then to Boston. In 1629 the first Congregational Church in America was organized in Salem, and Roger Williams (*q.v.*) was one of its first pastors. In 1686 the people of Salem, guarding against the danger of being dispossessed by a new charter, secured a deed to their land from the Indians for £20. Salem village (then part of Salem, but now in Danvers) was the centre of the witchcraft delusion of 1692. Beginning with accusations by ten young girls that Tituba, the West Indian slave of the Rev. Samuel Parris, and two old women had bewitched them, the hysteria spread rapidly, and within four months hundreds were arrested and tried, 19 hanged, and one pressed to death for refusing to plead. The reaction came quickly, and in May 1693 Governor Phelps ordered the release of all prisoners held on the charge of witchcraft. Salem was an important port after 1670, especially in the India trade, and Salem privateers were conspicuous in the Seven Years' War, during the Revolution (when 158 of them took 445 prizes), and in the War of 1812. The first provincial assembly of Massachusetts met in Salem in 1774. On Feb. 20, 1775, at the North bridge, the first armed resistance of the Revolution was offered by the men of the town to royal troops sent to search for hidden cannon. Marblehead was set off from Salem in 1649, Beverly in 1668 and Danvers in 1752. Salem was chartered as a city in 1836. It was the birthplace of Nathaniel Hawthorne, William H. Prescott, Nathaniel Bowditch, Jones Very and William Wetmore Story.

SALEM, a city of south-western New Jersey, U.S.A., the county seat of Salem county; 38 m. S.W. of Philadelphia, on the Salem river, 2 m. from its confluence with the Delaware. It is served by the Pennsylvania railroad, interurban trolleys, motor-bus lines and river boats. Pop. (1920) 7,435, (1930) 8,047. It is the trade centre for a rich agricultural region, and has important manufactures, including floor coverings, pickles, milk products and glass bottles, battery jars, carboys and large glassware. The public library was established in 1804; the county offices occupy the old Johnson house, built in 1804; and in the Friends' burial ground (set aside in 1676) is an oak tree 88 ft. high, with a spread of ¼ ac., a survivor of the original forest. In Finn's Point national cemetery, 4 m. N. of Salem, are buried some 2,460 Confederate soldiers, who died while prisoners of war at Ft. Delaware, on an island in the Delaware river near the mouth of the Salem. Salem is the oldest permanent English settlement along the Delaware. It was founded in 1675 by John Fenwicke, an English Quaker, who bought from the Indians the land now embraced in Salem and Cumberland counties, and selected the site of the present city for his settlement, naming it Salem because of its peaceful aspect. In 1682 he submitted to the authority of the proprietors of West Jersey. Salem was incorporated as a town in 1695 and as a city in 1858.

SALEM, a city of Columbiana county, Ohio, U.S.A., 67 m. S.W. of Cleveland; served by the Pennsylvania and the Youngstown and Ohio River railways. Pop. (1920) 10,305 (84% native white); 1930 Federal census 10,622. It is in a fine agricultural region, where coal and natural gas are plentiful, and has important manufactures (including engines, stoves, organs, enamelled ware, china, automobile tubes, tyres and bodies, and various other articles) with an output in 1927 valued at $10,529,983. Salem was settled by Friends in 1806, incorporated as a town in 1830, as a village in 1852, and as a city in 1887. It was a "station" on the Underground Railroad, and the headquarters of the Western Anti-Slavery Society, which published here *The Anti-Slavery Bugle.*

SALEM, the capital city of Oregon, U.S.A., and the county seat of Marion county; on the Willamette river, 52 m. S.S.W. of Portland. It is on the Pacific highway, and is served by the Southern Pacific and the Oregon Electric railways and by motor-coach lines. Pop. (1920) 17,679 (88% native white); 1930 Federal census 26,266. In the heart of the Willamette valley, Salem is surrounded by rich farm land, 35,000 ac. of fruits, berries and nuts, the only region in the United States where long-fibre flax is raised, and the principal hop-growing region. Its manufacturing industries include fruit, berry, and vegetable canneries, a paper mill, large sawmills, also sash and door factories, woollen mills, iron works and two linen mills. All but two of the State institutions are in or near the city, and at Chemawa, 5 m. N., is a Government school for Indians. On an 18 ac. campus in the heart of the city is Willamette university (Methodist Episcopal; 1842), an outgrowth of the mission work of the Methodist Episcopal church begun in the vicinity by Jason Lee in 1834. Around the mission and the school grew up a settlement which in 1853 was chartered as a city and in 1860 became the capital of the State.

SALEM, a town of south-western Virginia, U.S.A., the county seat of Roanoke county; on the Roanoke river and Federal highway 11, 6 m. W. of Roanoke. It is served by the Norfolk and Western and the Virginian railways. Pop. 4,159 in 1920; 4,833 in 1930 by the Federal census. Salem lies about 1,000 ft. above sea-level, in the beautiful region between the Blue Ridge and the Allegheny mountains. It is the seat of Roanoke college for men (Lutheran; 1853) and of two orphanages (Baptist and Lutheran), and has a variety of manufacturing plants. The town was laid out in 1802, incorporated in 1806 and became the county seat in 1838. Since 1922 it has had a council-manager form of government.

SALE OF GOODS. The law of sale is usually treated as a branch of the law of contract, because sale is effected by contract. Thus Pothier entitles his classical treatise on the subject, *Traité du contrat de vente.* But a completed contract of sale is something more. It is a contract plus a transfer of property. By an agreement to sell a *ius in personam* is created; by a sale of *ius in rem* is transferred. The essence of sale is the transfer of property for a price. If there be no agreement for a price, express or implied, the transaction is of the nature of a gift. So, too, if commodity be exchanged for commodity, the transaction is called barter (*q.v.*) and not sale, and the rules relating to sales do not apply in their entirety. Again, a contract of sale must

contemplate an absolute transfer of the property in the thing sold or agreed to be sold. A mortgage may be in the form of a conditional sale, but English law regards the substance and not the form of the transaction. If in substance the object of the transaction is to secure the repayment of a debt, and not to transfer the absolute property in the thing sold, the law at once annexes to the transaction the complex consequences which attach to a mortgage. So, too, it is not always easy to distinguish a contract for the sale of an article from a contract for the supply of work and materials. If a man orders a set of false teeth from a dentist the contract is one of sale, but if he employs a dentist to stop one of his teeth with gold the contract is for the supply of work and materials. The distinction is of practical importance, because very different rules of law apply to the two classes of contract. The property which may be the subject of sale may be either movable or immovable, tangible or intangible. The present article relates only to the sale of goods—that is to say, tangible movable property.

The Code of 1893.—In 1847, when Justice Story wrote his work on the sale of personal property, the law of sale was still in process of development. Many rules were still unsettled, especially the rules relating to implied conditions and warranties. But for several years the main principles have been well settled. In 1891 the subject seemed ripe for codification, and Lord Herschell introduced a codifying bill which two years later passed into law as the Sale of Goods Act, 1893.

Sale is a consensual contract. The parties to the contract may supplement it with any stipulations or conditions they may see fit to agree to. The code in no wise seeks to fetter this discretion. It lays down a few positive rules—such, for instance, as that which reproduces the 17th section of the Statute of Frauds. But the main object of the act is to provide clear rules for those cases where the parties have either formed no intention or have failed to express it. When parties enter into a contract they contemplate its smooth performance, and they seldom provide for contingencies which may interrupt that performance—such as the insolvency of the buyer or the destruction of the thing sold before it is delivered. It is the province of the code to provide for these contingencies, leaving the parties free to modify by express stipulation the provisions imparted by law. When the code was in contemplation the case of Scotland gave rise to difficulty. Scottish law varies widely from English. To speak broadly, the Scottish law of sale differs from the English by adhering to the rules of Roman law, while the English common law has worked out rules of its own. The Codifying bill of 1891 applied only to England, but on the advice of Lord Watson it was extended to Scotland. As the English and Irish laws of sale were the same, the case of Ireland gave rise to no difficulty, and the act now applies to the whole of Great Britain. As regards England and Ireland, very little change in the law has been effected. As regards Scotland, the process of assimilation has been carried further, but this has not been completed. In a few cases the Scottish rule has been saved or re-enacted, in a few other cases it has been modified, while on other points, where the laws were dissimilar, the English rules have been adopted.

The act is divided into six parts, the first dealing with the formation of the contract. The 1st section, which may be regarded as the keystone of the act, is in the following terms: "A contract of sale of goods is a contract whereby the seller transfers or agrees to transfer the property in goods to the buyer for a money consideration called the price. A contract of sale may be absolute or conditional. When under a contract of sale the property in the goods is transferred from the seller to the buyer the contract is called a 'sale,' but when the transfer of the property in the goods is to take place at a future time or subject to some condition thereafter to be fulfilled the contract is called an 'agreement to sell.' An agreement to sell becomes a sale when the time elapses or the conditions are fulfilled subject to which the property in the goods is to be transferred." This section clearly enunciates the consensual nature of the contract, and this is confirmed by sec. 55, which provides that "where any right, duty or liability would arise under a contract of sale by implication of law," it may be negatived or varied by express agreement, or by the course of dealing between the parties, or by usage, if the usage be such as to bind both parties to the contract. The next question is who can sell and buy. The act is framed on the plan that if the law of contract were codified, this act would form a chapter in the code. The question of capacity is therefore referred to the general law, but a special provision is inserted (sec. 2) relating to the supply of necessaries to infants and other persons who are incompetent to contract. Though an infant cannot contract he must live, and he can only get goods by paying for them. The law, therefore, provides that he is liable to pay a reasonable price for necessaries supplied to him, and it defines necessaries as "goods suitable to the condition in life of such minor or other person, and to his actual requirements at the time of the sale and delivery."

The 4th section of the act reproduces the famous 17th section of the Statute of Frauds, which was an act "for the prevention of frauds and perjuries." The object of that statute was to prevent people from setting up bogus contracts of sale by requiring material evidence of the contract. The section provides that "a contract for the sale of any goods of the value of £10 or upwards shall not be enforceable by action unless the buyer shall accept part of the goods so sold, and actually receive the same, or give something in earnest to bind the contract, or in part payment, or unless some note or memorandum in writing of the contract be made and signed by the party to be charged, or his agent in that behalf." It is a much-disputed question whether this enactment has brought about good or harm. It has defeated many an honest claim, though it may have prevented many a dishonest one from being put forward. When judges and juries have been satisfied of the *bona fides* of a contract which does not appear to satisfy the statute, they have done their best to get round it. Every expression in the section has been the subject of numerous judicial decisions, which run into almost impossible refinements, and illustrate the maxim that hard cases make bad law. It is to be noted that Scotland is excluded from the operation of sec. 4. The Statute of Frauds has never been applied to Scotland, and Scotsmen appear never to have felt the want of it.

As regards the subject-matter of the contract, the act provides that it may consist either of existing goods or "future goods"—that is to say, goods to be manufactured or acquired by the seller after the making of the contract (sec. 5). Suppose that a man goes into a gunsmith's shop and says, "This gun suits me, and if you will make or get me another like it I will buy the pair." This is a good contract, and no question as to its validity would be likely to occur to the lay mind. But lawyers have seriously raised the question, whether there could be a valid contract of sale when the subject-matter of the contract was not in existence at the time when the contract was made. The price is an essential element in a contract of sale. It may be either fixed by the contract itself, or left to be determined in some manner thereby agreed upon, *e.g.*, by the award of a third party. But there are many cases in which the parties intend to effect a sale, and yet say nothing about the price. Suppose that a man goes into an hotel and orders dinner without asking the price. How is it to be fixed? The law steps in and says that, in the absence of any agreement, a reasonable price must be paid (sec. 8). This prevents extortion on the part of the seller, and unreasonableness or fraud on the part of the buyer.

Warranty.—The next question dealt with is the difficult one of conditions and warranties (secs. 10 and 11). The parties may insert what stipulations they like in a contract of sale, but the law has to interpret them. The term "warranty" has a peculiar and technical meaning in the law of sale. It denotes a stipulation which the law regards as collateral to the main purpose of the contract. A breach, therefore, does not entitle the buyer to reject the goods, but only to claim damages. Suppose that a man buys a particular horse, which is warranted quiet to ride and drive. If the horse turns out to be vicious, the buyer's only remedy is to claim damages, unless he has expressly reserved a right to return it. But if, instead of buying a particular horse, a

man applies to a dealer to supply him with a quiet horse, and the dealer supplies him with a vicious one, the stipulation is a condition. The buyer can either return the horse, or keep it and claim damages. Of course the right of rejection must be exercised within a reasonable time. In Scotland no distinction has been drawn between conditions and warranties, and the act preserves the Scottish rule by providing that, in Scotland, "failure by the seller to perform any material part of a contract of sale" entitles the buyer either to reject the goods within a reasonable time after delivery, or to retain them and claim compensation (sec. 11 [2]). In England it is a very common trick for the buyer to keep the goods, and then set up in reduction of the price that they are of inferior quality to what was ordered. To discourage this practice in Scotland the act provides that, in that country, the court may require the buyer who alleges a breach of contract to bring the agreed price into court pending a decision of the case (sec. 59). It seems a pity that this sensible rule was not extended to England.

In early English law *caveat emptor* was the general rule, and it was one well suited to primitive times. Men either bought their goods in the open market-place, or from their neighbours, and buyer and seller contracted on a footing of equality. Now the complexity of modern commerce, the division of labour and the increase of technical skill, have altogether altered the state of affairs. The buyer is more and more driven to rely on the honesty, skill and judgment of the seller or manufacturer. Modern law has recognized this, and protects the buyer by implying various conditions and warranties in contracts of sale, which may be summarized as follows: First, there is an implied undertaking on the part of the seller that he has a right to sell the goods (sec. 12). Secondly, if goods be ordered by description, they must correspond with that description (sec. 13). Thirdly, there is the case of manufacturers or sellers who deal in particular classes of goods. They naturally have better means of judging of their merchandise than the outside public, and the buyer is entitled within limits to rely on their skill or judgment. A tea merchant or grocer knows more about tea than his customers can, and so does a gunsmith about guns. In such cases, if the buyer makes known to the seller the particular purpose for which the goods are required, there is an implied condition that the goods are reasonably fit for it, and if no particular purpose be indicated there is an implied condition that the goods supplied are of merchantable quality (sec. 14). Fourthly, in the case of a sale by sample, there is "an implied condition that the bulk shall correspond with the sample in quality," and that the buyer shall have a reasonable opportunity of comparing the bulk with the sample (sec. 15).

Effects of Contract.—The main object of sale is the transfer of ownership from seller to buyer, and it is often both a difficult and an important matter to determine the precise moment at which the change of ownership is effected. According to Roman law, which is still the foundation of most European systems, the property in a thing sold did not pass until delivery to the buyer. English law has adopted the principle that the property passes at such time as the parties intend it to pass. Express stipulations as to the time when the property is to pass are very rare. The intention of the parties has to be gathered from their conduct. A long train of judicial decisions has worked out a series of rules for determining the presumed intention of the parties, and these rules are embodied in secs. 16 to 20 of the act. The first rule is a negative one. In the case of unascertained goods, *i.e.*, goods defined by description only, and not specifically identified, "no property in the goods is transferred to the buyer unless and until the goods are ascertained." If a man orders ten tons of scrap iron from a dealer, it is obvious that the dealer can fulfil his contract by delivering any ten tons of scrap that he may select, and that until the ten tons have been set apart, no question of change of ownership can arise. But when a specific article is bought, or when goods ordered by description are appropriated to the contract, the passing of the property is a question of intention. Delivery to the buyer is strong evidence of intention to change the ownership, but it is not conclusive. Goods may be delivered to the buyer on approval, or for sale or return. Delivery to a carrier for the buyer operates in the main as a delivery to the buyer, but the seller may deliver to the carrier, and yet reserve to himself a right of disposal. On the other hand, when there is a sale of a specific article, which is in a fit state for delivery, the property in the article *prima facie* passes at once, even though delivery be delayed. When the contract is for the sale of unascertained goods, which are ordered by description, the property in the goods passes to the buyer, when, with the express or implied consent of the parties, goods of the required description are "unconditionally appropriated to the contract." It is perhaps to be regretted that the codifying act did not adopt the test of delivery, but it was thought better to adhere to the familiar phraseology of the cases. Section 20 deals with the transfer of risk from seller to buyer, and lays down the *prima facie* rule that "the goods remain at the seller's risk until the property therein is transferred to the buyer, but when the property therein is transferred to the buyer, the goods are at the buyer's risk whether delivery has been made or not." *Res perit domino* is therefore the maxim of English, as well as of Roman law.

Title.—In the vast majority of cases people only sell what they have a right to sell, but the law has to make provision for cases where a man sells goods which he is not entitled to sell. An agent may misconceive or exceed his authority. Stolen goods may be passed from buyer to buyer. Then comes the question, Which of two innocent parties is to suffer? Is the original owner to be permanently deprived of his property, or is the loss to fall on the innocent purchaser? Roman law threw the loss on the buyer, *Nemo plus iuris in alium transferre potest quam ipse habet.* French law, in deference to modern commerce, protects the innocent purchaser and throws the loss on the original owner. "En fait de meubles, possession vaut titre" (*Code civil*, art. 1,599). English law is a compromise between these opposing theories. It adopts the Roman rule as its guiding principle, but qualifies it with certain exceptions, which cover perhaps the majority of the actual cases which occur (secs. 21 to 26). In the first place, the provisions of the Factors Act, 1889 (extended to Scotland by 53 and 54 Vict. c. 40), are preserved. That act validates sales and other dispositions of goods by mercantile agents acting within the apparent scope of their authority, and also protects innocent purchasers who obtain goods from sellers left in possession, or from intending buyers who have got possession of the goods while negotiations are pending. In most cases a contract induced by fraud is voidable only, and not void, and the act provides, accordingly, that a voidable contract of sale shall not be voided to the prejudice of an innocent purchaser. The ancient privilege of market overt (*i.e.*, "open market") is preserved intact (sec. 22). The section does not apply to Scotland, nor to the law relating to the sale of horses which is contained in two old statutes, 2 and 3 Phil. and Mar. c. 7, and 31 Eliz. c. 12. The minute regulations of those statutes are never complied with, so their practical effect is to take horses out of the category of things which can be sold in market overt. The privilege of market overt applies only to markets by prescription, and does not attach to newly-created markets. The operation of the custom is therefore fitful and capricious. For example, every shop in the City of London is within the custom, but the custom does not extend to the greater London outside. If then a man buys a stolen watch in Fleet street, he may get a good title to it, but he cannot do so if he buys it a few doors off in the Strand. There is, however, a qualification of the rights acquired by purchase even in market overt. When goods have been stolen and the thief is prosecuted to conviction, the property in the goods thereupon revests in the original owner, and he is entitled to get them back either by a summary order of the convicting court or by action. This rule dates back to the statute 21 Hen. VIII. c. 11. It was probably intended rather to encourage prosecutions in the interests of public justice than to protect people whose goods were stolen.

Having dealt with the effects of sale, first, as between seller and buyer, and, secondly, as between the buyer and third parties,

the act proceeds to determine what, in the absence of convention, are the reciprocal rights and duties of the parties in the performance of their contract (secs. 27 to 37). "It is the duty of the seller to deliver the goods and of the buyer to accept and pay for them in accordance with the terms of the contract of sale" (sec. 27). In ordinary cases the seller's duty to deliver the goods is satisfied if he puts them at the disposal of the buyer at the place of sale. The normal contract of sale is represented by a cash sale in a shop. The buyer pays the price and takes away the goods "Unless otherwise agreed, delivery of the goods and payment of the price are concurrent conditions" (sec. 27). But agreement, express or implied, may create infinite variations on the normal contract. It is to be noted that when goods are sent to the buyer which he is entitled to reject, and does reject, he is not bound to send them back to the seller. It is sufficient if he intimate to the seller his refusal to accept them (sec. 36).

Remedies of Buyer and Seller.—The ultimate sanction of a contract is the legal remedy for its breach. Seller and buyer have each their appropriate remedies. If the property in the goods has passed to the buyer, or if, under the contract, "the price is payable on a day certain irrespective of delivery," the seller's remedy for breach of the contract is an action for the price (sec. 49). In other cases his remedy is an action for damages for non-acceptance. In the case of ordinary goods of commerce the measure of damages is the difference between the contract price and the market or current price at the time when the goods ought to have been accepted. The convenient market-price rule is subordinate to the general principle that "the measure of damages is the estimated loss directly and naturally resulting in the ordinary course of events from the buyer's breach of contract" (sec. 56). Similar considerations apply to the buyer's right of action for non-delivery of the goods (sec. 51). In exceptional circumstances the remedy of specific performance is available to the buyer (sec. 52). Thus the court might order the specific delivery of an autograph letter of an otherwise unrecorded signatory of the Declaration of Independence. The seller's rights are further protected by the rules as to lien and stoppage *in transitu* (secs. 38 to 48).

The sixth and last part of the act is supplemental, and is mainly concerned with drafting explanations, but sec. 58 contains some rules for regulating sales by auction. The practice known as a "knock-out" has since been struck at by the Auctions (Bidding Agreements) Act, 1927, by which it is declared illegal and punishable.

The act of 1893 has been adopted in substance by very many of the colonial possessions, and has been followed in the main by the American Sales Act (U.S.A.). (M. D. C.)

C.I.F. Contracts.—These are in a class by themselves. The law governing them is mostly of recent growth and, nearly all of it, case law. They are contracts for the sale of sea-borne goods where the price quoted covers cost, insurance and freight. Hence the name. But the distinguishing characteristic of these sales is this: Performance is effected by tender of the documents in place of the delivery of the actual goods. Indeed, in the business world they are often referred to as sales of documents. By their means the goods are often sold many times over while still afloat; even though the ship be sunk or the goods perish no loss need fall upon the buyer, because he is protected under the policy of insurance effected on the goods or the bill of lading under which they are carried.

The documents are naturally the focus of attention. The seller must tender to the buyer the invoice, the bill of lading and the policy of insurance. On this point the requirements of the English courts are strict. By bill of lading is meant a bill or document attesting that the goods have been loaded on board, not that a shipping company is under contract to carry the goods on a named or subsequent ship. In the United States the practice may be different and the courts there may recognize "received for shipment" bills of lading and similar documents which circulate freely enough in the commercial world. Similarly with the policy of insurance. English law requires the tender of a policy. In the United States certificates of insurance and even more informal records of the contract of insurance are in recognized use. In this respect perhaps English law lags a little behind commercial practice, for certainly these certificates are a great convenience and by special agreement can be regularly employed. But in criticizing the law as it stands it must not be forgotten that other interests besides those of buyer and seller are affected; the banker and underwriter have to be taken into account. The banker for his part has up till now resolutely set his face against the so-called "bill of lading" which gives no certain information as to the whereabouts of the goods.

When the documents are tendered the buyer must be ready and willing to pay the price. He is not entitled to withhold payment until he has had an opportunity of examining the goods. The term "net cash" in a c.i.f. contract means cash against documents. The property passes, if any one general rule can be laid down on the subject, when the documents are tendered. But on this as on other aspects of the sale there is a growing body of law to which it is very difficult to do justice in a general statement. Some of the topics are not altogether free from difficulty. Moreover, though it is a form of contract in use the world over, the law governing it is by no means as uniform as could be wished. Accordingly it has been suggested, though the suggestion has a greater measure of support on the Continent where it originated than in either England or the United States, that attempts should be made to secure uniformity along the lines of the York-Antwerp rules. More doubtless will be heard of the proposal as time goes on. (H. Got.)

UNITED STATES

The English law, as stated above, gives even in its details a picture of the American law. There is, to be sure, no market overt in the United States; and the American Factors' Acts are not only less broad in scope than the English, but, even with their narrower scope, are found only in a handful of States. Their policy should be compared with that of the statutes requiring filing or recording of chattel mortgages (*see* BILL OF SALE) and of conditional sales (*see* INSTALMENT PURCHASE). Where found, they commonly permit a consignee of goods, whose business also includes selling on his own account, to make an effective pledge of his principal's goods to secure his own debt; but the American law extends such powers to the "intending purchaser" who has secured possession only in a few specific cases, such as (in many States) instalment purchase. It should also be noted that the rule that risk follows title has an exception where title is withheld—as in the instalment purchase—only for securing payment of the price.

The chief divergence of American sales law from that described above has to do with warranties; *i.e.*, the nature of the seller's obligation with reference to the kind and quality of goods sold. The facts which will place some obligation on the seller with reference to quality are substantially the same in both countries. But in the United States, if the seller has undertaken any obligation in this respect, the buyer will, in the majority of States, be entitled not only to damages (the English "warranty") but also (at his election) to return the goods and recover the price (the English "condition"). This rule as indicated, is not universal. The American common law was in some conflict and confusion on the point, and the Uniform Sales Act, incorporating the view just stated, has not been adopted as yet (1928) in 20 of the States.

The long controversy over the buyer's power to return defective goods indicates the extent to which the law of warranty has been a creature of mercantile law, designated to settle disputes about goods between merchants. Of recent years, however, the law of warranty has been put to another striking social use: that of allocating the risks incident, in a highly industrialized society, to the unavoidable use of goods manufactured by persons with whom the user has no direct contact, who may be a "corporation" located in a distant place, whose methods the user has neither skill nor opportunity to know—but whose efficiency he is forced by the nature of the market to rely upon. Injury in those cases results from a tack or a piece of glass concealed in cake or a can of beans, from the explosion of an automatic water-heater, or from the breaking of an automobile wheel. In such cases return of the goods is not in

question, but only the allocation of the damage suffered. The device of an action for negligence has recently been extended for this purpose; but it seems to be limited to personal injury, as opposed to property damage; and it is obviously ineffective in the many States in which the burden rests on the injured plaintiff of proving the manufacturer negligent in regard to the particular defective article. There is some tendency to shift the burden to the manufacturer where the article is one, which, if negligently made, would be dangerous; *i.e.*, to make an injury due to defect raise a presumption of negligence in manufacture. Under this rule the remedy "for negligence" is effective—so effective indeed, as apparently to have given rise to a considerable volume of fraudulent claims. The remedy in negligence, too, may well be extended to any injured purchaser.

But the remedy for the same injury by way of the law of warranty seems in almost all States to be limited to the specific purchaser against his specific seller; it has been held to extend neither to his wife, his child, his employee nor his guest. Nor, under most decisions, will it run against the manufacturer if the plaintiff bought the article not directly from him, but from an intervening dealer. On the other hand, wherever remedy in warranty is available, it requires no proof of negligence at all: the seller is held to guarantee against dangerous defects in the article. It is clear the situation is one in which the courts are groping toward satisfying a definite social need, and yet one in which the traditional legal devices are only with delay and distortion capable of being made to fill the need.

Documents of Title.—One feature of American law in which wide changes have been worked in recent years requires mention. The old rule that no man might convey goods which he did not own imposes on buyers either a noticeable risk (of having any goods which have been improperly sold to them recovered by their true owners) or a degree of investigation incompatible with rapid turnover. Especially dangerous and impracticable is this in the case of bankers advancing money on the security of goods in warehouse or in transit; a banker's margin of profit is too low to make losses readily compensable, and enquiry into title is in general outside his competence. A practice therefore grew up, in the case of goods in warehouse, of accepting the warehouseman's receipt for the goods, if fair on its face, as full evidence of title to the goods, and of dealing with the receipt as with the goods themselves. The same practice has developed, even earlier, with reference to bills of lading, *i.e.*, carriers' receipts for goods entrusted to their care.

This mercantile custom has now received full warrant at law, in America, in all 28 States which have adopted the Uniform Sales Act (beginning in 1906); also, as to warehouse receipts, in the 48 States which have enacted the Uniform Warehouse Receipts Act (beginning in 1906); in more than half the States, as to bills of lading, and in all bills of lading arising out of interstate shipments, by the adoption of the Uniform Bills of Lading Act by Congress and many State legislatures (beginning in 1909). Sharp distinction is taken under these acts between straight or *non-negotiable* documents, which do not contain a promise to deliver to the *order* of named person, and which can transfer only such rights as the transferor possesses; and on the other hand, *order* or negotiable documents, which do carry a promise to deliver to the order of a named person, and which in general carry to a *bona fide* purchaser (or pledgee) for value all the rights apparent on their face, even though the transferor may have lacked such rights. The English law is to the same effect, and even expressly extends the same rules to policies of marine insurance drawn in proper form. All the American uniform acts named above are the work of Prof. Samuel Williston, whose credit in this connection is as great as that of Chalmers in England, and whose text on sales (see *The Law of Sales*, 2nd ed., 1924) promises to remain for a generation the authoritative work on the subject.

(K. N. L.)

BIBLIOGRAPHY.—C. Blackburn, *A Treatise on the Effect of Contract of Sale* (1845, 3rd ed. by W. R. Norman and L. C. Thomas, 1910); J. Bedarride, *Des achats et ventes* (1862), in *Droit Commercial*, 17 vol. (1854–64); J. P. Benjamin, *Sale of Personal Property* (1868, 6th ed. by W. C. A. Ker, 1920); W. W. Story, *A Treatise on the Sale of Personal Property* (4th ed. by E. H. Bennett, Boston, Mass., 1871); R. Campbell, *The Law relating to the Sale of Goods and Commercial Agency* (2nd ed. 1891); J. B. Moyle, *Contract of Sale in the Civil Law* (1892); Sir M. D. E. S. Chalmers, *Sale of Goods Act* (1894, 10th ed. 1924); R. Brown, *Notes and Commentaries on the Sale of Goods Act, 1893*, etc. (1895); E. J. Schuster, *Principles of German Civil Law* (1907); S. Williston, *Law Governing Sales of Goods at Common Law* (2nd ed., 1924); A. R. Kennedy, *Contracts of Sale on C.I.F. Terms* (1924); H. Goitein, *C.I.F. Contracts* (2nd ed. 1926).

SALEP, a drug extensively used in oriental countries as a nervine restorative and fattener, and also much prescribed in paralytic affections. It is not used in European medicine. It consists of the tuberous roots of various species of *Orchis* and *Eulophia,* which are decorticated, washed, heated until horny in appearance, and then dried. Its most important constituent is a mucilaginous substance which it yields with cold water to the extent of 48%.

SALERNO (known in Roman and mediaeval times as Salernum), a small seaport, archiepiscopal see and capital of a province of the same name, about 30 m. S.E. of Naples, Italy, finely situated at the foot of an amphitheatre of hills. Pop. (1921) 41,780 (town), 51,980 (commune). The modern town is of little commercial importance and its monuments are not of great artistic or historic value.

The site was of some strategic significance under the Roman Republic and Empire, but the town was of only secondary importance until mediaeval times. It was dismantled by Charlemagne in the 9th century. Later it became the fortified capital of an independent principality and the rival of Benevento. During the 9th and 10th centuries it was frequently attacked by the Saracens. It was taken in 1076 by the Normans under Robert Guiscard. In 1194 it was sacked by Henry VI., and its development ceased. Salerno revived somewhat in the early 13th century, under Frederick II. (1194–1250), but soon fell into decay. The historic interest of Salerno centres round its medical school, the foundation of which is ascribed to the legendary "four masters"—a Latin, a Greek, a Jew and a Saracen. The legend represents the syncretic cultural influences under which the school arose. In the 10th and 11th centuries the place was a health resort. Under Norman rule the medical element became organized and was profoundly influenced by the work of Constantine the African (d. 1087, *q.v.*), secretary to Robert Guiscard who translated medical works from Arabic into Latin. A contemporary who translated medical works from Greek was Alfanus, archbishop of Salerno. A Jewish element was early in evidence. Under Frederick II. lectures in Hebrew were given at Naples, and one of the most important Latin translators from the Arabic, the Jew, Faraj ben Salim (d. *c.* 1290), worked at Salerno. The decline of the school dates from 1224, when Frederick II. instituted a university at Naples. The very well known doggerel Latin verses on the preservation of health, known as the *Regimen Sanitatis Salerni,* have been translated into almost every European language. They are addressed to an apocryphal "King of England," usually supposed to be Robert of Normandy, but there is no doubt that the verses are mostly of the 14th century. They are probably, in the main, the work of Arnald of Villanova (1235–1311).

The school is regarded as the earliest university in Europe. It became, in the later middle ages, a place of bogus degrees but survived till 1811, when it was closed by Napoleon.

BIBLIOGRAPHY.—F. Hartmann, *Die Literatur von Früh- und Hochsalerno* (Leipzig, 1919), and C. Singer, *Essays on the History of Medicine, presented to K. Sudhoff* (Oxford, 1924), contain bibliographies. The legends of Salerno are disposed of by C. Singer in *From Magic to Science* (1928), and the Arabic and Hebrew Salernitan relationships are discussed by him in *The Legacy of Israel* (Oxford, 1927). The work of Alphanus is printed by C. Burkhard, *Nemesii Episcopi Premnon Physcon . . . Alfano Salerni in Latinum translatum* (Leipzig, 1917). The records of the University of Salerno are collected by H. Rashdall, *The Universities of the Middle Ages,* 3 vols. (Oxford, 1895). An important document, recording the physicians at Salerno, is C. A. Garufi, *Necrologio del Liber Confratum di S. Matteo di Salerno* (1922), discussed by P. Capparoni, *Magistri Salernitani noudum cogniti* (London, 1921). The last edition of the *Scola Salernitana* is by F. R. Packard and F. H. Garrison, *The School of*

Salernum Regimen Sanitatis Salernitanum (1920). (C. SI.)

SALESBURY or **SALISBURY, WILLIAM** (*c.* 1520–*c.* 1600), Welsh scholar, was a native of Denbighshire, being the son of Foulke Salesbury, who belonged to a family said to be descended from a certain Adam of Salzburg, a member of the ducal house of Bavaria, who came to England in the 12th century. Salesbury was educated at Oxford, where he accepted the Protestant faith, but he passed most of his life at Llanrwst, working at his literary undertakings. The greatest Welsh scholar of his time, Salesbury was acquainted with nine languages, including Latin, Greek and Hebrew, and was learned in philology and botany. He died about 1600. About 1546 he edited a collection of Welsh proverbs (*Oll synwyr pen kembero*), probably the first book printed in Welsh, and in 1547 his *Dictionary in Englyshe and Welshe* was published (facsimile edition, 1877). In 1563 the English parliament ordered the Welsh bishops to arrange for the translation of the Scriptures and the book of common prayer into Welsh. The New Testament was assigned to Salesbury, who had previously translated parts of it. He received assistance from Richard Davies, bishop of St. Davids, and also from Thomas Huet, or Hewett (d. 1591), but he himself did the greater part of the work. The translation, printed in 1567, served as the basis for the new one made by Bishop William Morgan (*c.* 1547–1604).

SALESMANSHIP. No consideration of salesmanship as a serious factor in business science is possible without having simultaneous regard to the larger subject of sales organization and control. The function of selling may be divided under two heads, distributive selling and retail selling. Some special forms are both distributive, in that they are employed by manufacturers; and retail, in that it is direct to the "consumer" that the selling is done. Usually, however, distributive selling covers the wholesale distribution of merchandise in quantity; while retail selling covers the transference of the goods in small lots or single units to the actual consumers. There is a separate, and in many ways quite different, technique of salesmanship for each form of selling.

Briefly summarised, the duties of a distributive sales manager are constructive, investigative and administrative. These three parts are naturally much interrelated. They cover such specific duties as the creation of a sales organization, both internal and external, the formulation of a sales policy, the co-ordination of manufacturing, sales and advertising policies, the adjustment of sales policy to financial policy, the selection and training of salesmen, the allocation of territories, the fixing of sales quotas, the appointment of jobbers and agents, the analytic study of the needs, prejudices and pre-conceived ideas of the ultimate consumer, and so on.

Sales management is as yet very largely empirical, and unanimity in the choice and employment of terms to indicate its various functions is still to be obtained. There is evidenced, however, a tendency to adopt the terms "marketing" and "merchandising" to indicate the two parts of distributive selling. Marketing covers that part which is concerned with getting the goods on to the retailers' shelves; while merchandising has to do with getting the goods off the dealers' shelves into the hands of the actual consumers, the public. Many manufacturing concerns both market their goods by means of a highly efficient sales organization, and merchandise them by means of "consumer" advertising in the press and on the hoardings.

"Outdoor salesmen" fall into two groups, usually styled commercial travellers and speciality salesmen respectively. A commercial traveller is normally selling a line of goods to a body of regular customers, such goods being intended for re-sale. A speciality salesman, on the other hand, is usually selling a single article to a continually shifting body of customers, such article being for the purchaser's own use and not for re-sale. A patent scale is a typical example of a speciality. In their relationships with salesmen, few firms rely on verbal agreements merely, as these are certain sooner or later to cause friction. A long and involved agreement needlessly couched in legal (or pseudo-legal) phraseology is even more productive of misunderstanding and unpleasantness. The simpler the agreement, the better, provided it covers such things as salary, commission (if any), expenses, territory, notice of termination required on each side, post-employment restriction, and so on. For a complete examination of the whole matter of salesmen's agreements, *see* the appropriate volume referred to in the bibliography. The same work contains useful data on the subject of methods of remunerating salesmen. Broadly speaking, some form of payment by results, with a basic living wage, is invariably preferred. Many firms have a system of sales quotas—the salesman receiving a salary, and drawing commission only on sales made above a specified figure per annum.

Psychology of Selling.—It is a truism that the sale takes place in the mind of the customer. For this reason the technique of salesmanship is very largely concerned with the thought processes of the customer, and might be referred to as a form of applied psychology. The mental "states" through which an individual's mind passes in the act of making a purchase have been propounded as (1) interest aroused, (2) knowledge increased, (3) adjustment to needs, (4) appreciation of suitability, (5) desire to possess, (6) consideration of cost, and (7) decision to buy. In the actual act of selling, the salesman is primarily concerned with inducing these mental states in turn in the mind of the prospective buyer.

There is, however, in salesmanship much that is extraneous to the actual act of selling. In certain forms of selling, for example, success or failure will in the main be governed by what the salesman does prior to "making contact" with the prospective buyer. In the higher realms of selling, pre-interview investigation plays a highly important part; and when at last the salesman comes face to face with his "prospect," it is with a most carefully prepared plan of action, known as a canvass. The preparation of a strong canvass, based on data gleaned from many sources, is part of the technique of salesmanship which is being successfully taught today. If the salesman is selling a speciality, such as a noiseless portable typewriter, the vital part of his canvass will be the demonstration. The four parts of the demonstration are (1) the production of the demonstration machine, (2) the explanation of its principal features, (3) the operation of the machine by the salesman, and (4) the operation of the machine by the prospect or his nominee. The complete interview may be divided into five parts. The first part is the courtesy opening; the second part begins the canvass proper, and consists of pre-demonstration sales arguments; the third part is the demonstration itself (which, as stated above, has its own four integral parts); the fourth part consists of post-demonstration sales arguments or "selling points," and ends with the salesman obtaining the order or desired action on the part of the prospect, or admitting temporary failure to do so; the fifth part is the courtesy close.

Of the various attributes and qualities essential to full success as a salesman, two may be cited as being of exceptional importance —adaptability and knowledge of merchandise. To some considerable extent, the measure of the salesman's success in getting orders will be the measure of his success in establishing the right relationships of mutual trust and regard between himself and his customers. The keenness of competition to-day has resulted in merchandise attaining a consistently high level of quality, and in certain circumstances whether or not a particular salesman obtains the business will be determined by whether or not he is liked by the buyer. The factor of sentiment weighs when other things are equal. It is the need for adaptability which leads the experienced salesman to become a shrewd judge of character. No one practically experienced pretends that character judgment, as the exigencies of selling permit it to be practised, is infallible. Nevertheless, a knowledge of physiognomy can be of the utmost value to the salesman who has learned to recognise the three ruling types—the phlegmatic or motive, the sanguinary or vital, and the nervous or mental. The salesman learns the physical characteristics of the various types, appreciates their corresponding mental attributes and qualities, and is thus able to obtain some valuable clues as to their probable behaviour. The wise salesman, however, regards his reading of the prospect's character as purely provisional, as providing a useful starting point merely. Of the other outstanding attribute, knowledge of merchandise, little need

be said beyond a most emphatic insistence upon its indispensability to full success. No amount of verbal plausibility or dialectic brilliance can compensate for lack of precise and complete knowledge of whatever one is selling. Other qualities and attributes desirable in a salesman are physical and mental fitness, a high standard of conduct ethically, a certain charm of manner, unfailing courtesy, persistence amounting to doggedness, a command of language above the average, some personal culture, an impressive bearing, marked powers of observation, a good memory, tact in large measure, and so on.

The Sales Field.—The equitable division of the sales field into territories for salesmen is a formidable task, the precise method of performing which must be governed by circumstances. A starting point may usually be obtained by considering the total absorption power of the sales field, the percentage of this total absorption power it is reasonable to expect to exploit, the estimated percentage of sales costs, and so on. For example, a sales manager might discover by market investigation (a highly important phase of distributive sales management) that the sales field is capable of producing £1,000,000 (or $5,000,000) worth of sales per annum. In light of the nature and intensity of competition, the comparative merits of his merchandise, etc., the sales manager decides that it is reasonable to aim to secure 10% of this, or £100,000 ($500,000) worth of sales per annum. He has gone very carefully into costs, and has fixed 7½% as a satisfactory percentage to cover salesmen's salaries and expenses, and £750 ($3,750) per annum as a fair average total cost for each salesman. This means that the salesmen must average £10,000 per annum each in sales, and a sales force ten strong is indicated. The market investigation should have disclosed how the total absorption power of £1,000,000 (or $5,000,000) is spread over the sales field; and the sales manager's task is now to divide that field into ten territories, each with a "sales potentiality" of £100,000 ($500,000). This might not seem to present any great difficulty; but additional factors have still to be taken into consideration, such as method of travel (by road or rail), density of population, class of prospect, rate of turnover, desired frequency of visit, extent and strength of competition in the various areas, average length of interview, and so on.

The organization and control of a distributive sales force are aspects of sales management so prolific in peculiar problems that only the briefest and most general reference to them is possible. The keynote of the efficient sales organization is service to the customer, and the whole department must be planned and operated with this ever in mind. System and method are highly essential in a sales department; but vision and imagination are none the less important. There must be a departmental objective, clearly defined and positively expressed, towards the attainment of which all must strive. There must also be a clear-cut sales policy as a fundamental; and a sales department "procedure" to co-ordinate executive detail. When it comes to the control of the outdoor sales force, one finds two extreme schools of thought—one which believes in laying down minute procedure to which salesmen must rigidly adhere; the other which believes in letting the salesmen work in any way they choose, so long as orders in adequate volume are forthcoming. A course of action which is a happy mean between these two extremes is, however, found most generally satisfactory.

Retailing.—Retail selling, of course, presents its especial problems which are the more difficult of solution because of rapidly changing conditions. The growth of the "chain shop" idea, the expansion of the co-operative store movement, the development of the departmental store—these are important factors in the tendency most clearly indicated in retailing today towards fewer, bigger and better shops. That shops are bigger and better cannot be denied; that they will be fewer by the inevitable process of elimination which is the corollary of intensified competition on one hand and amalgamation and absorption on the other seems inescapable.

The business of retailing may be divided under two main heads —administration, which includes finance, and merchandising, which embraces both buying and selling. Our concern here is with the selling part of merchandising. One of the most important things to realise is that all trade is either "created" or "diverted." It is created when we make a customer of an individual who has never previously purchased that class of merchandise; it is diverted when we merely secure the business from a competitor.

There are three classes of custom—casual, attracted and permanent—least desirable in this order. Casual custom is least desirable because least dependable. Attracted custom may be the fruits of advertising, novelty or interest of window display, exhibitions, demonstrations, etc. Stores which are situated in recognised and popular shopping centres, though appearing to depend largely on casual custom, are really exploiting attracted custom. In permanent custom we have the highest form, and the only form perhaps upon which real success may be built. Custom is made permanent by quality of merchandise (which embraces worth, value and desirability from the points of view of style and aesthetic appeal), quality of the service, the attentiveness, tact and courtesy of the assistants, and so on. The aim should be to convert the casual customer, first into an attracted customer, and then into a permanent customer.

All retail sales may be classified as "inevitable" or "worked for." The sale made to a customer who enters the store with her mind more or less made up to purchase that particular class of merchandise is an inevitable sale. Nothing but the absence of the article from stock, or gross discourtesy on the part of the assistant, will prevent the sale from being successfully completed. But if the assistant succeeds in interesting the customer in a second article, and in effecting the sale of that, then that second sale is "worked for," and its making is real salesmanship. The business which is able to show healthy expansion on inevitable sales only is the exception and not the rule. Most retail businesses are more or less dependent upon extra or "worked for" sales. Therefore, it is upon the making of extra sales that one concentrates in the teaching of retail salesmanship. The three sources of extra sales are (1) more customers, (2) more sales to the same customers, and (3) sales retrieved which would otherwise be lost. Admittedly, it is to advertising principally that we look to bring us the new customers to repair wastage and to provide the material of growth. None the less, it is part of salesmanship to give such complete satisfaction to those customers we have that they will return, and with them their friends. In making more sales to the same customers, the object is to tap the customer's "potential" purchasing power, as distinct from her (or his) "realised" purchasing power. Nothing savouring in the remotest degree of importunity is advocated; the forcing of goods upon customers is intolerable. The crux of the sale is the creation of desire to possess what is being offered sufficiently strong to overcome the natural reluctance to part with the price. It is absolutely wrong to sell a customer an article she does not desire, but perfectly right and proper to sell her a dozen articles which she has been made to desire, even though she had no intention of buying them when she entered the store. The making of extra sales by retrieving sales which would otherwise be lost follows the eradication by training of such faults in the assistant as boredom, discourtesy, inattention, undue familiarity, lack of knowledge of goods, poor display, want of sales imagination, failure to overcome objections to suitability and price, and so on.

Training in retail salesmanship is being conducted with conspicuous success, and the following are the subjects it is desirable to cover by the instruction—the house policy, shop etiquette and deportment, sales routine, the layout of the store, personal hygiene and dress, general principles of salesmanship, the customer's mental states, personal attributes and qualities essential to success, how to handle the price factor, how to suggest other purchases, customers' buying motives, general knowledge of merchandise, how to handle difficult types of customers, effective display, typical sales difficulties, self-expression, commercial calculations, etc. This summary covers sufficient material for at least six months' instruction. It can and should be much abbreviated for senior and experienced sales assistants.

BIBLIOGRAPHY.—Cunliffe L. Bolling, *Sales Management;* Ralph Borsodi, *The Distribution Age;* Norris A. Brisco, M.A. Ph.D., *Funda-*

mentals of Salesmanship; Herbert N. Casson, *Better Salesmanship;* C. H. Fernald, M.B.A., *Salesmanship;* N. C. Fowler, Jr., *Practical Salesmanship;* J. George Fredericks, *Modern Sales Management;* L. J. Hoenig, *Modern Methods in Selling;* Incorporated Sales Managers' Association, *Salesmen's Agreements;* Charles C. Knights: *An Outline of Sales Management; Building Retail Sales; The Technique of Salesmanship; Training for More Sales;* Charles H. Mackintosh, *Creative Selling;* William Macpherson, M.A., *The Psychology of Persuasion;* Thomas Russell, *An Introduction to Sales Management;* Perceval White, *Market Analysis.* (C. C. K.)

SALEYER (Dutch, *Saleijer*), a group of 73 islands belonging to the government of Celebes and its dependencies in the Dutch E. Indies. They include Saleyer, Tambalongang, Pulasi and Bahuluwang; between 5° 36′ and 7° 25′ S. and 119° 50′ and 121° 30′ E. The main island, Saleyer, is over 50 m. long and eight m. at its widest point; area, 248 sq.m. The strait separating it from southern Celebes is more than 100 fathoms deep and, running in a strong current, is dangerous for native ships. The strata of the island are all sedimentary rocks: coralline limestone, occasionally sandstone; everywhere, except in the north and north-west, covered by a fertile soil. The watershed is a chain running throughout the island from north to south, reaching in Bontona Haru, 5,840 ft., sloping steeply to the east coast and gradually to a flat stretch on the west.

The population, mainly a mixed race of Macassars, Buginese, and the natives of Luvu and Buton, is 63,377, Saleyer being one of the most thickly populated parts of the administrative division of Celebes. The people use the Macassar language, and are for the most part Mohammedans (though many heathen customs survive), and support themselves by agriculture, fishing, seafaring, the preparation of salt and weaving: maize is the chief food crop. It is prosperous owing chiefly to its proximity to Macassar. Cotton, tobacco, trepang, tortoise-shell, copra, coco-nut oil and salt are exported.

SALFORD, city; municipal, county and parliamentary borough; Lancashire, England; 189 m. N.W. of London. Pop. (1931) 223,442. Salford also gives its name to the hundred of south-west Lancashire in which Manchester is situated. The parliamentary and municipal boundaries of Salford are identical. The parliamentary borough returns three members. The borough, composed of three townships identical with the ancient manors of Salford, Pendleton and Broughton, is for the most part separated from Manchester by the river Irwell, which is crossed by a series of bridges. The Irwell valley, now largely occupied by factories, separates the higher ground of Broughton from that of Pendleton. The chief railway station is Exchange station, on the L.M.S. railway, which is in Salford, but has its main approach in Manchester. Salford is well served with canals, the most important being the Manchester ship canal.

Salford has been to some extent overshadowed by Manchester, and the two boroughs in spite of their separate government, are so closely connected as to be one great urban area. Broughton and Pendleton have each a separate town hall. Salford has 7 parks and 34 recreation grounds, covering 412 ac., about one-twelfth of the city. The commercial and industrial history of Salford is closely bound up with that of Manchester. It is the seat of extensive cotton, iron, chemical and allied industries, large engineering and electrical instrument factories as well as works for the manufacture of furniture, rubber goods, mackintoshes, etc. Tailoring and ready made clothing are also important. Salford forms part of the port of Manchester and the largest docks on the Manchester ship canal are in Salford. It contains a number of valuable coal-mines and the deepest workings in Britain are at Pendleton. In recent years it has shared the increase of trade owing largely to the construction of the Manchester ship canal. The water supply is from Manchester. In 1773 the population was 4,755 and in 1931 it was 223,442.

Within the city area there have been found neolithic implements and British urns, as well as Roman coins. In 1851 traces of a Roman road were visible. Domesday Book mentions Salford as held by Edward the Confessor. At the conquest it was granted to Roger of Poitou, but reverted to the Crown in 1102. After belonging to the earls of Chester and Derby it passed to the earl of Lancaster. When the house of Lancaster succeeded to the throne their Lancashire possessions were kept separate. Salford and Pendleton are still parts of the ancient duchy of Lancaster, belonging to the English Crown. In 1231 Salford was constituted a "free borough" but the government was essentially manorial. In the Civil Wars between Charles I. and the parliament, Salford was Royalist, and the successful siege of Manchester was conducted from its side of the Irwell. Its later history is mainly identical with that of Manchester (*q.v.*). In 1844 it received a municipal charter, became a county borough in 1889 and was raised to the rank of city in 1927.

For bibliography *see* under Manchester. The corporation issues an official handbook every year.

SALICETI, ANTOINE CHRISTOPHE (1757–1809), French revolutionary, was born at Saliceto, Corsica, on Aug. 26, 1757. He studied law in Tuscany, and was elected to the states-general in 1789, and later to the Convention. He was sent on a mission to repress counter-revolutionary plots in Corsica and Provence. His friendship with Robespierre led to his denunciation on the 9th Thermidor, but he was saved by the amnesty of the year IV. He organized the army of Italy and held various offices under the Consulate and the Empire, being minister of war at Naples under Joseph Bonaparte (1806–09). He died at Naples on Dec. 23, 1809.

SALICIN, SALICINUM, the bitter principle of willow-bark, $C_{13}H_{18}O_7$, found in most species of *Salix* and *Populus*.

Salicin is prepared from a decoction of the bark by first precipitating the tannin by milk of lime, then evaporating the filtrate to a soft extract, and dissolving out the salicin by alcohol. As met with in commerce it is usually in the form of glossy white scales or needles. It is neutral, bitter, odourless, unaltered by exposure to the air, soluble in about 30 parts of water and 80 parts of alcohol at the ordinary temperature, and in 0·7 of boiling water or in 2 parts of boiling alcohol, and more freely in alkaline liquids. It is also soluble in acetic acid without alteration, but is insoluble in chloroform and benzol. From phloridzin it is distinguished by its ammoniacal solution not becoming coloured when exposed to the air. Chemically, it is a glucoside derived from glucose and *saligenin* (*o*-hydroxy-benzyl alcohol), into which it is decomposed by the enzymes ptyaline and emulsin. Oxidation converts it into *helicin* (salicyl-aldehyde-glucose). *Populin,* a benzoyl salicin, is a glucoside found in the leaves and bark of *Populus tremula.*

Salicin is used in medicine for the same purposes as salicylic acid (*q.v.*) and the salicylates.

SALIC LAW and OTHER FRANKISH LAWS. The Salic Law is one of those early mediaeval Frankish laws which, with other early Germanic laws (*see* GERMANIC LAWS), are known collectively as *leges germanorum.* It originated with the Salian Franks, often simply called Salians, the chief of that conglomeration of Germanic peoples known as Franks.

The Salic Law has come down to us in numerous mss. and in divers forms. The most ancient form, represented by Latin ms. No. 4404 in the Bibliothèque Nationale at Paris, consists of 65 chapters. The second form has the same 65 chapters, but contains interpolated provisions which show Christian influence. The third text consists of 99 chapters, and is divided into two groups, according as the mss. contain or omit the "Malberg glosses." Some of the mss. contain words in a barbarian tongue and often preceded by the word "malb." or "malberg." These are admitted to be Frankish words, and are known as the Malberg glosses. Opinions differ as to the true import of these glosses. The fourth version, as amended by Charlemagne, consists of 70 chapters with the Latinity corrected and without the glosses. Though he added some new provisions, Charlemagne respected the ancient ones, even those which had long fallen into disuse. The last version, published by B. J. Herold at Basel in 1557 (*Originum ac Germanicarum antiquitatum libri*) from a ms. now lost, is founded on the second recension, but contains additions of later date.

The law is a compilation, the various chapters were composed at different periods, and we do not possess the original form of the compilation. Even the most ancient text, that in 65 chapters, contains passages which a comparison with the later texts shows to

be interpolations. The scale of judicial fines is given in the *denarius* ("which makes so many *solidi*"), and it is known that the monetary system of the *solidus* did not appear until the Merovingian period. Even in its earliest form the law contains no trace of paganism—a significant fact when we consider how closely law and religion are related in their origins. The Romans are clearly indicated in the law as subjects, but as not yet forming part of the army, which consists solely of the *antrustions, i.e.*, Frankish warriors of the king's bodyguard. As yet the law is not impregnated with the Christian spirit; this absence of both Christian and Pagan elements is due to the fact that many of the Franks were still heathens, although their king had been converted to Christianity. (For contrary opinion *see* Franz Beyerle in the *Zeitschrift der Savigny-Stiftung*, xliv. 216 *seq.*) Christian enactments were introduced gradually into the later versions. Finally, we find capitularies of the kings immediately following Clovis being gradually incorporated in the text of the law—*e.g.*, the *Pactum pro tenore pacis* of Childebert I. and Clotaire I. (511–558), and the *Edictum Chilperici* (561–584), chapter iii. of which cites and emends the Salic Law.

The law as originally compiled underwent modifications of varying importance before it took the form known to us in Latin ms. No. 4404, to which the edict of Childebert I. and Clotaire I. is already appended. Finally, Charlemagne, who took a keen interest in the ancient documents, had the law emended, the operation consisting in eliminating the Malberg glosses, which were no longer intelligible, correcting the Latinity of the ancient text, omitting a certain number of interpolated chapters, and adding others which had obtained general sanction.

The Salic Law is not a political law; it is in no way concerned with the succession to the throne of France, and it is absolutely false to suppose that it was the Salic Law that was invoked in 1316 and 1322 to exclude the daughters of Louis X. and Philip V. from the succession to the throne. The Salic Law is pre-eminently a penal code, which shows the amount of fines for various offences and crimes, and contains, besides, some civil law enactments, such as the famous chapter on succession to private property (de alode), which declares that daughters cannot inherit land.

Of the numerous editions of the Salic Law only the principal ones can be mentioned: J. M. Pardessus, *Loi salique* (Paris, 1843), 8 texts; A. Holder, *Lex Salica* (1879 *seq.*), reproductions of all the mss. with all the abbreviations; H. Geffcken, *Lex Salica* (Leipzig, 1898), the text in 65 chapters, with commentary paragraph by paragraph, and appendix of *additamenta:* and the edition undertaken by Bruno Krusch for the *Mon. Germ. hist.* For further information *see* E. Mayer-Homberg, *Die fränkischen Volksrechte und das Reichsrecht* (1912); Cl. v. Schwerin, in the *Neues Archiv*, xl. 581 *seq.;* Bruno Krusch, in the *Neues Archiv*, xl. 497 *seq.*, and in the *Nachrichten der Gesellschaft der Wissenschaften zu Göttingen* (1916), 683 *seq.;* E. Heymann and others, in the *Neues Archiv*, xli. 375 *seq.*, 419 *seq.;* Franz Beyerle, in the *Zeitschrift der Savigny-Stiftung*, xliv. 216 *seq.*

The *Lex Ripuaria* was the law of the Ripuarian Franks, whose centre was Cologne. We have no ancient mss. of the law of the Ripuarians; the 35 mss. we possess, as well as those now lost which served as the basis of the old editions, do not go back beyond the time of Charlemagne.

On analysis, the law of the Ripuarians, which contains 89 chapters, falls into three heterogeneous divisions. Chapters i.–xxviii. consist of a scale of compositions; but, although the fines are calculated, not on the unit of 15 *solidi*, as in the Salic Law, but on that of 18 *solidi*, it is clear that this part is already influenced by the Salic Law. Chapters xxix.–lxiv. are taken directly from the Salic Law; the provisions follow the same arrangement; the unit of the compositions is 15 *solidi;* but capitularies are interpolated relating to the affranchisement and sale of immovable property. Chapters lxv.–lxxxix. consist of provisions of various kinds, some taken from lost capitularies and from the Salic Law, and others of unknown origin.

There is an edition of the text of the Ripuarian Law in *Mon. Ger. hist. Leges* (1883), v. 185 *seq.* by R. Sohm, who also brought out a separate edition in 1885 for the use of schools. For further information *see* the prefaces to Sohm's editions; H. Brunner, *Deutsche Rechtsgeschichte* (2nd ed., Leipzig, 1906), I., 442; Bruno Krusch, *Die Lex Bajuvariorum, mit zwei Anhängen: Lex Alamannorum und Lex Ribuaria* (1924) 333 *seq.* and *Neue Forschungen über die drei oberdeutschen Leges: Bajuvariorum, Alamannorum, Ribuariorum* (1927) 142 *seq.;* Franz Beyerle, in the *Zeitschrift der Savigny-Stiftung*, xlviii., 264 *seq.*

Lastly, we possess a judicial text in 48 paragraphs, which bears the title of *Notitia vel commemoratio de illa ewa (law), quae se ad Amorem habet.* This was in use in the district along the Yssel formerly called Hamalant. The name Hamalant is unquestionably derived from the Frankish tribe of the Chamavi, and the document is often called *Lex Francorum Chamavorum.*

There is an edition of this text by R. Sohm in *Mon. Germ. hist. Leges*, v. 269, and another appended to the same writer's school edition of the *Lex Ribuaria. See* also Fustel de Coulanges, *Nouvelles Recherches sur quelques problèmes d'histoire* (1891).

(C. PF.; K. A. ECK.)

SALICYLIC ACID, employed in many medicinal preparations and in food preservation on account of its powerful antiseptic properties, is one of three hydroxybenzoic acids, $HO{\cdot}C_6H_4{\cdot}CO_2H$. It also finds considerable use in the manufacture of dyestuffs. (*See* DYES, SYNTHETIC.) It crystallises from hot water in prismatic needles melting at 156–159° C, and when carefully heated it sublimes without decomposition, this sublimation being sometimes applied as a method of purification. Salicylic acid and salicylaldehyde occur in the oils from various species of *Spiraea*, whereas methyl salicylate, a colourless oil boiling at 222° C, is the main constituent of oil of wintergreen from *Gaultheria procumbens* and *G. fragrantissima*. Salicylic acid was first obtained by R. Piria (1838) on treating salicylaldehyde with caustic potash, and until 1874 was mainly obtained by the action of potash on oil of wintergreen. It is now manufactured from phenol (*see* CARBOLIC ACID) by processes based on H. Kolbe's celebrated synthesis of the acid discovered in 1859 (Germ. Pat., 426), and on R. Schmidt's improvement whereby sodium phenoxide (or phenolate), $C_6H_5{\cdot}ONa$, is converted into sodium phenylcarbonate, $C_6H_5O{\cdot}CO_2Na$, and the latter salt heated under pressure until transformed completely into sodium salicylate, $HO{\cdot}C_6H_4{\cdot}CO_2Na$ (American Patent 334290, English Patent 10167/1884).

Preparation.—Pure phenol is converted by concentrated aqueous caustic soda into sodium phenoxide and this salt is dried carefully and pulverised in a strong steel vessel (autoclave) capable of withstanding considerable pressure. The anhydrous sodium phenoxide powder is then saturated under pressure (100 lb. per sq.in.) with carbon dioxide and heated in the autoclave at 120–140° C. The resulting sodium salicylate is dissolved in water, decolorised with stannous salts or with zinc and charcoal and then acidified with mineral acid, when salicylic acid is precipitated, collected and washed with cold water. For colour making, the precipitated acid is sufficiently pure, but for preservative and medicinal purposes further purification is effected either by distillation in superheated steam or by sublimation. As salicylic acid is 35 times more soluble in hot than in cold water (100 parts of water at 15° C dissolve 0·225 part of salicylic acid), it may be readily crystallised from this solvent or from alcohol in which it dissolves more freely (1 part in 2·5 parts of 90% alcohol).

The following methods of preparing salicylic acid are of scientific interest: (1) from phenol, sodium carbonate and carbonyl chloride; (2) by the action of sodium on phenol and ethyl chlorocarbonate, $Cl{\cdot}CO_2C_2H_5$; (3) by the process of F. Tiemann and K. Reimer who heated together at 100° C phenol, carbon tetrachloride and alcoholic potash.

Salicylic acid in aqueous solution develops a violet coloration with ferric chloride, and with bromine water it gives tribromophenol bromide, $C_6H_2Br_3{\cdot}OBr$. Sodium in boiling amyl alcohol reduces it to *n*-pimelic acid, $CO_2H{\cdot}[CH_2]_5{\cdot}CO_2H$. When heated at 195–220° C, it decomposes, yielding phenol and carbon dioxide, but also giving phenyl salicylate, $HO{\cdot}C_6H_4{\cdot}CO_2{\cdot}C_6H_5$ (salol). This drug, also prepared by the action at 125° C of phosphorus oxychloride or carbonyl chloride on a mixture of sodium phenoxide and salicylate, crystallises from alcohol in rhombic plates melting at 42° C and boiling at 172° C./12 mm. Acetylsalicylic acid (*see* ASPIRIN), prepared by the action of acetyl chloride on salicylic acid or its sodium salt, crystallises in colourless needles and melts at 132° C (with decomposition).

Applications of Salicylic Acid and Salicylates.—Salicylic acid has a strong inhibitory influence on the growth of micro-organisms, and retards the action of unorganised ferments and of the ferments of alcoholic and acetic fermentations. It has a widespread employment as a preservative of foods and beverages in concentrations of 0·5–6 parts per 1,000. It is thus used in jams and other fruit preparations, in glues and albuminoid substances, and also in milk, beer and wine. The use of salicylic acid as a food preservative was, however, condemned by a commission of the U.S.A. government in 1904.

Applied externally as an antiseptic and antipruritic to wounds and parasitic skin diseases, salicylic acid is less irritating than phenol, but may in strong solution have a destructive action on the horny layer of the epidermis. It is employed to remove corns and warts and in the treatment of lupus. It is a constituent of dental preparations and mouth washes.

For internal use, salicylic acid has been almost completely replaced by its sodium salt (sodii salicylas, official dose 0·6 to 2·09 grams) and its acetyl derivative (aspirin), which are less irritant to the mucous membrane of the stomach.

Salicylic acid is the basis of numerous drugs and therapeutic agents, and in addition to the above-mentioned there are also salipyrin, salophen, diuretin and many others.

The greater proportion of salicylic acid is, however, employed in the manufacture of such azo-dyes as alizarin yellow (khaki yellow), chrysamine, anthracene brown, cloth brown, cotton yellow, diamine yellow N, anthracene yellow, etc. Large quantities serve for the preparation of 5-aminosalicylic acid which is an intermediate in the production of the important wool dye, diamond black.

BIBLIOGRAPHY.—For preparation and chemical properties: T. E. Thorpe, *Dictionary of Applied Chemistry,* vol. vii. (1926); F. Ullmann, *Enzyklopädie der technischen Chemie,* 2nd. Edition (1928). For application in medicine and therapeutics: W. H. Martindale and W. Westcott, *Extra Pharmacopoeia,* vol. i., 1928. (G. T. M.)

SALIDA, a city of Chaffee county, Colorado, U.S.A., on the Arkansas river, Federal highways 50 and 650, and the Denver and Rio Grande Western railroad, 100 m. S.W. of Denver. The population was 4,689 in 1920 (88% native white) and was 5,065 in 1930 by Federal census. The city lies at an altitude of 7,050 ft. in a basin almost surrounded by mountains rising to heights of over 14,000 feet. It is head-quarters for the Cochetopa national forest, a region of great beauty, and there are hot mineral springs and many other points of interest near by. Gold, silver, lead, copper, lime and iron are mined and granite is quarried in the vicinity. The railroad has its repair shops here and a large creosoting plant. There is a large commercial fish hatchery. Salida (so-called because it stands at the "outlet" of the upper Arkansas basin) was settled and incorporated in 1880, when the railroad was under construction up the valley.

SALIERI, ANTONIO (1750–1825), Italian composer, was born at Legnano, on Aug. 19, 1750. In 1766 he was taken to Vienna by F. L. Gassmann, who introduced him to the emperor Joseph. His first opera, *Le Donne letterate,* was produced at the Burg-Theater in 1770. Others followed in rapid succession, and his *Armida* (1771) was a triumphant success. On Gassmann's death in 1774, he became Kapellmeister and, on the death of Bonno in 1788, Hofkapellmeister. He held his offices for fifty years, though he made frequent visits to Italy and Paris, and composed music for many European theatres. His *chef d'oeuvre* was *Tarare,* later called *Axur, re d'Ormus* (1787), a work which was preferred by the Viennese public to Mozart's *Don Giovanni.* His last opera was *Die Neger,* produced in 1804. After this he devoted himself to the composition of church music, for which he had a very decided talent. Salieri lived on friendly terms with Haydn, but was a bitter enemy to Mozart, though the wild suggestion that he actually poisoned him (albeit made the basis of Rimsky-Korsakov's *Mozart and Salieri*) has long been scouted. He retired from office on his full salary in 1824, and died at Vienna on May 7, 1825. Salieri gave lessons in composition to Cherubini and to Beethoven, who dedicated to him his three sonatas for pianoforte and violin, op. 12.

See also Albert von Hermann, *Antonio Salieri, eine Studie* (1897); J. F. Edler von Mosel, *Über das Leben und die Werke des Antonio Salieri* (Vienna, 1827).

SALII ("dancers"). An ancient priesthood at Rome, consisting of two colleges, each of 12 members, the Salii Palatini and the Salii Collini or Agonenses, connected respectively with the worship of Mars on the Palatine and the Quirinus on the *collis Quirinalis.* They wore armour of an ancient pattern, probably the old war-dress of the Italians, and in particular, carried shields called *ancilia,* shaped somewhat like the figure 8. These they carried in procession on certain days of the year, in March (Mars' month) and October (end of the campaigning season under early conditions), singing a very ancient hymn or hymns (*axamenta,* in honour of all the gods, and separate hymns to single deities, called by their names). They were assisted by women similarly dressed and called *saliae virgines;* these were hired for the occasion in historical times. The whole performance was accompanied with dancing.

All this suggests a war-dance, and can easily be paralleled from the customs of uncivilized peoples. But the matter is complicated by a statement of Johannes Lydus, a late and untrustworthy author, that on March 15 a man clad in goat-skins and called Mamurius was driven out with rods. This person Lydus identifies with Mamurius Veturius, said to have been the smith who made the *ancilia* after a pattern fallen from heaven. (*See* Lydus, *de mensibus,* p. 105, 19 Wünsch.) But the name may mean "old Mars," hence it has been plausibly conjectured that the ritual is at least in part connected with vegetation, the "old Mars" or worn-out spirit of fertility being yearly driven away. As, however, we have no proof that the Salii were connected with this ceremony, it is open to us to suppose, with Wissowa, that it is a mere coincidence of date, and that the name of the skin-clad figure was a popular one only, made up from the unintelligible words *mamuri veturi* in the Saliar hymn. The balance of evidence certainly is in favour of supposing the ritual of the Salii to have been purely war-magic, in its origin at least. There were also Salii at Tibur, of whom nothing is known (Servius on *Aen,* viii., 285).

BIBLIOGRAPHY.—W. Warde Fowler, *Roman Festivals* (1908); Wissowa, *Religion und Kultus* 2nd ed. (1912); Sir J. G. Frazer, *Golden Bough,* 3rd ed., ix., 229 ff. (bibl.).

SALINA, a city near the centre of Kansas, U.S.A., on the Smoky Hill river and Federal highways 40S and 81; the county seat of Saline county. It is served by the Missouri Pacific, the Rock Island, the Santa Fe and the Union Pacific railways. Pop. (1920) 15,085 (90% native white); 20,155 in 1930 by the Federal census. It is the seat of Kansas Wesleyan university (Methodist Episcopal; chartered 1885) and the see of a Protestant Episcopal bishop. The city operates under a commission-manager form of government. It has a city plan, zoning regulations, 185 ac. in parks, a municipal band, municipal golf links and swimming pool, and an assessed valuation (1928) of $28,500,000. Salina has a large wholesale and retail trade, and varied manufactures, with an output in 1927 valued at $15,156,923. Flour-milling is the chief industry (10,000 bbl. a day). The city was founded in 1858 and chartered in 1870. The first railway (the Union Pacific) came through in 1867. The first flour-mill (still in operation and using the original water turbines) was built in 1868.

SALINA CRUZ, the southernmost seaport of Mexico on the Pacific coast, in the State of Oaxaca, at the southern terminus of the Tehuantepec National railway, with connections to Mexico City. Pop. 5,976 in 1910. It is situated near the mouth of the Tehuantepec river, on the open coast of the Isthmus of Tehuantepec. The new port was opened to traffic in 1907. A costly artificial harbour has been built by the Mexican Government to accommodate the traffic of the Tehuantepec railway. It is formed by the construction of two breakwaters, which curve toward each other at their outer extremities and leave an entrance 635 ft. wide. The enclosed space is divided into an outer and inner harbour by a double line of quays wide enough to carry six great warehouses with electric cranes on both sides and a number of railway tracks.

SALINAS, a city of western California, U.S.A., 10 m. from Monterey bay, in the Salinas River valley, between the Gabilan and the Santa Lucia mountains; the county seat of Monterey

county. It is on Federal highway 101, and is served by the Southern Pacific railway. Pop. 4,308 in 1920; 10,263 in 1930 by Federal census. The Salinas valley is one of the richest agricultural regions in the United States, producing especially lettuce, cauliflower, bulbs and seeds, sugar-beets, artichokes, fruit and grain. Rubber also is produced on a commercial scale. A beet-sugar factory near the city uses 3,000 tons of beets daily. The famous California Rodeo is held here annually in July. Salinas was settled about 1858; became the county seat in 1872, in place of Monterey; and was incorporated as a city in 1874.

SALISBURY, JAMES EDWARD HUBERT GASCOYNE-CECIL, 4TH MARQUESS OF (1861–), British politician, eldest son of the 3rd marquis (*q.v.*), was educated at Eton and University College, Oxford. He entered parliament in 1885, and succeeded to the peerage in 1903. He served in the South African War, and on his return entered the ministry, joining the cabinet in 1903. In the crisis over the Parliament Bill he threw in his lot with the "Die-hards." He did not join either Coalition government during the World War, but was critical of both, taking an independent line. He gradually came to assume the informal leadership of the Conservative Opposition first in the House of Lords, and afterwards in the party generally. In a speech on Oct. 16, 1922, he categorically demanded the freedom of the party. Three days later the policy was accepted at the Carlton Club meeting. He was lord president in the council in Bonar Law's Cabinet and in Baldwin's first Cabinet. In Baldwin's second Cabinet he was lord privy seal, and on Curzon's death in 1925 he succeeded to the leadership of the House of Lords. He was created K.G. in 1917.

SALISBURY, ROBERT ARTHUR TALBOT GASCOYNE-CECIL, 3RD MARQUIS OF (1830–1903), British statesman, second son of James, 2nd marquis, by his first wife, Frances Mary Gascoyne, was born at Hatfield on Feb. 3, 1830. Lord Robert Cecil, as he then was, was educated at Eton and Christ Church, Oxford. His health was delicate and after leaving Oxford, he spent nearly two years at sea on a voyage round the world, visiting Cape Colony, Australia, Tasmania and New Zealand. On his return home he stood for parliament and on Aug. 22, 1853, was returned unopposed as member for the borough of Stamford in Lincolnshire. In the same year he was elected to a fellowship of All Souls.

He married in July 1857, the eldest daughter of Sir Edward Hall Alderson, Baron of the Court of Exchequer, a man of notable parts who at Cambridge had earned the rare distinction of being both Senior Wrangler, Senior Classic and Smith's Prizeman. His daughter inherited his abilities but there was very little money, and to add to his income Lord Robert joined the staff of the *Saturday Review* which had been lately founded by his brother-in-law, Mr. Alexander Beresford-Hope, this being, so far as is known, his only contribution to pure journalism. Most of his writing was done for the *Quarterly Review,* whose articles were then exclusively anonymous. The literary quality and vigorous lucidity of his style secured him a welcome in its pages, and of the 24 numbers which appeared between the years 1860 and 1866 there were only three which did not contain an article from his pen. Six of these have since been republished in volume form —three of them biographical essays on Pitt and Castlereagh and three dealing with foreign questions. These were uncompromisingly denunciatory of Lord John Russell's policy and to the study required for an effective presentation of his case may probably be traced his first knowledge of and interest in foreign affairs.

In the House of Commons.—Speeches on the same subjects, and notably one or two in 1864 on the abandonment of Denmark at the time of Germany's annexation of Schleswig-Holstein, placed him for the first time by general consent in the front rank of parliamentary debaters. When Lord Russell's Government was defeated over Mr. Gladstone's Reform bill in 1866, it was a foregone conclusion that he should be among those invited to join Lord Derby's cabinet. His eldest brother had died in 1865 and it was as Lord Cranborne that, in July 1866, he took office as secretary of State for India.

He only held it for seven months. The story of that ministry is well known. In the summer of 1866 the Tory party, assisted by a secession of anti-democratic Liberals, defeated Mr. Gladstone's Reform bill as tending dangerously in the direction of household suffrage. In the summer of 1867, the same party passed a Reform bill which established household suffrage. Lord Cranborne, with two other members of the Cabinet, Lord Carnarvon and General Peel, resigned on Feb. 9, two days before the bill's introduction. The breach was embittered by the tactics which the two leaders employed towards their junior colleagues. They kept them in the dark till within a week or two of the bill's production; offered reassurance in the shape of counter-checks and limitations which were changed with every meeting of the cabinet —and were in fact all abandoned in the course of the bill's passage through parliament—and allowed them no opportunity for considered argument. Their belief that there had been a deliberate attempt to hustle them into a consent which it was known that they would not have given freely, estranged them personally from Disraeli for many years afterwards. When the parliamentary fight was over Lord Cranborne accepted the constitutional change as an accomplished fact which it behoved every good citizen to make the best of, and it was the offence against public morality of which he held his party and its leaders to have been guilty that became the theme of an article called "The Conservative Surrender" which appeared that October in the *Quarterly Review.* Its quality and its easily divined authorship procured it a sensational reception. Seven editions of the number which contained it had to be issued in order to meet the demand for it.

On April 12, 1868, his father died and his House of Commons career came to an end. During the six years which followed (1868–1874), Lord Salisbury joined actively from below the gangway in the warfare which his late colleagues waged against Mr. Gladstone's legislation. In 1870 he was chosen chancellor of Oxford university in succession to Lord Derby,—an indication of the reputation which his attitude in '67 had won for him among the more serious representatives of the party outside Parliament. It was a distinction which he always peculiarly prized. When, after the defeat of the Liberals in 1874, Disraeli undertook the formation of his second ministry, almost his first step was to invite the return of this alienated colleague. Under actual conditions there could be no risk of a repetition of his earlier experience, and after a few days of painful hesitation, he accepted. On Feb. 17 he resumed control of the Government of India where a disastrous famine claimed all his energies. By a curious chance a similar visitation had synchronised with his previous brief tenure of office, and he had left behind him a high reputation for success in dealing with it.

The first two years of this ministry were uneventful—except in connection with an ecclesiastical measure—the Public Worship Act, introduced in 1874 by Archbishop Tait. Lord Salisbury and his chief took opposite sides upon it, and the momentary clashing of their swords in debate excited some quite unfounded anticipations of ministerial rupture. But in 1876 a crisis arose in the south-east of Europe, one of whose incidental results was to fix permanently Lord Salisbury's destiny in public life.

The Eastern Question.—Two or three of the European provinces of the Turkish Empire had revolted against its misgovernment; there had been a voluminous interchange of notes and protocols among the signatory Powers of the Treaty of Paris; the already autonomous principality of Serbia had taken up arms in support of its co-religionists, and finally the Russian tsar had mobilised his army and declared that, if the rest of Europe did not act, he would. A conference of the Great Powers had thereupon been called to meet at Constantinople in December, to draw up a scheme of reforms and, by securing the Porte's acceptance of it, avert the threatened war.

The repercussion of these events in England had been peculiarly characterised. The insurrection in Bulgaria had been suppressed by Turkish irregular troops with incidents of great savagery. Misled by the optimism of the British embassy at Constantinople, the prime minister—now become Lord Beaconsfield—had poured scorn upon the first newspaper reports of these outrages, and in the impassioned agitation which Gladstone initiated on the

subject throughout the country, the Tory Government became an object for almost equal denunciation with the Turkish sultan. Salisbury resented the agitation, but was himself admittedly sympathetic with the cause of the insurgent Christians and had privately urged his colleagues to dissociate England once and for all from the incriminated cause of Turkish ineptitude. His views were known or divined and when Beaconsfield invited him to serve as plenipotentiary to the Constantinople Conference, the appointment helped to quiet the prevailing excitement and was received with general acclamation. At first all went smoothly at the Conference; there was no difficulty in obtaining unanimous agreement among the Christian Powers as to the reforms to be recommended. But there success stopped. The Turkish envoys rejected all proposals, and were deaf to every argument. Salisbury would have tried that of force, but his colleagues refused, and on Jan. 20, 1877, the conference broke up and Russia was left to carry out her originally proclaimed purpose.

She declared war on April 24. Throughout the remainder of that year counsels in the British cabinet were divided. The prime minister and Cairns advocated present intervention; Salisbury and Carnarvon opposed a resolute veto to any action which the Turks could construe into acquiescence in their defiance of Europe; and Derby, the foreign secretary, supported them with impartial loyalty. Agreement between the warring groups was obtained for a declaration of neutrality, balanced by a warning addressed to Russia that no attempt on Constantinople itself would be tolerated.

The change of issues foreshadowed in this document materialised in the new year and with it a change in cabinet grouping. The Turkish defence, at first resolute and successful, suddenly collapsed and when the Russian troops in rapid advance appeared upon the threshold of the forbidden city Lord Salisbury was foremost in urging that men-of-war should be sent up to the Bosphorus for its protection. On this decision being taken (Jan. 23), Derby and Carnarvon resigned, though the former was subsequently persuaded to withdraw his resignation.

An armistice was agreed upon and a treaty of peace, negotiated between the two belligerents, was signed at San Stefano on March 3. It provided for a huge Slav State under Russian protection stretching right across the Balkans and completely isolating Constantinople. Russia announced that at the approaching conference of the Signatory Powers required under treaty law to legalize the settlement she would admit discussion on those parts only of the new treaty which were "of European interest." The other Powers hesitated to enforce their rights but England declared that unless the treaty were submitted in its entirety she must decline to participate in the congress; Russia again refused, the summoning of the congress was indefinitely postponed, and when the British cabinet met on March 27 it was to face an imminent probability of war. They called out the Reserves and telegraphed orders for a contingent of Indian troops to be at once embarked for the Mediterranean. Lord Derby resigned the same evening and Lord Salisbury, who had taken a leading part in these decisions, was appointed foreign secretary the following day.

He signalized his accession to control by a despatch whose contents were telegraphed on April 1 to every capital and which became famous as the Salisbury Circular. Its object was to show that the Treaty of San Stefano, by reducing the Turkish Empire to vassalage, would constitute a greater menace to the interests of other Powers than would have arisen from its frank dismemberment in Russia's favour. It was by the treaty as a whole that this result would be achieved and it was as a whole therefore that it must be submitted to the judgment of Europe. This document, by the lucidity of its style and argument, the impression of resolution which it conveyed and the subtly indirect appeals which it contained to the interests or sentiments of the different neutral nations, effected an immediate revolution in the international position. Hesitation disappeared; the rest of Europe ranged itself on the side of the British contention and Russia could do no other than submit.

But danger was not over with the removal of obstacles to the meeting of the Powers. In present conditions a failure of agreement at the Congress itself must precipitate a general war and Salisbury refused to risk that possibility. He entered into private communication with Russia and satisfied himself that the provisions which either side regarded as vital were capable of adjustment. On May 31st a secret agreement was signed between him and the Russian ambassador binding both Powers not to push dispute on these provisions to the point of rupture at the Congress. Russia's price for this adjustment was her retention of her Asiatic conquests, and to counteract the effect of these Salisbury co-incidentally arranged a convention with Turkey. Under this, in consideration of her ceding Cyprus to England and entering into an engagement of administrative reform in Asia Minor, England guaranteed her Asiatic frontier against further aggression.

These preparations having been effected, the Congress, summoned by Prince Bismarck, met at Berlin on June 13. Lord Beaconsfield and Lord Salisbury attended it, and a month later a treaty was signed there by the seven great Powers. It secured all the objects for which England had contended, and when the two plenipotentiaries returned to London Beaconsfield was able to announce that they had brought back "Peace with Honour."

In Opposition.—At the general election of 1880, the Conservative party was heavily defeated. Lord Beaconsfield died the following spring, and Lord Salisbury succeeded him as leader in the House of Lords, sharing with Sir Stafford Northcote in the leadership of the party as a whole. During this period of opposition and in the election campaign which closed it, he spoke continually on public platforms and developed gifts for attracting and holding mass meetings of working men which hitherto had had little opportunity for display.

In home affairs his attitude was distinguished alike from that of the Tory Democrats of that day and that of the more old-fashioned Toryism. He made no attempt, like the former, to clothe his views in radical or democratic phraseology, but on the other hand he was disdainful of privilege and frankly indifferent to tradition. That the confidence begotten of economic stability and respect for individual rights was of supreme importance to the class whose welfare depends on full and well-paid employment; that theorists and phrasemakers are the enemy, always and everywhere; above all, that unity and mutual trust are the indispensable foundation for all moral and all material welfare in a nation,—were the recurrent texts from which he spoke. But he demurred to the title of Conservative: "There is much . . . which it is highly undesirable to conserve." He identified himself strongly with the movement for housing reform and in speaking to a bill promoted by a Royal Commission of which he had been a member, he shocked the rigid individualists of his own and the opposite party by his warm advocacy of State expenditure in dealing with the evils of overcrowding.

In 1884 Gladstone introduced a bill for enfranchising two million agricultural voters and divorced it from the large rearrangement of seats which such an unequally distributed addition to the electorate would require. Salisbury saw in this procedure an intention of manipulating the constituencies in a party sense and invited the House of Lords to compel an appeal to the country on the question by refusing to pass one bill without the other. They did so and a tempestuous campaign of protest against their action followed. It was responded to by a similar campaign in their favour, in which Salisbury took a prominent part. The recurrent climax of his speeches was a challenge to the Government to dissolve parliament and so obtain the verdict of the electors on the issue. Through the Queen's mediation the controversy was closed by Gladstone's giving the required guarantee of impartiality in the Redistribution bill by inviting Salisbury and Sir Stafford Northcote to assist in drawing it up.

On June 8, 1885, the Liberals, disorganized by Sudanese disaster, allowed their Government to be defeated on a Budget vote and Mr. Gladstone resigned. The passage of the Franchise Act had made a dissolution impossible until the new registers were completed in November, and there were patent reasons why Salisbury, whom the Queen summoned, should refuse to take office. It would lose for his party all the advantage of attack in the

approaching elections, and it would place on it the invidious responsibility of governing Ireland without the Crimes act, whose necessity it had urged and which was due to expire that summer. But the state of affairs abroad which the Queen revealed to him decided Salisbury upon acceptance. England was at that moment without friends or authority in Europe; perennial antagonists—Russia and Austria—France and Germany—had been negotiating reconciliation at her expense; if present conditions were suffered to continue it seemed to him that any catastrophe was possible. He kissed hands as prime minister and foreign secretary on June 24.

First Ministry.—His tenure of office this time was too short for the testing of any policy, but he achieved one sensational success. That September, the southern Bulgarians, who had been left under Turkish rule by the Treaty of Berlin, revolted and proclaimed union with their northern brethren. These and their Prince, Alexander of Battenberg, had in the intervening seven years quarrelled hopelessly with their Russian patron and Russia was now foremost in vindication of the treaty and insistence upon an immediate reversal of the achieved union. A conference of the Powers was called and the rest of the Continent rallied to the Russian demand. Salisbury alone refused. Now that the union had become an accomplished fact, he declared, the Bulgarians would never willingly surrender it and to force surrender, as the Imperial Governments proposed, by means of a Turkish military "execution," was unthinkable. For weeks he was argued with, pressed, objurgated for stultifying the united authority of Europe. He refused to give in and on Nov. 25 the conference broke up. Meanwhile Serbia, outraged at the accretion of territory illicitly secured by her neighbour, had invaded Bulgaria. Her unexpected and crushing defeat by Prince Alexander converted the great Powers to a depressed recognition of the facts upon which Salisbury had insisted. In December he was appealed to for help in discovering some face-saving compromise and the sultan was induced to come to a direct agreement with Prince Alexander, in which the union was recognized. The Treaty Powers had only to acquiesce, while the continental press turned round and congratulated the British minister upon the prescience and firmness which had saved Europe from a disastrous blunder.

Before this settlement was finally consummated Salisbury had left office. The general election in November had resulted in giving the Irish party the casting vote in the House of Commons. In December Gladstone had announced his adhesion to Home Rule and Salisbury's ministry was defeated on an amendment to the address on Jan. 26, 1886. Gladstone introduced his Home Rule bill which, with the assistance of 90 dissident Liberals, was rejected, on June 8. Parliament was dissolved; the Unionists gained a decisive victory though not one giving a majority to the Conservatives independently of their allies. On July 20, the Queen sent for Salisbury who, with her leave, pressed Hartington to take the premiership in his stead. But the Liberal-Unionist chief refused, promising independent support, and Lord Salisbury formed his second Government which remained in power for six years,—1886–92.

Government of 1886–92.—The worst difficulty which it had to encounter was at starting. Lord Randolph Churchill, who was the second man in the ministry and leader in the House of Commons, found himself unable to work with his colleagues, and resigned at the end of the year. The most popular platform speaker in the party, he was at that time without a rival on his own front bench, and the break up of the Government was anticipated. Salisbury again offered to widen its support by retiring in Hartington's favour, and Hartington again refused. But he advised his lieutenant, Goschen, to join the cabinet, which in the end suffered no permanent injury by Lord Randolph's defection. Salisbury, who at the outset had surrendered the foreign office to Lord Iddesleigh, now resumed its direction (Jan. 1887).

England was no longer in the position of dangerous isolation which she had occupied when he took office in 1885. The initiatory approaches which he had then made to the German chancellor had re-established friendly relations between them, and his successful obstinacy about Bulgaria had presented England to Europe as a power that had to be reckoned with. In '86, circumstances all combined to draw her towards the grouping of Central European Powers,—Germany, Austria and Italy as against the Russo-French combination. Russia had been alienated by her resistance to the coercion of Bulgaria, while across the Channel France's growing resentment at her continued presence in Egypt had operated in the same direction. But in 1887 there was an interval of hesitation. Salisbury was repelled by the German chancellor's methods. Throughout the preceding autumn and winter he had been ceaselessly resisting the chancellor's efforts to induce an Anglo-Russian war and so shift the Bulgarian quarrel from Austrian to English shoulders. The menacing pressure with which the chancellor visited any crossing of his wishes by a friendly Power had been a constant source of irritation. Salisbury's wish for a wider choice in friendships expressed itself that spring in a new departure in Egyptian policy. He offered to Turkey—as the suzerain power—an engagement to evacuate Egypt in three years if the conditions for her security permitted and with a right of re-entry reserved. After prolonged negotiation the sultan agreed to sign a convention to that effect (May 22, 1887). But France rejected the proffered compromise with indignation, and under threats of violence from her and Russia the sultan withdrew his consent, and refused ratification. The attempt, though it failed in its main object in a reconciliation with France, was not fruitless. It freed England from further solicitations and intrigues on the score of Egypt. She had made her offer and it had been rejected. Thenceforward, as Lord Salisbury soon made abundantly clear, she would consult only her own judgment as to the period of her occupation.

But France's inveteracy was decisive in determining England's continental friendships for the next ten years. Lord Salisbury declined to give them the character of alliances. In response to insistent requests from the Austrian and Italian Governments, backed by a private letter of strong appeal from the German chancellor (Nov. 22), he that autumn signed an engagement (the Tripartite Agreement, Dec. 10, 1887), to join with them in resisting any future coercion of Turkey on the part of Russia. The chancellor's letter hinted at a more general and binding adhesion to the Triple Alliance and it was followed by other suggestions to the same effect. These were ignored or evaded and more definite proposals met with more definite refusals. In the spring of 1887, Italy had asked for a defensive alliance specifically directed against France and in Jan. 1889 Germany invited a similar compact. Salisbury's answer on both occasions was that an undertaking to fight on an unarrived issue was contrary to the traditions of English policy and was impossible for a Constitutional Government.

To maintain this refusal of the only thing that constituted an alliance in Continental eyes without falling into the pit of national isolation was a difficult problem for diplomacy. Salisbury's large success in solving it during the period of his ministry was due in the main to his avoidance of exaggerated claims and his readiness not only to acquiesce in but actively to assist those of other countries wherever they were in any way admissible. Thus the detachment which must otherwise have become a source of jealousy and suspicion was, time and again, presented in a guise attractive to the needs of other nations. England never occupied a position of greater authority in Europe than during this time, and after Bismarck's retirement in 1890 Salisbury's became the dominating figure among European statesmen.

The white invasion of Africa which signalized that decade afforded opportunity for a marked display of his capacity for international co-operation. It was a movement unique in history for the rapidity, and, it may be added, the human benefit of its achievement. But behind the inrush of explorers, missionaries and traders of all nations, had now come their Governments, whose claims—undefined and illimitable—were, by the end of the eighties, advancing to inevitable conflict. England, whether by earlier occupation or the present activity of her adventurers, was a competitor in every region, north, south, east and west, and Lord Salisbury accepted the initiative to bring order out of chaos which was thus marked out for him. He engaged in negotiations, delimitations, arbitrations, and struck the best bargains he could

for his own clients compatible with an instructed sympathy with their rivals' requirements. With an eye for a future still eight years distant he averted encroachment upon the Nile valley up to the river's source, though no Englishman had as yet set foot south of Wady Halfa, and placated French enmity beforehand by a large complaisance in the west and north-west of the continent. He reasoned suavely with Italy's aspirations and sharply with Portugal's baseless obstruction to the northward advance of Cecil Rhodes' South Africans; and when England's and Germany's irreducible requirements proved incompatible, threw Heligoland into the scales in security of a peaceful settlement (June 1890). When he left office the main outlines of actual occupation and prospective "spheres of influence" had been drawn without the serious chilling of a single international relationship.

The elections of 1892 resulted in a victory for the Liberal party though with a small and unharmonious majority. Gladstone passed a bill for Home Rule and one for Welsh Disestablishment through the House of Commons in successive sessions, but the evident want of enthusiasm in the country for either measure encouraged Salisbury, in accordance with the principle on which he acted in this connection, to invite their rejection by the House of Lords. The place of the Lords in the Constitution was to secure an appeal to the electorate but they could only wisely assert it against the House of Commons when there were sound reasons to believe that the electorate agreed with them. On this occasion his judgment proved amply justified. Parliament was dissolved in '95 and the verdict of the constituencies ratified the Lords' action by a substantial majority. Lord Salisbury again became prime minister and foreign secretary while the Liberal Unionist leaders established the fusion of the two sections of the party by joining his cabinet.

Third Ministry.—This was in many ways the least satisfactory of Lord Salisbury's four tenures of the foreign office. Since he was last in office the German emperor had quarrelled with England over Far East politics, and never afterwards paid more than lip service to the old friendship. The breach with France was not yet healed, and, though Lord Salisbury's personal authority remained and the influence of his initiative, England was isolated in European sympathy throughout this period. He found diplomacy once more absorbed in the Near East problem as the result of a peculiarly atrocious outbreak of Turkish cruelty and misgovernment in Armenia. After failing in a private proposal to Germany to join in some drastic enterprise—its details are not known—for the dismemberment or subjugation of Turkey, he appealed in 1896 to the Christian Powers as a whole to take combined action for enforcing reform on the Porte. They agreed and accepted his initiative. The "Concert of Europe" succeeded both in this matter and in a subsequent crisis in Crete, in averting the ever-present danger of a breach in the "armed truce" on the continent. But as regarded the lot of the unhappy Armenians it proved a sore disappointment to its author—Russia, who, in the strange whirligig of time, had become the champion of Turkish independences, vetoing, with German support, any form of coercion at Constantinople.

In the summer of 1895 a long-drawn-out frontier dispute between British Guiana and Venezuela achieved sudden importance through the action of the American Government which, with a view to hastening a conclusion, addressed a singularly discourteous despatch to that of England, claiming rights of dictation rather than intervention. Lord Salisbury, after some delay, replied with a reasoned demurrer to such a development of the Monroe doctrine. President Cleveland responded in a fierce speech, foreshadowing ultimatums, and was applauded by his public in a wild outbreak of anglo-phobic jingoism. Lord Salisbury declined the quarrel and some months later, when feelings had cooled, tacitly conceded America's claim to intervene and agreed to defer the whole question to neutral arbitration, whose verdict substantially conceded the British case. (Oct. 1899.)

In the winter of '97–98 a stir of anger was roused in England by Russia's illegal seizure from China of two ports—Port Arthur and Talienwan—which were supposed to secure domination over Pekin, and Lord Salisbury was much censured for passing the aggression by with no more than a diplomatic protest. Events elsewhere called urgently for complaisance. The culminating crisis of the long quarrel with France over Egypt was imminent and Lord Salisbury held that its peaceful issue would depend on her finding no militant encouragement from sympathetic outsiders when the moment came. Colonel Marchand had been for more than three years making his way through the forests of Central Africa with instructions to assert a French claim upon the upper waters of the Nile before England had established an effective occupation there. He succeeded in fact in arriving that July at Fashoda a few weeks before General Kitchener reached it, steaming hurriedly up the river from the battle of Omdurman. But the news of the planting of the French flag and that of its removal reached Paris concurrently and with it a telegram from Lord Salisbury announcing the British occupation of the post and warning the French Government and people in the clearest terms that no compromise on England's claim upon the Nile valley was possible. Popular passion, dangerously excited for a few days, was thus compelled in the first moment of its ebullition to face the gravity of the decision to be taken and in the end it suffered its Government, discouragingly advised thereto by its Russian ally, to follow counsels of peace. The episode thus safely passed through proved, in spite of the resentment which it aroused at the time, the close of the quarrel that had so long kept the two nations apart. The resentment was artificially prolonged by the general unpopularity in which England was submerged through the South African war the following year, but when in 1901 that had passed by, the way was left open for the automatic operation of the forces which three years later resulted in the conclusion of the Entente.

The successful conduct of this crisis was Lord Salisbury's last diplomatic achievement of any note. He surrendered the foreign office in Nov. 1900, and the prime ministership in July 1902—only deferring this final retirement to avoid the embarrassment of a change before peace had been concluded in South Africa. He died a year later on Aug. 22, 1903, his wife having predeceased him in Nov. 1899.

He was singularly happy in his domestic life, taking little pleasure in society outside his home, though his wit, literary culture and gift of language made him a brilliant companion in conversation. Science was his main interest outside his profession and he was also widely read in history and theology. He was a strong Churchman and a convinced and devout Christian, his religious faith constituting the fundamental inspiration of his life.

(G. Ce.)

See *Speeches of the Marquis of Salisbury* (ed. H. W. Lucy, with short biography, 1885) and Lord Salisbury's *Essays* (2 vols., 1905); also F. S. Pulling, *Life and Speeches of the Marquis of Salisbury* (1885); S. H. Jeyes, *Life and Times of the Marquis of Salisbury* (4 vols., 1895–96); G. G. Cecil, *Life of Robert, Marquis of Salisbury* (1921).

SALISBURY, ROBERT CECIL, 1st Earl of (*c.* 1565–1612), English lord treasurer, the exact year of whose birth is unrecorded, was the youngest son of William Cecil, 1st Lord Burghley, and of his second wife Mildred Cooke, of Gidea Hall in Essex. He was educated in his father's house and at Cambridge University. In 1584 he was sent to France, and was returned the same year to parliament, and again in 1586, as member for Westminster. In 1588 he accompanied Lord Derby in his mission to the Netherlands to negotiate peace with Spain, and sat in the parliament of 1588, and in the assemblies of 1593, 1597 and 1601 for Hertfordshire. About 1589 he appears to have entered upon the duties of secretary of state, though he did not receive the official appointment till 1596. In 1591 he was knighted, and sworn of the privy council. In 1597 he was made chancellor of the duchy of Lancaster, and in 1598 despatched on a mission to Henry IV. of France to prevent the impending alliance between that country and Spain. The next year he succeeded his father as master of the court of wards.

On Lord Burghley's death on Aug. 4, both Essex and Bacon desired to succeed him in the supreme direction of affairs, but the queen preferred the son of her last great minister. At this period began Cecil's secret correspondence with James in Scot-

land. Hitherto Cecil's enemies had persuaded James that the secretary was unfavourable to his claims to the English throne. An understanding was now effected by which Cecil was able to assure James of his succession, ensure his own power and predominance in the new reign against Sir Walter Raleigh and other competitors, and secure the tranquillity of the last years of Elizabeth, the conditions demanded by him being that all attempts of James to obtain parliamentary recognition of his title should cease, that an absolute respect should be paid to the queen's feelings, and that the communications should remain secret.

Owing to Cecil's action, James took possession of the throne without opposition on the death of Elizabeth in 1603. Cecil was continued in his office, was created Baron Cecil of Essendine in Rutlandshire (1603), Viscount Cranborne (1604) and earl of Salisbury (1605). He was elected chancellor of the University of Cambridge in 1601, and obtained the Garter in 1606. Meanwhile Cecil's success had completed the discontent of Raleigh, who, exasperated at his dismissal from the captaincy of the guard, became involved—whether innocently or not is uncertain—in the treasonable conspiracy known as the "Bye Plot." Cecil took a leading part in his trial in July 1603, and, though probably convinced of his guilt, endeavoured to ensure him a fair trial and rebuked the attorney-general, Sir Edward Coke, for his harshness towards the prisoner. In 1608 the office of lord treasurer was added to Salisbury's other appointments, and the whole conduct of public affairs was placed solely in his hands. His real policy is not always easy to distinguish, for the king constantly interfered, and Cecil was often merely a follower, simulating approval of schemes opposed to his real judgment.

In foreign affairs Salisbury made it his aim to preserve the balance of power between France and Spain, and to secure the independence of the Netherlands from either state. He also hoped, like his father, to make England the head of the Protestant alliance abroad; and his last energies were expended in effecting the marriage in 1612 of the princess Elizabeth, James's daughter, with the Elector Palatine. He was in favour of peace, preoccupied with the state of the finances at home and the decreasing revenue, and, though sharing Raleigh's dislike of Spain, was instrumental in making the treaty with that power in 1604. In 1611 he disapproved of the proposed marriage between the prince of Wales and the Infanta. His bias against Spain and his fidelity to the national interests render, therefore, his acceptance of a pension from Spain a surprising incident in his career. At the conclusion of the peace in 1604 the sum Cecil received was £1,000, which was raised the following year to £1,500; while in 1609 he demanded an augmentation and to be paid for each piece of information separately.

As lord treasurer Salisbury showed considerable financial ability. In 1608 he imposed new duties on articles of luxury and those of foreign manufacture which competed with English goods, while lowering the dues on currants and tobacco. By this measure, and by a more careful collection, the ordinary income was raised to £460,000, while £700,000 was paid off the debt, leaving at the beginning of 1610 the sum of £300,000. But the minister's efforts were nullified by the extravagances of James, who continued to exceed his income. Salisbury erred, as the sequel was to show, in forcing the king's legal right to levy impositions against the remonstrances of the parliament. In the "great contract," the scheme now put forward by Salisbury for settling the finances, his lack of political wisdom was still more apparent. The Commons were to guarantee a fixed annual subsidy, on condition of the abandonment of impositions and of the redress of grievances by the king. An unworthy and undignified system of higgling and haggling was initiated between the crown and the parliament.

Salisbury had always been averse to prosecution for religion, and he made the offer in October 1607 that if the pope would excommunicate those that rebelled against the king and oblige them to defend him against invasion, the fines for recusancy would be remitted and they would be allowed to keep priests in their houses. This was a fair measure of toleration. But his attitude to the Nonconformists was identical with that afterwards maintained by Laud; he maintained that "unity in belief cannot be preserved unless it is to be found in worship."

Elizabeth and James found security in Salisbury's calm good sense, safe, orderly official mind and practical experience of business, of which there was no guarantee in the restlessness of Essex, the enterprise of Raleigh or the speculation of Bacon. On the other hand, he was neither guided nor inspired by any great principle or ideal, he contributed nothing towards the settlement of the great national problems, and he precipitated by his ill-advised action the struggle between crown and parliament.

Lord Salisbury died on May 24, 1612, at the parsonage house at Marlborough. During his long political career he had amassed a large fortune, besides inheriting a considerable portion of Lord Burghley's landed estate. In 1607 he exchanged, at the king's request, his estate of Theobalds in Hertfordshire for Hatfield. Here he built the magnificent house of which he himself conceived the plans and the design, but which he did not live to inhabit, its completion almost coinciding with his death. In person and figure he was in strange contrast with his rivals at court, being diminutive in stature, ill-formed and weak in health. Elizabeth styled him her pygmy; his enemies delighted in vilifying his "wry neck," "crooked back" and "splay foot." He married Elizabeth, daughter of William Brooke, 5th Baron Cobham, by whom, besides one daughter, he had William (1591–1668), his successor as 2nd earl.

No complete life of Robert Cecil has been attempted, but the materials for it are very extensive, including *Hist. MSS. Comm. Series, Marquis of Salisbury's MSS.* (superseding former reports in the series), from which MSS. selections were published in 1740 by S. Haynes, by Wm. Murdin in 1759, by John Bruce, in *The Correspondence of King James VI. with Sir Robert Cecil*, in 1861 (Camden Society), and by Ed. Lodge, in *Illustrations of English History*, in 1838. Some of his writings are printed in the *Harleian Miscellanies* and the *Somers Tracts*.

SALISBURY, THOMAS DE MONTACUTE, 4TH EARL OF (1388–1428), was son of John, the third earl, who was executed in 1400 as a supporter of Richard II. Thomas was granted part of his father's estates and summoned to parliament in 1409, though not fully restored till 1421. He was present throughout the campaign of Agincourt in 1415, and at the naval engagement before Harfleur in 1416, and in 1417–18. During the spring of 1419 he held an independent command, capturing Fécamp, Honfleur and other towns, was appointed lieutenant-general of Normandy, and created earl of Perche. In 1420 he was in chief command in Maine, and defeated the Maréchal de Rieux near Le Mans. When Henry V. went home next year Salisbury remained in France as the chief lieutenant of Thomas, duke of Clarence. The duke, through his own rashness, was defeated at Baugé on March 21, 1421. Salisbury came up with the archers too late to retrieve the day, but recovered the bodies of the dead, and by a skilful retreat averted further disaster. He soon gathered a fresh force, and in June was able to report to the king "this part of your land stood in good plight never so well as now." (*Foedera*, x. 131.) Salisbury's success in Maine marked him out as John of Bedford's chief lieutenant in the war after Henry's death. In 1423 he was appointed governor of Champagne, and by his dash and vigour secured one of the chief victories of the war at Crevant on July 30. Subsequent operations completed the conquest of Champagne, and left Salisbury free to join Bedford at Verneuil. There his "judgment and valour" won the day. During the next three years Salisbury was employed on the Norman border and in Maine. After a year's visit to England he returned to the chief command in the field in July, 1428. Against the judgment of Bedford he determined to make Orleans his principal objective, and began the siege on Oct. 12; whilst surveying the city from a window in Tourelles he was wounded by a cannon-shot, and died on Nov. 3, 1428. Salisbury was the most skilful soldier on the English side after the death of Henry V. He was a patron of John Lydgate, who presented to him his book *The Pilgrim* (now Harley ms. 4826, with a miniature of Salisbury, engraved in Strutt's *Regal Antiquities*). By his first wife Eleanor Holand, daughter of Thomas, earl of Kent, Salisbury had an only daughter Alice, in her own right countess of Salisbury, who married Richard

Neville, and was mother of Warwick the King-maker. His second wife Alice was grand-daughter of Geoffrey Chaucer, and after his death married William de la Pole, duke of Suffolk.

The chief accounts of Salisbury's campaigns are to be found in the *Gesta Henrici Quinti*, edited by B. Williams for the Eng. Hist. Soc. (London, 1850) in the *Vita Henrici Quinti* (erroneously attributed to Thomas of Elmham), edited by T. Hearne (Oxford, 1727); the *Chronique* of E. de Monstrelet, edited by L. D. d'Arcq (Paris, 1857–1862); the *Chroniques* of Jehan de Waurin, edited by W. and E. L. C. P. Hardy (London, 1864–1891); and the *Chronique de la Pucelle* of G. Cousinot, edited by Vallet de Viriville (Paris, 1859). For modern accounts *see* Sir J. H. Ramsay, *Lancaster and York* (Oxford, 1892); and C. Oman, *Political History of England*, 1377–1485 (London, 1906). (C. L. K.)

SALISBURY, WILLIAM LONGSWORD (or **LONGESPÉE**), 3RD EARL OF (d. 1226), was an illegitimate son of Henry II., who granted him the estates of Appleby, Lincolnshire (1188). In 1198 he received from Richard I. the hand of Isabella, or Ela (d. 1261), daughter and heiress of William, earl of Salisbury, and was granted this title with the lands of the earldom. He was received with favour by King John, who appointed him sheriff of Wiltshire in 1200, and subsequently gave him many important military and diplomatic posts, thus retaining his allegiance during the period of excommunication. In 1213 Salisbury was sent in command of a fleet to attack Philip of France, and, by his successful action at Damme, he foiled the projected invasion of England; but in the following year he was captured by the French and was only exchanged after prolonged negotiations. On his return to England he supported John in opposition to the baronial party, but feeling that the king's cause was hopeless, he surrendered to Louis on his arrival in England.

After the death of John, however, Salisbury deserted the French side in 1217, supported Herbert de Burgh and the young king, Henry III., and was appointed sheriff of Lincoln. It is asserted by Matthew Parker that he took part in the siege of Damietta (1219), but the evidence in support of this is scanty. It is known, however, that he supported the excommunication of William of Aumâle in 1221; that he assisted in the war on the Welsh marches (1224); and that in 1225 he accompanied the expedition to Gascony. On the return voyage he was wrecked on the isle of Ré, and the hardships which he suffered probably hastened his death, which occurred on March 7, 1226, at Salisbury.

SALISBURY, a city and municipal borough, and the county town of Wiltshire, England, 23 m. W. of Winchester, with stations on the S.R. and G.W.R. Pop. (1931) 26,456. The city lies among flat meadows mainly on the north bank of the river Avon, which is here joined by tributaries. The cathedral stands out above the city whose streets are in part laid out in squares called the "Chequers." To the north rises the bare upland of Salisbury Plain. The neighbourhood of Salisbury was one of the most important areas in prehistoric England. It seems to have been a meeting place of early cultures, *e.g.*, of the people who made beakers and the people who built megaliths; 6 m. N. is Stonehenge (*q.v.*). The Blackmore museum in the city has exhibits of almost every age from the neighbourhood. Most intimately associated, however, with the origins of Salisbury is the great prehistoric fortress of *Old Sarum*. It is about 2 m. N. of the present city. The great mound has a fosse and earthwork, while the summit is hollowed out like a crater and its rim surmounted by a rampart. It was certainly an important site in Romano-British times and especially in the period immediately preceding the arrival of the Romans. It was known to the Romans as *Sorbiodunum*. In 552 it was taken by Cenric, who named it *Searesbyrig* ("dry town") and it became the home of the kings of Wessex. Alfred strengthened the castle, and it was selected by Edgar as a place of national assembly to devise means of checking the Danes. About 1075 Old Sarum became the seat of a bishopric. Osmund, the second bishop, compiled a missal which forms the groundwork of the celebrated "Sarum Use." The "Sarum Breviary" was printed at Venice in 1483, and upon this, the most widely prevalent of English liturgies, the prayer-books of Edward VI. were mainly based. Osmund also built a cathedral, in the form of a plain cross. The garrison and priests, confined within a small space, were at perpetual feud; and after a licence had been granted by Pope Honorius III., it was decided to move down into the fertile Avon valley. In 1102 Bishop Roger Poore obtained a comprehensive charter from Henry I. With the building of New Sarum in the 13th century and the transference to it of the see, Old Sarum lapsed to the crown. By the 16th century it was in ruins, and in 1608 it was ordered that the town walls should be demolished.

The new city, under the name of New Sarum (New Saresbury, Salisbury) immediately began to spring up round the cathedral close. A charter of Henry III. in 1227 recites the removal from Old Sarum, the king's ratification and his laying the foundation-stone of the church. In 1611 the city obtained a charter of incorporation from James I. under the title of "mayor and commonalty" of the city of New Sarum.

The cathedral church of St. Mary is a beautiful example of Early English architecture, begun and completed, save its spire and a few details, within one brief period (1220–1266). There is a tradition that Elias de Derham, canon of the cathedral (d. 1245), was the principal architect. The building is 473 ft. in extreme length, the length of the nave being 229 ft. 6 in., the choir 151 ft., and the lady chapel 68 ft. 6 in. The width of the nave is 82 ft. and the height 84 ft. The spire, the highest in England, measures 404 ft. (For plan, *see* GOTHIC ARCHITECTURE: *Gothic Architecture in England.*) The cathedral consists of a nave of ten bays, with aisles and a lofty north porch, main transepts with eastern aisles, choir with aisles, lesser transepts, presbytery and lady chapel. The two upper storeys of the tower and the spire above are early Decorated. The west front, the last portion of the original building completed, bears in its rich ornamentation signs of the transition to the Decorated style. The perfect uniformity of the building is no less remarkable within than without. The frequent use of Purbeck marble for shafts contrasts with the delicate grey freestone which is the principal building material. An unhappy restoration of the cathedral (1782–1791) destroyed many magnificent stained-glass windows which had escaped the Reformation, and also removed two Perpendicular chapels and the detached belfry which stood to the north-west of the cathedral. The lady chapel is the earliest part of the original building, as the west end is the latest. The cloisters, south of the church, were built directly after its completion. The fine octagonal chapter-house is of the time of Edward I. with a series of contemporary sculptures. The library contains many valuable mss. and ancient printed books. The diocese covers nearly the whole of Dorsetshire, the greater part of Wiltshire and very small portions of Berkshire, Hampshire, Somersetshire and Devonshire.

There are three ancient parish churches: St. Martin's, with square tower and spire, and possessing a Norman font and Early English portions in the choir; St. Thomas's (of Canterbury), founded in 1240 as a chapel to the cathedral, and rebuilt in the 15th century; and St. Edmund's, founded as the collegiate church of secular canons in 1268, but subsequently rebuilt in the Perpendicular period. The residence of the college of secular priests is occupied by the ecclesiastical college of St. Edmund's, founded in 1873. St. John's chapel, founded by Bishop Robert Bingham in the 13th century, is occupied by a dwelling-house. There is a beautiful chapel attached to the St. Nicholas hospital. The poultry cross, or high cross, an open hexagon with six arches and a central pillar, was erected by Lord Montacute before 1335. Among remaining specimens of ancient domestic architecture may be mentioned the banqueting-hall of John Halle, wool merchant, built about 1470; and Audley House, belonging also to the 15th century, and repaired in 1881 as a diocesan church house.

Salisbury returned two members to parliament until 1885 when the number was reduced to one. Its representation has since been merged in that of one of the county constituencies.

SALISBURY, capital of southern Rhodesia. White pop. (1926) 5,606. Altitude 4,865 feet. It was founded in 1890, is well laid out, has good shops, and an excellent water supply. There are gold fields in the neighbourhood. The distance by rail to Cape Town is 1,661 m., and to Beira 374 miles.

SALISBURY, a city of south-eastern Maryland, U.S.A., at the head of navigation on the Wicomico river; the county seat

of Wicomico county. It is on Federal highways 13 and 213, and is served by the Baltimore and Eastern and the Pennsylvania railways. Pop. 7,553 in 1920 (21% negroes); and 10,997 in 1930 by the Federal census, after annexations of territory. It is the wholesale distributing centre for the entire "eastern shore" south of Delaware. Salisbury was founded in 1732, organized as a town in 1812, incorporated in 1854 and chartered as a city in 1880.

SALISBURY, a city of North Carolina, U.S.A., the county seat of Rowan county; 120 m. W.S.W. of Raleigh, near the Yadkin river. It is on Federal highways 70 and 170, and is served by the Southern and the Yadkin railways. Pop. 13,884 in 1920 (26% negroes); and 16,951 in 1930 by the Federal census. It is a rapidly developing industrial and commercial centre in the rich and beautiful Piedmont section of the State, and is the seat of Catawba college (Reformed Church; opened in 1851 at Newton and moved to Salisbury in 1923) and Livingstone college for negroes (1882). The city has cotton mills operating 107,036 spindles and 1,686 looms (1928), car shops and various other manufacturing plants, with an output in 1927 valued at $8,066,677. There are granite quarries and iron deposits in the vicinity. The city operates under a council-manager form of government. Salisbury was incorporated as a town in 1755, and as a city in 1770. During the Civil War it was the seat of a Confederate military prison. On April 12, 1865, a cavalry engagement near by resulted in the capture of 1,364 Confederate soldiers. There is a national cemetery here, containing 12,186 graves.

SALISH. This tribe, popularly known as Flathead, has given name to the Salishan family of Indians, all speaking cognate dialects, in British Columbia and north-western United States. None of the Salishan tribes were agricultural or matrilineal; those on the coast practised potlatch festivals, accumulated wealth, held slaves and lived in plank houses like the other coastal tribes of the area. Inland, arts and customs were simpler. The principal groups or tribes are: 1, Interior Salish, comprising the Shuswap, Lillooet, Thompson or Ntlakyapamuk, Okanagan in British Columbia, and the Flathead or Salish proper, Kalispel, Coeur d'Alène, Spokane, Methow in the United States; 2, Coast Salish, in order from north to south: Bella Coola of Dean's inlet, Comox, Cowichan of Vancouver island, Nanaimo, Squawmish, Lummi, Snohomish, Snoqualmie (Seattle), Puyallup, Nisquallie, Cowlitz, Skokomish, Songish, Clallam of Strait of Juan de Fuca, Quinault, Chehalis, and, south of Columbia river, Tillamook called also Nehalim. In 1909 the total population was 18,600, somewhat more than half being respectively in the interior and in Canada. The original number was perhaps three times as great.

SALITE (from Sala, Sweden, its original locality), a variety of monoclinic pyroxene (*q.v.*) characterized by a prominent parting parallel to the basal pinacoid (001), and owing this property to repeated twinning on this plane. Many salites correspond in composition to magnesium-diopside or enstatite-augite (*see* DIOPSIDE) and are particularly characteristic of the quartz-dolerite group of igneous intrusions. (C. E. T.)

SALIVAN, a group of tribes of South American Indians, usually regarded as constituting an independent linguistic stock. The Salivas, from whom the stock gets its name, lived originally along the western side of the Orinoco and for some distance west along its tributaries, from above the mouth of the Vichada to the Sinaruco. They were a peaceful, docile folk, who, being attacked by the Caribs in the latter part of the 17th century, withdrew westward up the Meta and Vichada toward their heads. In the main a hunting and fishing people, they had no maize and but little manioc. Like some of the neighbouring groups, they were accustomed to exhume the bones of the dead after a year or so, burn and reduce them to powder and then drink this, mixed with their fermented beer.

See J. Cassani, *Historia de la provincia de la compañia de Jesús del Nuevo Reino de Granada* (Madrid, 1741).

SALLI: *see* SALE.

SALLOW, the name often applied to various species of willow (*Salix*). (*See* WILLOW, OSIER.)

SALLUST [GAIUS SALLUSTIUS CRISPUS] (86–34 B.C.), Roman historian, belonging to a well-known plebeian family, was born at Amiternum in the country of the Sabines. After an ill-spent youth he entered public life, and was elected tribune of the people in 52. From the first he was a decided partisan of Caesar, to whom he owed such political advancement as he attained. In 50 he was removed from the senate by the censor Appius Claudius Pulcher, restored in 49 and became quaestor. In 46 he was praetor, and accompanied Caesar in his African campaign, which ended in the decisive defeat of the remains of the Pompeian party at Thapsus. He was then made governor of Numidia, where he was oppressive and extortionate. On his return to Rome he purchased and laid out in great splendour the famous gardens on the Quirinal known as the *Horti Sallustiani.* He now retired from public life.

His account of the Catiline conspiracy (*De coniuratione Catilinae* or *Bellum Catilinarium*) and of the Jugurthine War (*Bellum Jugurthinum*) have come down to us complete, together with fragments of his larger and most important work (*Historiae*), a history of Rome from 78–67, intended as a continuation of L. Cornelius Sisenna's work. In the *Catiline Conspiracy* Sallust adopts the usually accepted view of Catiline, and describes him as the deliberate foe of law, order and morality, without attempting to give any adequate explanation of his views and intentions. Catiline, it must be remembered, had supported the party of Sulla, to which Sallust was opposed. He is careful to clear Caesar of complicity and on the whole he is not unfair towards Cicero.

His *Jugurthine War,* again, though a valuable and interesting monograph, is not a satisfactory performance. Here, as in the *Catiline,* he dwells upon the feebleness of the senate and aristocracy, too often in a tiresome, moralizing vein, but as a military history the work is unsatisfactory in the matter of geographical and chronological details, though vivid in its depiction of character and scenery. The extant fragments of the *Histories* (some discovered in 1886) are enough to show the political partisan, who took a keen pleasure in describing the reaction against the dictator's policy and legislation after his death. Two letters (*Duae epistolae de republica ordinanda*), and an attack upon Cicero (*Invectiva* or *Declamatio in Ciceronem*), frequently attributed to Sallust, are probably the work of a rhetorician of the first century A.D., also the author of a counter-invective by Cicero.

Editions and translations in various languages are numerous. Editio princeps (1470); (text and notes) F. Jacobs, H. Wirz (1894); G. Long, revised by J. G. Frazer, with chief fragments of *Histories* (1884); English translation by A. W. Pollard (1882); (text and tr.) J. C. Rolfe (Loeb library, 1921). There are many separate editions of the *Catilina* and *Jugurtha,* chiefly for school use. The fragments have been edited by F. Kritz (1853) and B. Maurenbrecher (1891–93); and there is an Italian translation (with notes) of the supposititious letters by G. Vittori (1897).

SALMASIUS, CLAUDIUS, the Latinized name of CLAUDE SAUMAISE (1588–1653), French classical scholar, born at Semur-en-Auxois in Burgundy on April 15, 1588. He was educated at Paris and Heidelberg, where he went over to Protestantism. In 1609 he brought out an edition of Florus. He then returned to Burgundy, and qualified for the succession to his father's post, which he eventually lost on account of his religion. In 1620 he published Casaubon's notes on the *Augustan History,* with copious additions of his own. In 1623 he married Anne Mercier, a Protestant lady of a distinguished family. In 1629 Salmasius produced his *magnum opus* as a critic, his commentary on Solinus's *Polyhistor,* or rather on Pliny, to whom Solinus is indebted for the most important part of his work. Salmasius learned Arabic to qualify himself for the botanical part of his task. In 1631 he went as professor to Leiden, where he composed for Frederick of Nassau his *De Re Militari Romanorum,* not published till 1657. He was persistently attacked by a clique led by Daniel Heinsius. His *De primatu Papae* (1645) excited a warm controversy in France.

In November 1649 appeared his *Defensio regia pro Carolo I.* It does not appear who influenced him to write it but Charles II. defrayed the expense of printing, and presented the author with £100. The first edition was anonymous, but the author was universally known. This celebrated work, in our day principally famous for the reply it provoked from Milton (1651) even

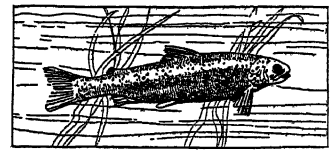
in its own time added little to the reputation of the author. His reply to Milton, which he left unfinished at his death, and which was published by his son in 1660, is insipid as well as abusive. Salmasius died on Sept. 3, 1653.

As a commentator and critic, Salmasius is entitled to very high rank. His notes on the *Augustan History* and Solinus display not only massive erudition but massive good sense as well; his perception of the meaning of his author is commonly very acute, and his emendations are frequently felicitous.

The life of Salmasius was written by Philibert de la Mare, but never printed; it was used by Papillon, whose account of Salmasius in his *Bibliothèque des auteurs de Bourgogne* (Dijon, 1745) is by far the best extant, and contains an exhaustive list of his works, both printed and in ms. There is an *éloge* by A. Clément prefixed to his edition of Salmasius's *Letters* (Leiden, 1656), and another by C. B. Morisot, in his own *Letters* (Dijon, 1656). *See* also E. Haag, *La France protestante,* (ix. 149–173); and, for the *Defensio regia,* G. Masson's *Life of Milton.*

SALMERÓN, NICOLÁS (1838–1908), Spanish statesman, born at Alhama la Seca, Almeria, April 10, 1838. Professor of literature and philosophy at Madrid, he co-operated with Castelar on *La Democracia* and in 1865 was a member of the directing committee of the Republican party. Imprisoned as a suspect in 1867, he was elected to the Cortes in 1871 and on the resignation of Amadeo (Feb. 11, 1873) was naturally marked out to be the leader of the party which sought to establish a republic in Spain. He succeeded Pí y Margall in the presidency of the republic on July 18, 1873, but resigned (Sept. 7), when he found that the generals insisted on executing rebels taken in arms. His successor, Castelar, was compelled to restore order by drastic means. Salmerón took part in the attack made on him in the Cortes on Jan. 3, 1874, and went into exile until recalled by Sagasta in 1881. In 1886 he was elected to the Cortes as Progressive deputy for Madrid. He died at Pau, Sept. 21, 1908.

SALMON AND SALMONIDAE. The salmonoids are soft-rayed fishes with abdominal pelvic fins, generally with an adipose fin, a pneumatic duct to the air-bladder with oviducts absent or incomplete, and with ribs attached to small separate bones wedged into pits in the centra of the vertebrae. The group includes three northern families, the Salmonidae, the Osmeridae (*see* SMELT) and the Salangidae, little white fishes of the seas of China and Japan. Three families, Argentinidae, Microstomidae and Ophisthoproctidae, are strictly marine, mostly oceanic. Three others, Retropinnatidae, Haplochitonidae and Galaxiidae, are southern, found on the coasts and in the rivers of Patagonia, Australia and New Zealand.



BY COURTESY OF THE N.Y. ZOOLOGICAL SOCIETY

LAND-LOCKED SALMON (SALMO SALAR OUANANICHE)

The Salmonidae are the most generalized family, distinguished by having the last two or three vertebrae turned upwards. They inhabit arctic and northern seas, and the fresh waters of Europe, northern Asia and North America; the marine species enter rivers to breed. There are eight genera, which may be distinguished as follows:—

I. Parietals not meeting. Scales small, 19 or more from origin of dorsal fin to lateral line. Dorsal fin short, of 10 to 16 rays.

A double or zig-zag series of teeth along vomer in middle of roof of mouth ..... *Salmo*

A group of teeth on head of vomer ..... *Salvelinus*

A curved series of teeth across head of vomer, connecting the palatine series; mouth large ..... *Hucho*

A straight series of teeth across head of vomer, connecting the palatine series: mouth smaller ..... *Brachymystax*

II. Parietals meeting. Scales larger, 13 or less from origin of dorsal to lateral line.

A. Dorsal fin short, of 10 to 16 rays.

Teeth small, in bands ..... *Stenodus*

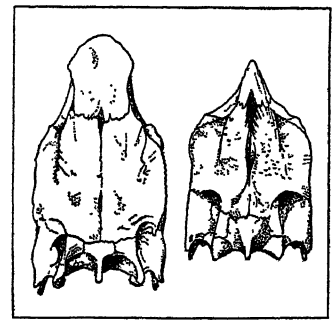
Teeth vestigial or absent ..... *Coregonus*

B. Dorsal fin longer, of 18 to 24 rays.

Mouth rather large; teeth strong ..... *Phylogephyra*

Mouth smaller; teeth moderate ..... *Thymallus*

Some of these genera are described in other articles, namely *Salvelinus* (CHAR), *Coregonus* (WHITEFISH) and *Thymallus* (GRAYLING). *Hucho* includes the huchen of the Danube, a large predacious fish with somewhat pike-like head, and two other species, respectively from Siberia, and from northern Saghalien and Yesso. *Brachymystax* has a single species from Siberia, and *Stenodus* one only, a large migratory fish, entering the Mackenzie river and arctic rivers of Siberia. The genus *Salmo* is by far the most important, and includes the black-spotted fish generally known as salmon and trout.



FROM REGAN IN THE "ANNALS AND MAGAZINES OF NATURAL HISTORY" (TAYLOR & FRANCIS)

SKULLS OF (A) SALMON (SALMO SALAR), (B) QUINNAT (SALMO QUINNAT); JAWS, FACIAL BONES, ETC., HAVE BEEN REMOVED

The Salmon (*S. salar*) is fusiform, with conical head; it is silvery, with scattered blackish spots; the mouth is moderately large with conical teeth in the jaws, and on the palate and tongue. It inhabits the north Atlantic, ranging from Hudson bay, Iceland and northern Europe to Cape Cod and the Bay of Biscay. It feeds on herring, mackerel, sand-eels, etc., and enters rivers throughout the year, breeding on gravelly shallows from September to February. The fresh-run fish are silvery, with red flesh full of fat; they do not feed in the rivers and the sexual glands are developed at the expense of the other tissues, so that the flesh becomes pale and watery; in the breeding fish the silvery coloration is replaced by a dull grey or brown, and in the males especially large black spots edged with white and irregular red spots appear on the body; the skin is thick and spongy, with the scales imbedded in it; in the males the front teeth are enlarged, the jaws are prolonged, and the lower is hooked upwards. These peculiarities of the breeding fish are probably due to their abnormal physiological condition while fasting and transferring substance from the muscles to the genital glands. The female fish scoops out a trough in the gravel, and sinking into it deposits some eggs which are fertilized by the male; she then covers the eggs with gravel by strokes of the tail, burying them at a depth of about a foot. The eggs are about $\frac{1}{4}$ in. in diameter; they hatch out at the end of the winter. The fry, or *alevins,* have a large yolk-sac, which provides their nourishment for a month or two, during which they live in the gravel; then the young fish, a little more than an inch long, emerge and swim in shoals, feeding on crustaceans, insects, etc. Generally in about two years, but less in southern waters and more in the north, they attain a length of about six inches, and then migrate to the sea.

The young fish living in fresh-water, like other young Salmonidae, have a series of dark bars along the side and are known as parr (*q.v.*); when about to migrate they become silvery and are termed smolts. The smolts generally enter the sea about May; in the sea they grow rapidly, and after their first winter, when they are termed grilse, may weigh several pounds, and towards the end of their second summer 10 lb. or even more. Grilse may return to the river from which they came in order to spawn, but many salmon do not spawn as grilse, and may spend several years in the sea before spawning. After spawning the salmon is termed a kelt; these may return to the sea and recover, but in many rivers a large number die after spawning. Probably few salmon live more than ten years or spawn more than three or four times; large fish—a weight of more than 80 lb. may be obtained—are not necessarily very old; they are fish that have spent several years in the sea without spawning. The method of scale-reading has proved invaluable in elucidating the life-history of the salmon; the concentric lines of growth are close together on the central part of the scale formed during the life of the parr in fresh-water; the more rapid growth in the sea is marked by more rings farther apart, in which each winter is shown by a few rings, incomplete and closer together; if the fish enters fresh-water to breed the scale wears away and gets an irregular edge,

and if it recovers and gets back to the sea, the line of this former edge is seen inside the rings formed later, and is termed a spawning mark.

Fresh-water Colonies.—Salmon may form permanent fresh-water colonies. The famous ouananiche of Quebec is a non-migratory salmon, a small but very active fish, rarely reaching 8 lb. The Sebago salmon inhabits the lakes of Maine. In Europe there are fresh-water salmon in Lakes Ladoga and Wenern. Lake Wenern is now cut off from the sea by inaccessible falls, but there can be no doubt that formerly salmon entered it from the sea to spawn in its tributaries, and that some of the smolts descending to the lake found it a sufficiently good substitute for the sea to stay there, and so founded a lacustrine race. In Wenern the salmon feed on fish and grow to a good size, but the fresh-water colony recently described by K. Dall from the Byglandsfiord in Norway (*Salmon and Trout Mag.* 1928) is of quite another kind, for the fish feed on minute crustacea and do not grow to more than a foot in length; they are overgrown parr, probably originally tempted to stay by the abundance of parr-food. This discovery is interesting, for a similar explanation has been given of the presence in the rivers of Dalmatia of *Salmo obtusirostris*, a fish reaching a foot in length, very like a salmon parr, but with a smaller mouth and more numerous gill-rakers, and feeding mainly on ephemerid larvae. This may be derived from a colony of salmon-parr formed in Glacial times, when salmon would have entered the Mediterranean.

The third Atlantic species of *Salmo* is the trout, *S. trutta*. (*See* TROUT.) In the north Pacific there are about eight species of this genus, which form a natural group, distinguished from the salmon and trout of the Atlantic by the structure of the skull, the ethmoid bone in the Atlantic species being large and blunt, in the Pacific ones smaller and pointed. The steelhead (*S. gairdneri*) of the Pacific coast of North America forms numerous permanent fresh-water colonies, and there is a related species in the rivers of Formosa. The other five species are found on both coasts of the north Pacific; in them the breeding males have the jaws greatly prolonged and hooked, and it is believed that all the fish die after spawning. The largest and most valuable species is the quinnat (*S. quinnat*) which ascends rivers for long distances, and has parr that live in fresh-water. The blueback or redfish (*S. nerka*) also ascends streams, but the other species spawn at no great distance from the sea, to which the young fish soon make their way. The quinnat appears to have been successfully introduced into New Zealand, as has the trout (*S. trutta*), but attempts to introduce *S. salar* have been successful only in rivers in the extreme south, where the fish grow to be a fair size and breed, but feed in the lakes and do not go to sea.

The Salmonidae are to be regarded primarily as a group of northern marine fishes that breed in fresh-water, often forming colonies in lakes or rivers, and now including a number of species and even some genera that never go to the sea. An interesting feature of their distribution is the presence of species of certain genera, *Salmo, Salvelinus, Coregonus,* in lakes and rivers far to the south of their present range in the sea, which they must have reached from the sea in glacial times.

BIBLIOGRAPHY.—See *Salmon and Trout Magazine* (London) and papers by C. H. Gilbert and others in *Bull. U.S. Fisheries Bureau;* W. L. Calderwood, *The Life of the Salmon* (1907); J. A. Hutton, *Salmon Scales* (1909) and *Salmon Scale Examination* (1910); D. S. Jordan and B. W. Evermann, *Fishes of North America* (1897–1901) and *American Food and Game Fishes* (1904); D. S. Jordan and K. Oshima, *"Salmo formosanus," Proc. Acad. Philadelphia* (1919); P. D. Malloch, *The Life History of Salmon, Sea trout, etc.* (1910); C. T. Regan, *British Fresh-water Fishes* (1911); "Systematic Arrangement of Salmonidae," *Ann. Mag. Nat. Hist.* (1914). (C. T. R.)

SALMON-BERRY (*Rubus spectabilis*), a vigorous North American shrub of the raspberry genus, native from California to Alaska and eastward to Idaho, bearing rose-coloured flowers and large salmon-coloured edible berries. The name is applied also to the thimble-berry (*R. parviflorus*), of similar range but extending farther eastward, with white flowers and red scarcely edible fruit.

SALMONEUS, in Greek mythology, son of Aeolus (king of Magnesia, in Thessaly, looked upon as the mythic ancestor of the Aeolian race), grandson of Hellen and brother of Sisyphus. He removed to Elis, where he built the town of Salmone, and became ruler of the country. His subjects were ordered to worship him under the name of Zeus; he built a bridge of bronze, over which he drove at full speed in his chariot to imitate thunder, the effect being heightened by dried skins and cauldrons trailing behind, while torches were thrown into the air to represent lightning. At last Zeus smote him with his thunderbolt, and destroyed the town (Apollodorus i. 89; Hyginus, *Fab.*, 60, 61; Strabo viii. p. 356; Manilius, *Astronom.*, 5, 91; Virgil, *Aen.*, vi. 585). There is small doubt that this is a confused recollection of some old rite of weather-magic. At Crannon in Thessaly there was a bronze chariot, which in time of drought was shaken and prayers offered for rain (Antigonus of Carystus, *Historiae mirabiles,* 15).

Frazer, *Golden Bough, see* index s.v.; another interpretation in S. Reinach, *Cultes, Mythes et Religions,* II. 160.

SALOME, the name of one of the women present at the crucifixion of Jesus (Mk. xv. 40) and at the sepulchre (xvi. 1). The name is derived from Heb. *shālōm,* "peace." Comparison with Matt. xxvii. 56 suggests that she was the wife of Zebedee. The name was borne by some of the Herod family also, notably by the daughter of Herodias by her first husband, the disinherited Herod Philip. She is probably the "damsel" (whose name is not given) mentioned in connection with the death of John the Baptist (Matt. xiv. 3–6; Mk. vi. 17–22). She afterwards married her uncle Herod Philip the Tetrarch. The reading in Mk. vi. 22 adopted by Hort, however, assumes that the girl dancer was Herod Antipas' own daughter, also called Herodias.

See Josephus, *Ant.* XVIII. v., 4; *Jewish War,* I., xxx., 7; Justin, *Dial.* 49; Schürer, *The Jewish People in the Time of Jesus Christ.*

SALON (-de-Provence), a town of south-eastern France, in the department of Boûches-du-Rhône, 40 m. N.N.W. of Marseilles by rail. Pop. (1926) 8,677. Salon is situated on the eastern border of the plain of Crau and on the irrigation canal of Craponne. The church of St. Laurent is 14th century, and the church of St. Michel (12th century), has a fine Romanesque portal. The central part of the town preserves a gateway of the 15th century and the remains of fortifications. There are remains of Roman walls near Salon, and in the *hôtel-de-ville* (17th century) there is a milestone of the 4th century. The town carries on an active trade in olive oil and soap. Olives are grown in the district, and there is a trade in them.

SALONIKA (sah-lŏn-ē'ka, popularly săl-ŏn'ĭ-ka) or **SALONIKI,** the capital of Greek Macedonia, and one of the principal seaports of south-eastern Europe. Pop. (1926) about 250,000, including some 50,000 Sephardic Jews, whose ancestors fled thither in the 16th century to escape religious persecution in Spain and Portugal: their language is a corrupt form of Spanish, called Ladino (*i.e.,* Latin). Salonika lies on the west side of the Chalcidic peninsula, at the head of the Gulf of Salonika (*Sinus Thermaicus*), on a fine bay whose southern edge is formed by the Kalamara heights, while its northern and western side is the broad alluvial plain produced by the discharge of the Vardar and the Vistritza, the principal rivers of western Macedonia.

Antiquities.—The Via Egnatia of the Romans (Grand Rue du Vardar) traverses the city from east to west, between the Vardar Gate and the Kalamara Gate. Recent excavations have revealed the Hellenistic *agora* near the present prefecture. Two Roman triumphal arches used to span the Via Egnatia. The arch near the Vardar Gate—a massive stone structure probably erected towards the end of the 1st century A.D., was destroyed in 1867 to furnish material for repairing the city walls; an imperfect inscription from it is preserved in the British Museum. The other arch, assigned to the reign of Galerius (A.D. 305–311), is built of brick and partly faced with sculptured marble.

The ecclesiastical architecture of Salonika was once remarkable for its specimens of early Christian (Byzantine) origin and style, with well-preserved mural decorations. St. Sophia (Aya Sofia), formerly the cathedral, probably erected in the 6th century by Justinian's architect Anthemius, was converted into a mosque in 1589. The nave, forming a Greek cross, is surmounted by a

hemispherical dome covered with a rich mosaic representing the Ascension. St. Demetrius, which was probably older than the time of Justinian, consisted of a long nave and two side aisles, each terminating eastward in an atrium the full height of the nave, in a style not known to occur in any other church. This church was destroyed by the great fire of 1917. It is partly repaired but mainly ruinous. St. George's, conjecturally assigned to the reign of Constantine (d. 337), is circular in plan, measuring internally 80 ft. in diameter. The external wall is 18 ft. thick, and at the angles of an inscribed octagon are chapels formed in the thickness of the wall, and roofed with wagon-headed vaults visible on the exterior; the eastern chapel, however, is enlarged and developed into a bema and apse projecting beyond the circle, and the western and southern chapels constitute the two entrances of the building. The dome is covered throughout its entire surface of 800 sq. yd. with what is the largest work in ancient mosaic still extant, representing a series of fourteen saints standing in the act of adoration in front of temples and colonnades. The Eski Juma, or Old Mosque, is another interesting basilica, evidently later than Constantine, with side aisles and an apse without side chapels.

Salonika is the see of an Orthodox Greek archbishop. Each religious community has its own schools and places of worship, among the most important being the Jewish high-school, the Jesuit college, a high-school founded in 1860 and supported by the Jewish Mission of the Established Church of Scotland, a German school, dating from 1887, and a college for boys and a secondary school for girls, both managed by the French *Mission Laïque* and subsidized since 1905 by the French government.

Railways, Harbour and Commerce.—Salonika is the principal Aegean seaport of the Balkan Peninsula, the centre of the import trade of all Macedonia, and the natural port of shipment for the products of an even larger area. It is the terminus of four railways. One line goes north to Nish in Serbia, where it meets the main line (Paris–Vienna–Constantinople) of the Oriental railways; another, after following the same route as far as Usküb in Macedonia, branches off to Mitrovitza in Albania. A third line extends westward from Salonika to Monastir. A fourth, the Constantinople junction railway to Constantinople, was partly dismantled and put out of use in 1921, but re-organized later. It now runs via Séres and Kavalla and joins the main line at Kuleli Burgas.

The new harbour, which was opened to navigation in Dec. 1901, allows the direct transhipment of all merchandise whatever may be the direction of the wind, which was previously apt to render shipping operations difficult. The harbour works consist of a breakwater 1,835 ft. long, with 28 ft. of water on its landward side for a width of 492 ft. Opposite the breakwater is a quay 1,475 ft. long, which was widened in 1903–07 to a breadth of 306 ft.; at each end of the quay a pier 656 ft. long projects into the sea. Between the extremities of these two piers and those of the breakwater are the two entrances to the harbour. Salonika exports grain, flour, bran, silk cocoons, chrome, manganese, iron, hides and skins, cattle and sheep, wool, eggs, opium, tobacco and fennel. Other industries are cotton-spinning, brewing, tanning, iron-founding, and the manufacture of bricks, tiles, soap, flour, ironmongery and ice. The spirit called mastic or raki is largely produced.

Province of Macedonia, of which Salonika is the capital, is rich in minerals, including chrome, manganese, zinc, antimony, iron, argentiferous lead, arsenic and lignite, but some of these are unworked. The chief agricultural products are grain, rice, beans, cotton, opium and poppy seed, sesame, fennel, red pepper; there is also some trade in timber, live stock, skins, furs, wool and silk cocoons. Apart from the industries carried on in the capital, there are manufactures of wine, liqueurs, sesame oil, cloth, macaroni and soap. The principal towns, Séres, Vodena and Kavalla, are described in separate articles; Tikvesh is the centre of an agricultural region, Karaferia a manufacturing town, and Drama one of the centres of tobacco cultivation. The total population of Macedonia is, from a census of 1926, 1,511,000. This total includes the large number of refugees who were settled here after 1922. The Greeks now form 88·8% of the population; there are no Muslims except those of Albanian origin. Bulgarians number about 77,000, being 5·1% of the total.

History.—Thessalonica was built on the site of the older Greek city of Therma, so called in allusion to the hot-springs of the neighbourhood. It was founded in 315 B.C. by Cassander, who gave it the name of his wife, a sister of Alexander the Great. It was a military and commercial station on a main line of communication between Rome and the East, and had reached its zenith before the seat of empire was transferred to Constantinople. It became famous in connection with the early history of Christianity through the two epistles addressed by St. Paul to the community which he founded here; and in the later defence of the ancient civilization against the barbarian inroads it played a considerable part. In A.D. 390, 7,000 citizens who had been guilty of insurrection were massacred in the hippodrome by command of Theodosius. Constantine repaired the port, and probably enriched the town with some of its buildings. During the iconoclastic reigns of terror it stood on the defensive, and succeeded in saving the artistic treasures of its churches: in the 9th century Joseph, one of its bishops, died in chains for his defence of image-worship. In the 7th century the Macedonian Slavs strove, but failed, to capture the city. It was the attempt made to transfer the whole Bulgarian trade to Thessalonica that in the close of the 9th century caused the invasion of the empire by Simeon of Bulgaria. In 904 the Saracens from the Cyrenaica took the place by storm, and the inhabitants to the number of 22,000 were sold as slaves throughout the countries of the Mediterranean. In 1185 the Normans of Sicily took Thessalonica after a ten days' siege, and perpetrated endless barbarities, of which Eustathius, then bishop of the see, has left an account. In 1204 Baldwin, conqueror of Constantinople, conferred the kingdom of Thessalonica on Boniface, marquis of Montferrat; but in 1222 Theodore, despot of Epirus, one of the natural enemies of the new kingdom, took the city and had himself crowned there by the patriarch of Macedonian Bulgaria. On the death of Demetrius, who had been supported in his endeavour to recover his father's throne by Pope Honorius III., the empty title of king of Salonika was adopted by several claimants. In 1266 the house of Burgundy received a grant of the titular kingdom from Baldwin II. when he was titular emperor, and it was sold by Eudes IV. to Philip of Tarentum, titular emperor of Romania, in 1320. The Venetians to whom the city was transferred by one of the Palaeologi, were in power when Murad II. appeared and on May 1st, 1430, in spite of the desperate resistance of the inhabitants, took the city, which had thrice previously been in the hands of the Turks. They cut to pieces the body of St. Demetrius, the patron saint of Salonika, who had been the Roman proconsul of Greece under Maximian and was martyred in A.D. 306. In 1876 the French and German consuls at Salonika were murdered by the Turkish populace. On Sept. 4, 1890, more than 2,000 houses were destroyed by fire in the south-eastern quarters of the city. During the early years of the 20th century Salonika was the headquarters of the Committee of Union and Progress, the central organization of the Young Turkey Party, which carried out the constitutional revolution of 1908. Before this event the weakness of Turkey had encouraged the belief that Salonika would ultimately pass under the control of Austria-Hungary or one of the Balkan States, and this belief gave rise to many political intrigues which helped to delay the solution of the Macedonian Question.

When the first Balkan War broke out in 1912, Salonika surrendered to the Greeks on the festival of its patron, St. Demetrios, Nov. 8, after 482 years of Turkish occupation. King George I. proceeded to what was now the second largest city of his kingdom, but was assassinated there on March 18, 1913, by a Greek, named Schinasi.

The Treaty of London of May 30, 1913, assigned Salonika to Greece, and the battle of Kilkis in the second Balkan War of that year prevented the Bulgarians from approaching it. Salonika was becoming more and more hellenized when the World War brought it into prominence as the base of the Allied

operations in the Near East. (*See* SALONIKA CAMPAIGNS below.)

In 1916 a Venizelist revolution against King Constantine broke out there, and on Oct. 9 M. Venizelos arrived and formed a Provisional Government, which the Allies recognized, and to which Lord Granville was accredited as British representative. From Salonika this national government declared war on Nov. 23 against Bulgaria and Germany. On Aug. 18, 1917, a great fire destroyed a large part of the city, including the ancient church of St. Demetrios. After the War an arrangement was made by which Yugoslavia, now only three hours distant by rail, should have a so-called "Serbian Zone" in the harbour. After the proclamation of the Greek Republic, Salonika, as an important military centre, often had a decisive voice in politics, and the large immigration of Greek refugees from Asia Minor has further hellenized the country round it. Salonika is rapidly becoming a great modern city and has been largely rebuilt since the fire of 1917. The main arterial roads have been widened and metalled and pavements added to them.

See General Sarrail, *Mon Commandement en Orient, 1916–18* (1920); P. Risal, *La Ville Convoitée, Salonique* (1914); *Greek Refugee Settlement* (League of Nations, Geneva, 1926).

SALONIKA CAMPAIGNS 1915–18. Under the heading SERBIAN CAMPAIGNS the collapse and subjugation of Serbia in 1915 is related in this work. The present article describes the campaigns in Salonika which formed the sequel to this Allied disaster.

I. OBJECTS OF THE EXPEDITION

Although undertaken for political objects—to bring relief to a hard-pressed ally and to check the influence of Germany in the Balkans—the Salonika campaigns were ultimately crowned by the first decisive military success of the World War. For on the Macedonian front the continent-wide trench barriers of the Central Powers were first breached beyond repair, and there too was knocked away the first national prop—Bulgaria—of the Germanic alliance. To disentangle cause from effect is difficult where moral, military and economic threads are so closely interwoven as in the years 1914–18, yet the fact at least stands out that the overthrow of Bulgaria began the series of national capitulations which ended with that of Germany on Nov. 11, 1918.

If Salonika was for several years an unproductive field of military effort, an infringement of the law of economy of force, which in some measure justified the German gibe that it was their largest concentration camp—"an enemy army, prisoner of itself" —the historian, when weighing his verdict, must throw the counterpoise of 1918 into the scales. And not this only, for it must be remembered that the Allied occupation of the Salonika front made possible the rebuilding of the Serbian army—from the ragged and disorganized survivors of the 1915 winter retreat through Albania to the well-equipped and irresistible force which broke through the Vardar front in Sept. 1918. On the credit side also must be set the fact that the Salonika expedition prevented the danger that Greece might become a submarine base for the Central Powers, one which would have lain in deadly proximity to the British artery of communication with the East via the Suez Canal. And again, that the Allied force contained the bulk of the Bulgarian army—although it is perhaps doubtful whether these would have placed their services at Germany's disposal for any front more remote from their homeland.

Although the Salonika expedition was the immediate outcome of the Serbian débâcle of Sept.–Oct. 1915, the idea had an earlier origin. For Salonika was not only the one feasible channel of Allied communication with and supply to Serbia, but that front offered a possible strategic flank for attack once the trench line on the western front had been welded into a seemingly impenetrable barrier. As far back as 1914, British and French naval missions, with guns, had been sent to support the Serbians, and they had also been supplied with munitions by the Salonika route. The question, too, had been mooted of a larger employment of military force in that theatre, but British commitments at Gallipoli led to this project being shelved—until the Bulgarian mobilization for war on the side of the Central Powers.

Throughout the summer of 1915 the two warring coalitions had been bidding for intervention on the part of the Bulgarians, and in this diplomatic bargaining the Entente suffered a moral and a material handicap—the first, their obvious failure at the Dardanelles; the second, Serbia's reluctance to concede any part of Bulgarian Macedonia, which she had seized as her share of the spoils of the second Balkan war of 1913. As this was the one prize on which the Bulgarians had set their heart, and as Austria had nothing to deter her from offering territory that belonged to her enemy—Serbia—the Entente offers failed to attract Bulgaria. Her intervention on the opposite side meant that free communication could be easily established between Germany and Turkey, and as a consequence that the Entente forces on the Gallipoli peninsula were imminently menaced.

II. THE RETREAT TO SALONIKA

Faced with this critical situation, the French and British Governments decided, albeit tardily, to succour Serbia with an expeditionary force.

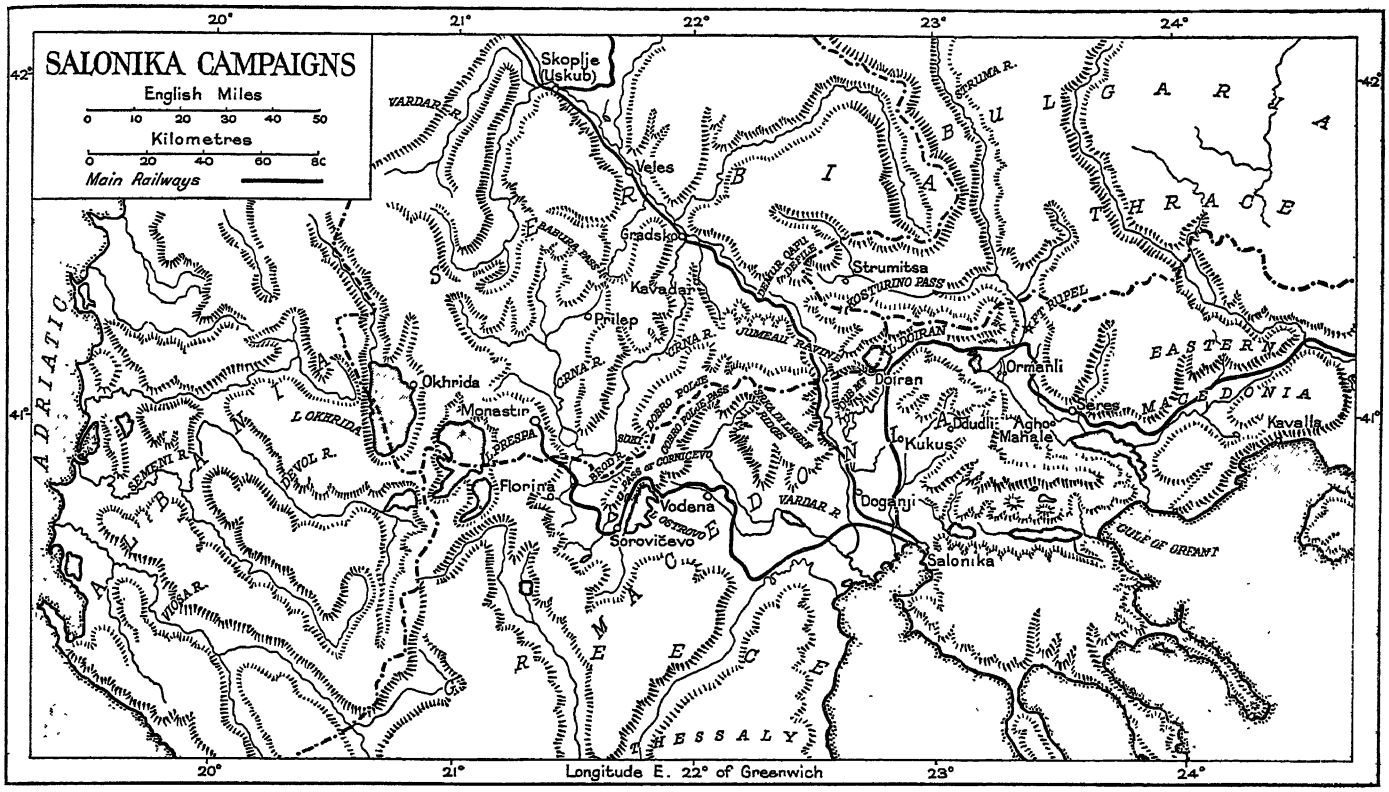
In this the French Government took the lead and nominated as commander Gen. Sarrail, the former chief of the III. Army in the Verdun sector. Sarrail's political activities had earned him the distrust of the military authorities; but the same factor, through his influence with the parties of the Left, made it difficult to ignore him completely. His removal by Joffre from the III. Army command placed the Government in a temporary dilemma, and they eagerly seized the opportunity of placating Sarrail and his political supporters by appointing him to a conveniently distant theatre of war.

While the constitution of Sarrail's force was still under discussion, the Bulgarian mobilization on Sept. 22 forced the hands of the Entente Governments. A hurried order was sent for the dispatch to Salonika of contingents from Gallipoli, preliminary to the arrival of reinforcements from France. Preceded by staff officers, the British 10th and French 156th Divs. began to disembark at Salonika on Oct. 5, and they were followed by the French 57th Division. On the same day, however, the Greek promise of aid to Serbia, made by M. Venizelos, was repudiated by King Constantine, and the Venizelist Government fell—to be replaced by that of M. Zaimis, which took neutrality as its keynote. This reacted at once not only on the Franco-British plan but on their operations. The Greek officials, civil and military, at Salonika did their best, or worst, to obstruct the disembarkation of the Allied contingents.

To increase the confusion, the intended concentration point was several times changed by successive orders from Paris until, on Sarrail's arrival on Oct. 12, he decided, in view of his slender resources and the doubtful attitude of the Greek army in his rear, to concentrate no further forward than the Demir Qapu (Demir Kapija) defile. The limited object was to protect the railway and to ease the pressure on the Serbian forces to the north by repelling a Bulgarian advance from Strumitsa (Strumica)—which would sever that line and so the Serbian line of retreat. Meanwhile, the British troops under Gen. Mahon began moving up to Doiran, in echelon behind the right of the French.

On Oct. 14 the vanguard of the French troops came into action at Strumitsa station (in Serbia), driving back a Bulgarian reconnaissance, and on Oct. 17, in response to Serbian urgings, a brigade was sent forward beyond the Demir Qapu defile as far as Krivolak. Reinforced by the arrival of the French 122nd Div. Sarrail began, on Nov. 3, an offensive northward to facilitate the Serbian retreat. But the seizure of the Babuna pass by the Bulgarians closed the channel of southward retreat for the main Serbian army, and finally shattered the hope that the Serbians might fall back on the relieving force, as was the advice of their allies.

Sarrail was thus faced with a difficult problem. On the one hand the gallant French efforts to break through towards the Babuna had failed and they were forced on the defensive, and, on the other, he received news of the Serbian decision to retreat westward through Albania towards the Adriatic. With his small force thus isolated he took the only possible decision—to fall



MAP SHOWING THE TERRAIN OF THE SALONIKA CAMPAIGNS IN 1915–1918. NATIONAL BOUNDARIES ARE INDICATED BY THE BROKEN LINE

back towards Salonika. This decision raised further problems. Were they to hold on there, or evacuate Greek soil altogether? With the disappearance of Serbia beneath the enemy flood, the Entente Powers could no longer claim that they were at Salonika merely to use a line of communication to which Serbia was by treaty entitled. The other justification, that they had come at the request of the Greek Government was now nullified by the downfall of Venizelos. Considerations of prestige and their desire to use Salonika as a base for diplomatic operations in the Balkans led the Entente Governments to remain, but without any clear policy as to the future.

Even with the decision to retreat taken, the Franco-British forces were not "out of the wood." The withdrawal had to be made down a single-track railway, through a country without roads—converted by the autumn rains into a swamp—and in face of a pursuing enemy. The retreat was made by echelons, in four stages, and only by a narrow margin did the French frustrate Bulgarian efforts to outflank and cut their retreat, first at the Demir Qapu defile, and again at Strumitsa station. The British, too, on the right were heavily attacked, and any weakening of their line at this critical juncture might have been fatal to the extrication of the Allied forces from the noose into which they had been pushed.

Fortunately, once the Greek frontier was regained the pursuit halted—mainly because the Germans were reluctant to undertake further commitments in the Balkans to the detriment of their strength in other theatres. Falkenhayn held that the Macedonian operations should be left to the Bulgarians, but this policy overlooked the fact that the Greeks, however friendly to the Germans, would have resented any invasion of their territory by the Bulgarians. Thus by Dec. 12 the retreating forces were safely out of reach of their pursuers, facing them across the frontier. After pausing for a few days on a line stretching roughly from Sorovičevo to Lake Doiran, the withdrawal was resumed, and by Dec. 18 the forces of Sarrail and Mahon were back in the vicinity of Salonika. Covering this base an entrenched line was constructed, on an 80m. arc stretching from the mouth of the Vardar through Doganji to the Gulf of Orfano, and occupied early in the new year.

Allied Reinforcements.—The delay in the expected enemy offensive enabled the Entente force to receive reinforcements, not only French and British but Serbian, for the remnant of their army, after resting and being re-equipped at Corfu, was brought round to Salonika. From April onwards the stream steadily swelled until by July their strength on the Salonika front reached a total of 152,000, divided into three armies of two divisions each. The French had four divisions. The British had been raised to five divisions (10th, 22nd, 26th, 27th, 28th), and later a sixth (60th), organized in two army corps; in May Lieut.-Gen. G. F. (later Sir George) Milne took over command as general officer commanding the British Salonika Force. The total allied force was thus a little over 300,000 men. Opposing it early in 1916 were the Bulgarian I. and II. Armies and the German XI. Army—a total of some 280,000 men—aligned on a front from Lake Okhrida on the west to the point where the Struma enters Bulgaria on the east. But from March onwards the drain on the German forces at Verdun led Falkenhayn to withdraw the German troops, all but one division; by 1918 the XI. Army, though German in name and in staff, contained only one complete German battalion.

On the Entente side the reaction of Verdun took the form of orders from Joffre to Sarrail to pin down the enemy on his front, in order if possible to prevent Falkenhayn drawing upon the forces there. Accordingly the French moved out west of the Vardar towards Vodena and the British advanced north to Kukus. This advance, although it lengthened the front to be defended and the lines of communication, was of essential value for the security of the Allied force, for the entrenched position at Salonika itself was dominated from the mountains east of the town, and might become untenable if these heights were occupied by the enemy. But in how small degree the Allied advance fixed the Germans can be gauged from the previous paragraph, and Sarrail, who had been placed under Joffre's supreme command in Dec., received instructions not only to operate with greatly increased vigor on the Salonika front but also to prepare and organize a definite offensive to be launched simultaneously with the anticipated entry of Rumania into the war.

Meantime the situation was complicated by a Greek incident; until 1918 politics were to play a larger part in the Salonika theatre than war. The neutral Greek forces, five corps, were

distributed throughout the region, in theory to guard the frontier; and such a situation, while Gilbertian in its absurdity to the distant observer, was a source of serious anxiety to the Franco-British forces on the spot. Feeling that they would be safer without such dubious protection, they brought diplomatic pressure to bear on the Greek Government for the withdrawal of the Greek forces from Macedonia and their demobilization. Reluctantly the Greeks complied, but while the Allies occupied certain of their forts the Bulgarians seized the opportunity to cross the frontier, and appeared before Fort Rupel, which commanded the Struma gate into the Macedonian plain. The Greek commander thereupon handed over the fort to them (May 26).

This unfriendly act bared the eastern flank of the Entente army, and gave the whole of Eastern Macedonia into the hands of the enemy. To meet the danger the British occupied the Struma line in force. Further, the Entente Governments instituted an economic blockade of the Greek coast, sent a brigade to Athens, and by the ultimatum of June 21 enforced the demobilization of the Greek army and the resignation of the Government. As it proved, however, the seizure of Rupel and Eastern Macedonia did not develop into a general offensive by the German-Bulgarian forces.

Handicaps of the Allies' Army.—While these external troubles with Greece beset the Entente Powers, they were far from the sum of the handicaps which hindered effective action by the Salonika force. The idea of an offensive was constantly discussed between the French and British Governments, as also between Joffre and Sarrail; but, apart from reluctance to provide adequate forces, it depended on too many contingencies, in particular the uncertain and often postponed intervention of Rumania. Furthermore the internal troubles of the Salonika force were notorious. Sarrail had the title of "Commander-in-chief of the Allied Armies in the Orient," and with him Cordonnier commanded the French forces; but his status was a nebulous one. Not only was the British commander to all intents independent, but also the Italian—a detachment arrived from Italy in Aug. 1916.

Apart from the defect that Sarrail's orders were issued from French headquarters without consultation with the other Allied Powers, Sarrail's own personality was not such as to weld this loose understanding into an effective co-operation. In a heterogeneous force, composed of French, British, Italians, Serbians and Russians, it was hardly a recommendation that the chief commander should be known not to have the confidence of his own supreme command, and that even the suspicion should exist that he was conducting operations with one eye on the political game at home. The British, by polite but firm insistence on their independence, maintained tranquil relations; wrangles and disputes between the other Allied commands were continual, and the majority were unfortunately attributable to the policy or tactlessness of Sarrail.

While the Allied leaders were debating ways and means, the opposing armies moved, on Aug. 17, to forestall and dislocate the Allied offensive, which they judged would synchronize with Rumania's intervention. The Bulgarians made their effort on the two wings. The eastern wing from Rupel drove back the French cavalry on the east of the Struma and pressed down towards its mouth. But they dissipated their force by detaching part to seize the coastal strip of Kavalla, and the stout resistance of the British prevented them forcing the river line. On the western wing the position was more critical, for the Bulgarian advance from the Monastir area drove the Serbs out of Florina and reached Lake Ostrovo before they were ultimately held.

III. THE FIRST AND SECOND ALLIED OFFENSIVES

These reverses caused a further change in Sarrail's plan for the Allied offensive; the forces east of the Vardar were merely to contain the enemy, while those west of the Vardar carried out the offensive. Thus to all intents it became no more than a counter-offensive to restore the impaired situation in this sector. To release additional French troops the British extended their line west from Doiran to the Vardar; Sarrail was thus enabled to form an offensive group (of 2½ French divisions, one Serbian division and a Russian brigade) under Cordonnier, in addition to the Serbian striking force of four divisions.

On Sept. 10 various British detachments crossed the river Struma in raids at six points in order to divert the enemy's attention, and on Sept. 11 the real attack developed west of the Vardar. The Serbs, skilled mountain fighters and inspired by the closeness of their native soil, made good progress, and on Sept. 14 gained the pass of Gorničeyo, breaking through the hostile front. But the Cordonnier group was slower, partly because of transport difficulties and Cordonnier's own inclination for the secure methodical advances he had practised successively in France. As a result, however, the Bulgarians, broken by the Serbs at Gorničeyo, were able to fall back across Cordonnier's front and re-establish their lines on the Brod. Sarrail, incensed, ordered fresh attacks by both groups, which were repulsed with heavy loss—as Cordonnier, protesting, had prophesied.

Between Sept. 30 and Oct. 8 the British XVI. Corps (Briggs) advanced its front to the line Agho Mahale-Ormanli, as a fixing move, coincidently with a fresh attack on the main front by the French and Serbs from Kaimakčalan westward. The pressure of the Serbs turned the Bulgar left and forced a further slight withdrawal, but a Franco-Russian attack on Oct. 6 failed. Cordonnier urged the idea of a wider turning manoeuvre, but Sarrail, in the mistaken belief that a Bulgarian collapse was imminent, ordered a fresh blow on Oct. 14. This was a costly failure and led to a violent scene between Sarrail and his subordinate. Cordonnier left for home a few days later. This internal friction caused a temporary breakdown of action, and the Serbs were left to fight unsupported, until Sarrail took the step of putting the whole attacking force under the Serbian Gen. Michich—a man of real military genius and with the knack of inspiring not only Serbian but other national forces.

Michich attacked in the Crna bend on Nov. 12 while, to aid this offensive, Milne's troops made local attacks and raids as a diversion on the Struma. Despite rain and snow the Serbs pressed on, turning successive positions, with the French, Russians and an Italian brigade on their left. Monastir was outflanked and on Nov. 19 was found evacuated—the first important Serbian town to be regained. For a moment there was a real opportunity of exploitation, as the Bulgarians were in full retreat towards Prilep; but the immediate attacking forces were tired and hungry, and Sarrail suspended the advance—to the annoyance of the Serbs, who, in default of receiving fresh reserves, tried to press on unsupported until exhaustion stopped them.

By this time the Rumanian collapse, under pressure of the convergent German and Bulgarian attacks, was clear, and on Dec. 11 Sarrail received instructions to consolidate a defensive line embracing as much of the regained territory as possible. This line stretched from Lake Prespa—just north of Monastir—north slopes of Kaimakčalan—to the Vardar, and thence by Doiran to the Struma and down to the sea. Its worst feature was that the commanding heights were held almost everywhere by the enemy. This front was to remain practically unchanged until Sept. 1918.

Reorganization.—Apart from the incident of a threatening Greek concentration in Thessaly—settled by a fresh ultimatum—the winter months of 1916–17 passed quickly, and the opportunity was taken to reorganize and regroup the forces. From the Gulf of Orfani to the Vardar the front was held solidly by the British, owing to Milne's insistence, but on the rest of the front Sarrail followed his usual plan of interspersing detachments of the various nationalities—presumably on the principle *"divide et impera."* Whatever its personal advantages it was hardly conducive to prompt and effective action. Reinforcements had now brought the French up to a strength of eight divisions, while there were six Serbian and 1½ Italian divisions—making with the British 21½ divisions, plus two Russian brigades. The total Allied strength was approximately 600,000, while the Greek National Defence, or Venizelist army, was in process of formation. This concentration afforded adequate reserves for a resolute offensive in the spring.

Confronting the Allies were still the nominal German XI.

Army, and Bulgarian I. and II. Armies, comprising the equivalent of one German and 13 Bulgarian divisions,[1] of which practically half faced the British. Apart from the II. Army, these forces were under a German Commander-in-chief, Gen. Von Scholtz. On their side no large move was considered, partly because the Bulgarians had already achieved their principal territorial aims, and merely desired to hold tight, while the Germans were satisfied with immobilizing so large an Allied force at no expenditure to themselves.

For the 1917 campaign Sarrail's scheme was for a preliminary flanking move on the extreme west, between Lakes Okhrida and Prespa, to shake the enemy's hold in the Monastir area; following this was to be the main fixing attack by the British on the Doiran front; then the French, Russians and Italians in the south-west of the Crna bend were to advance; and finally the Serbs were to strike the decisive blow to the west again.

The preliminary move began on March 12 and was soon suspended, achieving little apart from a creditable French local success on a spur west of Monastir. Then came the British turn —to attack the key position formed by the Dub and lesser ridges which commanded the passage between Lake Doiran and the Vardar. Milne had rejected an alternative proposal of Sarrail's that he should attack to gain Seres, which while attractive as a political advertisement had no military value, and being dominated by the hills behind would have been difficult to hold. After a two days' artillery preparation, in vile weather, the British infantry advanced to the assault, on a two-division front (22nd and 26th), at 9.45 P.M. on April 24, the late hour being to gain surprise and protection. On the left the enemy's first position was gained and held, but in the centre and right the difficulties of the Jumeaux ravine and the strength of the resistance foiled the attackers.

Worst of all, their sacrifice was in vain and their "fixing" rôle rendered abortive because the attack west of the Vardar was postponed by Sarrail, ostensibly for climatic reasons. Not until May 9 did the other attacks develop. Sarrail had rejected the Italian proposal for a flanking manoeuvre, in preference for a frontal blow, and this, made by the French and Italians, was a costly failure. The Serbian attack was even less effectual, in fact hardly developed, partly owing to internal political troubles then rife and partly to their want of confidence in the higher direction and in the genuineness of its intention to support their efforts. Once more the British, on the night of May 8, had delivered a fixing attack, and once more their heavy sacrifice had been purposeless. The offensive was definitely closed down by Sarrail on May 24.

The Bulgarians, content with the prestige of this successful repulse, attempted no counter-stroke, and as the Allied forces were neither in the mood nor the condition for further efforts, the front relapsed into stagnation for the rest of the year. The only minor incidents were a successful local advance in Sept. by the French on the extreme left, west of Lake Okhrida, and Milne's withdrawal of his right from the marshy valley to the foot-hills west of the Struma, a precaution to lessen the danger of malaria and dysentery. The focus of interest again became political—common action was taken to settle the simmering menace and intrigues of Greece. In June, Allied troops invaded Thessaly, but the abdication of King Constantine was forced without fighting, and the Venizelist Government returned to power. The consequent reinforcement of the Allies by the Greek army came as a prospective counterpoise to the contemplated withdrawal of two British divisions in Sept. for the projected offensive in Palestine.

Sarrail Superseded.—At the end of 1917 the new Clemenceau ministry recalled Sarrail, in response to the renewed requests of the British and Italian Governments, which were supported by Foch. His successor was Gen. Guillaumat, who had distinguished himself as an army commander on the Verdun front. His first aim was to restore confidence and cohesion in the Allied forces at Salonika, while hastening the reorganization and training of the Greek army. His second, to think out and prepare the plan for a fresh offensive, adopting in its main outlines one which Gen. Michich had suggested in 1916. But to obtain the sanction of the Allied Governments was more difficult, obsessed as they were with the threatened German offensive in France, and in any case dubious of the effectiveness of any major operation in Macedonia. While biding his time, however, Guillaumat seized the opportunity to "blood" his new Greek troops in an ably planned *coup de main* against the Srka di Legen ridge. Supported by a powerful concentration of French artillery it was completely successful, and Guillaumat withdrew the attackers into reserve before any possible counterstroke might dilute the moral tonic. On the main front there were no other incidents of note between Jan. and Sept. 1918; but away on the Adriatic coast, in Albania, Ferrero's Italian XVI. Corps, aided by a French division, advanced in July from the Viosa to the line of the Semeni and Devol rivers; an Austrian counter-offensive late in Aug. regained most of the lost ground.

In July also, Gen. Guillaumat, his task of reorganization completed, was summoned back to France, to be entrusted with the defence of the capital in view of the critical situation caused by the German offensives. A man who put first not his own interests, nor even those of France, but his duty to the Allied forces as a whole, his military ability had won the respect, as his character had won the esteem, of the multifarious contingents. He was succeeded by Gen. Franchet d'Esperey, who, if perhaps not possessing the exceptional tact and supra-national outlook of Guillaumat, was yet an able strategist, and well able to maintain allied co-operation. He adopted and put the finishing touches to Guillaumat's offensive plan, while the latter utilized his position at the centre of policy to gain sanction for its execution. Winning over M. Clemenceau, he then went to London and Rome on the same mission, and at last on Sept. 11 Franchet d'Esperey was authorized to attack—if there was still little confidence in its success.

IV. THE DEFEAT OF BULGARIA

The military situation on the eve of the offensive was numerically little changed. The Bulgarians had a ration strength of some 700,000 and a rifle strength of 200,000—divided into the same three armies. The Allies had a ration strength of about 574,000 and a rifle strength of 157,000, although against the inferiority of numbers they could put a slight preponderance in artillery and a heavy one in aircraft. But the real defect on the enemy's side was the first underlying war-weariness of the Bulgarians and their dissatisfaction with their German directors; and secondly the divided command by which the so-called German XI. Army and the Bulgarian I. Army—from Doiran westwards—were under Von Scholtz, while the Bulgarian II. Army and the coastal detachments were under the Bulgarian commander-in-chief, Gen. Gekoff.

For the new offensive Franchet d'Esperey's plan was first to strike a concentrated blow with a Franco-Serb group under Michich on a narrow front of seven miles along the Sokol-Dobro Polje range, aiming at a tactical break-through and a subsequent expansion of the breach to gain and clear the triangle formed by the Crna and the Vardar. This would menace the enemy's communications on both flanks, and the offensive would then be taken up in turn by the other forces along the front. The initial objectives were relatively modest, for the possibility of a strategic break-through, ending in the overthrow of the enemy armies, was no more than an idea in the commander's mind.

The immense difficulties of the terrain and the scantiness of reserves made even this limited aim far from certain of success. But Franchet d'Esperey's plan, made possible by the wholehearted co-operation of the other Allied commanders, was an admirable fulfilment of the principle of concentration. On the vital sector six Serbian and two French divisions with 600 guns—more than a third of the total artillery strength in Macedonia—were concentrated against one Bulgarian division, and to do this the other sectors were almost stripped of their artillery.

The offensive began on Sept. 1, as the British 27th Div. made

[1] A Bulgarian division had almost twice the infantry strength of a French or German division.

a feint attack in the Vardar valley to divert the enemy's attention, and on the night of Sept. 14 a heavy bombardment was begun on the real front of attack. Next morning at 5.30 A.M. the French divisions assaulted and after hard fighting gained the Dobro Polje ridge, the Sokol also falling by the evening—opening a path for the Serbian divisions of the I. Army, hitherto in reserve, to be pushed through. At the same time the Serbian II. Army advanced to the attack. By nightfall on Sept. 16 a penetration of 5m. had been made.

The Serbian troops now wonderfully inspired by success and the sight of their homeland, swept forward with such *élan* that by the night of Sept. 17 they were 20m. forward, and the breach had been expanded to 25m. by Greek and French divisions on the flank. After the initial clash resistance was feeble, partly because the mountains hampered the lateral movement of reserves. By Sept. 19 the left wing of the attackers had reached across the Crna, while the right wing was rolling up the front eastwards towards the Vardar, and between the two wings the Serbian cavalry had penetrated to Kavadarci in the apex of the Crna-Vardar triangle. Meanwhile on Sept. 18 Milne's troops attacked on the whole front from the Vardar to Lake Doiran in order to prevent the Bulgarians withdrawing troops to dam the breach west of the Vardar. Facing the British were the pick of the Bulgarian troops and also the strongest fortified positions, so that although they penetrated the enemy's lines along most of the front, it was little wonder that lack of reserves and artillery compelled them to yield up the larger part of their gains. But they had fulfilled their mission of pinning down the enemy including the reserves during these critical days, Sept. 18 and 19, and by Sept. 21 the whole of the enemy's front west of the Vardar had collapsed under the convergent pressure of the exploiting Serbs and of the French on their flanks.

By the afternoon of the same day the collapse had extended to the Doiran-Vardar front, and the British aeroplanes spread considerable havoc among the troops of the Bulgarian VI. Army falling back through the narrow Kosturino pass. Similarly, on the extreme west, facing Prilep, the Italians joined in the advance. From now on the advance became a strategic pursuit, now fast, now slow, in which successive rearguard resistances of the enemy were outflanked. On Sept. 23 the Serbian spearhead reached Gradsko, and Veles three days later. Seizing their opportunity, a French cavalry brigade under Gen. Jouinnot-Gambetta made a dash for Skoplje (Üsküb), and seized this vital centre of communications, the key to the whole front, on Sept. 29. This definitely separated the XI. Army from the remainder of the Bulgarian forces, forcing them on divergent lines of retreat. To the south-east the British had already invaded Bulgaria itself, taking Strumica on Sept. 26. That night a Bulgarian staff officer arrived at British headquarters to ask for an armistice, and three days later the Bulgarians capitulated, accepting the Allied terms unreservedly. The first national prop of the Central Alliance had fallen. While the reoccupation of Serbia proceeded rapidly, a mixed striking force was rapidly organized under Milne's command to advance through Thrace on Constantinople, and had pressed as far as the Maritsa, seizing the bridgeheads, when Turkey—her force in Syria already annihilated by Allenby—surrendered on Oct. 30.

BIBLIOGRAPHY.—M. P. E. Sarrail, *Mon Commandement en Orient* (1920); Mackensen, *Von Bukarest bis Salonika* (Berlin, 1920); Reichsarchin Einzelschriften, *Der Endkampf in Mazedonien* (Berlin, 1921); L. Villari, *The Macedonian Campaign* (1922); Landfried, *Der Endkampf in Mazedonien 1918* (Berlin, 1923); Feyler, *Campagne en Macédoine 1917–18* (Paris, 1926). *See* also WORLD WAR: BIBLIOGRAPHY.

(B. H. L. H.)

SALSETTE ("sixty-six villages"), a large island in British India, N. of Bombay city, forming a part of Thana district. Area, 246 sq.m. It is connected with Bombay Island and also with the mainland by bridge and causeway. Salsette is a beautiful, well-wooded tract, its surface being diversified by hills and mountains, some of considerable height, while it is rich in rice fields. In various parts of the island are ruins of Portuguese churches, convents and villas; while the cave temples of Kanheri form a subject of interest. There are 109 Buddhist caves, which date from the end of the 2nd century A.D. Salsette is crossed by two lines of railway and is being opened up as a residential suburb of Bombay. The island was taken from the Portuguese by the Mahrattas in 1739, and from them by the British in 1774; it was formally annexed to the East India Company's dominions in 1782. There is another Salsette in the Portuguese settlement of Goa.

SALSIFY or **SALSAFY,** *Tragopogon porrifolius,* a hardy biennial, with long, cylindrical, fleshy, esculent roots, which, when properly cooked, are extremely delicate and wholesome; it occurs in meadows and pastures in the Mediterranean region, and in Britain is confined to the south of England, but is not native. The salsify requires a free, rich, deep soil, which should be trenched in autumn, the manure used being placed at two spades' depth from the surface. The first crop should be sown in March, and the main crop in April, in rows a foot from each other, the plants being afterwards thinned to 8 in. apart. In November the whitish roots should be taken up and stored in sand for immediate use, others being secured in a similar way during intervals of mild weather. Salsify is widely naturalized as a wayside weed in the United States and Canada.

The genus *Tragopogon* belongs to the natural order, Compositae, and is represented in Great Britain by goat's beard, *T. pratensis,* found in meadows, pastures and waste places. The flowers close at noon whence the old name "John-go-to-bed-at-noon."

SALSOMAGGIORE, a town of Emilia, Italy, in the province of Parma, 6 m. S.W. of Fidentia by steam tramway. Pop. (1921) 7,927, village; 11,482, commune. It is situated 525 ft. above sea-level at the foot of the Apennines, and is a popular watering-place. The water is strongly saline, and is also used for inhalation. The wells are, some of them, over 2,000 feet deep, and yield illuminating gas and oil as well as water.

SALT, SIR TITUS, BART., 1869 (1803–1876), English manufacturer, was born on Sept. 20, 1803, at Morley, Yorkshire. His success in introducing the coarse Russian wool (*donskoi*) into English worsted manufacture, due to special machinery of his own devising, gave his firm a great impetus. In 1836 he solved the difficulties of working alpaca (*q.v.*) wool, created an enormous industry in the production of the staple goods for which that name was retained, and became one of the richest manufacturers in Bradford. In 1853 he opened, a few miles out of the city on the Aire, the extensive works and model manufacturing town of Saltaire. During 1859–61 Salt was M.P. for Bradford, of which city he had been mayor in 1848. He died on Sept. 20, 1876.

See R. Balgarnie, *Sir Titus Salt, his Life and its Lessons.*

SALT. In chemistry the term salt is applied generically to any compound formed by substituting the hydrogen of an acid by a metal or a group of elements acting as a metal. (*See* ACID.) Common salt, or, simply, salt, is the name given to the varied natural and industrial forms of sodium chloride, NaCl. Pure sodium chloride is made by passing dry hydrogen chloride gas into a saturated solution of commercial salt, when the purified substance is deposited in the form of a colourless crystalline powder. It crystallizes in cubes (*see* below, under Rock Salt) which melt at about 800° C, that is, at bright red heat, and begins to volatilize at a slightly higher temperature. It dissolves readily in cold water and a little more readily in hot water; 100 parts of water dissolve 35·52 parts of salt at 0° C, 39·16 parts at 100° C, and 40·35 parts at 109·7° C, the boiling point of the saturated solution. If a saturated solution in water be cooled to −10° C, a crystalline hydrate, $NaCl{\cdot}2H_2O$, separates. (*See* HYDRATE.) Solution of salt in water is accompanied by reduction of temperature: 36 parts of salt in dissolving in 100 parts of water at 12·6° C lower the temperature to 10·1° C. If the same proportion of salt and snow be intimately mixed the temperature falls to −21·3° C.

Salt occurs in the sea, in natural brines and in the crystalline form, as rock salt. Its most abundant source is the ocean. Assuming that each gallon of sea water contains 0·2547 lb. of salt, and allowing an average density of 2·24 for rock salt, it has been computed that if dried up the entire ocean would yield no less than 4½ million cubic miles of rock salt or about 14½ times the bulk of the entire continent of Europe above high-water mark. Natural

brines having commercial importance are those of Austria, France, Germany, of Kharaghoda and Kuda in India, of Michigan, New York State, Ohio, Pennsylvania, West Virginia, and the salt lake of Utah in the United States, and the Dead sea. In Great Britain salt brines are met with in Cheshire, Worcestershire, Lancashire and Yorkshire, and have been found by deep boring in Derbyshire, Staffordshire and Midlothian. Salt in solution is accompanied by the chlorides and sulphates of potassium, calcium and magnesium; in many cases the valuable element bromine occurs, probably in the form of magnesium bromide.

Sea water contains on the average about 3·33% of solids, but the concentration of salts varies from about 2·9% in the polar seas to 3·55% and upwards at the equator. Enclosed seas such as the Mediterranean and Red seas contain a higher proportion of salt than the open ocean at the same latitude. (*See* OCEAN.) From Dittmar's analyses of sea water taken during the "Challenger" expedition, the average composition of the solids in sea water may be considered to be: sodium chloride 2·60%, magnesium chloride 0·31%, magnesium sulphate 0·22%, calcium sulphate 0·12%, potassium chloride 0·07% and magnesium bromide 0·007%. The mixed salt obtained by evaporation of sea water has, however, the following composition irrespective of the source of the sea water: sodium chloride 77·82%, magnesium chloride 9·44%, magnesium sulphate 6·57%, calcium sulphate 3·44%, potassium chloride 2·11%, magnesium bromide 0·22%, and some calcium carbonate.

Natural Brines.—The Dead sea, which covers an area of about 340 square miles, contains approximately 11,600 million tons of salt, and the River Jordan, which contains only 35 parts of salt per 100,000 of water, adds each year 850,000 tons of salt to this total. The composition of Dead sea water is given in the following table:

DEAD SEA WATERS	Surface water	Deep water (250 ft.)
Specific gravity	1·1651	1·2356
Sodium chloride	6·11%	7·20%
Potassium chloride	0·85	1·25
Magnesium bromide	0·38	0·61
Magnesium chloride	9·46	13·73
Calcium chloride	2·63	3·82
Calcium sulphate	0·11	0·05
Total solids	19·54	26·66

The concentration of salts in the Dead sea increases to a depth of about 250 feet, after which it remains practically constant. At this depth and below it is a concentrated solution, which, indeed, is supersaturated when pumped up, for a slight deposition of salt takes place owing to diminished pressure. Noteworthy features of Dead sea water are its relative freedom from sulphates and the high proportions of potash and bromide. These factors, coupled with the circumstance that atmospheric conditions in Palestine are favourable to solar evaporation for about 8 months of the year, indicate that the production of salt, potash, and even bromine is feasible in the Dead sea area, the process as regards salt and potash being similar to that described below under Manufacture. The brines at Kharaghoda resemble sea water in the character of their dissolved salts, but are much more concentrated, and in some cases practically saturated as shown by analysis No. 2.

KHARAGHODA BRINES	1	2
Specific gravity	1·134	1·220
Sodium chloride	13·15%	14·52%
Potassium chloride	0·29	0·78
Magnesium bromide	0·05	0·15
Magnesium chloride	2·05	9·48
Magnesium sulphate	1·19	0·85
Calcium sulphate	0·33	0·33
Calcium carbonate	0·01	0·02
Total solids	17·07	26·13

The following table gives the composition of some concentrated natural brines used for the production of salt in various countries.

CONCENTRATED NATURAL BRINE	Droitwich	Winsford	Syracuse, N.Y.	St. Charles, Mich.	Artern, Saxony	Friedrichshall, Württemberg
	%	%	%	%	%	%
Sodium chloride	24·97	25·46	21·71	22·84	25·27	25·49
Sodium sulphate	0·26	..	..	..	..	..
Potassium chloride	..	..	..	..	0·12	..
Potassium sulphate	..	..	..	..	0·29	..
Magnesium bromide	..	..	..	0·26	..	..
Magnesium chloride	0·05	0·21	0·14	4·03	0·42	0·01
Calcium sulphate	0·37	0·45	0·50	0·20	0·40	0·44
Calcium chloride	..	..	0·19	0·77	..	..
Total solids	25·65	26·11	22·54	28·10	26·50	25·54

Certain natural brines occurring in England and the United States are of interest, not only from the economic point of view, but also because they contain salts not usually found in brines, such as the chlorides of barium and strontium; when salt is produced from such brines special methods of manufacture are adopted. In Great Britain these brines were found at great depth in boreholes in Derbyshire, Staffordshire and Midlothian during the search for petroleum wells. In America they occur in the Ohio valley district of West Virginia and in Ohio, at depths ranging from 1,100 to 1,600 feet.

	Renishaw, Derbyshire	West Calder, Scotland	Pomeroy, Ohio	Malden, W. Virginia
Depth (feet)	3,198	3,910	..	..
Specific gravity	1·127	1·063	1·075	1·063
Sodium chloride	10·28%	6·26%	7·92%	6·01%
Potassium chloride	0·03	0·04	0·04	0·06
Magnesium bromide	0·11	0·07	..	..
Magnesium chloride	0·84	0·55	0·57	0·50
Calcium chloride	4·23	1·34	1·36	1·49
Strontium chloride	0·12	0·16	0·03	0·02
Barium chloride	0·14	0·07	0·04	0·07
Total solids	15·75	8·49	9·96	8·15

It has been suggested that the foreign brines, characterized by the absence of sulphates and carbonates, have been produced by a natural process akin to the "Permutit" process for softening water.

Rock Salt, mineralogically termed halite, crystallizes in the cubic system, the more usual form being a cube, but octahedral, dodecahedral, tetrahexahedral and hexoctahedral faces sometimes occur. The word halite is sometimes used as a group name to include a series of haloid minerals, of which rock salt is the type. Rock salt commonly occurs in cleavable masses, sometimes in laminar, granular or fibrous form, the last being known as "hair salt." The crystals, which occasionally have distorted or cavernous faces, possess a perfect cubic cleavage, exhibit conchoidal fracture and are rather brittle; the specific gravity varies from 2·1 to 2·6 and the hardness is 2·5 on the scale of Mohs.

Rock salt is colourless and transparent when pure, but is frequently red, yellow or brown, and more or less opaque owing to the presence of impurities such as lime and magnesium salts, with marl and iron oxide as insoluble impurities. The proportion of sodium chloride varies from 94·5% upwards, depending on the proportion of the foregoing impurities.

Rock salt occasionally exhibits double refraction, due perhaps to natural pressure. In some crystals small cavities are present, and these may contain saline solutions or gases such as carbon-dioxide, CO_2, and volatile hydrocarbons. Some crystals (Knistersalz) decrepitate on being dissolved owing to the escape of condensed gases. Pure rock salt is essentially sodium chloride, but it generally contains magnesium salts, and these impurities cause it to be deliquescent. Rock salt is highly diathermanous, or capable of transmitting heat rays and the shorter infra-red rays. This property is utilized in investigations of infra-red radiation up to

about 16μ, and large rock salt prisms have been used for this purpose with faces up to 6″. The refractive index of rock salt varies from 1·54431 at wave-length 0·5893μ (yellow light) to 1·44102 at 15·9116μ (infra-red).

Rock salt is occasionally found as a sublimate on lava, as at Vesuvius, where it is associated with potassium chloride, but it occurs mostly in bedded deposits, often lenticular in shape and sometimes of great thickness. These deposits are generally associated with other minerals such as gypsum, anhydrite, sylvine, carnallite and kieserite. The associated minerals are compounds of calcium, magnesium, and potassium, and it is inferred therefrom that rock salt has been formed by the evaporation of inland seas such as the Dead Sea and the Great Salt Lake of Utah, or perhaps in some cases by the extreme desiccation of an arm of the sea, such as the Kara Bughaz, which forms a natural salt-pan on the east side of the Caspian sea. Such beds of salt are found in strata of very varied geological age; the Salt Range of the Punjab, for instance, is probably of Cambrian age, while the famous salt deposits of Wieliczka near Cracow have been referred to the Pliocene period. In many parts of the world, including the British area, the Triassic age offered conditions especially favourable for the formation of large salt-deposits. In England all the known deposits of rock salt occur in the New Red Sandstone, and with one doubtful exception are of Triassic age. The great salt deposits of Prussian Saxony are of Permian age (Zechstein), whilst those of Bavaria and of Tirol are Triassic. In the United States of America salt is found in strata of very different ages: the Silurian in New York, Michigan and north Ohio; the Carboniferous in Pennsylvania; the Permian in Kansas, Texas and New Mexico; the Jurassic in Utah; the Tertiary in Louisiana, Idaho and Wyoming; and the Recent deposits of Oklahoma, Nevada and other western states.

Manufacture.—At one time almost the whole of the salt in commerce was produced from the evaporation of sea water, and sea salt still forms a staple commodity in many maritime countries, especially where the climate is dry and the summer of long duration. Commercial salt is mainly manufactured from two sources, (1) natural brine and (2) rock salt.

(1) *From Natural Brine.*—When an aqueous solution of several salts is evaporated, the salts separate in the order of their solubility, the least soluble salt being deposited first and the most soluble last. Hence in the case of sea water and brines the order of deposition is calcium carbonate, calcium sulphate, sodium chloride, magnesium sulphate, carnallite (potassium magnesium chloride) and finally magnesium chloride. These salts are not, however, deposited completely within sharply defined limits of concentration; there is some overlapping and each salt is contaminated to a greater or less extent with others. Further, when solar evaporation is employed the difference of temperature between day and night will affect the character of the salt deposited. The art of the salt-maker is to produce grades of salt suitable for the particular use to which it is to be put; *e.g.*, table salt, industrial salt, fish salt.

Salt is produced by solar evaporation from sea water in France, Portugal, Spain, Italy, India, California and China, and from natural brine or salt lakes in India, Russia and the United States. The process generally adopted is similar in principle, although details of evaporating pans and of manufacturing plant vary with local conditions. A preliminary concentration is usually carried out by allowing the brine to flow through a series of channels to concentrating ponds constructed of wood, puddled clay or concrete. The areas of the ponds vary from 280 to 20,000 sq. feet in different countries. The solution is concentrated first to specific gravity of about 1·21. At this stage suspended impurities (sand and clay) and the less soluble salts (calcium carbonate or chalk and calcium sulphate, gypsum and anhydrite) are removed. The clear brine is now run successively into crystallizing pans, usually three, of similar construction to the evaporating pans, where the salt is deposited. The total area of crystallizing pans is approximately one tenth of that of the evaporating pans. In the first crystallizing pan the brine is concentrated to a specific gravity of 1·25 and here the finest grade of salt is produced. The mother liquor reaches a specific gravity 1·26 in the second pan, where the second grade of salt separates. In the third pan a specific gravity 1·275 is attained when the coarsest salt is deposited. The final mother liquor, termed *bitterns,* is used in some countries, *e.g.*, France, India and America, for the manufacture of potash, bromine, Epsom salts and magnesium chloride.

The salt from each crystallizing pan is raked into rows and allowed to drain for some days, then collected into heaps, drained again, lifted from the pans, washed and finally dried. As in most European countries a tax is levied on salt, it is obviously of advantage to trade in the dried material. The salt from the first pan is frequently utilized locally as table salt, that from the second pan goes as a rule into chemical industry, and that from the third pan is used for pickling fish, refrigerating, and as bath salt. Typical compositions of the salts thus produced are given in the following table:

	Grade I.	Grade II.	Grade III.
	%	%	%
Sodium chloride	96·0	95·0	91·0
Calcium sulphate . . .	1·0	0·9	0·4
Magnesium sulphate . .	0·2	0·5	1·0
Magnesium chloride . . .	0·2	0·5	1·2
Insoluble matter.	..	trace	0·2
Water (moisture) . . .	2·6	3·1	6·2
	100·0	100·0	100·0

In England, Germany, most of the eastern states of the United States and elsewhere where it is impracticable to manufacture salt by means of solar heat, the brines are concentrated by artificial heat. Formerly the brine was concentrated in open pans over a fire until crystallization of the salt occurred. More recently steam jacketed vessels were used, but now much of the salt produced in colder countries is manufactured in triple-effect vacuum pans. In the older method the brine, natural or artificial, is first pumped into settling tanks, where lime and magnesium salts may be precipitated by the addition of milk of lime. The excess of lime is then removed by soda ash and, after settling, the brine is delivered into the steam-heated evaporating pan (grainer) at approximately the same rate as that at which evaporation is taking place, and at a temperature only slightly below that of the brine in the grainer. To obtain a high-grade salt the bitterns are removed every day, but at less frequent intervals for coarser salt. The bitterns may be further concentrated by waste steam in a separate or "dividend" grainer, when salt suitable for refrigerating is deposited. Where multiple-effect vacuum evaporators are employed, the vacuum in each vessel is so adjusted that the steam from the first vessel is sufficiently hot to boil the brine in the second vessel, and so on. In a triple-effect system, vacua of 15, 24 and 27 inches of mercury have been found efficient, the vacuum of the third vessel representing a high degree of evacuation. With ordinary open pans, one ton of coal will produce about 2 to 2½ tons of salt, whereas it will yield 5 to 6 tons of salt with an efficient triple effect plant.

In France and Germany weak brines which could not profitably be used for salt making with the aid of artificial heat are first concentrated by a natural process. The brine is pumped to the top of a tower-like structure of scaffolding enclosing brushwood and is distributed by means of a spray over the top of the brushwood. Exposure to air and wind during the trickling down rapidly concentrates the brine which is collected in a trough and sprayed again over the brushwood until the liquor is sufficiently strong to be used in the ordinary concentrating pans. The brines at Pomeroy, Ohio, containing notable quantities of barium chloride were formerly concentrated in steam jacketed vessels without treatment to remove this salt, but it is now customary to separate barium by a preliminary addition of "salt cake" (sodium sulphate) when the precipitated barium sulphate is removed by sedimentation or filtration. By this procedure the barium chloride content of the first-grade salt has been reduced from 0·2% to negligible traces.

(2) *Manufacture from Rock Salt.*—In the Middlesborough

district of England and similar localities, fresh water is allowed to run down boreholes to the underground salt beds, remaining there until it is saturated with salt. This artificial brine is then pumped up and the salt crystallized from heated pans in the manner already described. White salt made from rock-salt is usually classified into boiled or fine, table, lump, stoved lump, superfine, basket, butter and cheese salt, unboiled and common, chemical, fishery, Scotch fishery, extra fishery, double extra fishery and bay salt. These names are derived from the size and appearance of the crystals, from their modes of production and their uses. The small crystals of boiled salts are formed in a medium constantly agitated by boiling. The fine or stoved table salts constitute the familiar white masses. Basket salt takes its name from the conical baskets in which it is allowed to drain when first drawn from the pan. Butter and cheese salts are not stove-dried, but left in moist condition, being thus more easily applied to their respective uses. Of the unboiled salts, the first two show by their names the use to which they are applied, and the others merely depend for their quality on the length of time which elapses between successive "drawings," and on the temperature of evaporation, which varies from 55° to 180° F (13° to 82° C). The time for unboiled salts varies from 12 hours to 3 or 4 weeks, the larger crystals requiring the longer time.

Where the rock-salt is of high degree of purity, as in the United States and in Galicia, the salt is ground and sieved, and comes on to the market without further treatment. A great drawback to this kind of salt is its tendency to revert to hard masses when kept in sacks. The mined salt in lumps of about 1 ft. diameter is first coarsely crushed and riddled. The coarser material is ground between rollers and the whole of the ground salt screened to four sizes, namely, oversize, no. 2, no. 3 and C.F. (common fine). The last may be further screened into three sizes including "packers fine" while the oversize is frequently sent back to the mill. In Germany a similar process is adopted, but coarser fragments of impurities such as anhydrite and gypsum are picked out by hand as the coarsely crushed rock-salt is carried past the workers on a travelling band or belt. The less pure forms of German rock-salt are purified by fusion, either alone or with soda ash and silica or with chalk and saltpetre. In some cases the fused mass is subjected to a blast of compressed air to burn away carbonaceous matter, leaving a clear, white melt, which crystallizes on cooling. After separation from the slag by concussion, the salt is ground and sieved. Alternatively, an impure salt is digested with a saturated solution of pure salt in dilute hydrochloric acid, whereby impurities such as gypsum, magnesium salts and iron oxide are dissolved. The treated salt is filtered, washed with a saturated solution of pure salt, dried, ground and graded for market.

The salt workings in Great Britain represent the annual abstraction of a mass of rock rather more than a foot in thickness spread over a square mile. This displacement leads to grave subsidences so that in certain places—Northwich and Winsford—the damage to property is so great that the houses have to be keyed up with "shaps," "face-plates" and "bolts." Saltmaking is not an unhealthy trade, an occasional slight soreness of the eyes being the only ailment, whereas the atmosphere of steam saturated with salt seems specially preservative against colds, rheumatism, neuralgia and similar troubles.

Uses and Statistics.—Table salt of fine grain and high quality will remain dry and powdery when exposed to the atmosphere, owing to the addition of just sufficient sodium carbonate or trisodium phosphate to combine with such hygroscopic impurities as calcium and magnesium chlorides. Common salt used for various manufacturing purposes is a little coarser in grain than table salt. Fishing salt, a coarse-grained quality used in fish curing, may contain up to about 5% of saline impurities. Bay salt, the coarsest grained variety, contains about 10% of impurities and is used for refrigerating. Salt is used universally as a condiment and preservative. It is employed in the meat packing, fish curing, dairy and pickle industries; for salting cattle, curing hides and refrigerating. It is indispensable to the manufacture of sodium carbonate (washing soda), caustic soda, hydrochloric acid, chlorine, bleaching powder, and many heavy and fine chemicals; the glass and soap industries are dependent upon it and it is used also in the glaze and enamel trades. As a flux it enters into metallurgical processes and has been used in the manufacture of cement to aid in the recovery of potash as a by-product. Moreover, it finds a use in farming as an insecticide and a fertilizer, and as a lick stick for cattle.

The table on p. 900 gives (in long tons) the world's production of salt for the years 1923–25. (J. J. F.; A. G. F.)

Ancient History and Religious Symbolism.—Salt must have been quite unattainable to primitive man in many parts of the world. Thus the *Odyssey* (xi. 122 *seq.*) speaks of inlanders who did not know the sea and used no salt with their food. In some parts of America, and even of India (among the Todas), salt was first introduced by Europeans; and there are still parts of central Africa where its use is a luxury confined to the rich. Indeed, where men live mainly on milk and flesh, consuming the latter raw or roasted, so that its salts are not lost, it is not necessary to add sodium chloride, and thus we understand how the Numidian nomads in the time of Sallust and the Bedouins of Hadramut at the present day never eat salt with their food. On the other hand, cereal or vegetable diet calls for a supplement of salt, and so does boiled meat.

The habitual use of salt is intimately connected with the advance from nomadic to agricultural life, *i.e.*, with precisely that step in civilization which had most influence on the cults of almost all ancient nations. The gods were worshipped as the givers of the kindly fruits of the earth, and, as all over the world "bread and salt" go together in common use and common phrase, salt was habitually associated with offerings, at least with all offerings which consisted in whole or in part of cereal elements. This practice obtained among the Greeks and Romans and among the Semitic peoples (Lev. ii. 13). As covenants were ordinarily made over a sacrificial meal, in which salt was a necessary element, the expression "a covenant of salt" (Numb. xviii. 19) is easily understood; it is probable, moreover, that the preservative qualities of salt made it a peculiarly fitting symbol of an enduring compact, and influenced the choice of this particular element of the covenant meal as that which sealed an obligation to fidelity. Hence the Greek phrase ἅλας καὶ τράπεζαν παραβαίνειν, the Arab phrase "there is salt between us," the expression "to eat the salt of the palace" (Ezra iv. 14, R.V.) and the modern Persian phrase *namak harām*, "untrue to salt," *i.e.*, disloyal or ungrateful and many others.

Salt and incense, the chief economic and religious necessaries of the ancient world, play a great part in all that we know of the ancient highways of commerce. Thus one of the oldest roads in Italy is the *Via Salaria*, by which the produce of the salt pans of Ostia was carried into the Sabine country. Herodotus's account of the caravan route uniting the salt-oases of the Libyan desert (iv. 181 *seq.*) makes it plain that this was mainly a salt-road, and to the present day the caravan trade of the Sahara is largely in salt. The salt of Palmyra was an important element in the vast trade between the Syrian ports and the Persian Gulf (*see* PALMYRA), and long after the glory of the great merchant city was past "the salt of Tadmor" retained its reputation (Mas'ūdi viii. 398). In like manner the ancient trade between the Aegean and the coasts of southern Russia was largely dependent on the salt pans at the mouth of the Dnieper and on the salt fish brought from this district (Herod. iv. 53; Dio Chrys. p. 437). The vast salt mines of northern India were worked before the time of Alexander (Strabo v. 2, 6, xv. 1, 30). The economic importance of salt is further indicated by the prevalence down to the present day of salt taxes or of government monopolies. In Oriental systems of taxation high imposts on salt are seldom lacking and are often carried out oppressively with the result that the article is apt to reach the consumer in an impure state largely mixed with earth. "The salt which has lost its savour" (Matt. v. 13) is simply the earthy residuum of such an impure salt after the sodium chloride has been washed out.

Cakes of salt have been used as money—for example, in Abyssinia and elsewhere in Africa, and in Tibet and adjoining parts.

	1923	1924	1925
British Empire	Long Tons	Long Tons	Long Tons
United Kingdom, rock salt	48,914	53,454	44,617
„ „ brine salt	1,837,968	1,992,308	1,888,973
Mauritius, sea salt	1,500*	1,500	1,500
Nigeria	400*	400	400
Somaliland, sea salt	1,707†	1,303	§
S.W. Africa	§	335	425
Sudan	9,000*	9,000	9,000
Tanganyika	1,887	4,556	4,000
Union of South Africa	61,188	§	§
Canada	184,808	188,158	208,703
Bahamas, sea salt	2,680‖	1,570	1,291
Turks and Caicos Islands, sea salt	58,060‖	52,327	62,432
Ceylon	28,279	§	§
Cyprus	766‖	22	1
India, rock salt	119,673	189,237	§
„ ¶♦brine and sea salt	1,661,483	1,434,238	§
Weihaiwei	2,000*	2,000	2,000
Australia, Victoria	40,000*	40,000	40,000
„ Western	8,000‖	8,000	8,000
„ South	50,286	62,687	78,251
Total (British sources)	4,100,000	4,100,000	4,200,000
United States of America, rock salt	1,878,216	1,843,488	2,091,637
United States of America, brine salt	2,488,606	2,244,512	2,527,576
United States of America, evaporated salt	1,999,886	1,986,210	1,995,696
Total (U.S.A. sources)	6,366,708	6,074,210	6,614,909
Other Countries			
Austria, rock salt	1,496	2,700	2,054
„ brine salt	80,457	106,682	126,651
Czechoslovakia	131,925	122,768	124,000
France, rock salt and brine salt	1,169,484	1,267,881	1,327,049
„ sea salt	332,276	§	§
Germany, rock salt	1,558,521	1,570,759	1,738,879
„ brine salt	286,883	371,214	449,468
Greece, sea salt	58,945	84,000	§
Italy, rock salt	51,906	55,982	62,956
„ brine salt	87,886	150,054	211,672
„ sea salt	612,584	588,310	626,924
Yugoslavia	45,000*	48,000*	53,623
Netherlands	25,969	31,895	34,191
Poland	357,468	636,089	§
Rumania	301,684	297,895	§
Russia	924,016	998,443#	§
Spain, rock salt	97,034	103,755	§
„ sea salt	607,288	848,989	§
Switzerland	66,951	§	§
Algeria	24,676	§	§
Belgian Congo	80*	§	§
Egypt	154,758‖	206,584	207,645
Eritrea	20,000*	20,000	20,000
Tunis	72,000	§	§
Dutch West Indies	11,605‖	§	§
Mexico	66,000*	§	§
Chile	37,627	53,513	§
Colombia	29,000*	29,000	29,000
Peru	26,096	25,000*	§
Venezuela	30,000*	30,000	30,000
China	2,000,000	2,000,000	2,000,000
Dutch East Indies	122,066	§	§
Formosa	235,400	134,000	§
French Indo-China	11,215	4,184	5,861
Japan	472,195♦	626,929	§
Philippine Islands	30,803‡	§	§
Portuguese India	12,000*	12,000	12,000
Siam	32,428▲	39,923	34,639
Anatolia	100,000*	100,000	100,000
Total (other countries)	10,500,000	11,000,000	11,500,000
World total	21,000,000	21,000,000	22,000,000

*Approximate.
†Exports via land customs to Abyssinia.
‡Incomplete.
¶Includes sea salt at Aden.
‖Exports.
§No information.
#Year ending Sept. 30th of year stated.
▲Exports for year ending March 31st of year following that stated.
♦Excluding production from salt beds.
♦Revised figures.

(*See* the testimony of Marco Polo and Colonel Yule's note on analogous customs down to our own time, in his translation of Polo ii., 48 *seq.* The same work gives interesting details as to the importance of salt in the financial system of the Mongol emperors, ii. 200 *seq.*).

In the Roman army an allowance of salt was made to officers and men, from which in imperial times this *salarium* was converted into an allowance of money for salt.

BIBLIOGRAPHY.—E. Thorpe, *A Dictionary of Applied Chemistry* (7 vol., 1921–27); F. A. Fürer, *Salzbergbau und Salinenkunde* (Brunswick, 1900); A. Larbalétrier, *Le Sel les Salines, et les Marais Salants* (1901); J. O. von Buschmann, *Das Salz, dessen Vorkommen und Verwertung, etc.* (2 vol., Leipzig, 1906–09); F. Ullmann, *Enzyklopädie der technischen Chemie* (1914 etc.); W. C. Phalen, "Technology of Salt Making in the United States," *U.S.A. Bur. of Mines Bull.* No. 146 (1917), and "Salt Resources of the United States," *U.S.A. Geol. Survey Bull.* No. 669 (1919); E. Manzella, Articles in *Annali di Chimica applicata,* vol. vii. (1917), and *Giornale di Chimica industriale ed applicata,* vol. iii. (1921); R. L. Sherlock, *Rock-Salt and Brine,* vol. xviii. of the *Memoirs* of the Geol. Survey of the U.K. (1921); Imperial Institute, *The Mineral Industry of the British Empire and Foreign Countries: Statistical Summary 1923–25* (1926).

SALTA, a north-western province of Argentina. Area, 48,302 sq.m.; pop. (1914) 140,927; 1927 (estimate) 162,424. The western part of the province is mountainous, being traversed from north to south by the eastern chains of the Andes. Indenting these, however, are large valleys or basins, of highly fertile and comparatively level land, like that in which the city of Salta is situated. The eastern part of the province is chiefly composed of extensive areas of alluvial plains belonging to the Chaco formation, whose deep, fertile soils are among the best in Argentina. This part of the province is well wooded with valuable construction timbers and furniture woods. The drainage to the Paraguay is through the Bermejo, whose tributaries cover the northern part of the province; and through the Pasage or Juramento, called Salado on its lower course, whose tributaries cover the southern part of the province and whose waters are discharged into the Paraná. The climate is hot in summer but mild in winter, and the year is divided into a wet and a dry season. Irrigation is necessary in a great part of the province, though the rainfall is abundant in the wet season, about 21 inches. Fever and ague, locally called *chucho,* is prevalent on the lowlands, but in the mountain districts the climate is healthy. There is considerable undeveloped mineral wealth, but its inhabitants are almost exclusively agriculturists. Its principal products are sugar, rum (*aguardiente*), wine, wheat, Indian corn, barley, tobacco, various tropical fruits, alfalfa and coffee. Stock-raising is carried on to a limited extent for the home and Bolivian markets. The province is traversed by a Government railway (the Central Northern) running northward from Tucumán to the Bolivian frontier, with a branch from General Güemes westward to the city of Salta (*q.v.*), the provincial capital.

The principal towns are Orán (pop. about 3,000) in the northern part of the province; Rosario de Lerma (pop. 2,500), 30 m. N.W. of Salta; and Rosario de la Frontera (pop. 1,200) near the Tucumán frontier.

Salta was at one time a part of the great Inca empire, which extended southward into Tucumán and Rioja. The first Spanish settlement was made by Hernando de Lerma in 1582.

SALTA, a city of Argentina, capital of a province of the same name, and see of a bishopric, on a small tributary (the Arias) of the Pasage, or Juramento, 976 m. by rail N.N.W. of Buenos Aires. Pop. (1914) 28,436. Salta is built on an open plain 3,560 ft. above the sea, nearly enclosed with mountains. The climate is warm and malarial in summer, but mild and pleasant in winter. Near by is the battle-field where Gen. Belgrano won the first victory from the Spanish forces (1812) in the War of Independence. There is a large *mestizo* element in the population, and the Spanish element still retains many of the characteristics of its colonial ancestors. Salta was founded in 1582 by Governor Abreu under the title of San Clemente de Nueva Sevilla, but the site was changed two years later and the new settlement was called San Felipe de Lerma. In the 17th century the name Salta came into vogue.

SALTASH, municipal borough, Bodmin parliamentary division, Cornwall, England, 5 m. N.W. of Plymouth, on the G.W. railway. Pop. (1931) 3,603. It is situated on the wooded shore of the Tamar estuary, on the lower part of which lies the port and naval station of Plymouth. Local communications are maintained by river steamers. At Saltash the Royal Albert bridge (1857–59) carries the railway across the estuary. The church of St. Nicholas and St. Faith has an early Norman tower. The church of St. Stephen retains its ornate Norman font. The town is a recruiting ground for the Royal Navy.

Saltash (Esse, 1297; Ash, 1302; Assheburgh, 1392) belonged to the manor of Trematon and at the Domesday Survey was held by Reginald de Valletort. Reginald's descendant and namesake granted a charter to Saltash about 1190. This charter was confirmed in the fifth year of Richard II. Roger de Valletort gave the borough of Saltash to the earl of Cornwall. Thenceforth the earls and subsequently the dukes of Cornwall were the lords of Saltash. The privilege of parliamentary representation was conferred by Edward VI. In 1584 Queen Elizabeth granted a charter of incorporation to Saltash. This was superseded by another in 1683. In 1832 Saltash was deprived of its two members.

SALT-BUSH, the name given especially in Australia to plants of the genus *Atriplex* (family Chenopodiaceae), which inhabit arid saline soils, notably to *A. halimoides* and *A. Nummularia,* which are cultivated for forage. *A. semibaccata,* also native to Australia, is grown as a forage plant in California, where it is known as Australian salt-bush. (*See* GREASEWOOD.)

SALTILLO, a city and the capital of the State of Coahuila, Mexico, about 615 m. by rail N. by W. of Mexico City. Pop. (1921) 40,451. Saltillo is on the Mexican National railway and another railway connects it with the important mining and industrial town of Torreón, on the Mexican Central. The city is on the great central plateau of Mexico, about 5,200 ft. above sea-level. It has a cool and healthy climate. Saltillo is an active commercial and manufacturing town, railway centre and the seat of a yearly fair of importance. Its manufactures include cotton and woollen fabrics, knitted goods and flour. The woollen *zarapes* or *ponchos* of Saltillo are among the finest produced in Mexico. There are undeveloped coal deposits in the vicinity.

Saltillo was founded in 1586 as an outpost against the Apache Indians. It became an incorporated city in 1827. In 1824 the capital of the State of Coahuila and Texas was at Saltillo. A partisan controversy removed the seat of government to Monclova in 1833, but it was returned to Saltillo in 1835. The battle of Buena Vista was fought near there on Feb. 22–23, 1847.

SALT LAKE CITY, the capital city of Utah, U.S.A., and the county seat of Salt Lake county, on the Jordan river, 11 m. E. of Great Salt Lake, at the foot of the Wasatch mountains, about equally distant from Denver, Los Angeles, San Francisco and Spokane. It is on Federal highways 30 (the Lincoln), 40, and 91; has a modern municipal airport and is the concentration and distribution point for air-mail between the Pacific coast and the East; and is served by the Denver and Rio Grande Western, the Union Pacific, the Western Pacific, and several electric railways, and by aeroplane lines to Chicago, San Francisco, Los Angeles, Seattle and Great Falls. The population was 118,110 in 1920 (82% native white) and was 140,267 in 1930.

Physical Aspect and Buildings.—Salt Lake City is the largest city between the Rockies and the coast, and is the headquarters of the Church of Jesus Christ of Latter-Day Saints (Mormons), by whom it was founded and who are still the largest single element in the population. It has an area of 52·3 sq.m.; an altitude of 4,255 ft.; and is almost surrounded by mountain peaks, some of which reach a height of 12,000 feet. The site was chosen by Brigham Young (*q.v.*), and the basic plan of the city was determined by the original survey under his direction, which laid it out in ten-acre blocks, separated by streets 132 ft. wide. In one of these blocks (Temple square, originally the centre of the community) stand the great Mormon temple which no "gentile" may enter, built of grey granite (1853–93) with walls six feet thick and six spires, the highest (220 ft.) surmounted by a copper statue of the angel Moroni; the tabernacle (a low building seating 10,000, with a turtle-shaped roof unsupported by pillars or beams) where recitals are given daily on the magnificent organ (5,500 pipes); the assembly hall, also of granite, seating 2,500; a Bureau of Information and a Museum of Pioneer Relics; the first house built in Utah (enclosed in a protecting shelter); monuments to Joseph Smith and his brother Hyrum; and a monument to the sea-gulls which at a critical hour of the early colony's history saved the crops and all the vegetation from destruction by grasshoppers. In the adjoining block are the administration building of the Church; Eagle Gate, formerly the entrance to Brigham Young's estate; the Beehive house and the Lion house, two of his residences. The State capitol (a fine colonnaded building of marble and Utah granite, completed in 1916) stands half a mile N.E. of Temple square, at the head of State street (a long, straight thoroughfare) on an eminence commanding the entire valley and backed by the mountains. Immediately east of it is Memory Grove, a park created in honour of the veterans of the World War, at the entrance to City Creek canyon. On the east edge of the city is the 92-ac. campus of the University of Utah (established by the Provisional Government of the State of Deseret in 1850), which has an attendance of over 2,600. Beyond the university is Ft. Douglas, a regimental garrison post, and in the mountains near by is the army's transcontinental radio station. At the entrance to Emigration Canyon, east of the military reservation, is a point (marked by Pioneer monument) where Brigham Young looked down over the valley and said he recognized the site that had been shown him in a vision. The State prison stands in the southern part of the city. Public parks and playgrounds cover 1,035 acres. Saltair, 15 m. west of the city, is a popular pleasure resort on the lake (in which it is impossible to sink, on account of the large amount [about 22%] of salt in the water).

Churches and Schools.—Of the 130 churches, about half are Mormon chapels, and the rest (including a Roman Catholic cathedral) represent most of the faiths and denominations commonly found in American cities. The public school system comprises 48 elementary, seven junior high, and two senior high schools, and a part-time school for boys and girls who go to work before the age of 18. There are several private schools; a junior college under Presbyterian auspices (Westminster; established 1897); and various hospitals and charitable institutions. Interest in music, the dance, and the drama was fostered from the beginning by Brigham Young. The Tabernacle choir (500 voices) is one of the best choruses in the United States, and the Salt Lake theatre (one of the foremost in design and appointments when it was built in 1862) has had a brilliant history. Salt Lake City ranked second among the large cities of the country in 1920 in the proportion of children and young people attending school and in literacy. The general death rate and the infant mortality are among the lowest in the country. Since 1911 the city has had a commission form of government. The assessed valuation of property for 1927 was $194,146,087.

Commerce and Industry.—Salt Lake City is the commercial, financial and industrial centre of the State of Utah and of a large additional part of the inter-mountain territory. It is the seat of the fourth branch (established 1918) of the Federal Reserve Bank of San Francisco, serving 31 counties in Idaho and four in Nevada besides the entire State of Utah. Debits to individual accounts in the local banking institutions amounted in 1927 to $881,787,000. Manufacturing has expanded rapidly since the World War. More than 100 national firms have established branch factories or distributing offices here, to supply the natural trade territory of the city (500,000 sq.m.), and many local industries have extended their markets to cover the country. Among the leading industries are slaughtering and meat-packing, printing and publishing, the refining of oil, the smelting of silver, lead and copper, and the manufacture of beet sugar, candy, flour and radio equipment. Salt Lake City makes a third of all the "loud speakers" for radios produced in the United States. Receipts at the stockyards totalled nearly 1,000,000 head in 1926, of which the local packing-plants used 155,000 head. There is an oil refinery covering 120 acres. The suburb of Murray, 7 m. S. (population in 1920; 4,584) is a great smelting centre.

History.—The history of the city is bound up with that of the Mormons (*q.v.*) and of the State (*see* UTAH). On July 22, 1847, an advance party of Mormons, led by Orson Pratt and Erastus Snow, in search of a place where they might "colonize in peace and safety," entered the Salt Lake valley. On July 24, Brigham Young arrived and approved the site, and on July 28 he chose the spot for the temple. Ploughing and planting were begun forthwith; the hard sun-baked earth was flooded by building a dam in City Creek canyon; and an irrigation system was devised. The city was named the City of the Great Salt Lake, and was so called until 1868. Before the end of 1847 the main body of the people arrived. A theocratic government was set up, with a bishop in charge of each of the 19 wards into which the community was divided. The settlers were American citizens squatting on foreign soil, for the region at that time belonged to Mexico, and they were practically beyond the reach of any civil government, as their leaders had desired. This isolation was of brief duration. The Treaty of Guadalupe-Hidalgo, at the close of the Mexican War, transferred the region to the United States, and after the discovery of gold in California, the city was overrun with caravans of treasure-seekers. Many of the colonists deserted to join the stream of prospectors, notwithstanding the attitude of their leader, who opposed the exploitation of mineral wealth (even in Utah) and whose ideal was a community of farmers, merchants and manufacturers. Those who stayed at home grew rich as outfitters. There was a considerable immigration from Europe in the early years, especially from England, where the Mormon missions were very successful. By 1850 the city had a population of 6,000. It was chartered in 1851 by the Territorial legislature of Utah. After the Civil War the non-Mormon population steadily increased, and there was a long period of conflict between the opposing elements, as well as officially between the Mormon Church and the U.S. Government over the practice of polygamy and other matters of dispute (*see* MORMONS), all of which happily is now long past. The population of the city has grown steadily, more than doubling itself in each 20-year period since 1860.

SALTO, the third city of Uruguay in population and importance, capital of the department of the same name. Pop. (1927) about 30,000. It lies on the Uruguay river opposite the Argentine town of Concordia, 336 m. (590 km.) by railway from Montevideo and 221 m. (356 km.) by water from Buenos Aires. It is 90 m. (144 km.) above its rival city of Paysandu, and 12 m. (19 km.) below the rapids which mark the end of the navigation of the Uruguay river for large steamers. Salto is reached by rail from Montevideo by the Central railway to Paso de los Toros and thence by Midland railway, via Paysandu. The Northwestern Uruguay railroad runs from Salto to the Brazilian border at Santa Rosa (112 m. or 181 km.), where it connects with the Brazilian railways. The Mihanovitch steamship lines give good river boat service. The Salto region is an important stock raising centre, notable for the high grade of its cattle. There are packing houses and wine factories and the region produces varied agricultural wealth. The town is modern, well lighted and paved.

The province of Salto covers 4,855 sq.m., with a population of 83,690, or 17·2 per square mile, slightly less than the average for the country, which is 21·17. A large proportion of the population are Brazilians, as the province borders on Brazil. The country is rolling prairie, devoted very largely to cattle raising, with the exception of farms and vineyards about the principal towns.

SALTPETRE, the commercial name given to three naturally occurring nitrates, distinguished as (1) ordinary saltpetre, nitre or potassium nitrate, (2) Chile saltpetre, cubic nitre or sodium nitrate (3) wall saltpetre or calcium nitrate. These nitrates generally occur as efflorescences caused by the oxidation of nitrogenous matter in the presence of the alkalis and alkaline earths.

1. **Ordinary Saltpetre or Potassium Nitrate,** KNO_3, occurs, mingled with other nitrates, on the surface and in the superficial layers of the soil in many countries, especially in certain parts of India, Persia, Arabia and Spain. The deposits in the great limestone caves of Kentucky, Virginia and Indiana have been probably derived from the overlying soil and accumulated by percolating water; they are of no commercial value. The actual formation of this salt is not quite clear; but it is certainly conditioned by the simultaneous contact of decaying nitrogenous matter, alkalis, air and moisture. The demand for saltpetre as an ingredient of gunpowder led to the formation of saltpetre plantations or nitriaries, which at one time were common in France, Germany and other countries; the natural conditions were simulated by exposing heaps of decaying organic matter mixed with alkalis (lime, etc.) to atmospheric action. The salt is obtained from the soil in which it occurs naturally, or from the heaps in which it is formed artificially, by extracting with water, and adding to the solution wood-ashes or potassium carbonate. The liquid is filtered and then crystallized. Since potassium nitrate is generally more serviceable than the sodium salt, whose deliquescent properties inhibit its use for gunpowder manufacture, the latter salt, of which immense natural deposits occur (*see* below), is converted into ordinary saltpetre in immense quantities. This is generally effected by adding the calculated amount of potassium chloride (of which immense quantities are obtained as a by-product in the Stassfurt salt industry) dissolved in hot water to a saturated boiling solution of sodium nitrate; the common salt, which separates on evaporating the solution, is removed from the hot solution, and on cooling, the potassium nitrate crystallizes out and is separated and dried.

As found in nature, saltpetre generally forms aggregates of delicate acicular crystals, and sometimes silky tufts, but not as distinctly developed crystals. When crystallized from water, crystals belonging to the orthorhombic system, and having a prism angle of 61° 10′, are obtained; by the evaporation of hot solutions, unstable rhombohedra may be obtained, but these rapidly revert to the more stable form on cooling. The hardness is 2, and the specific gravity 2·1. It is fairly soluble in water; 100 parts at 0° C dissolving 13·3 parts of the salt, and about 30 parts at 20°; the most saturated solution contains 327·4 parts of the salt in 100 of water; this solution boils at 114·1°. It fuses at 339° to a colourless liquid, which solidifies on cooling to a white fibrous mass, known in pharmacy as *sal prunella.* It is an energetic oxidizing agent, and on this property its most important applications depend. At a red heat it evolves oxygen with the formation of potassium nitrite, which, in turn, decomposes at a higher temperature. Heated with many metals it converts them into oxides, and with combustible substances, such as charcoal, sulphur, etc., a most intense conflagration occurs. Its chief uses are in glass-making to promote fluidity, in metallurgy to oxidize impurities, as a constituent of gunpowder and in pyrotechny; it is also largely used in the manufacture of nitric acid.

Potassium nitrate was used at one time in many different diseased conditions, but it is now never administered internally, as its extremely depressant action upon the heart is not compensated for by any useful properties which are not possessed by many other drugs. One most valuable use it has, however, is the treatment of asthma. All nitrites (*e.g.*, sodium nitrite, ethyl nitrite, amyl nitrite) cause relaxation of involuntary muscular fibre and therefore relieve the asthmatic attacks, which depend upon spasm of the involuntary muscles in the bronchial tubes. Saltpetre may be made to act as a nitrite by dissolving it in water in the strength of about fifty grains to the ounce, soaking blotting-paper in the solution and letting the paper dry. Pieces about 2 in. square are then successively put into a jar and lighted. The patient inhales the fumes, which contain a considerable proportion of nitrogen oxides. This treatment is frequently very successful indeed in relaxing the bronchial spasm upon which the most obvious features of an attack depend.

2. **Chile Saltpetre, Cubic Nitre** or sodium nitrate, $NaNO_3$, occurs under the same conditions as ordinary saltpetre in deposits covering immense areas in South America, which are known locally as *caliche* or *terra salitrosa,* and abound especially in the provinces of Tarapaca and Antofagasta in Chile, the fields being confined to a narrow strip of country 2½ miles in width and 260 miles in length. The nitrate forms beds, varying in thickness from 6 in. to 12 ft., under a covering of conglomerate locally known as *lostra,* which is itself overlaid by a loose sandy soil. The conglomerate consists of rock fragments, sodium chloride and

various sulphates, cemented together by gypsum to form a hard compact mass 6 to 10 ft. in thickness. The caliche has often a granular structure, and is yellowish-white, bright lemon-yellow, brownish or violet in colour. It contains from 48 to 75% of sodium nitrate and from 20 to 40% of common salt, which are associated with various minor saline components, including sodium iodate and more or less insoluble mineral, and also some organic matter, *e.g.*, guano, which suggests the idea that the nitrate was formed by the nitrification of this kind of excremental matter. The caliche is worked up *in loco* for crude nitrate by extracting the salts with hot water, allowing the suspended earth to settle, and then transferring the clarified liquor, first to a cistern where it deposits part of its sodium chloride at a high temperature, and then to another where, on cooling, it yields a crop of crystals of purified nitrate. The nitre thus refined is exported chiefly from Valparaiso, whence the name of "Chile Saltpetre." The mother liquors used to be thrown away, but are now utilized for the extraction of their iodine (*q.v.*).

Chemically pure sodium nitrate can be obtained by repeated recrystallization of Chile saltpetre or by synthesis. It forms colourless, transparent rhombohedra, like those of Iceland spar; the crystals are almost cubic: hence the name of "cubic saltpetre." One hundred parts of water at 0° and at 100° dissolve 72·9 and 180 parts of the salt; at 120°, the boiling-point of the saturated solution, 216 parts. The salt fuses at 316°; at higher temperatures it loses oxygen (more readily than the corresponding potassium salt) with the formation of nitrite, which, at very high temperatures, is reduced ultimately to a mixture of peroxide, Na_2O_2, and oxide, Na_2O. The chief applications of Chile saltpetre are in the nitric acid industry, in the manufacture of ordinary saltpetre, and particularly as a fertilizer. When quite pure, it is only very slightly hygroscopic.

3. **Wall-saltpetre or Lime Saltpetre,** calcium nitrate, $Ca(NO_3)_2$, is found as an efflorescence on the walls of stables; it is now manufactured in large quantities from atmospheric nitrogen. (*See* NITROGEN, FIXATION OF.) Its chief applications are as a manure and in the nitric acid industry.

SALT RANGE, a hill system in the Punjab and North-West Frontier Provinces of India, deriving its name from its extensive deposits of rock salt. The range commences in Jhelum district, in the lofty hill of Chel (3,701 ft.), on the right bank of the river Jhelum, traverses Shahpur district, crosses the Indus in Mianwali district, thence a southern branch forms the boundary between Bannu and Dera Ismail Khan until it finally merges in the Waziristan system of mountains. The salt range contains the great mines of Mayo, Warcha and Kalabagh, which supply the wants of all Northern India. Coal of an inferior quality is also found.

SALTYKOV (STCHEDRIN), MICHAEL EVGRAFOVICH (1826–1889), Russian satirist, was born on his father's estate in the province of Tula, Jan. 15 (27), 1826. In 1848 he published *Zaputennoye Dyelo* ("A Complicated Affair"), which led to his banishment to Vyatka, where he spent eight years as a minor government official. The clever picture of Russian provincial officials in his *Gubernskie Otcherki* ("Provincial Sketches") resulted from this experience. After an interval given to writing he was appointed deputy governor, first of Ryazan and then of Tver. On his return to St. Petersburg in 1864 he was appointed president of the local boards of taxation successively at Penza, Tula and Ryazan. In 1868 he finally quitted the civil service. His principal works are: *Poshekhonskaya Starina* ("The Old Times of Poshekhona"), *Istoria odnavo Goroda* ("The History of a Town"); A Satirical History of Russia; *Messieurs et Mesdames Pompadours;* and *Messieurs Golovloff.* He died in St. Petersburg on April 30 (May 12), 1889.

SALUS, an ancient Roman goddess of safety (from defeat, etc.). In 302 B.C. a temple on the Quirinal was dedicated to Salus (Livy x. 1), Salus being identified with Hygieia (*q.v.*). *See* Wissowa, *Relig. u. Kultus,* p. 131.

SALUTATIONS or GREETINGS, the customary forms of kindly or respectful address, especially on meeting or parting or on occasions of ceremonious approach. Etymologically *salutation* (Lat. *salutatio,* "wishing health") refers only to words spoken.

Embraces.—Forms of salutation frequent among savages and barbarians may persist almost unchanged in civilized custom. The habit of affectionate clasping or embracing is seen at the meetings of the Andaman islanders and Australian blacks, or where the Fuegians in friendly salute hug "like the grip of a bear." This natural gesture appears in old Semitic and Aryan custom.

Rubbing Noses.—The salute by smelling or sniffing (often called by travellers "rubbing noses") belongs to Polynesians, Malays, Burmese and other Indo-Chinese, Mongols, etc., extending thence eastward to the Eskimo and westward to Lapland.

Kissing.—The kiss, the salute by tasting, appears constantly in Semitic and Aryan antiquity. Herodotus describes the Persians of his time as kissing one another—if equals on the mouth, if one was somewhat inferior on the cheek (Herod. i. 134). In Greece, in the classic period, it became customary to kiss the hand, breast or knee of a superior. In Rome the kisses of inferiors became a burdensome civility (Martial xii. 59). The early Christians made it the sign of fellowship: "greet all the brethren with an holy kiss." Of more ceremonial form is the kiss of peace given to the newly baptized and in the celebration of the Eucharist, which is retained by the Greek church. After a time, by ecclesiastical regulations, men were only allowed to kiss men, and women women, and eventually in the Roman Catholic Church the ceremonial kiss at the communion was only exchanged by the ministers, a relic or cross called an *osculatorium* or *pax* being carried to the people to be kissed. While the kiss has thus been adopted as a religious rite, its original social use has continued. Among men, however, it has become less effusive. Court ceremonial keeps up the kiss on the cheek between sovereigns and the kissing of the hand by subjects. When these osculations cease to be performed they are still talked of by way of politeness: Austrians say, *"Küss d' Hand!"* and Spaniards, *"Beso a Vd. las manos!"* ("I kiss your hand!"). Strokings, pattings and other caresses have been turned to use as salutations.

Weeping.—Weeping for joy is sometimes affected as a salutation. Highly ceremonious weeping is performed by several rude races when, meeting after absence, they renew the lamentations over those friends who have died in the meantime. Among the Australian natives, the male nearest of kin presses his breast to the newcomer's, and the nearest female relative, with piteous lamentations, embraces his knees with one arm, while with the other she scratches her face till the blood drops. Obviously this is mourning. So, too, the New Zealand *tangi* is performed at the reception of a distinguished visitor, whether he has really dead friends to mourn or not. Weeping, as A. R. Brown has shown, is for the Andamanese a rite for the revival of sentiments that have lain dormant, the renewal of interrupted social relations and for the recognition of a change in personal relations.

Cowering.—Cowering or crouching is a natural gesture of fear or inability to resist. Its extreme form is lying prostrate, face to the ground. In barbaric society, as soon as distinctions are marked between master and slave, chief and commoner, these tokens of submission become salutations. The sculptures of Egypt and Assyria show the lowly prostrations of the ancient East, while in Dahomey or Siam subjects crawl before the king. A later stage is to suggest, but not actually perform, the prostration, as the Arab bends his hand to the ground and puts it to his lips or forehead, or the Tongan would touch the sole of a chief's foot, thus symbolically placing himself under his feet.

Kneeling.—Kneeling prevails in the middle stages of culture, as in the ceremonial of China; Hebrew custom sets it rather apart as an act of homage to a deity; mediaeval Europe distinguishes between kneeling in worship on both knees and on one knee only in homage.

Bowing.—Bowing, as a salute of reverence, appears in its extreme in oriental custom, as among the ancient Israelites: "bowed himself to the ground seven times." The Chinese according to the degree of respect implied bow kneeling or standing. The bowing salutation, varying in Europe from something less than the Eastern salaam down to the slightest inclination of the head,

is given mutually. Uncovering is a common mode of salutation, originally a sign of disarming or defencelessness or destitution in the presence of a superior. Taking off the hat by men has for ages been the accepted mode in the Western world. Some Eastern nations are apt to see disrespect in baring the head, but insist on the feet being uncovered. Europeans have been called on to conform to a native custom by taking off their shoes to enter the royal presence. In Burma it is respectful to squat in the presence of a superior; elsewhere the inferior should stand.

Handshaking.—Grasping hands appears in antiquity as a legal act symbolic of the parties joining in compact, peace or friendship. In marriage, the hand grasp was part of the ancient Hindu ceremony, as was the "dextrarum iunctio" in Rome, which passed on into the Christian rite and became a mere salutation.

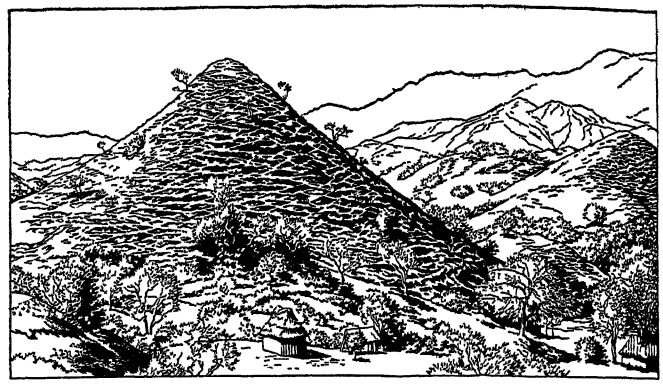
Words of Greeting.—As to words of salutation, even among the lower races certain ordinary phrases have passed into formal greetings. Many formulas express difference of rank and consequent respect, as where the Basuto salute their chiefs with *"Tama sevata!" i.e.,* "Greeting, wild beast!" Congo negroes returning from a journey salute their wives with an affectionate *"Okowe!"* but they, meekly kneeling round him, may not repeat the word, but must say *"Ka! ka!"* Among cultured nations, salutations are apt to be expressions of peace and goodwill. Such formulas run on from age to age, and the latter may be traced on to the Muslim greeting, *"Salām ʿalaikum!"* ("The peace be on you"), to which the reply is *"Wa-ʿalaikum as-salām!"* ("And on you be the peace," *sc.* "of God!"). This greeting is a password among fellow believers, for it may not be used by or to an infidel. The Babylonian form, "O king, live for ever!" (Dan. iii. 9), represents a series of phrases, which continue still in the *"Vivat rex!"* ("Long live the king!"). The Greeks said "Be joyful!" both at meeting and parting. The Romans applied *"Salve!"* ("Be in health!") especially at meeting, and *"Vale!"* ("Be well!") at parting. In the modern civilized world, everywhere, the old inquiry after health appears, the "How do you do?" becoming so formal as often to be said on both sides, without either waiting for an answer. Hardly less wide in range is the set of phrases "Good day!" "Good night!" etc., varying according to the hour and translated into every language of Christendom. Among other European phrases, some correspond to our "Welcome!" and "Farewell!" while the religious element is exemplified by our "Good-bye!" ("God be with you!") and French *"Adieu!"* Such half-meaningless forms of salutation serve the purpose of keeping up social intercourse.

SALUZZO, a city and episcopal see of Piedmont, Italy, in the province of Cuneo, 42 m. S. of Turin by rail, 1,296 ft. above sea-level. Pop. (1921) 11,976, town; 15,680, commune. The upper town preserves some part of the fortifications which protected it when, previous to the plague of 1630, the city had upwards of 30,000 inhabitants. The old castle of the marquises of Saluzzo (the line runs 1142–1548) now serves as a prison. Besides the Gothic cathedral (1480–1511), with the tombs of the marquises, the churches of San Giovanni (formerly San Domenico), San Bernardo and the Casa Cavazza, now the municipal museum, are noteworthy. Railways run to Cuneo and Airasca (the latter on the Turin-Pinerolo line).

Henry IV. restored the marquisate to Charles Emmanuel I. of Savoy at the peace of Lyons in 1601.

SALVADOR or **EL SALVADOR** (sometimes incorrectly called San Salvador from its capital city), the smallest and most densely populated republic of Central America and probably the most intensively cultivated country in Latin America. It is bounded on the north and east by Honduras, on the south by the Pacific ocean and on the west and north-west by Guatemala. It is the only republic of Central America which has no Atlantic seaboard. Pop. (estimated, as of Jan. 1, 1927) 1,657,000. The republic is 140 m. long from east to west, and 60 m. wide; its greatest length is about 160 miles. Its area is 13,176 sq.m. (34,126 sq.km.); the population density is thus about 125 per sq.m., a greater density than that of any other national area in the Western Hemisphere.

Physical Features.—The chief physical features of Salvador are the two mountain chains, largely independent of the central Cordillera of Central America, which cross the country and the rich river valleys (chiefly that of the Río Lempa). The mountains are accented by a series of volcanic cones, some of ancient and some of recent origin, which cross the country from east to west. Most of the area of the country is comprised in the plateau,



A HILL IN THE MINING SECTION OF NORTHERN SALVADOR, SHOWING THE GOAT PATHS CORRUGATED DURING THE RAINY SEASONS

some 2,000 ft. high, between the mountain chains, the region in which the coffee of Salvador is cultivated, and in which are situated the volcanoes. The Río Lempa rises in Guatemala, crosses a corner of Honduras, and entering Salvador near Citala, flows east, forming its famously rich and beautiful valley, turns south at the base of the volcano Siguatepeque, and enters the Pacific at 80° 40′ W. The Lempa is the only river of importance, and although it can be navigated for portions of its course, is little used. The Río San Miguel drains the country between the Bay of Fonseca and the Lempa valley. The volcanoes are clustered into more or less well defined groups, and in some of these beautiful crater lakes are found; the largest of these, Lake Ilopango, has been used as a landing place for seaplanes. The most important volcanic groups are, from west to east: the Izalco group, including Izalco (thrown up in 1770), Marcelino, Santa Ana (8,300 ft.), Naranjos, Águila, San Juan de Dios, Apaneca, Tamajaso and Lagunita; the San Salvador group, 30 m. east, the chief cone of which is San Salvador; Cojutepeque to the north-east; the San Vicente group farther east, marked by San Vicente volcano and Lake Ilopango; and the San Miguel group, to the south-east, including notable landmarks like San Miguel (7,120 ft.), Chinameca, Buenapa, Usulatan, Tecapa and Taburete. Two other volcanoes, Cacaguateque and Sociedad, in the north-eastern portion of the country, lie in the Cordillera and are not to be taken as part of the Salvador groups proper. Many of these volcanoes are in eruption, and San Miguel has had violent outbursts in recent years. In 1923 San Salvador suffered an eruption which destroyed the coffee crop and damaged the city. But plants whose crops are destroyed by eruptions of volcanic dust invariably come up again with renewed vigour.

Climate.—Salvador has, in general, a climate similar to that described under Central America, but locked in as it is by the Cordillera which marks its boundaries with Guatemala and Honduras, it has an almost temperate climate, on the table-land and along the mountain slopes, which are intensively cultivated for coffee, often to the very summits of the hills or volcanoes. The lowland is often hot and sultry when the winds are not blowing. The recognized seasons are the wet and the dry, the wet season, from May to October, being confusingly called "winter" in Salvador, the dry season, from November to April, "summer." Winds and thunderstorms mark the middle of the wet season, in July and August, and in September and October the rains are almost continuous, but moderate. Following the August storms, there is a brief dry spell, the "dog days," *veranillo* or "little summer," when crops are planted and preparations made for obtaining the greatest productivity from the soil. In the earlier days, when Salvador suffered from revolutions, there was a tradition that no revolution could be fought during the *veranillo,* as both

armies insisted on returning home to attend to their planting.

The geology, flora and fauna of Salvador are described in the article CENTRAL AMERICA.

Inhabitants.—As noted above, Salvador has a population of about 1,657,000, and is densely inhabited, a large proportion of the people living on farms, and the number of landowners including a very large number of small landholders; these small farmers raise coffee and sugar which is milled in larger properties or *centrals*, which buy the crops or prepare it for the market on a percentage basis. In 1887 the population was put at 664,513; in 1901 it was 1,006,848; in 1906, 1,116,253. The chief cities are San Salvador, the capital (84,315), San Miguel (35,546), San Vicente (31,927), Sonsonate (16,233), Santa Tecla (27,279), La Unión (6,946), the principal seaport.

The people of Salvador are made up of white, chiefly Spanish, stock (about 10%); mixed blood, Spanish and Indian (about 50%); and Indian (40%). There are very few negroes. The rulers are chiefly of the white group, and this strain is jealously guarded; the large coffee owners are whites of Spanish colonial origin, there being some foreigners, but no such proportion of German-owned coffee estates as in Guatemala, for instance. The Indians of Salvador constitute an important element of the population, being industrious, efficient and commanding, as a class, higher wages on the plantations than the mixed bloods of similar social groups; the Indian villages are still largely segregated by their own choice, but they have their own little coffee farms and work at wages, with their families, for the white owners of the larger estates.

Industry and Agriculture.—Salvador aspires to become an industrial country, and the dense population, the character of the people and the geographical location tend to make this a likelihood of the future, when indeed electric power may possibly be developed in industrial quantity from such sources as Lake Ilopango, although the danger of earthquakes which would destroy reservoirs makes capital timorous in this direction. Meanwhile, although there are local manufacturing industries, Salvador is an agricultural State chiefly, and produces coffee, sugar and specialities in quantities which make it an important factor, in proportion to its size, in world markets. Coffee is the chief crop, the exports amounting to about 100,000,000 lb. annually, more than 80% of the exports. Sugar is second, with exports of approximately 21,000 tons. Maize, which is shipped to neighbouring Central American countries, including Costa Rica and Nicaragua, is third. Beans are a similar food crop, and some wheat is also exported. Of the specialities, balsam of Peru and indigo are the chief, and both are important. Balsam, a healing drug (*q.v.*), is produced solely in Salvador, the misnomer coming down from early Spanish days, when Peru was best known. There is some mining, about 200 mining establishments being listed as in operation, but the total exports, chiefly gold, reach only about £250,000 annually.

Commerce and Trade.—With 80% of the production of the country devoted to coffee, the exports and indeed the imports depend largely on the crop and its price, and in recent years both have been excellent; hence Salvador has prospered greatly. The following data show the tendencies:—

Year	Imports	Exports
1923	£2,060,795	£2,346,253
1924	2,324,111	5,415,000
1925	3,419,000	3,474,000
1926	3,374,434	5,079,611

Salvador now exports much of her coffee by rail through Guatemala and Puerto Barrios, but the bulk still travels abroad through the three seaports, Acajutla, the terminus of the old Salvador railway, a British property; La Libertad, the port of San Salvador, but not greatly used for freight, and La Unión, the modern port at the southern terminus of the International Railways of Central America. The coasting vessels that touch the Panama canal and northward make one or more of these stops in Salvador.

Communications.—The interior is well supplied with railways and with highways. The Salvador railway was opened in 1882, and the International Railways finished their Salvador line to La Unión in 1922 and connected up with the Guatemala line in 1929. There is a short railway to Santa Tecla, near San Salvador, a line which is projected to be continued to La Libertad at some future date. The highways have been well developed, the older road, of dirt, having been built and kept up for many years, and in recent years, paved city streets and properly graded and surfaced highways having opened up the interior. The highway to La Libertad from San Salvador has been built and improved twice since it was first projected.

Finance.—The external debt of Salvador is (1927) £1,946,586, in English pounds and about $6,000,000 in U.S. dollars, all under the 1923 gold bond issue, which was one of the first of the modern issues of Latin American securities. A portion of the debt bears 8% (the remainder, which replaced outstanding obligations, draws 6%), in spite of the fact that the interest and amortization are guaranteed by a fiscal agent, whose issue of stamps must be used for payment of most of all customs duties. Since 1923, when the loan was floated, Salvador has enjoyed a surplus of revenues, when prior to that time there was almost invariably a deficit. The figures since 1923 are as follows, in American dollars:—

Year	Revenue	Expenditures
1923	$13,925,206	$14,865,172
1924	17,883,756	14,821,949
1925	20,320,309	20,271,074
1926	22,314,798	21,922,930

The unit of currency is the *colón*, established on July 16, 1920, at a value of 50 cents, U.S. currency. The *colón* is divided into 100 *centavos*, and subsidiary silver and nickel coins are issued. U.S. currency is legal tender for all debts. There are three banks authorized to issue paper currency, the Banco Salvadoreño, the Banco Occidental and the Banco Agrícola Comercial. On Dec. 31, 1926, there were 15,904,868 *colones* of paper in circulation, secured with a gold reserve of 65% of their face value.

Government.—The present Constitution of Salvador was promulgated Aug. 13, 1886, and provides for the three divisions of government. The legislative function is vested in a congress of a single chamber, which meets annually between Feb. 1 and 15, for 40 sessions; other sessions may be called for special purposes by the president. The chamber has 42 members, 3 from each department elected by popular vote for one-year terms. Voting is obligatory on every male citizen of 18 years or over. The president and vice president are elected by popular vote for four-year terms, and may not succeed themselves for the ensuing four-year term. The president of Salvador is Dr. Pío Romero Bosque, whose term expires on March 1, 1931. The president has four cabinet officers, who are required to attend meetings of congress and to answer inquiries from the deputies. The judiciary is composed of a supreme court, one court of third instance, and several of first and second instance. The supreme court is composed of three judges of third instance, and four of second instance. Salvador is divided into 14 departments presided over by governors appointed by the president for terms of four years.

Education and Religion.—In 1926 there were 849 public schools with 1,555 teachers and 51,933 enrolled pupils, ten travelling teachers serving rural schools. There were also 37 private schools and 61 municipal schools. In secondary education there were the National Institute and 16 private lyceums, two normal schools and the National university with faculties of arts and the professions. The Roman Catholic religion prevails, although there is freedom of worship. The church is headed by an archbishop in San Salvador and bishops in Santa Ana and San Miguel.

History.—Salvador was conquered by Pedro de Alvarado, Cortés' doughty lieutenant, who invaded the present republic in 1524 and early the next year met and defeated the Indians and captured their capital, Cuscatlan, placing the rule of the new region under the captain-generalcy of Guatemala. Salvador declared her independence from Spain with the other countries of Central America, on Sept. 15, 1821, and her history was that of Central America during the early period (*see* CENTRAL AMER-

ICA). The independent history of Salvador has been marked by a number of revolutions and by wars between the Central American countries described in the article on Central America. During the World War Salvador remained neutral, apparently following the leadership of President Carranza of Mexico. Later her foreign minister called upon the United States for a statement of the Monroe Doctrine, as mentioned in the Versailles Treaty. In 1921 Salvador issued an extra-official denial of Mexican influence.

BIBLIOGRAPHY.—The recent literature on Salvador is confined to books on Central America. Amongst them are Wallace Thompson, *Rainbow Countries of Central America* (1926); D. G. Munro, *The Five Republics of Central America* (1916). *See* also P. F. Martin, *Salvador of the Twentieth Century* (1911); J. Leiva, *The Republic of El Salvador* (1913); F. Gavidia, *Historia moderna del Salvador* (1917); L. Quiñónez, *La cuestión económica* (1919); Department of Overseas *Trade Reports*, annual series (London, 1923 *seq.*); H. G. James and P. A. Martin, *The Republics of Latin America* (1923); L. E. Elliott, *Central America* (1924); W. S. Robertson, *History of the Latin-American Nations* (1925). (W. THO.)

SALVAGE, includes a service rendered voluntarily by a person by saving life or property from peril, and also the reward for such service and in certain cases the thing saved, as from fire on land. Usually the word is employed in reference to salvage at sea, which has two divisions: (1) civil salvage, (2) military salvage.

Civil Salvage.—This is defined in English law as such a service as may become the ground of a reward in an admiralty court, and arises from the preservation of life or property from dangers of the sea. The jurisdiction to give it is an admiralty jurisdiction. But the right to reward was recognized in the courts of common law before the admiralty court became, as it now is, a part of the High Court of Justice, *e.g.*, by enforcing a possessory lien of the salvor over the salved property. The origin of the rule has been traced to the doctrine of Roman law that "spontaneous services" in the protection of lives and property should be rewarded. But that doctrine has not found a place in English law, except as part of the maritime law administered in the court of admiralty. Thus services on land, as in rescuing lives or houses or goods from fire, do not entitle the person rendering those services to reward, unless he has acted under some contract or employment. But at sea or in a harbour or dock the right to reward springs from the service itself if it has been rendered to a ship, or her passengers, crew or cargo, or to property which has been thrown or washed out of her.

The right to salvage for saving lives from ships is the creation of modern statutes. Formerly the admiralty court treated the fact that lives had been saved as enhancing the merit of a salvage of property by the same salvors, where the two could be connected; and so indirectly gave life salvage. And this is still the position in cases where the Merchant Shipping Act of 1894 does not apply. This act (s. 544) applies to all cases in which the "services are rendered wholly or in part within British waters in saving life from any British or foreign vessel, or elsewhere in saving life from any British vessel." Also (s. 545) it can be applied, by Order in Council, to life salvage from ships of any foreign country whose Government "is willing that salvage should be awarded by British courts for services rendered in saving life from ships belonging to that country where the ship is beyond the limits of British jurisdiction." By s. 544 life salvage is made payable "by the owner of the vessel, cargo or apparel saved"; and is to be paid in priority to all other claims for salvage. Where the value of the vessel, cargo and apparel saved is insufficient to pay the life salvage, the Board of Trade may in their discretion make up the deficiency, in whole or in part, out of the Mercantile Marine Fund. The effect of the act is to impose a common responsibility upon the owners of ship and cargo to the extent of their property saved. Whatever is saved becomes a fund out of which life salvors may be rewarded, and to which they are entitled in priority to other salvors. By the Maritime Convention Act 1911 a master who does not render assistance to any person in danger of being lost at sea is guilty of a misdemeanour.

This limitation of the reward to the amount of the property salved also applies in the case of salvage of property. The ordinary remedy of the salvor is against the property itself by proceedings *in rem*, to enforce the maritime lien given him by the law upon that property. This enables him to arrest the property, if within the jurisdiction, into whose hands soever it may have come; and, if necessary, the court will order a sale, and payment of his claim out of the proceeds. The salvor has also a remedy *in personam* against the owners or others interested in the property saved; but it seems that this right depends upon property having been saved, and having come to the owner's hands. The amount which can be awarded is limited by the value of that property.

In order to create a right to salvage lives or property saved must have been in danger—either in immediate peril, or in a position of "difficulty and reasonable apprehension." Danger to the salvor is not essential, though it enhances his claim to reward. Again, the service must have helped towards saving the lives or property. Ineffectual efforts, however strenuous and meritorious, do not give rise to a claim. But the service need not be completely successful. If it has contributed to an ultimate rescue it will be rewarded, though that may have been accomplished by others. And as we have seen, there must have been ultimate success. Some of the property involved in the adventure must have been saved. And its value, or the fund realized by its sale, limits the total of the awards to all the salvors. Cases, of course, occur in which services at sea are employed by ships in danger: as where a steamer with a broken propeller shaft employs another steamer to tow her; or where a vessel which has lost her anchors employs another to procure anchors for her from shore. In such cases the conditions of reward above set out may not apply. Reward may be payable, notwithstanding entire failure or success, by the express or implied terms of the employment. But such a reward is not truly "salvage."

Services that are rendered in the performance of a duty do not bestow a claim to salvage. Thus the crew cannot (while still the crew) be salvors of the ship or cargo; nor can the passengers, unless they have voluntarily stayed on the ship for the purpose of saving her. Nor can a pilot employed as such be salvor, unless he has boarded a vessel in such exceptional circumstances that his doing so for pilotage fees could not reasonably be expected; or unless the circumstances of the service, entered upon as pilotage, have so changed as to alter its character. Again, the owners and crew of a tug employed to tow a ship cannot claim salvage for rescuing her from danger which may arise during towage, unless circumstances have supervened which were not contemplated, and are such as to require extraordinary aid from the tug, or to expose her to extraordinary risk. Officers and crew of a ship of the royal navy may, with consent of the Admiralty, recover salvage when they have rendered services outside the protection which their ship ought to afford. No claim, however, can be made in respect of the ship herself, except she be specially equipped with salvage plant.

The reward depends first, on the degree of the danger to the property salved, on its value, and on the effect of the services rendered; next, on the risks run by the salvors, the length and severity of their efforts, the enterprise and skill displayed, and on the value and efficiency of the vessel or apparatus they have used, and the risks to which they have exposed her. Negligent or improper conduct of the salvors will cause a diminution or total disallowance of the award.

In apportioning the award given for a salvage service among the owners, master and crew of the vessel by means of which it has been rendered, the special circumstances of each case have to be considered. In nearly all cases a large portion goes to the owners, and as in recent times the value and efficiency of ships (especially of steamships) have increased, so the proportion of the whole usually awarded to the owners has also increased. In an ordinary case of salvage by a steamship towing a distressed ship into safety, the share of the owners has often been about three-fourths; of the remainder the master usually gets about one-third, and the officers and crew divide the rest in proportion to their ratings. But where the salving ship has sustained special damage in the service, or her owners have been put to loss by it, that is taken into considera-

tion. On the other hand, where special personal services have been rendered by members of the crew they are specially rewarded.

An agreement as to the salvage to be paid is sometimes made at the time the assistance is given. When made fairly the court will act upon it, though it may turn out to be a bad bargain for one or other of the parties. But if the facts were not correctly apprehended by one or both, or if the position was one of such difficulty that those salved had no real option as to accepting the salvor's terms, the court will set the agreement aside.

The award of salvage is generally made in one sum against ship, freight and cargo; and those interests contribute to the amount in proportion to the value saved. Each is liable to the salvors for his own share, and for no more. If, however, the shipowner pays the cargo's share, he has a lien upon it for the amount. (T. G. C.)

Military Salvage.—This is such a service as may become ground for a reward in a prize court for the rescue of property from the enemy in time of war. It involves the determination of two questions: first, whether the property is to be restored to its original owner or condemned as prize to the recaptor; and second, what amount of salvage, if any, is to accompany restitution. The first question depends upon the law of nations, which may be taken to be that where a ship has been carried by an enemy *infra praesidia,* and especially after a sentence of condemnation, the title of the original owner is divested, and does not revest upon recapture by third parties. In such a case, therefore, *iure gentium* restitution cannot be claimed. The municipal law of civilized countries, however, does not encourage subjects to "make reprisals upon one another," and laws are generally found, as in England, which as between subjects of that particular State provide for restitution irrespective of any change in the title to the subject matter which may have occurred. But (speaking henceforth of England) in cases which do not fall strictly within these acts, the old maritime law, which was in unison with the general law of nations, is applied by the courts. Moreover, the English Prize Acts do not apply to foreign owners of recaptured prizes, and therefore no award can be made against them unless in accordance with the law of nations. In practice the courts have acted upon the "rule of reciprocity" where recaptures have been made of the property of formal allies, dealing with them as the allied State would have dealt with English property. If a neutral vessel is recaptured restitution is always ordered, unless the vessel is in peril of condemnation or destruction. An exception to the rule of restitution as between British subjects is made in the case of a British ship which has been "set forth as a ship of war" by the captor, and subsequently retaken by a British ship. Such a ship is not liable to restoration, but is the prize of the recaptor. This exception, the object of which is to encourage the capture of armed ships, dates from 1793, previous acts having provided for restitution upon payment of a moiety as salvage. The condition of setting forth as a ship of war is satisfied, where under a fair semblance of authority, which is not disproved, the ship "has been used in the operations of war, and constituted a part of the naval force of the enemy."

The right to salvage and the amount which will be allowed are also questions of the *ius gentium,* though usually governed by municipal law. In England the first statutory recognition of the right occurs in 1648, when an act of the Commonwealth provided that British vessels captured by an enemy and retaken by British ships shall be restored upon payment of one-eighth of the value of the property in lieu of salvage, or one-half in the case of a prize "set forth as a ship of war." Since the first act, and down to the act of 1805 inclusive, a distinction has always been drawn between a recapture effected by one of the royal ships of war and a recapture by a privateer or other vessel. In the former case the allowance has always been one-eighth, in the latter it varied, but was usually one-sixth. In the act of 1692 a clause gave salvage to a privateer, rising in amount from one-eighth to one-half according to the number of hours the prize had been in the enemy's possession, but this clause has disappeared since 1756. There is no provision in the present act for the payment of salvage, except in case of recapture by one of His Majesty's ships, but it seems beyond question that recaptors are entitled at law to salvage, although they may hold no commission from the Crown. Similarly, salvage is awarded in the case of recapture from pirates or from a mutinous crew. In the case of royal ships the act of 1864 allows one-eighth salvage, which in cases of "special difficulty or danger" the court may increase to an amount not exceeding a quarter. (M. Bt.)

UNITED STATES

Mariners are not under any legal obligation to render salvage services to *property* in peril at sea. Salvage awards are granted by the maritime law in order to encourage them to undertake the peril and responsibility of performing such services. However, the duty of master mariners to render assistance to every *person* in peril at sea has been laid down by statute in the leading maritime countries (*see* Salvage Act of Aug. 1, 1912, c. 268, s. 2; *Comp. Stat.* s. 7,991). Under American law, failure of a master of a vessel to fulfil this duty renders him liable to a penalty not exceeding $1,000, or imprisonment not exceeding two years, or both. The reward for life salvage is not so definitely provided for in American law as in England. By the Act of Aug. 1, 1912 (c. 268, s. 3; *Comp. Stat.* s. 7,992), salvors of human life may recover an award for such service only where a salvage award is made with respect to a salved vessel, her cargo and accessories. Salvors of life receive no award unless property is saved. A private vessel may take off the crew and passengers of a sinking liner, but unless some property is saved, no claim for salvage award will lie. But the property saved need not be saved by the salvors of human life. And if any property is saved, it matters not by whom, the salvage award on that property which, as will be hereafter remarked, usually does not exceed half of its salved value, is the fund from which the award for life salvage must be drawn (*The Admiral Evans,* 286 Fed. Rep. 442). It is provided by statute that with the exception of ships of war, or vessels appropriated exclusively to public service, salvors of human life who have taken part in the services are entitled to a fair share of the remuneration awarded to the salvors of the vessel, her cargo and accessories (Salvage Act of Aug. 1, 1912, c. 268, s. 3; *Comp. Stat.* s. 7,992).

The Government may claim salvage for services rendered by its public vessels. By the Act of July 1, 1918 (Stat. L. 40, p. 705, c. 114), the secretary of the navy is authorized to cause vessels under his control, adapted to the purpose, to afford salvage service to private or public vessels in distress, and to determine and collect reasonable compensation therefor when such salvage service is rendered by a vessel especially equipped for the purpose, or by a tug. The implication which might be drawn from the statute that, where the service is rendered by a public vessel not specially equipped for salvage service, such as a man-of-war or a transport, the Government may not demand and collect a salvage award, has been rejected by the courts. The Government has sued for and been allowed salvage award for salvage services rendered to a British merchant vessel by a merchant vessel owned by the U.S. Shipping Board and operated as a munitions ship for Government account (*The Impoco,* 287 Fed. 400). In the case of salvage services rendered by any merchant vessel owned or operated by the United States or the U.S. Emergency Fleet Corporation (now U.S. Merchant Fleet Corporation), it is provided by s. 10 of the Act of March 9, 1920 (Suits in Admiralty Act c. 95; *Comp. Stat.* s. 1,251), that the United States and the crew of any such vessel shall have the right to collect and sue for salvage services rendered, and any moneys recovered therefrom by the United States for its own benefit, shall be paid into the U.S. Treasury, to the credit of the department of the Government, or of the U.S. Shipping Board, or of the Emergency (Merchant) Fleet Corporation having control of the possession or operation of the vessel.

Salvage Award.—By statute, the master and crew of the salving vessel, in rendering services to another vessel of common ownership, are entitled to salvage award (Salvage Act of Aug. 1, 1912, c. 268, s. 1; *Comp. Stat.* s. 7,990). In the absence of request by the distressed vessel, salvage services, to merit an award, must be rendered directly to the salved property. It has been held that where a dry-dock is on fire and tugs extinguish

the flames, if a vessel in the dry-dock does not request such services and has other means of protecting itself, no salvage award may be claimed from it. The services were rendered directly to the dry-dock and perhaps incidentally benefited the vessel lying in it, but no salvage award may be claimed from the vessel (*Merritt and Chapman D. & W. Co.* v. *United States* [*The Leviathan*], 274 U.S. 611). So, also, where vessels are moored alongside a river quay, services rendered by tugs in extinguishing a fire on one of the vessels do not give rise to a salvage claim against the vessels near by, unless the vessels against which the claim is made requested the salvors to perform the services (*The City of Atlanta,* 56 Fed. 252). In the same circumstances, however, if the salvors devote their attention to the other vessels and tow them away from the burning vessel, then salvage award may be claimed from them. It is not essential that there should be direct contact between the structure, gear or personnel of the salving vessel and the vessel saved. A word of warning to a vessel heading for a shoal, which enables her to avoid destruction, is a salvage service (*South American S.S. Co.* v. *Atlantic Towing Co.,* 22 F. [2d] 16). Likewise, a vessel which stands by another in distress, even though she does nothing else, is entitled to salvage award (*The Sapinero,* 5 F. [2d] 56; *The Manchester Brigade,* 276 Fed. 410).

It often happens that while the services are rendered under the apprehension of grave peril, the result shows that the vessel was not in danger at all or at least not to the extent anticipated. In such case it has been held that it is the apprehended danger which fixes the value of the services and controls the amount of the award. The owner of the salved property will not be heard to argue that subsequent developments showed that the salvage was unnecessary or that the risks taken by the salvors were less in fact than they appeared at the time the services were rendered (*The Lowther Castle,* 195 Fed. 604). But see *The Sapinero,* 5 F. (2d) 56, holding that the master of the distressed ship exaggerated the plight of his vessel. Apparently it is the peril reasonably apprehended which controls.

Success is of the essence of a salvage service. But if a salvor undertakes a salvage service and is ready and able to carry it to completion, he cannot be summarily dismissed on the arrival of other assistance and thus deprived of salvage award. If a salvor is dismissed after he has contributed to the ultimate success of the operation and is ready and able to continue, he is entitled to share in the salvage award. Cases frequently arise where salvors are relieved by other vessels belonging to the same ownership as that of the distressed vessel. It has been held that the first salvors are entitled to share in the salvage award (*The Annie Lord,* 251 Fed. 157; *The Manchester Brigade,* 276 Fed. 410). However, a salved vessel need not retain incompetent salvors and is free to obtain whatever assistance is available. Whether or not the first set of salvors are entitled to share in the award depends on what they did and what they were able to do (*The Santa Rosa,* 295 Fed. 350).

Claims for Salvage.—In making demands for salvage, and in exacting security under process *in rem* against the salved property, salvors must be careful not to be exorbitant in their demands. The amount of salvage award is entirely discretionary with the court. A grasping attitude on the part of salvors will often work against their claim for salvage. Indeed it may cause the court to dismiss their claim entirely where their conduct is of such character as to destroy whatever merit there may have been in the service (*The Gypsy Queen,* 284 Fed. 607). The salved interests must also show the proper attitude. Owners of salved ships should make reasonable offers of award, or else the court may penalize them for putting the salvors to the expense of litigation (*The Western Star,* 157 Fed. 489). Interest on the amount of the award may be allowed, in the discretion of the court (*The Naiwa,* 3 F. [2d] 381).

Where salvors are negligent in the performance of the service, or in care of the property after deliverance from the peril, the owner of the salved property may urge the fact against them in reduction of salvage award or as a complete defence to the claim (*The Henry Steers, Jr.,* 110 Fed. 578; *The Bremen,* 111 Fed. 228; *The Ragnarok,* 158 Fed. 694; *Albury* v. *Cargo Ex. Lugano,* 215 Fed. 963; *The F. Q. Barstow,* 257 Fed. 395).

Salvage awards, in the view of the United States maritime law, while having as their purpose the encouragement of salvage service, must be fixed in such amounts as not to deprive the owner of the property saved of all benefit of the service.

Amount of Award.—This depends, in each case, on the facts. The courts frequently advert to awards made in similar cases, but precedents serve only as a guide. They have no controlling force (*The Buckhannon,* 284 Fed. 917). The appellate courts will not disturb the award made by the trial judge unless there appears to be such a clear abuse of discretion as to amount to an error of law (*The Bay of Naples,* 48 Fed. 737; *The Kia Ora,* 352 Fed. 507; *The Naiwa,* 3 F. [2d] 381; *The Santa Rosa,* 5 F. [2d] 478; *The Zaca,* 7 F. [2d] 69). A classic definition of the elements to be considered by a court in fixing salvage award was given by the U.S. Supreme Court in *The Blackwall,* 10 Wall. 1, 14:—

"(1.) The labour expended by the salvors in rendering the salvage service. (2.) The promptitude, skill, and energy displayed in rendering the service and saving the property. (3.) The value of the property employed by the salvors in rendering the service, and the danger to which such property was exposed. (4.) The risk incurred by the salvors in securing the property from the impending peril. (5.) The value of the property saved. (6.) The degree of danger from which the property was rescued."

It is, therefore, apparent that the amount of award in the various classes of salvage can not be readily classified because of the highly variable factors which enter into them. The following cases, grouped according to the nature of the service, will give some idea of the amounts of salvage awards. Towage on high seas: *The Varzin,* 180 Fed. 892; *The Melderskin,* 249 Fed. 776; *The Western Pride,* 274 Fed. 920; *The Katrina Luckenbach,* 61 Ct. Cls. 632. Releasing stranded vessels: *The St. Paul,* 82 Fed. 104; *The Kia Ora,* 352 Fed. 507; *The Santa Rosa,* 295 Fed. 350. Extinguishing fire on vessels: *The F. Q. Barstow,* 257 Fed. 793; *The Huttonwood,* 262 Fed. 452; *The Zaca,* 7 F. (2d) 69; *The Florence Luckenbach,* 9 F. (2d) 1,008. Towing vessels away from burning vessels or pier: *The Geo. W. Elzey,* 250 Fed. 602; *The West Mount,* 277 Fed. 168; *The Thorwald Halvorsen,* 281 Fed. 506; *The Magnetic,* 293 Fed. 94; *The Santa Barbara,* 299 Fed. 152.

Where the salved vessel has been abandoned by her master and crew and is therefore derelict, the salvage awards run much higher than otherwise. The ancient rule was that the salvage award amounted to a moiety of the salved value. While this rule is no longer regarded as controlling, there are a few cases of derelict salvage awards which even exceed 50% (*The Edwards,* 12 Fed. 508; *The Flower City,* 16 Fed. 866; *The Bay of Naples,* 48 Fed. 737; *The Myrtle Tunnel,* 146 Fed. 324; *The Flora Rodgers,* 152 Fed. 286).

Division of Award.—The division of salvage award between the owner of the salving vessel and the master, officers and crew is subject to the circumstances of each case. Where a vessel is towed from her position of distress at sea to a port of refuge, or where a stranded vessel is released, the salvage award is often divided four-fifths to the shipowner and one-fifth to the crew. In cases of towage on the high seas, where the salving crew has incurred considerable peril, the crew's share may run higher. An exceptional case arose when the "Katrina Luckenbach," steaming in convoy from Gibraltar to Hampton Roads in Aug. 1918, broke down at sea. The "Gaelic Prince," of the same convoy, took the "Katrina Luckenbach" in tow and brought her 1,356 m. to Hampton Roads, through an area in which German submarines were operating. Great risk was incurred by the master and crew of the "Gaelic Prince," because by taking the "Katrina Luckenbach" in tow their vessel became vulnerable to attack by a submarine. The court, in rendering a salvage award to the "Gaelic Prince" of $93,000 in addition to the salvor's expenses, allowed two-thirds of it to the master, officers and crew (*Prince Line Ltd.* v. *The United States,* 61 Ct. Cls. 632). In cases of salvage services rendered to burning vessels, whether at sea or in port, the crew's share is usually from about one-quarter to one-

third, because of the personal risk involved. It may be more in cases of specific heroism. It should be borne in mind, however, that the facts of each case control the amount of salvage award and the share of it to be given to the officers and crew of the salving vessel. The services rendered by the personnel are considered by the court in fixing their share of the salvage award. Following this principle, if the facts show that the crew did nothing more than attend to their ordinary routine duties at sea, as in the case of towage of a vessel on a calm sea, the court may exclude the crew entirely from the award, particularly where both vessels are owned by the same interests (*The Lewis Bros.,* 287 Fed. 143; *The Lake Elmont,* 1924 A.M.C. 711). The crew's fund is usually pro-rated according to the monthly wages, the master's share figured on double his monthly wages.

Settlement Agreement.—The seaman is specially protected by law from those who would deprive him by agreement of his right to salvage award. He is the ward of the admiralty, and in order to protect him from those who would cause him to discount his rights in salvage, it has been provided by statute that every stipulation by which any seaman consents to abandon any right which he may have or obtain in the nature of salvage shall be wholly inoperative (*U.S. Rev. Stat.* 4,535; *Comp. Stat.* s. 8,324). However, it has been intimated in an *obiter dictum* that a settlement made with the seaman after the performance of the salvage service would be valid where the shipowner has acted in good faith (*Rivers* v. *Lockwood,* 239 Fed. 380).

Salvage awards are frequently agreed on by the parties without the need of litigation, and the shipowner commonly conducts the negotiations. If a suit proves necessary to collect the award, the shipowner has the right to sue on behalf of the crew (*Castner, Curran and Bullitt* v. *United States,* 5 F. [2nd] 214). The shipowner, however, has not any authority to bind the crew by any arrangement which he may make with the salved interests. Indeed, if the settlement which the shipowner agrees to accept is not commensurate with the services rendered, the crew may maintain direct action against the salved interests for their proper share of salvage award. The arrangements made by their shipowner are not a bar to their recovery (*Bergher* v. *General Petroleum Co.,* 242 Fed. 967). The common practice in salvage settlements without litigation is that the salved interests, in paying the entire award to the owner of the salving ship, demand and receive an agreement of indemnity by which the owner of the salving vessel agrees to hold harmless the salved interests from any future claims which may be made by the crew in respect of the salvage services. Thus the owner of the salving vessel takes upon himself the responsibility for the salvage settlement and assumes the obligation of making good to his own crew any deficiency of salvage award which any court in the future may allow to the seamen in addition to their share of the award fixed by the settlement. It is generally considered that any payment which the seaman receives, whether in consideration of the surrender of his salvage rights, or in the distribution of a settlement fund received by his shipowner, is deemed a payment *pro tanto* on account of any salvage award to which the seaman may be entitled (*The Edward Lee,* Fed. Cas. No. 4,292; *The Adirondack,* 5 Fed. 214; *Baker Salvage Co.* v. *The Taylor Dickson,* 40 Fed. 261; *Rivers* v. *Lockwood,* 239 Fed. 380). *See* also SALVAGING. (E. S. M.)

See C. Abbott, *A Treatise of the Law relative to Merchant Ships and Seamen* (14th ed., 1901); Sir W. R. Kennedy, *A Treatise on the Law of Civil Salvage* (2nd ed., 1907); E. S. Roscoe, *On the Admiralty Jurisdiction and Practice* (4th ed., 1920); T. G. Carver, *Treatise on the Law relating to Carriage of Goods by Sea* (7th ed., 1925).

SALVAGE CORPS. The London Salvage Corps is maintained by the fire offices of London. The corps was first formed in 1865 and began operations in March 1866. The staff of the corps when first formed consisted of 64. Since that time, owing to the many improvements that have taken place in the system of dealing with salvage, and the increase in the work to be done, the corps has necessarily been strengthened, and the staff now numbers above 80. The headquarters are situated at Watling street, which is called the No. 1 station, and this station protects the City of London enclosed by the Euston road, Tottenham Court road, City road and the river Thames; this is known as the "B" district. No. 2 station is at Commercial road, and attends to the whole of the east and north-east portion of London to the north of the Thames, and is known as the "C" district. No. 3 station, opposite the headquarters of the Metropolitan Fire Brigade Station in the Southwark Bridge road, protects the whole of south London, and is known as the "D" district. No. 4 station at Poplar covers the East End of London. Finally, No. 5 station, in Upper street, Islington, guards the parish of Islington. The working staff, which is mainly recruited from the royal navy, consists of the chief officer, superintendents, firemen and crews. The stations of the corps are connected by telephone with the fire-brigade stations from whence the "calls" are received.

Generally speaking, the work of the corps may be divided into two distinct classes: (1) services at fires; (2) watching and working salvage.

Practical Work.—(1) *Services at Fires* form the most important feature of the work. Much depends upon the method of dealing with the salvage. If, for instance, a large Manchester goods warehouse was on fire in the top part, it would be very little advantage to the offices interested in the risk if the men were set to work removing the stock off the ground floor. The best method is to cover up with tarpaulin all goods there, and prevent the water from collecting on the lower floors. It will be gathered that the most important work of the corps is to prevent damage to goods, and that water is mostly looked after. The tenders which immediately on receipt of an alarm proceed to the scene of the fire with their crew of men, carry every kind of appliance for the saving of goods from destruction by fire or damage by water, as well as lime-light apparatus for use in working after the fire has been extinguished, thus enabling the men to note the position of dangerous walls, etc.

(2) **Working Salvage.**—When a fire has taken place, a man is left behind in charge of the salvage if the property is insured; or if that fact cannot be ascertained, but it appears probable that it is, a man is left until the information is obtained later. The duty, if an important one, is divided into a day and night duty. This enables an experienced man to be sent on day duty to meet the assessor and to carry out his instructions regarding the working out of the salvage; and a junior man at night. The day man, if working out salvage, sometimes finds it requisite to employ outside men as helpers over whom he acts as a kind of foreman. The "working out" may take the form of dividing up damaged goods into lots ready for a sale to be held by the assessor or of sifting over the débris to find remains of certain articles claimed for. If, for instance, a large fire occurred at a pianoforte manufacturer's, and the débris was all in one common heap, the London Salvage Corps might have to arrange certain quantities of pegs and wires in order to give an idea of the number of pianos before the fire. The watching continues until the loss is settled, when the charge of the premises is given over to the assured.

There are also salvage corps on similar lines, but on a smaller scale, in Liverpool and Glasgow. (C. J. F.)

UNITED STATES SALVAGE CORPS

The earliest effort in America at putting salvage work on an organized basis was made in New York city in May, 1835, when the Association of Fire Insurance Companies laid the foundation of the New York Fire Patrol by appointing four men "to attend all fires and protect property exposed to fire and damage thereto by water." This force was enlarged in 1839 and again in 1855. In May, 1867, the New York Board of Fire Underwriters was chartered and this date marks the inception of the New York Fire Patrol as it was in 1928, with ten companies operating in Greater New York, having a total force of 328 men. Salvage corps, sometimes called fire patrols, are maintained by the underwriting interests in 20 of the larger cities in the United States; the latest of these to be established was in Indianapolis in 1914. It is the policy of the insurance companies, as expressed through the National Board of Fire Underwriters, that no additional salvage corps will be organized by them, for the reason that fire depart-

ments are organized and maintained for the broad purpose of saving property and life at and after fires, and that the first duty of fire extinguishment and life saving is followed closely by the obligation to curtail the property loss caused by water, by resort to effective salvage methods. This principle that organized salvage work is a legitimate function of the municipal fire department has been recognized in a number of cities of which Los Angeles is the best example; in that city six fully equipped salvage companies are in operation. The Dallas, Texas, and Pittsburgh, Pa., fire departments have organized companies which perform salvage work as a chief duty. Many other city fire departments carry one or more covers on most pieces of apparatus, which covers are spread whenever there is danger of water damage to stocks of merchandise or furnishings of dwellings. The salvage corps apparatus carries a great variety of equipment, including waterproof covers, brooms, shovels, scoops, sponges, etc.

The usual first move of the patrol on arrival at a fire in a mercantile building is to spread covers to protect goods located on floors beneath the fire, commencing where the water is likely to descend first, and then widening out as far as the number of covers available will permit. In manufacturing buildings the procedure is about the same as in mercantile property; where the number of covers is not sufficient to protect both stock and machinery the former should be given the preference, since machinery can be dried, cleaned and oiled after a fire. In dwellings a somewhat different procedure is followed; the men roll up the carpet or rug, placing it on top of some piece of furniture, and then moving all the furniture to the centre of the room. Clothing is removed from closets and wardrobes and placed on top of the pile, over which one cover is usually sufficient for protection. The type of cover most commonly used is 12 ft. by 18 ft. in size, and most of the corps are using rubber coated duck covers, which weigh about 30 pounds. These rubber coated covers have the advantage of drying more quickly after service and are more certainly water-proof than other types. Some of the corps make their covers, using linseed oil as a water-proofing to the fabric. A few of the corps use covers made of a tightly woven duck without water-proofing, but with a treatment intended to prevent mildew; these covers will shed water but are not absolutely water-tight. In addition to spreading covers, the salvage corps, and many fire departments, proceed after the fire is extinguished to sweep and shovel out water and rubbish, cover holes in roofs with spare tarpaulins or tar paper, and perform other services tending to minimize damage to the building and the goods it contains. Progressive salvage corps officers may also accomplish a great deal in the way of educating merchants and the general public in methods of storing stock on skids to raise it slightly above the floor level, and in constructing shelving and wall cases in such a way as to allow space for covering and to prevent stock from being wet. The progressive officer will also find a large field for activity in promoting fire prevention activities and observing and reporting evidence of fires of incendiary or suspicious origin; it is usual practice to leave a man on watch to preserve such evidence, as well as to act in any emergency to prevent further damage or theft of the contents of a building. (W. E. MA.)

SALVAGING. Salvage work, or the raising and recovery of sunken ships and cargoes, has always had a fascination; first, for the reason that very little is known of the subject by the outside public; and secondly, because the spirit of adventure appeals to us still, although possibly in a modified degree compared with that which sent our forefathers out to search for hidden treasures in far-off lands.

Salvage engineering has always been confined to a small number of the engineering profession, although it is a highly technical business, where skill, experience and determination are pitted against wind and sea. It necessitates trained men and special appliances and is a work that must be carried on night and day whenever the elements permit.

Marine salvage may be divided up under a few principal headings:—

(1) The raising of vessels sunk in deep water by means of pontoons, etc.

(2) Raising by the application of compressed air to expel the water.

(3) Refloating of ships stranded on rocks or sand where the bottom is damaged and temporary repairs have to be made by divers, and where pumping plant of different descriptions is used to free the vessel of water.

(4) Uprighting of capsized vessels, etc.

Salvage Plant.—The salvage ship is one of the most important factors in salvage operations, and, although generally a small vessel, carries a very complicated equipment of appliances for use in the work with a view to rendering her as independent as possible of assistance from ashore, and enabling her to make repairs, etc., in out-of-the-way places where it would be difficult to obtain other assistance.

As an example, one of the most modern type is composite built (170ft. long by 30ft. wide), fitted with triple expansion engines, and has a speed of 14 knots. She accommodates about 80 officers and men, consisting of engineers, artisans, divers, motor engineers, electrical engineers and others. Her equipment consists of portable pumping plant of 5,000 tons per hour, which can be transferred to the wrecked vessel, portable oil-driven air compressors, portable electric lighting plant and electric submersible pumps which work under water.

At the mastheads the vessel has powerful electric arc lamps of 5,000 c.p., with sufficient length of water-tight cables to allow of them being placed on the wrecked ship and operated by the salvage ship's dynamos; also searchlights, submarine arc and incandescent lamps for the divers, submarine oxyacetylene burning plant for cutting plates under water, also a complete equipment of submarine pneumatic drilling machines up to 3in. in diameter, pneumatic hammers, rock-boring drills and submarine photographic apparatus. She is fitted with long-range wireless telegraphy. Being constructed of wood she is able to remain alongside a damaged ship in rough weather.

At one time steam pumps were entirely used in salvage operations, and were supplied with portable boilers so that they might be placed on board a wreck. They performed very excellent service, generally under most difficult conditions. To place such heavy gear on board a wrecked ship from a salvage craft rolling alongside on a winter night required a large amount of skill and care. When placed in position they had to be connected up to the portable boilers, and steam had to be raised before they were available for pumping. It was also necessary to place a supply of coal on board if the ship's bunkers were not available, and this supply was often washed away. Steam pumps are still retained on board the salvage ship, as they are able to perform work that the present type of pumping plant cannot do; for instance, sand, coal, grain and even copper and iron ore can be discharged by them from under water.

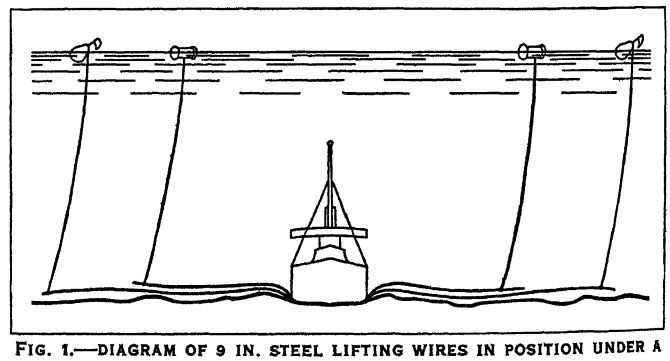


FIG. 1.—DIAGRAM OF 9 IN. STEEL LIFTING WIRES IN POSITION UNDER A WRECK WITH THEIR FREE ENDS BUOYED
The wires are made fast to lifting ships at low tide so that when the tide rises, the wreck is lifted off the bottom

The internal combustion engine (*q.v.*) went a great way to revolutionize salvage pumping plant. It was much lighter than the steam pump, required no boiler, and the fuel could be carried to the wreck in barrels or drums in an ordinary ship's life-boat. Further, when not required for work it can be stopped and

started again in a few minutes, while steam has always to be kept on the portable boilers of the steam pumps. The advantages of the oil motor-driven centrifugal pump will be obvious; it is just as efficient for pumping water as the steam pump, saves in cost of running, takes up less stowage space and uses paraffin or gasolene as fuel, which can generally be obtained without difficulty. The sizes in general use are 12in. and 6 inch.

The latest type of pumping machinery is the electrically driven submersible. It has been tried under all conditions and found

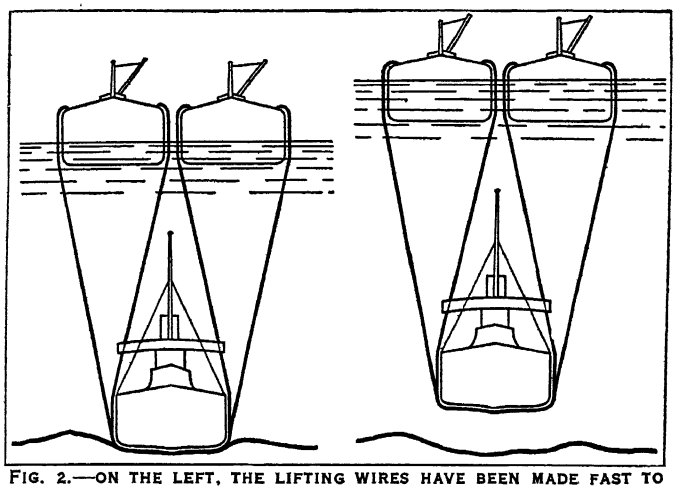


FIG. 2.—ON THE LEFT, THE LIFTING WIRES HAVE BEEN MADE FAST TO LIFTING LIGHTERS; ON THE RIGHT, THE WRECK IS CLEAR OF THE BOTTOM, AT HIGH WATER. IT IS THEN TOWED TO SHALLOWER DEPTHS AND THE OPERATION REPEATED

more efficient than any of the older types. It can be placed aboard in boats and driven from the dynamos of the salvage ship lying off the wreck. There is no necessity to secure it, as it works practically without vibration and can be used from the derricks and lowered down into the water. Its great advantage is that while the ordinary salvage pump has only a lifting capacity of 30ft., the submersible is able to raise the water to a height of 80ft.; no priming is necessary, and no particular attention need be paid to the discharge hose as far as making it air and watertight. Former electric salvage pumps that were tried were fitted with watertight cases, and proved entirely unsuccessful for this particular kind of work. In the submersible pump, water is allowed free access to the electrical parts.

Lifting Operations.—With this somewhat brief description of salvage plant used the particulars of actual salvage operations will be explained, commencing with the raising of sunken vessels from deep water by means of lifting barges dependent on the rise and fall of tide.

The method of procedure is to place lifting vessels of sufficient buoyancy over the wreck and pass a number of 9in. steel wire ropes under the vessel, bringing the ends of the wires up and making them fast to the lifting ships at low water; then as the tide rises, if the calculations have been correct, the vessel is raised from the bottom the height of the rise of tide, and carried into shallower water where the wreck is grounded, and the operations are continued each tide until her decks are above water (*see* figs. 1 and 2). The fractures are then patched by the divers, salvage pumps installed and the vessel pumped out and floated. The dimensions of lifting vessels that have been employed in a large number of cases are: length 165ft.; breadth 36ft., and each with a lifting capacity of 1,500 tons maximum.

One of the principal difficulties with this method is the placing of the heavy wire cables under the bottom of the wreck, especially if she has sunk in sand, mud or clay. If not too deeply embedded this is generally accomplished by towing them under with two vessels, one on each side, and the ends of the cables attached to them. Where this is not found to be possible, owing to the wreck having become too deeply embedded, a system of hydraulic boring at high pressure is used.

In cases where there is little or no rise of tide submersible pontoons are used. These are really steel cylinders with a lifting capacity ranging from 50 tons each to 250 tons or more. They are divided into three water-tight compartments and fitted with low pressure air connections for expelling the water, and with high pressure air for opening the valves. The ends of the cylinders used at the lifting of H.M.S. "Gladiator" were dome-shaped, and covered with collision mats to protect them against chafing. Strong channel bars were rivetted around the pontoons at intervals to carry the wire cables, and the whole of the cylinders between the channel bars were covered with 3in. fir planking for protection against obstructions when lifting. Double 6in. special extra flexible wire ropes were fitted in the required position around the pontoons, and to these were attached plate shackles to which the 9in. lifting wires were fastened. In this case the pontoons were used to make the vessel upright, as she lay over on her beam ends at an angle of 113 degrees.

The 9in. wire cables were swept under the wreck and the outside ends attached to the pontoons. These were filled with water and sunk alongside the ship; the other ends of the wires were then hove in as tightly as possible and made fast to massive steel bollards fastened to the upper side of the ship. The cylinders or pontoons were then emptied of water by means of compressed air and the vessel uprighted, assistance being also given by compressed air and pumping from some of the sound compartments. In this case pontoons were only used on one side, but in order to raise a vessel that is sunk and lying upright on the bottom two sets of cylinders are necessary, and the plan of lifting is as follows:—

A sufficient number of 9in. wire cables are placed under the ship, the pontoons are attached to the ends of the wires on one side of the ship and filled with water, and by heaving in on the opposite cables they are hauled down into the required positions alongside the wreck. A special form of hydraulic gripping machines are attached to the pontoons on the other side of the wreck and the wire cables rove through these hydraulic grips. When everything is ready the pontoons are filled and allowed to slide down the wire cables to the bottom. The grips are then closed from the surface vessel and compressed air pumped down to all the pontoons, which expels the water, and if sufficient buoyancy has been given by the pontoons the vessel is brought to the surface.

In the method of lifting by compressed air all openings are closed by the divers, and compressed air pumped down to connections made to all the different compartments from air compressors of the salvage ships. The water is then expelled through the fractures and the vessel rises to the surface. This method entails a very large amount of diving work, as funnels, etc., have to be cut away and the openings closed and made air-tight. Decks have to be strongly shored up and supported.

The conditions of stranding are very varied. Assuming a large vessel stranded on a rocky bottom on an exposed coast and sustaining such damage that all compartments are filled with water and the vessel appears at first sight to be a hopeless wreck, a diver's survey of the position is made as soon as possible, and at the same time a careful survey is made of all compartments to ascertain whether the water falls in each at the same rate as the tide. Some compartments will generally be found to be holding water, that is to say the tide does not ebb and flow in them as it does outside. The amount of pumping plant required can thus be easily gauged for compartments under these conditions. When the tide ebbs and flows as it does outside it shows considerable damage to the outer bottom, which necessitates extra pumping plant and the patching of the fractures by divers.

(F. Y.)

SALVARSAN or **"606,"** is the trade name of dihydrochloride of dioxy-diamino-arsenobenzene, a powerful remedy for syphilis, invented by Ehrlich and introduced to the public in 1910. It is a yellow powder which is prepared for injection into a vein by a rather complicated process. A little later Ehrlich invented a modification, "914" or Neo-salvarsan, which is much easier to use, and preparations of this type are now by far the most commonly employed. Of rather another order are Silver-salvar-

san and Neo-silver-salvarsan in which the action of arsenic is assisted by that of silver. There is now a fairly large variety of arsenobenzene preparations made by different firms. They are sold in Great Britain only after satisfaction of Government tests of toxicity and therapeutic activity which are applied to each batch. In America the arsenobenzene preparations are known as arsphenamines. A moderate dose of an arsenobenzene preparation usually causes the germs of syphilis to disappear from the secretions of open sores within a day and a rapid amelioration of symptoms follows, but it is necessary to treat for 1½ to 2 years or more and to use also either the older remedy, Mercury, or the newer one, Bismuth. The best chance of success lies in commencement when the infection is very recent.

The arsenobenzene preparations are not tolerated equally well by all patients. In a minute percentage of cases they may cause death by damaging the small vessels of the brain or the kidneys. Other toxic effects are jaundice, and an inflammation of the skin (either of which may be fatal) and a variety of minor troubles. Serious effects from arsenobenzene injections are, however, far too rare to counteract their very great advantages. One of the most important of these is the rapidity with which patients are rendered non-infectious, an effect to which is probably due the very substantial decrease in syphilis in most countries which has taken place in recent years. (L. W. H.)

SALVATION ARMY, a religious philanthropic organization founded by William Booth (*q.v.*), who in 1865 began to hold meetings for preaching in the streets in London and in tents, music halls, theatres and elsewhere. In 1878 the Mission, which had spread beyond London, was reorganized on a quasi-military basis, and the title of "The Salvation Army" was definitely adopted in June 1880, with Booth as "General" of the whole body. The spiritual operations of the Army at once rapidly expanded in spite of much disorderly opposition in some places. In doctrine, the Army is in harmony with the main principles of the evangelical bodies, "as embodied in the three creeds of the Church." Its preaching is practical and direct, asseverating the reality of Sin and Redemption, and the supreme duty of self-sacrifice for the sake of the salvation of others.

Great Britain.—The Army is under the General for the time being, who issues all orders and regulations. Large powers devolve upon other officers, such as the "Chief of the Staff," the "Foreign Secretary," and the "Chancellor," who direct affairs from the "International Headquarters" in London. The system of government is autocratic, "unquestioning obedience" being required throughout all ranks. The Army is divided, usually in harmony with national boundaries, into "territories," each under a "Commissioner," with headquarters in the capital of the country. The Territories are generally divided into "Provinces" and these again into "Divisions," which include a number of corps, each supporting its own "Captain" and "Lieutenant." The "soldiers" or members are drawn from all classes of the community. The property of the Army in the United Kingdom is held by the General for the time being, for the benefit of the Army exclusively, he being constituted the sole trustee of the property, in the disposal of which and in the appointment of his successor he is placed under the government of a deed poll, executed by Booth while the body was still known as "The Christian Mission," and enrolled in the Court of Chancery in August 1878. In other countries various modifications have been necessary, but the General's ultimate control has been practically assured.

The announcement of the founder's death was accompanied by the intimation that his eldest son, William Bramwell Booth (*q.v.*), formerly his chief of staff, had become the new general. Under the deed poll of 1878, each general appoints his successor under seal, but the name of the person so chosen is not divulged until the proper time. At an International Staff Council in 1904 a supplementary deed poll was adopted, the principal object of which was to set up machinery for removing from the position any general who proved to be unworthy of confidence, and also for the selection of a general by a high council of the Army called into being for this purpose, in the event of the position becoming vacant through failure to appoint or other cause. In Jan., 1929 the high council voted to remove General Booth on the ground of incapacity but Booth carried the issue to the courts. The court decided that the removal was illegal because no hearing had been given the general or his representatives before the vote was taken. On Feb. 13 after such a hearing a second vote resulted as the first, and the council proceeded to elect Edward J. Higgins, formerly chief of staff, as the new general. Higgins announced that he favoured reform in the army's constitution and practical administration. Booth refused to accept the council's action and prepared to carry the fight forward in the courts. The struggle was interrupted by his death in June.

Extension.—In many quarters it was feared that after the withdrawal of the forceful and picturesque personality who had dominated Salvation Army affairs for a generation, and had raised up a worldwide following from what was originally a despised and derided local effort in the slums of London, the Army would decline. The World War also was a menace to all international organisations. These fears, however, proved to be groundless. The number of adherents has steadily increased, and the "field" occupied has grown greatly in extent. The Army has more than 14,000 corps or societies, each of which serves not only for the establishment of its own members in the faith, but as a centre of aggressive evangelistic effort. It has also 1,400 social institutions for the friendless, unfortunate and wayward. In the British Islands the centres number 1,500, and reach a similar figure in the United States; in Canada there are between 600 and 700, and in Australia and New Zealand nearly 1,900. India, with Ceylon, has nearly 5,000 such centres, and the Far East 450. The number of officers and cadets engaged in field and social work is about 22,360. The Army's mission field has greatly extended, and many of its officers who work devotedly in their own dark lands were, but a few years previously, themselves in the bondage of superstition. The right method of evangelising the people is found in the employment of converted officers of their own race and speech. In Japan, for instance, 98% of the officers are Japanese.

New Organisations.—The progress which continued under the second general is not to be measured merely by an extended front. New organisations have been called into existence, especially for influencing and instructing the young of both sexes. Careful provision has been made to insure a constant replenishment of officers by means of institutes for the training of cadets. In each year upwards of 1,800 young men and women are trained for Army work, to which they have to devote the whole of their time. Congresses on national and international lines are held frequently for the instruction and encouragement of officers; and constantly increasing use is made of the printing-press.

Social Work.—The social work, which received its first great impetus in 1890 with the publication of *In Darkest England and the Way Out,* by William Booth, has become not only more extensive but more varied in character. This work from the first has been regarded by the Army leaders as an organised warfare against social evils in order to clear the way for evangelisation.

It was realised that the physical and environmental condition of many of the people, especially in great cities, made it extremely difficult for them to apprehend the spiritual message which the Army had to deliver. Therefore various social activities arose, diverse in character but all actuated by the same purpose, from the provision of free breakfasts and night shelters to the settlement of people in overseas dominions. This last is a department of work characterised by careful selection of the emigrants, and is coupled, particularly in the case of the young, with training beforehand and effective provision for future care, while work is assured upon arrival. The efforts of the Army in getting men to work on the land, both in England and overseas, have called forth many commendations from statesmen and others.

Rescue work among women was one of the earliest social tasks to which the Army set its hand. In this work Mrs. Florence Booth, wife of Gen. Bramwell Booth, was the responsible leader from its inception until 1912. Maternity work has been carried out by the Army's ministering women, and for this in 1918 the Army received a grant from the British Government—the first state subsidy made to the Army in the country of its origin. In other lands

also social work has proceeded, adapted to the different national conditions and needs, and often commended and assisted by the governments concerned. This is true also of eastern lands: thus settlements for criminals have been established in India, and leper colonies in the Dutch Indies; and these are but instances of many such works.

Spiritual Character of the Work.—With this development of organisation the Army has maintained its original character as a body of spiritual witness and aggressive evangelism. In theory and creed it is at one in almost every respect with orthodox evangelical belief, but its methods—its realistic presentation of religion, and its use of various constraining means to bring people to salvation—distinguish it from other religious bodies. It continues to lay the greatest emphasis upon the need for conversion, preceded by penitence, and followed by growth in holiness. The people gathered into its ranks are cared for by its officers and trained in a real separation from the world and devotion to Christ. They are set to work immediately with a definite objective, their zeal is employed in the winning of others, and public testimony is required from them, however unlearned or backward in religious experience they may be.

A large place in the Army's endeavours is given to music and song. In every country the band—usually a brass band—is a feature of Army work. The strains of such a band, reaching farther than the human voice, draw numbers within earshot of the Army's message who would otherwise not be attracted. The Army has also made use of improvisations of various kinds, not only because in this way public attention is more likely to be caught, but because these methods prevent the officers from falling into the conventional and the ordinary.

The Army exacts a high standard of behaviour from its adherents. In the series of *Orders and Regulations* for officers and for the rank and file definite guidance is given even in the smaller matters of everyday conduct. Officers accept a relative poverty, being content to receive sufficient for their simple needs. There are contributory funds from which they receive allowances on retirement, and from which provision is made for widows and orphans. Marriages are solemnised "under the flag," and children of members are dedicated to become soldiers or officers in the "war." Officers wear a regulation uniform, which it is not permissible for the individual to vary. The uniform is regarded as a means of confessing to the world the fact of separation and consecration, as opening the way to many opportunities of usefulness which would not otherwise appear, and as making possible instant recognition and fellowship amongst Salvationists themselves. One of the great principles of the Army, firmly adhered to, is that women have absolute parity of privilege, position and dignity.

Salvation Army funds are raised from the voluntary offerings of the corps, from open-air and other collections, from the profits on publications and general trading, and from friends interested in evangelical and charitable work. The financial statements of the various funds are annually published, certified by public accountants. Reports and statistics of the spiritual and social operations of the army are given in the annual *Salvation Army Year Book* and in the *War Cry* and other publications issued at Headquarters (Queen Victoria Street, London, E. C. 4). Under the head of social operations are included Shelters and Food Depots, Labour Bureaus, Labour Homes and Factories, Rescue and Maternity Homes, Children's Homes, and Farm Colonies.

BIBLIOGRAPHY.—William Booth, *Orders and Regulations for Soldiers, Orders and Regulations for Field Officers; Orders and Regulations for Staff Officers, Salvation Soldiery, Interview with W. E. Gladstone, In Darkest England and the Way Out* (1890); Bramwell Booth, *Servants of All* (1899) and *Echoes and Memories* (1926); Booth-Tucker, *The Life of Catherine Booth* (1892); Railton, *Heathen England; Twenty-one Years in the Salvation Army;* A. White, *Truth about the Salvation Army* (1892, 1900 and 1906); *The Great Idea* (1909; 2nd ed., 1910); T. F. G. Coates, *The Life Story of General Booth* (2nd ed., 1906); Harold Begbie, *Broken Earthenware* (1909), and *Life of William Booth* (1920); Mrs. B. Booth, *Powers of Salvation Army Officers* (1923); H. L. Taylor, *General Booth's Journal* (1925). The criticisms by J. Manson in *The Salvation Army and the Public* (1906; 3rd ed. 1908) caused some public discussion of the Army's religious, social, and financial operations and methods, but the details of these discussions have now mainly a historic interest.

THE UNITED STATES

In the United States the Salvation Army began its operations officially in March 1880, America being the first country to which evangelists were sent from England. A family of converts had gone to Philadelphia in 1879 and started evangelical services. At their request Gen. William Booth sent Commissioner Railton and seven women assistants as pioneer officers. The early years of the Salvation Army in America were strenuous ones; but the work prospered. The original staff soon found it impossible to cope with the success attending their efforts, and more help was sent from England. But America soon began to produce its own officers, a development which has grown through the years until there were in 1928 four training colleges devoted exclusively to maintaining the requisite supply of officers. These send out annually into the field some 500 young men and women as officer reinforcements, in addition to providing help for the missionary countries of the world.

The national leader in the United States, Commander Evangeline Booth, daughter of the founder and first general, William Booth, assumed her high command in 1904 after serving for nine years in a similar capacity in Canada. The 24 years that have intervened have witnessed great advances in every phase of Salvation Army activity. Commander Booth has shown herself a leader possessed of many outstanding qualities. She has endeared herself to all sections of the nation by her simplicity of purpose and her devotion to the ideals she sets forth so vividly in her public addresses. Faced at the onset with overwhelming problems of money and personnel, she has revolutionized the financial system of the organization, and strengthened its resources.

The work of the Salvation Army in connection with the World War endeared the organization to the nation in general. Commander Booth realized that extensive welfare work amongst the American troops would be required. With a rare courage, she placed the whole resources of the Salvation Army at the disposal of the Government. The resultant work at home and in France, where the Army women ministered day and night to the soldiers' comfort right up to the front-line trenches, is known and appreciated throughout the Union. The President bestowed upon the commander the Distinguished Service Medal as a mark of his appreciation in this connection.

Much attention has been given by the Salvation Army to the youth of the nation. Movements for boys and girls of varying ages, ranging from cradle rolls to courses of study for Army officership, with clubs for boys and camps for both sexes, have been inaugurated. The statistics for 1927 give some idea of the ramifications of Salvation Army activity in the United States; corps and outposts 1,704, officers 4,670, combined circulation of *War Cry* 13,954,165, hotels and residences 83, with accommodation for 9,002 persons, 106 industrial institutions, 9 children's homes, 34 rescue homes and maternity hospitals, 13 settlements and day nurseries, general hospitals and dispensaries 15, patients treated 47,642. Converts for the year numbered 110,135; 7,088 mothers and 35,453 children were given summer holidays, and 2,335,292 persons were afforded temporary relief.

SALVEMINI, GAETANO (1873–), Italian historian, was born in Molfetta in Sept. 1873. In 1902 he became professor of mediaeval and modern history at Messina university. He then went to Pisa university, and in 1917 was appointed to the chair of history at Florence university. His best known historical works are *Magnati e Popolani in Firenze dal 1280 al 1295* (1899); *La Rivoluzione francese 1789–92* (1905); *Mazzini* (1915) and *L'Italia e gl'Imperi Centrale dal* 1871 *al* 1915. He edited the Liberal newspaper *L'Unità* (1911–21). Before the World War he vigorously criticised the Socialists for their half-hearted social work, and attacked Giolitti's electoral methods. During the War he was a leading advocate of Italian diplomatic moderation. He was a member of the Italian parliament from 1919–21. After the Fascists captured power, however, his political activity was made impossible, and, being suspect, he was in constant personal danger. In June 1925 he was arrested in Rome and taken to Florence, where he was charged on the hearsay evidence of a printer with complicity in the production of an anti-Fascist newspaper *Non-*

Mollare. He was imprisoned for 35 days before being tried. No evidence but that of the printer was cited, and his case was postponed till July 1925 when he was provisionally released. Prof. Salvemini was compelled to leave Florence, and was kept under police surveillance until Oct. 1925, when he took the occasion of the Government amnesty, proclaimed for the Matteotti murderers, to leave the country. He settled in London, and became one of the fiercest assailants abroad of Fascist rule. Among the works published in exile was *The Fascist Dictatorship* (1928).

SALVIA, a large genus belonging to the family Labiatae (*q.v.*), containing about 550 species in the temperate and warmer regions of both hemispheres. The name is derived from the Lat. *salvo,* from the healing properties of sage, *S. officinalis*. *S. verbenaca* is a native of Great Britain found in dry pastures and waste places as is also *S. pratensis*.

Many native species of *Salvia* occur in western North America, especially in California, where 15 species are found. Among these are *S. carduacea* (thistle sage), cultivated for its thistle-like, white-woolly foliage and blue flowers; *S. mellifera* (black sage), a very important honey-plant; *S. Columbariae* (chia), valued for its nutritious seeds; *S. apiana* (white sage), with white flowers, and *S. spathacea* (crimson sage), with showy crimson-purple flowers.

Some of the salvias are among the most showy of the soft-wooded winter-flowering plants, the blossoms being of a bright glowing scarlet. Three useful species are *S. splendens, S. Heerii* and *S. gesneriflora,* the first beginning to flower early in the autumn and lasting till Christmas, while the others follow immediately in succession, and continue in full beauty till April. There are other very ornamental species of easy growth, increased by cuttings in spring, and succeeding well in ordinary rich loamy soil.

SALVIAN, a Christian writer of the 5th century, was born probably at Cologne (*De gub. Dei,* vi. 8, 13), some time between 400 and 405. He was educated at the school of Treves and seems to have been brought up as a Christian. His writings show legal knowledge. He married Palladia, the daughter of heathen parents, Hypatius and Quieta, whose displeasure he incurred by persuading his wife to retire with him to a distant monastery, which is almost certainly that founded by St. Honoratus at Lerins.

It was presumably at Lerins that Salvian made the acquaintance of Honoratus (d. 429), Hilary of Arles (d. 449) and Eucherius of Lyons (d. 449). That he was a friend of the former and wrote an account of his life we learn from Hilary (*Vita Hon.,* ap. Migne, l. 1260). To Eucherius's two sons, Salonius and Veranus, he acted as tutor in consort with Vincent of Lerins. Salvian continued his friendly intercourse with both father and sons long after the latter had left his care; it was to Salonius (then a bishop) that he wrote his explanatory letter just after the publication of his treatise *Ad ecclesiam;* and to the same prelate a few years later he dedicated his great work, the *De gubernatione Dei.* Salvian spent the last years of his life at Marseilles (Gennadius, ap. Migne, lviii. 1099). It has been conjectured that Salvian paid a visit to Carthage; but this is a mere inference based on the minute details he gives of the state of this city just before its fall (*De gub.* vii., viii.). He seems to have been still living at Marseilles when Gennadius wrote under the papacy of Gelasius (492–496).

Of Salvian's writings there are extant *De gubernatione Dei* (more correctly *De praesenti judicio*) and *Ad ecclesiam,* and a series of nine letters. The *De gubernatione,* Salvian's greatest work, was written between 439 and 450; it furnishes a valuable if prejudiced description of life in 5th-century Gaul. Salvian deals with the same problem that had moved the eloquence of Augustine and Orosius. Why were these miseries falling on the empire? Could it be, as the pagans said, because the age had forsaken its old gods? or as the semi-pagan creed of some Christians taught, that God did not constantly overrule the world he had created (i. 1)? He concludes that the misery of the Roman world is all due to the neglect of God's commandments and the terrible sins of every class of society. It is difficult to credit the universal wickedness adduced by Salvian, especially in face of the contemporary testimony of Symmachus, Ausonius and Sidonius. Salvian was a 5th-century socialist of the most extreme type, and a zealous ascetic who exaggerated, albeit unconsciously, the faults that he desired to eradicate.

The *Ad ecclesiam* was first printed in Sichard's *Antidoton* (Basel, 1528); the *De gubernatione* by Brassican (Basel, 1530). Salvian's works are reprinted (after Baluze) in Migne's *Cursus patrologiae,* ser. lat. vol. liii. For bibliography, *see* T. G. Schoenemann's *Bibliotheca patrum* (ii. 823), and the prefaces to the editions of C. Halm (*Monum. Germ.,* 1877) and F. Pauly (Vienna, *Corp. scr. eccl. Lat.,* 1883). *See* also S. Dill, *Roman Society in the Last Century of the Western Empire,* pp. 115–120.

SALVINI, TOMMASO (1829–1915), Italian actor, was born at Milan on Jan. 1, 1829. His father and mother were both actors, and Tommaso first appeared when he was barely fourteen as Pasquino in Goldoni's *Donne curiose*. In 1847 he joined the company of Adelaide Ristori, and with her he played the title rôle in Alfieri's *Oreste* at the Teatro Valle in Rome. He fought in the cause of Italian independence in 1849; otherwise his life was an unbroken series of successes in his art. He acted frequently in England, and made five visits to America, his first in 1873 and his last in 1889. In 1886 he played there Othello to the Iago of Edwin Booth. Apart from Othello, which he played for the first time at Vicenza in June 1856, his most famous impersonations included Conrad in Paolo Giacometti's *La Morte civile,* Egisto in Alfieri's *Merope,* Saul in Alfieri's *Saul,* Paolo in Silvio Pellico's *Francesca da Rimini,* Oedipus in Nicolini's play of that name, Macbeth and King Lear. Salvini retired from the stage in 1890, but in Jan. 1902 took part in the celebration in Rome of Ristori's eightieth birthday.

See his *Ricordi, anedotti ed impressioni* (Milan, 1895); *Leaves from the Autobiography of Tommaso Salvini* (London, 1893); G. Piccini, *Vita aneddotica di Tommaso Salvini* (Florence, 1908).

SALWEEN, a district in the Tenasserim division of Burma. Area, 2,666 square miles. Pop. (1921) 50,379, consisting largely of aboriginal tribes, Karens (43,311) and Shans (4,052). Nearly the whole district is a maze of mountains intersected by deep ravines, the only level land of any considerable extent being found in the valley of the Yōnzalīn, while the country is covered with dense forest, of which portions are reserved. The district is drained by three principal rivers, the Salween, Yōnzalīn and Bilīn, fed by mountain-torrents. The Yōnzalīn, which rises in the extreme north, is navigable with some difficulty in the dry season as far as Papun; the Bilīn is not navigable within the limits of the district except by small boats and rafts. The district headquarters are at Papun. The rainfall is heavy. A considerable trade is carried on with Siam by bridle paths across the mountains.

SALWEEN, a river of Tibet, China (Yunnan) and Burma. This river, called Nam Kōng by the Shans, Thanlwin by the Burmese, Lu Kiang, or Nu Kiang, or Lu Tzu Kiang by the Chinese, is the longest river in Burma, and one of the wildest and most picturesque streams in the world. It rises in Tibet south of the Kun Lun, and is thus a much longer river than the Irrawaddy. From the time it leaves Tibet it has a very narrow basin, and for long stretches has no other affluents than the mountain torrents from the hills, which rise from 3,000 to 5,000 or 6,000 ft. above the level of the river-bed. In the dry season the banks are alternate stretches of blinding white, fine sand, and a chaos of huge boulders, masses and slabs of rock, with here and there, usually where a tributary enters, long stretches of shingle. In the rains all these disappear, and the water laps against forest trees and the abrupt slope of the hills. The average difference between high and low water level of the Salween throughout the Shan States is between 50 and 60 ft., and in some places it is as much as 90. There are many rapids, caused by reefs of rock running across the bed, or by a sudden fall of from one to several feet, which produce very rough water below the swift glide; but the most dangerous places for navigation are where a point juts out into the stream, and the current, thrown back, causes a violent double backwater. Nevertheless, long stretches of the river, extending to scores of miles, are habitually navigated by native boats. The current is extremely variable, from ½ m. an hour to ten knots. Launches ply regularly from Moulmein to the mouth of the Yōnzalīn, in Lower Burma. The worst part of the whole Salween,

so far as is known, is the gorge between the mouth of the Yōnzalīn and Kyaukhnyat. It is quite certain that steam launches could ply over very long sections of the river above that, perhaps as far as the Kaw ferry, or even the Kunlong ferry. In British territory, however, there are very few settlements on the river itself, and frequently the ferry villages are built 1,000 ft. above the river.

The Chinese believe the Salween valley to be deadly to all strangers, but it is in Chinese territory—particularly in the Lu Kiang, or Möng Hkö state—that there is the largest population on the river until Lower Burma is reached. A description of the Salween resolves itself into a list of the ferries at which it can be crossed, for no one marches up the river. The river is bridged by the Chinese on the main route from Tēng Yüeh (Momien) and Bhamo to Tali-fu. Native boats can ply from Kyodan S., and light draught steamers ascend as far as Shwegūn, 63 m. from Moulmein.

The Salween enters the sea in the Gulf of Martaban by two mouths, one to the north and one to the south of Bilugyun island. The southern mouth is the more important, and is the one by which ocean-going craft approach the port of Moulmein. The Salween cuts the British Shan States nearly in half, and is a very formidable natural obstacle. It seems probable, however, that long stretches of it can be opened to trade. It is certainly no less navigable than the Middle Mekong or the Yangtsze-kiang above I-chang.

SALYES (Gr. Σάλυες; also SALLYES, SALYI, SALLUVII), a people occupying the plain south of the Druentia (Durance) between the Rhone and the Alps. According to Strabo (iv. p. 203) the older Greeks called them Ligyes, and their territory *Ligustikē*. In 154 B.C. the inhabitants of Massalia, who had been connected with the Romans by ties of friendship since the second Punic war, appealed for aid against the Oxybii and Decietes (or Deciates). These people, called by Livy (*Epit.* 47) "transalpine Ligurians," were perhaps two smaller tribes included under the general name of Salyes. They were defeated by Quintus Opimius. In 125–124 B.C. hostilities broke out between the Romans and the Salyes from the same cause. Gaius Sextius Calvinus (123–122 B.C.), subdued the Salyes, destroyed their chief town, and founded near its ruins the colony of Aquae Sextiae (Aix). Part of their territory was handed over to Massaliots. From this time the Salyes practically disappear from history.

For ancient authorities *see* A. Holder, *Altceltischer Sprachschatz*, ii. (1904).

SALZA, HERMANN VON (*c.* 1170–1239), master of the Teutonic Order, and councillor of the emperor Frederick II., entered the Teutonic Order in early life, became very intimate with Frederick II., took part in the expedition to Damietta in 1221, and accompanied the emperor on the crusade of 1228. About 1210 he was appointed master of the Teutonic Order, and in 1226 received the province of Kulm from Conrad I., duke of Masovia, in return for help against the Prussians. In 1230 the conquest of Prussia was begun by the Order, although not under his immediate leadership. In 1225 he reconciled Valdemar II., king of Denmark, with Henry I., count of Schwerin, and thus won again the land on the right bank of the Elbe for the Empire, and the recognition of imperial superiority over Denmark. Trusted by Pope Gregory IX. and the emperor alike, he brought about the treaty of San Germano between them in 1230, was the only witness when they met in conference at Anagni in the same year, and it was he who, in 1235, induced Frederick's son, Henry, to submit to his father. He died on March 19, 1239 at Barletta in Apulia, and was buried there in the chapel of his Order.

See A. Koch, *Hermann von Salza, Meister des deutschen Ordens* (Leipzig, 1885).

SALZBRUNN, a watering-place in the Prussian province of Silesia, at the foot of the Riesengebirge, 30 m. S.W. of Breslau, by rail to Waldenburg. Pop. (1925) 15,013. It consists of Ober-, Neu- and Nieder-Salzbrunn, and manufactures glass, wire goods and yarn. Its alkalo-saline springs were known as early as 1316.

SALZBURG, a mountainous province of Austria, covers an area of 2,762 sq.m. and extends from the central ridge of the crystalline zone of the Alps to the Alpine foreland. Physically it includes from south to north parts of the following lithological belts of the Alps, the crystalline, the slate and schist, the limestone High Alps, and the *flysch* zones. The first named extends from the glacier-capped Hohe Tauern and southern slopes of the Niedere Tauern to the line of the Pinzgau eastward to the Mandling pass. This is a region much dissected by tributaries of the Salzach and characterised by forestry and pastoral pursuits. The most important valley is that of the Gastein leading to a col between the Hohe and Niedere Tauern ranges and followed by a railway to Carinthia. North of this belt is a wedge-shaped mass of slates and schist, with softer outlines and lower forested heights, which is in turn replaced by the lake-strewn plateau of Dachstein limestone, split into several detached blocks, *e.g.*, the eastern end of the Kitzbühl Alps, the Salzburg Alps (Birnhorn, 8,637 ft.), the Reiteralpe and the glacier-capped Schönfeldspitze mass (8,708 ft.). Part of the Dachstein group also belongs to Salzburg. Drainage is effected mainly by the Salzach which in its upper course follows a west-east marshy valley (Pinzgau) along the foot of the Hohe Tauern, at the junction of crystallines and slates, to Schwarzach St. Veit, where it takes a transverse course through a wider and more fertile valley (Ponzgau), breaking through a narrow pass between the Hagengebirge and the Tennegebirge and reaching the foreland at Salzburg; the upper waters of the Enns and Mur take the drainage of the eastern half of the Niedere Tauern. Salzburg is noted for its numerous beautiful lakes and the many magnificent falls on its rivers, *e.g.*, the four Krimmler falls, together 2,085 ft. high, the most important falls in the Eastern Alps and the Tauern fall (660 ft.).

The enclosed basins of the higher mountain districts experience very hard winters and settlement in them is thin and confined to the sunny slopes and alluvial fans. About 16% of the total area is unproductive and of the remainder some 11% is given over to crops and 10% to meadows. Forestry and pastoral activities, aided by a wealth of Alpine pasture (some 30% of the area) are most important. Mineral resources include: salt at Hallein, copper near Bischofshofen, iron-ore at Werfen, marble (Adnet) and small quantities of gold, silver and arsenic. The absence of coal is compensated by the rich stores of water, from which electrical power is developed at Lend Gastein, Bärenwerk, etc., yet industry is only moderately progressive. Catering for visitors to the spas, scenic resorts and centres for winter-sports is the most remunerative industry.

Apart from Salzburg (*q.v.*), the capital, the population of 223,023 (1923) is rurally distributed, mainly along the valleys and chief lines of traffic, and no other town reaches 10,000 inhabitants. The people are of German stock and mainly Roman Catholic in religion, with a high standard of education.

See F. Martin, *Kunstgeschichte von Salzburg* (Vienna, 1924) and E. Spengler, *Geologischer Führer durch die Salzburger Alpen und das Salzkammergut* (Berlin, 1924).

SALZBURG, the capital of the province of Salzburg, Austria, and formerly of the archbishopric of the same name, lies on both banks of the Salzach where this river leaves its narrow valley through the limestone Alps and enters the Alpine foreland. The situation is important economically and strategically, for here several types of physical region, with differing agricultural possibilities, meet and the Orient route from Germany through Munich joins the Orient route from France through Switzerland and branches along the Salzach valley and through the Hohe Tauern to Carinthia and Italy. The site has been occupied since pre-Roman time, the original settlement being replaced by a Roman trading town (*Juvavum*) which was sacked by the barbarians (477). The modern city grew up around the monastery and bishopric founded here about 700 by St. Rupert of Worms, who preached Christianity in the district at the invitation of its ruler Duke Theodo of Bavaria, and its history from that time is closely bound up with that of the see. The present name, due to the local abundance of salt, appears first in 816 by which time it had been raised to an archbishopric. Its archbishops gained in temporal power and dignity and were made imperial princes by Rudolf of Hapsburg in 1278.

Relations between the ecclesiastical rulers on the one hand and

the nobles and people on the other were always difficult, *e.g.*, during the Peasants' War of 1525–26, quelled with the aid of the Swabian League, and contributing to a reaction against the church when Salzburg became a stronghold of resistance to the Reformation. Persecution was rife and Protestant citizens were driven from the town. Nevertheless, the movement grew and in 1731–32, aided by the intervention of Frederick William I. of Prussia, 30,000 people sold their possessions and left the see, 6,000 of them leaving the capital. By the peace of Lunéville (1802) the see was secularized and given to the archduke of Austria. Following the peace of Pressburg (1805) it fell to Austria but four years later passed to Bavaria, returning to Austria in 1816 with the exception of a small portion on the left bank of the Salzach —by the peace of Paris. In 1849 the province became a crownland, several of its districts being transferred to Tirol, and remained so until 1918.

Salzburg abounds in objects and buildings of interest. Its ecclesiastical traditions are exemplified by eight convents and twenty-five churches, the majority interesting from their antiquity, architecture or associations. Of these, the 17th century cathedral, one of the largest and most perfect specimens of the Renaissance style in the Germanic countries, is on the model of St. Peter's at Rome. Though situated in the old town it is bounded on three sides by open squares, which permit its beauties to be appreciated. Other buildings of note are the old and new residences of the archbishops, the latter occupied by government offices, the present palace, the 15th century town-hall and the Mozart house and museum. The only relic of the university (1623–1810) is a theological seminary. By the suppression of its university Salzburg has been prevented from making that contribution to Austrian culture that its importance as an administrative and spiritual centre leads one to expect.

Salzburg to-day has a heavy seasonal tourist traffic, favoured by a healthy climate and delightful scenic surroundings, but to this it adds permanent occupations involving a number of small manufactures, *e.g.*, brewing, book-binding, the manufacture of musical instruments and marble wares and light iron goods, and the administrative functions customary to a provincial capital. Pop. (1923) 37,856.

SALZKAMMERGUT is a mountainous district of Austria forming the drainage area of the Traun and its tributaries above Gmunden. Originally its name (literally "salt-exchequer property") and its economic importance were derived from the valuable salt deposits, worked from prehistoric times at Hallstätt and Aussee, but although these are still valuable the region is rapidly developing as a health and tourist resort. Belonging to the eastern Alps it contains the Dachstein group (Dachstein, 9,830 ft.) with the most easterly glaciers of the Alps, the Totes Gebirge (Grosser Priel, 8,246 ft.), the Höllengebirge (Höllenkogel, 6,106 ft.), the Ischler and Sensen groups. Among its numerous lakes are Traun, Hallstätt, St. Wolfgang and Atter, the largest lake in Austria (18 sq.m., 1,527 ft. above sea-level, 560 ft. deep), each overshadowed by dark, forested heights. The district embraces parts of the provinces of Styria, Salzburg and Upper Austria, and the occupations of its population, apart from those suggested above, are cattle-rearing, forestry and the development of electricity. The towns are small and situated along the valleys and lake shores. Among them Gmunden (*q.v.*) is the chief, while Hallstätt is famous for its museum of local finds illustrative of the cultural period to which it gave its name.

SAMAIN, ALBERT VICTOR (1858–1900), French poet, was born at Lille on April 4, 1858. He was educated at the lycée of that town, and on leaving it entered a bank as a clerk. He enjoyed no literary associations, and his talent developed slowly in solitude. About 1884 Samain went to Paris, having obtained a clerkship in the Préfecture de la Seine, which he held for most of his life. His earliest volume of poems, *Au Jardin de l'infant,* led to the sudden recognition of his talent, and to applause from critics of widely different schools. In 1897 this book was reprinted in a more popular form, with the addition of a section entitled *L'Urne penchée.* Samain's second volume, *Aux flancs du vase,* appeared in 1898. His health began to fail and he withdrew to the country, where he died, in the neighbourhood of the village of Magny-les-Hameaux, on Aug. 18, 1900. A third volume of his poems, *Le Chariot d'or,* appeared after his death, with a lyrical drama, *Polyphème* (1901), which was produced at the Théâtre de l'Oeuvre in 1904. Samain's natural life was patiently spent in squalid conditions; he escaped from them into an imaginative world of the most exquisite refinement.

See also R. Doumic, "Trois Poètes," in the *Revue des deux mondes* (Oct. 1900); L. Bocquet, *Albert Samain, sa vie, son oeuvre* (1905); and E. W. Gosse, *French Profiles* (1905); F. Gohin, *L'Oeuvre poétique d'Albert Samain, 1858–1900* (1919); G. Bonneau, *A. Samain, poète Symboliste* (1925).

SAMANA RANGE, mountain ridge in the Kohat district of the North-West Frontier Province of India, commanding the south boundary of Tirah. The ridge lies between the Khanki valley on the north and the Miranzai valley on the south, and extends for some 30 m. W. from Hangu to the Samana Suk. It is some 6,000 to 7,000 ft. high. Beyond the Samana Suk lies the pass, known as the Chagru Kotal, across which the Tirah Expedition marched in 1897. On the opposite hill on the other side of this road is the famous position of Dargai (*see* TIRAH CAMPAIGN). After the Miranzai Expedition of 1891 this range was occupied by British troops and eleven posts were established along its crest, the two chief posts being Fort Lockhart and Fort Gulistan. In 1897 all the forts on the Samana were attacked by the Orakzais, and this and the Afridi attack on the Khyber pass were the two chief causes of the Tirah Expedition. When Lord Curzon reorganized the frontier in 1900, British garrisons were withdrawn from most of the Samana forts, which are now held by a corps of tribal police 450 strong, called the Samana Rifles.

SĀMĀNIDS, the first great native dynasty which sprang up in the 9th century in E. Persia, and, though nominally provincial governors under the suzerainty of the caliphs of Baghdad, succeeded in a very short time in establishing an almost independent rule over Transoxiana and the greater part of Persia. Under the caliphate of Mamun, Sāmān, a Persian noble of Balkh, who was a close friend of the Arab governor of Khorasan, Asad b. Abdallah, was converted from Zoroastrianism to Islam. His son Asad, named after Asad b. Abdallah, had four sons who rendered distinguished services to Mamun. In return they all received provinces: Nūḥ obtained Samarkand; Aḥmad, Ferghana; Yahyā, Shash; Ilyās, Herat. Of these Aḥmad and his second son Ismāʿīl overthrew the Saffārids (*q.v.*) and the Zaidites of Tabaristan, and thus the Sāmānids established themselves with the sanction of the caliph Motamid in their capital Bokhara.

The first ruler (874) was Naṣr I. (Naṣr or Naṣir b. Aḥmad b. Asad. b. Sāmān). He was succeeded by his brother Ismāʿīl b. Aḥmad (892). His descendants and successors, all renowned for the high impulse they gave both to the patriotic feelings and the national poetry of modern Persia (*see* PERSIA: *Literature*), were Aḥmad b. Ismāʿīl (907–913); Naṣr II. b. Aḥmad, the patron and friend of the great poet Rūdagi (913–942); Nūḥ I. b. Naṣr (942–954); Abdalmalik I. b. Nūḥ (954–961); Manṣūr I. b. Nūḥ, whose vizier Balʿamī translated Tabarī's universal history into Persian (961–976); Nūḥ II. b. Manṣūr, whose court-poet Daqiqi (Daḳiḳi) began the *Shāhnāma* (976–997); Manṣūr II. b. Nūḥ (997–999); and Abdalmalik II. b. Nūḥ (999), under whom the Sāmānid dynasty was conquered by the Ghaznevids. The rulers of this powerful house, whose silver dirhems had an extensive currency during the 10th century all over the N. of Asia, and were brought, through Russian caravans, even so far as to Pomerania, Sweden and Norway, where Sāmānid coins have been found in great number, were in their turn overthrown by a more youthful and vigorous race, that of Sabuktagīn, which founded the illustrious Ghaznevid dynasty and the Mohammedan empire of India.

Under Abdalmalik I. a Turkish slave, Alptagīn, had been entrusted with the government of Bokhara, but, showing himself hostile to Manṣūr I., he was compelled to fly and to take refuge in the mountainous regions of Ghazni, where he established a semi-independent rule, to which, after his death in 977 (A.H. 367), his son-in-law Sabuktagīn, likewise a former Turkish slave, succeeded. Nūḥ II., in order to retain at least a nominal sway over those Afghan territories, confirmed him in his high position and

invested Sabuktagīn's son Maḥmūd with the governorship of Khorasan, in reward for the help they had given him in his struggles with a confederation of disaffected nobles of Bokhara under the leadership of Fā'iq and the troops of the Dailamites, a dynasty that had arisen on the shores of the Caspian Sea and wrested already from the hands of the Sāmānids all their western provinces. Unfortunately, Sabuktagīn died in the same year as Nūḥ II. (A.H. 997, 387), and Maḥmūd (*q.v.*) confronted with an internal contest against his own brother Ismā'īl, had to withdraw his attention for a short time from the affairs in Khorasan and Transoxiana. This interval sufficed for the old rebel leader Fā'iq, supported by a strong Tatar army under the Ilek Khān Abu'l Ḥosain Naṣr I., to turn Nūḥ's successor Manṣūr II. into a mere puppet, to concentrate all the power in his own hand, and to induce even his nominal master to reject Maḥmūd's application for a continuance of his governorship in Khorasan. Maḥmūd refrained for the moment from vindicating his right; but, as soon as, through court intrigues, Manṣūr II. had been dethroned, he took possession of Khorasan, deposed Manṣūr's successor Abdalmalik II., and assumed as an independent monarch for the first time in Asiatic history the title of "sultān."

The last prince of the house of Sāmān, Montaṣir, a bold warrior and a poet of no mean talent, carried on for some years a kind of guerilla warfare against both Maḥmūd and the Ilek Khān, who had occupied Transoxiana, till he was assassinated in 1005 (A.H. 395). Transoxiana itself was annexed to the Ghaznevid realm eleven years later, 1016 (A.H. 407).

See S. Lane Poole, *Mahommedan Dynasties* (1894), pp. 131–133; Stockvis, *Manuel d'histoire* (Leyden, 1888), vol. i. p. 113; also articles CALIPHATE and PERSIA: *History*, section B, and for the later period MAḤMŪD, SELJUKS, MONGOLS.

SAMANIEGO, FELIX MARIA DE (1745–1801), Spanish fabulist. His *Fábulas en verso castellano* (1781–84), imitations or translations for the most part of Phaedrus, La Fontaine and Gay, are excellent of their kind.

SAMARA, a province of Russia, lying east of the Volga river, except for the territory enclosed in the great Volga loop, and south of the Tatar A.S.S.R. Its southern boundary lies between the Great Irgiz and the railway from Saratov to Uralsk, and runs parallel to the latter till it reaches the boundary of the Kazakstan A.S.S.R., on the Obschiy Syrt plateau. Orenburg province and the Bashkir A.S.S.R., lie to the east.

South of the Volga loop (Samarskaya Luka) is a low flat steppe recently emerged from the post-Pliocene Aral-Caspian basin, while from the Samara river to the Sok are Permian formations. The province is a transition region between the black-earth and the salt steppe types of soil. The most fertile black earth with a humus content of 18% lies to the north-east of the province in the lyesso-steppe area—*i.e.*, steppe with patches of forest, here mainly oak. Between the Samara river and the Mocha, except for a patch north and south along the eastern part of the latter stream, the black-earth is of poorer humus content, of a sandy type, and patches of salted soil appear, especially near the Volga. South of the Great Irgiz river the soil is salt steppe, and there are salt marshes. South of the Samara river there is no forest, but the land in the loop and to the north of it is forested, and there is a patch of forest on the north bank, west of Buzuluk.

The region is undergoing a process of rapid desiccation. It has an arid climate, the rainfall varying from 8 to 16 in., per annum, mostly falling in spring and summer in heavy showers, so that the run-off is excessive and only the surface becomes saturated. The prevailing winds are from the north-east, dry and strong, and blowing with great violence in winter, so that snow does not lie and the ground is exposed to the severe winter frost. The average July temperature at Samara is 70·4° F and January 9·3° F. An added disadvantage is the liability to years of excessive drought such as 1911 and 1921. Winter lasts for five months and rain falls on an average of 95 days per annum, 34 of which are in June–August. Thunderstorms are frequent in June and July and if accompanied by dry hail may ruin the crops.

Diminution in the spring rainfall causes the disastrous famines to which the region is subject. Of the inhabitants, 90% are occupied in agriculture, depending on the crops for sustenance and for purchase of necessities. Bad harvests, therefore, such as those of 1911 and 1921, bring disaster. In 1921 great numbers died of starvation and starvation diseases and others fled from the region, many to perish on the road. Bands of starving children, whose parents had succumbed first in their efforts to feed the children, penetrated even as far as the Caucasus. Livestock diminished and when the weakened survivors of the terrible period faced the next year there was a shortage of everything, from seeds and instruments to working cattle.

The area has revived to an extraordinary degree, an evidence of the fertility of its famous black soil. Attention had been concentrated on the drought problem and the need for more intensive agriculture in Samara as early as 1864, and some efforts were made to improve the type of cultivation. Further evidence of the crisis of extensive agriculture in the region is the great variation in the harvest, in 1911 not enough to satisfy local needs; in 1913, a surplus of 110,000,000 poods. Six experimental stations have been established to study local problems, Besenchuk, Buguruslan, Alekseyev, Bugulma, Buzuluk and one connected with the Samara agricultural school at Kinel.

The main lines along which attempts are being made to improve agriculture and lessen the chances of famine in the district are the increasing practice of irrigation; a wider range of variety in crops, and especially the sowing of grasses and lucerne, in this respect Samara stands first in the provinces of the famine area; the preservation of what forest is left, and the planting of more trees, in view of their protective value in a windswept region, and their influence on moisture conditions in the soil; the greater extension of stock raising, in view of the increasing importance of meat, dairy products, fats and wool for the growing industrial regions. Though many experiments have been made, no kind of winter corn able to withstand the severe conditions has yet been discovered, but more drought resisting varieties of hard wheat, which commands a better market than soft wheat, have been introduced. Efforts are also directed towards co-operative farming, though as yet not very successfully.

About 90% of Samara province is favourable for vegetation, and of this about two-thirds is ploughed land, about one-tenth is forest and scrub, and the rest is pasture, meadowland or garden. In the stock-raising areas, cattle, sheep and pigs are at pre-1914 level, but horses are still much below that level. Cattle plague often devastates the herds. A few dairy artels have been established. Bee-keeping and poultry raising are subsidiary occupations. The manufactures in the region are entirely dependent on local products and include flour-milling, distilling, starch manufacture, tobacco making, confectionery, woollen goods, leather and matches. Most of them are of the small scale, peasant type. Two sugar factories were working before 1914, and there is one factory producing agricultural machinery.

The population in 1926 was 2,409,773, consisting mainly of Great Russians, with Mordvas, Chuvashes, Tatars and Bashkirs. The ethnographic variety is very great and the colonies of Poles, Mennonites from Danzig, and Circassians settled here in 1847–59 by the government added to it. Difficulties of overcoming illiteracy and raising the cultural standard under these conditions are great. The Volga is the great artery of commerce, its tributaries are shallow and not suitable for navigation, with the exception of the Great Irgiz up to Kushum. Samara is linked by rail with Moscow on the west, and with Ufa, and Orenburg on the east, while a branch line reaches the Sok river. Roads are poor, there are few bridges, and transport difficulties hamper development. The chief towns are Samara, Pugachev, Buguruslan and Buzuluk (*qq.v.*).

See P. A. Preobrazhenskiy *The Restoration of Agriculture in the Famine Area of Russia* (1922, in English); *Colonisation of the Samara Region* (1923, in Russian); M. M. Dubenskiy, *The Central Volga Region* (1927, in Russian).

SAMARA, a town of Russia in the province of Samara, in 53° 11′ N., 50° 9′ E., on the left bank of the Volga loop, at the junction of the Samara river. Pop. (1926) 171,952. It is a fine river port, and acts as an entrepôt for goods brought by rail and

transhipped, or *vice versa*. Its industries include the making of machinery, distilling, brewing, match-making, saw-milling, leather-work and flour-milling. There are municipal electricity, water and canal and tram services. Near the town is a *kumiss* or fermented mare's milk sanatorium. Samara was built in 1586 to secure communication between the recently conquered principalities of Kazan and Astrakhan. Later discontent among the serfs led to a rising in the district in 1775 and the town was the centre for its leader, Pugachev. Nearly a century earlier, in 1670, it was captured by the rebel Stenka Razin. Its importance as a trading centre dates from the end of the 18th century, when colonisation spread eastwards. In 1918 the Russian State gold treasure was transferred from Kazan to Samara, under the charge of employees of the Tsarist government, but when the military situation became critical, it was removed under an escort of Czech soldiers. In spite of the difficulties of this period and of the terrible famine conditions of 1921, the town has revived and its population is increasing rapidly.

SAMARIA, an ancient city of Palestine in the tribe of Ephraim, 6 m. N. of Shechem (Nāblus). The site, an isolated steep hill in the very centre of Palestine, is one of great natural strength. Sebastiyeh, a mean village of 600 inhabitants, occupies part of the area of the royal city; its houses are mostly built with ancient materials.

History.—Omri, king of Israel, bought the hill from its owner, Shemer, for two talents of silver, and erected a city which he made his capital (1 Ki. xvi. 24). The evidence of the excavations establishes that the site was unoccupied prior to the time of Omri (10th century B.C.). Ahab occupied the city, built a temple and remodelled Omri's palace, which was further extended later and probably by Jeroboam II. Benhadad II. of Syria in the days of Elijah and Elisha, after having been repulsed from its walls (1 Ki. xx. 34) returned to besiege it and bring it to dire straits through famine (2 Ki. vi. vii.). Shalmaneser IV. laid siege to it for three years (724–22 B.C.), but died during its progress. The operation was completed by Sargon, who deported its inhabitants and substituted for them a new body of settlers from Cutha, the ancestors of the Samaritans. Alexander the Great conquered it in 331 B.C., as did also later Ptolemy Lagi and Antiochus Poliorcetes. It offered a lively resistance to the fanatical John Hyrcanus. Pompey rebuilt it; Gabinius restored it; but Herod the Great was its chief benefactor. A temple, hippodrome and colonnaded streets were amongst his endowments; their remains still arrest attention. He made it his capital and it took the name Sebaste (commemorating Augustus). The rise of Nāblus (Neapolis), restored by Vespasian, involved the gradual decay of Sebaste. The Crusaders built a church on the hill and established a bishopric. The church, like so many others, was later converted into a mosque. Here were shown the tombs of Elisha, Obadiah, and John the Baptist.

Archaeology.—From 1908 to 1910 excavations, under the auspices of Harvard University were carried out on the site, the results of which were published in 1924. The oldest edifice found on the hill was the palace of Omri, added to and enlarged by Ahab and Jeroboam II. An interesting discovery was that of a number of Hebrew texts traced in ink on tiles in Hebrew writing of a beautiful type belonging to the 9th century B.C. The foundations of a forum, senate-house, palace, city-gate flanked by two round towers, etc., have been laid bare. The low ground to the north-east was the site of the stadium.

See G. A. Reisner, C. S. Fisher, D. G. Lyon, *Harvard Excavations at Samaria (1908–10)* (1924); R. Dussaud, "Samarie au temps d'Achab," *Syria* 6 (1925), 314 *seq.* (E. Ro.)

SAMARITANS, primarily meaning "inhabitants of Samaritis, or the region of Samaria," is specially used, in the New Testament and by Josephus, as the name of a peculiar religious community which had its headquarters in the Samaritan country, and is still represented by a few families at Nāblus, the ancient Shechem. They claim to be descendants of the ten tribes, and to possess the orthodox religion of Moses, accepting the Pentateuch only and transmitting it in a Hebrew text which for the most part has but slight variations from that of the Jews. But they regard the Jewish temple and priesthood as schismatical, and declare that the true sanctuary chosen by God is not Zion but Mount Gerizim, over against Shechem (St. John iv. 20). The sanctity of this site they prove from the Pentateuch, reading Gerizim for Ebal in Deut. xxvii. 4. With this change the chapter is interpreted as a command to select Gerizim as the legitimate sanctuary (*cf.* verse 7). Moreover, in Exod. xx. 17 and Deut. v. 21 a commandment (taken from Deut. xxvii.) is found in the Samaritan text, at the close of the decalogue, giving directions to build an altar and do sacrifice on Gerizim, from which of course it follows that not only the temple of Zion but the earlier shrine at Shiloh and the priesthood of Eli were schismatical.

The Samaritans must have derived their Pentateuch from the Jews after Ezra's reforms of 444 B.C., no doubt at the time of the expulsion from Jerusalem in 432 B.C. of a man of high-priestly family (Neh. xiii. 28), who had married a daughter of Sanballat. *Cf.* Josephus *Ant.* xi. 8. The story that they possess a copy of the Law written by Abisha, the great-grandson of Aaron, seems to have aroused a strangely wide-spread interest, so that tourists invariably ask to see it and usually claim to have succeeded in doing so. Considering the extreme reverence with which it is regarded, it may safely be said that *this* manuscript is never shown to them.

In spite of the differences which separated the two communities, their internal development and external history ran parallel courses till the Jewish state took a new departure under the Maccabees. The religious resemblance between the two bodies was increased by the institution of the synagogue, from which there grew up a Samaritan theology and an exegetical tradition. The latter is embodied in the Samaritan Targum, or Aramaic version of the Pentateuch, which in its present form is probably not much earlier than the 4th century A.D., but in general is said to agree with the readings of Origen's τὸ Σαμαρειτικόν. Whether the latter represents a complete translation of the Law into Greek may be doubted, but at any rate the Samaritans began already in the time of Alexander to be influenced by Hellenism. They as well as Jews were carried to Egypt by Ptolemy Lagi, and the rivalry of the two parties was continued in Alexandria (Jos. *Ant.* xii. 1. 1), where such a translation may have been produced. Of the Samaritan contributions to Hellenistic literature some fragments have been preserved in the remains of Alexander Polyhistor.

The troubles that fell upon the Jews under Antiochus Epiphanes were not escaped by the Samaritans (2 Macc. v. 23; vi. 2), for the account in Josephus (*Ant.* xii. 5. 5), which makes them voluntarily exchange their religion for the worship of Zeus, is evidently coloured to suit the author's hostility. Under the Maccabees their relations with Judaea became very bitter. They suffered severely at the hands of Hyrcanus, and the temple on Mt. Gerizim was destroyed. Although this treatment established an unalterable enmity to the Jews, as we see in the New Testament, in Josephus and in Jewish tradition, the two sects had too much in common not to unite occasionally against a common enemy, and in the struggles of the Jews with Vespasian the Samaritans took part against the Romans. They were not, however, consistent, for under Hadrian they helped the Romans against the Jews and were allowed to rebuild their temple on Mt. Gerizim. They seem to have shared in the Jewish dispersion, since in later times we hear of Samaritans and their synagogues in Egypt, in Rome and in other parts of the empire. In the 4th century they enjoyed a certain degree of prosperity, according to their own chronicles, under Baba the Great, who (re-)established their religious and social organization. In 484, in consequence of attacks on the Christians, the Gerizim temple was finally destroyed by the Romans, and an insurrection in 529 was suppressed by Justinian so effectively that, while retaining their distinctive religion, they became henceforth politically merged in the surrounding population, with a merely domestic history. They are mentioned in later times by the Jewish travellers Benjamin of Tudela (1173) and Obadiah Bertinoro (1488 in Egypt), by Sir John Maundeville and others, but little was known of them in Europe till Scaliger opened communications

with them in 1583. In consequence of the interest thus aroused, the traveller Pietro della Valle visited them in 1616 and succeeded in obtaining a copy of their Pentateuch and of their Targum. At the present day they live only at Nāblus (Shechem), about 150 in number, the congregations formerly existing in Gaza, Cairo, Damascus and elsewhere having long since died out. Their ecclesiastical head is the "Priest-levite," who claims descent from Uzziel the younger son of Kohath (Exod. vi. 18). The line of the high-priests, so called as being descended from Aaron, became extinct in 1623.

In religion, since they recognize no sacred book but the Pentateuch, they agree with the Jews in such doctrines and observances only as are enjoined in the law of Moses. They do not therefore observe the feast of Purim, nor the fast of the 9th of Ab, nor any of the later rabbinical extensions or modifications of the law. Briefly summarized, their creed is as follows: (*a*) God is one, and in speaking of Him all anthropomorphic expressions are to be avoided: creation was effected by his word: divine appearances in the Pentateuch are to be explained as vicarious, by means of angels (so as early as the 4th century A.D.); (*b*) Moses is the only prophet: all who have since claimed to be so are deceivers; (*c*) the Law, which was created with the world, is the only divine revelation; (*d*) Mt. Gerizim is the house of God, the only centre of worship; (*e*) there will be a day of judgment. Closely connected with this are the doctrines (also found in the 4th century) of a future life and of a messiah (Ta'eb), who shall end the period of God's displeasure (Fanuta) under which his people have suffered since the schism of Eli and the disappearance of the Ark, and shall restore Israel to favour (Re'uta, Riḍwân).

The Samaritan language properly so called is a dialect of Palestinian Aramaic, of which the best examples are found in the literature of the 4th century A.D. An archaic alphabet, derived from the old Hebrew, was retained, and is still used by them for writing Aramaic, Hebrew and sometimes even Arabic. After the Muslim conquest of Syria in 632 the native dialect of Aramaic gradually died out, and by the 11th century Arabic had become the literary as well as the popular language. In the Liturgy Hebrew was no doubt used from the earliest times side by side with Aramaic, and after the 11th century it became, in a debased form, the only language for new liturgical compositions.

Literature.—Their literature is, like that of the Jews, chiefly of a religious character. (For an account of it *see* Montgomery, *The Samaritans*.) Reference has been made above to Samaritan Hellenistic works which have perished except for a few fragments. According to Samaritan tradition, their books were destroyed under Hadrian and Commodus, but of the language and contents of them nothing is recorded. There can be no doubt that some, perhaps much, of the literature has been lost, for nothing is extant which can be dated before the 4th century A.D. The Targum, or Samaritan-Aramaic version of the Pentateuch was most probably written down about that time, though it was clearly based on a much older tradition and must have undergone various recensions. To the same period belong the liturgical compositions of Amram Darah and Marqah, and the latter's midrashic commentary (called the "Book of Wonders") on parts of the Pentateuch, all in Aramaic. With the possible exception of one or two hymns there is nothing further till the 11th century when there appears the Arabic version of the Pentateuch, usually ascribed to Abu Sa'id, but perhaps really by Abu'l-ḥasan of Tyre, who also wrote three Arabic treatises, still extant, on theological subjects, besides some hymns. Of the same date (1053) is an anonymous commentary on Genesis, preserved in the Bodleian Library at Oxford (MS. Opp. add. 4°, 99), interesting because it quotes from books of the Bible other than the Pentateuch. In the 12th century, Munajja and his son Ṣadaqah wrote on theology; the earlier part of the chronicle called al-Taulidah was compiled in Hebrew (1149); and about the same time treatises on Grammar by Abu Sa'id and Abu Isḥaq Ibrahim ibn Faraj. Ghazal ibn-al-Duwaik, who wrote on the story of Balak and on the restoration of the kingdom to Israel, is said to have lived in the 13th century, and another chronicle (in Arabic), called the book of Joshua, is dated about the same time by T. W. J. Juynboll. In the second half of the 14th century lived three important liturgical writers, Abisha b. Phinehas (ob. 1376), Abdallah b. Solomon and Sa'd-allah (or Sa'd-ed-din) b. Ṣadaqah: Abu'l-fath, who composed his chronicle in 1355: a high priest Phinehas, author of a lexicon: and the anonymous writer of the commentary on the Kitab al-asaṭir, a work, ascribed to Moses, containing legends of the Patriarchs. Another famous liturgist was Abraham Qabaẓi, whose pupil Isma'il Rumaiḥi in 1537 wrote a work on the praise of Moses. Several members of the Danfi family were prominent in the 18th century as liturgists, among them Abraham b. Jacob, who also wrote a commentary on Gen.-Num.; and of the levitical family Ghazal ibn Abi Sarur, who commented on Gen.-Exod. Another Ghazal (=Ṭabiah b. Isaac), priest-levite, who died in 1786, was a considerable writer of liturgy. Of subsequent authors mention need only be made of the Hebrew chronicle by Ab Sakhwah (=Murjan) b. As'ad, of the Danfi family, in 1900, chiefly on the basis of al-Taulidah and Abu'l-fatḥ; an Arabic chronicle by Phinehas b. Isaac (ob. 1898) of the levitical family; and an Arabic theological work, by the late priest-levite, Jacob b. Aaron.

BIBLIOGRAPHY.—*See* Montgomery, *The Samaritans* (Philadelphia, 1907). Since then the Pentateuch has been edited with critical apparatus by August von Gall (Giessen, 1914–18), The Samaritan Liturgy, text and introduction, by A. Cowley (Oxford, 1909), The Asater, with introduction, translation and notes by M. Gaster (London, 1927). (A. Cy.)

SAMARIUM, a metallic element (symbol Sm, atomic number 62, atomic weight 150·4), belonging to the rare-earth group, was discovered in 1879 by Lecoq de Boisbaudran and obtained in the form of pure compounds by Demarçay about 1901. Samarium occurs in many minerals such as monazite, gadolinite, samarskite, etc. It is best separated from the other members by the fractional crystallization of the double magnesium nitrates from 50% nitric acid. The oxide, Sm_2O_3, forms a pale yellow powder rapidly soluble in most acids giving topaz-yellow salts such as $Sm_2(SO_4)_3 \cdot 8H_2O$. The solutions show characteristic absorption and spark spectra. The metal has been prepared by the electrolysis of the fused anhydrous chloride. It slowly oxidizes in the air and melts at 1,300°–1,400° C. Samarium, like europium, gives a lower chloride, $SmCl_2$, which is produced by heating $SmCl_3$ in hydrogen. (*See* RARE EARTHS.) (C. J.)

SAMARKAND, a city of Asiatic Russia, in 39° 39′ N., 66° 56′ E., the capital of the Uzbek S.S.R. Pop. (1926) 101,365. The city is the ancient Maracanda, the capital of Sogdiana, then the residence of the Muslim Samanid dynasty, and subsequently the capital of the Mongol prince Tamerlane. It was captured by the Russians under General Kaufmann, after a fierce struggle, in 1868 and for a time declined. In 1900 its population was 58,194, but since the foundation of the Uzbek republic in 1924 with Samarkand as its administrative centre, the town has grown rapidly, an electric power station has been constructed and it has leather factories, cotton cleaning mills, flour-mills, distilleries, and pencil and brick factories. It is linked by rail with Orenburg and with the Caspian, and when these lines are joined up via Semipalatinsk with the trans-Siberian line, it is hoped that cotton cultivation will develop markedly and the population will depend on Siberian grain. It is situated at a height of 2,358 ft. in the fertile loess valley of the Zarafshan, at the point where the river issues from the western spurs of the Tian Shan, on a high plain, with the snow clad Hissar range rising to the south, from which bracing winds blow and make the city more healthy than others in Central Asia. Within a journey of a couple of days lie the glacier snouts of the Archa-Maidan, "Place of Junipers."

The Russian part of the town has wide streets lined with poplar, acacia, willow and elm strees, but the Muslim part is an intricate labyrinth of narrow, winding streets. Gardening, the making of pottery and metal goods, and trade in cotton, silk, wheat, rice, horses, asses, fruit and cutlery are among the occupations of the people. The native city, with its maze of yellow houses nestling among the trees, and from which rises the turquoise cupola of the Bibi-Khanum (a college erected in 1388 by a Chinese wife of Timur), centres on the Rigistan, a square around which are three

madrasahs (Muslim colleges), Ulug-beg, Shir-dar and Tilla-kari, of great architectural symmetry and beauty, decorated with enamelled tiles of various colours. Outside the walls of Samarkand are the Hazret Shah-Zindeh, the summer palace of Timur, on a terrace reached by 40 marble steps, and the grave of Shah-Zindeh (Kasim ibn Abbas), a companion of Timur. The latter was a famous shrine in the 14th century (Ibn Batuta's *Travels*, iii. 52). The Gur Amir, the tomb of Timur, a dome-crowned chapel, has suffered much from time and earthquakes; on its interior walls are turquoise arabesques and inscriptions in gold.

Maracanda was destroyed by Alexander the Great in 329 B.C. and was the scene of the murder of Cleitus. Ruins of its buildings, amongst which are plain and enamelled tiles and Graeco-Bactrian coins, lie outside Samarkand and are now called Aphrosiab. The city reappears as Samarkand at the time of the Arab conquest, when it was finally reduced by Kotaiba ibn Muslim in A.D. 711–712. Under the Samanids it became a brilliant seat of Arabic civilization and is reported to have been defended by 110,000 men when besieged by Jenghiz Khan in 1221, by whom it was destroyed and pillaged. When Timur (Tamerlane) made it his residence in 1369, its inhabitants numbered 150,000. The magnificent buildings of Timur's successors, which still remain, testify to its former wealth. But by the beginning of the 18th century it was almost uninhabited. It fell under Chinese dominion and subsequently under that of the Amir of Bukhara, and finally under that of Russia.

SAMAWA, a town on the Euphrates in 31° N., 45° E., at the junction of the Hindieh and Hilla branches of the Euphrates. The town is on the Baghdad-Basra railway and there is a good clear stretch of river as far as Nasiriyeh 71 m. down stream (up stream the river is practically impassable). It is also situated on the caravan routes to Hilla, Nejef and Basra, in a fertile area and is a centre of trade in local agricultural products, including vegetables, rice and wheat and barley. Like most of the Euphrates towns it is a market for such imported goods as sugar, indigo and coffee and also Manchester goods. A good deal of wool is raised locally and woollen carpets are manufactured in the town. Pop. (estimated) 10,000.

SAMBALPUR, a town and district of British India, in the Orissa division of Bihar and Orissa. The town is on the left bank of the river Mahanadi, and the terminus of a branch of the Bengal-Nagpur railway. Pop. (1921) 13,594. It contains a ruined fort with old temples.

The DISTRICT OF SAMBALPUR has an area of 3,824 sq.m. and a population (1921) of 789,466. The Mahanadi, which is the only important river, divides it into unequal parts. The greater portion is an undulating plain, with ranges of rugged hills, the largest of which is the Bara Pahar, covering an area of 300 sq.m., and attaining at Debrigarh a height of 2,267 ft. The Mahanadi affords means of water communication for 90 m.; its principal tributaries in Sambalpur are the Ib, Kelo and Jhira. To the west of the Mahanadi the district is under close cultivation; to the east the country is broken by hills and a considerable area is under forest. Gold dust and diamonds have been found near Hirakud, at the junction of the Ib and Mahanadi.

Sambalpur lapsed to the British in 1849, and was attached to Bengal until 1862, when it was transferred to the Central Provinces. In 1905 Sambalpur was transferred back again to Bengal, without the subdivisions of Phuljhar and Chandarpur-Padampur. On the outbreak of the Mutiny in 1857 a general rising took place, and it was not until 1864 that tranquillity was restored.

SAMBOURNE, EDWARD LINLEY (1844–1910), English draughtsman, illustrator and designer, was born in London, on Jan. 4, 1844. He was educated at the City of London school, and also received a few months' education at the South Kensington school of art. After a six years' "gentleman apprenticeship" with John Penn and Son, marine engineers, Greenwich, his humorous and fanciful sketches made surreptitiously in the drawing-office of that firm were shown to Mark Lemon, editor of *Punch*, and at once secured him an invitation to draw for that journal. In April 1867 appeared his first sketch, "Pros and Cons," and from that time his work was regularly seen, with rare exceptions, in the weekly pages of *Punch*. In 1871 he was called to the *Punch* "table." He drew his first political cartoon, properly so-called, in 1884, and ten years later began regularly to design the weekly second cartoon, following Sir John Tenniel as chief cartoonist in 1901. He died on Aug. 3, 1910.

See M. H. Spielmann, *The History of Punch* (1895).

SAMBUCA, SAMBUTE, SAMBIUT, SAMBUE, SAMBUQUE, an ancient stringed instrument of Asiatic origin generally supposed to be a small triangular harp of shrill tone (Arist. Quint. Meib. ii. p. 101). But there is no certainty on the point and the most widely different characters have been ascribed to the instrument from time to time in the older records. Thus it has been described as a kind of tambourine, as a sort of flute, as a cithara, as another form of the sackbut, and so on.

SAMLAND, a peninsula of Germany, in the province of East Prussia, on the Baltic. It separates the Frisches Haff on the west from the Kurisches Haff on the north-east, and is bounded on the south by the river Pregel and on the east by the Deime. Its shape is oblong; it is 43 m. long, and 18 broad, and has an area of 900 sq.m. The surface is mostly flat, but on the west sand-hills rise to a height of 300 ft. The chief product is amber. The former episcopal see of Samland was founded by Pope Innocent IV. in 1249 and subordinated to the archbishop of Riga. Bishop Georg von Polentz embraced the Reformation in 1523, and in 1525 the district was incorporated with the duchy of Prussia.

SAMNAN: *see* SEMNAN.

SAMNITES, the name given by the Romans to the warlike tribes inhabiting the mountainous centre of the southern half of Italy. The word *Samnites* was not the name, so far as we know, used by the Samnites themselves, which would seem rather to have been (the Oscan form of) the word which in Latin appears as *Sabini* (*see* below). The ending of *Samnites* seems to be connected with the name by which they were known to the Greeks of the Campanian coast. Both from tradition and from surviving inscriptions (*see* OSCAN and R. S. Conway, *Italic Dialects*, pp. 169–206) it is clear that they spoke Oscan; and tradition records that the Samnites were an offshoot of the Sabines (see *e.g.*, Festus, p. 326 Müller). On two inscriptions, of which one is unfortunately incomplete, and the other is the legend on a coin of the Social War, we have the form *Safinim*, which would be in Latin *Sabinium*, and is best regarded as the nominative or accusative singular, neuter or masculine, agreeing with some substantive understood, such as *nummum* (*see* Conway, *ibid.*, pp. 188, 216).

The abundance of the group names ending in the suffix *-no-* in all the Samnite districts classes them unmistakably with the great Safine stock (*see* SABINI). The Samnites are thus intimately related to the patrician class at Rome (*see* ROME: *History*).

The longest and most important monument of the Oscan language, as it was spoken by the Samnites (in, probably, the 3rd century B.C.) is the small bronze tablet, engraved on both sides, known as the *Tabula Agnonensis*, found in 1848 at the modern village Agnone, not very far from the site of Bovianum, which was the centre of the northern group of Samnites called *Pentri*. This inscription, now preserved in the British Museum, is carefully engraved in full Oscan alphabet.

The text and commentary will be found in Conway, *op. cit.*, p. 191: it contains a list of deities to whom statues were erected in the precinct sacred to Ceres, or some allied divinity, and on the back a list of deities to whom altars were erected.

See R. S. Conway, *Dialectorum Italicarum exempla selecta*, and C. D. Buck, *Oscan and Umbrian Grammar*.

SAMO, a tall, robust-looking people inhabiting the borders of Upper Volta and the French Sudan. They speak a language, still little known, apparently related to Sia, and live in independent villages, distributed in quarters consisting of flat-roofed houses of mud. Marriage is restricted within the village but must be outside the extended family group. In the case of a divorce the children remain with the father. The family property passes to the brother of the deceased, and personal goods, or individual property, is inherited by the eldest son. The Samo are skilled cultivators, and raise cattle. They are animists and perform seasonal sacrifices and worship sacred animals protecting the

villages. The dead are exposed and then buried in special places set apart for (*a*) old men, (*b*) young men, (*c*) old women and (*d*) young women.

See Tauxier, *Le Noir du Yatenga* (1917).

SAMOA, an archipelago in the South Pacific. Tutuila is the chief island of the American group. (For map, *see* PACIFIC OCEAN.) The archipelago consists of 14 islands forming a slightly curved chain from west by north to east by south, between 13° 26′ and 14° 22′ S. and 169° 29′ and 172° 48′ W., as follows: Savaii, Manono, Apolima, Upolu, Fanuatapu, Manua, Nuutele and Nuulua, which are mandates of New Zealand, and Tutuila, Aunuu, Ofu, Olosega, Tau and Rose, which belong to the United States of America. On May 13, 1925 Swains island was made part of the administrative district of American Samoa. The principal islands are Savaii (area 703 sq.m.), Upolu (about 430 sq.m.), Tutuila (40·2 sq.m.) and the Manua group, which includes Tau with Ofu and Olosega (17·7 sq.m.). With the exception of Rose island, which is an uninhabited coral inlet 70 m. east of its nearest neighbour, and therefore scarcely belongs geographically to the group, all the islands are considerably elevated, with several extinct or quiescent craters rising from 2,000 to 4,000 feet. Although there are no active cones, Upolu has in comparatively recent times been subject to volcanic disturbances, possibly as late as the 17th or 18th century. In 1866 a submarine volcano near the islet of Olosega was the scene of a violent commotion, discharging rocks and sand to a height of 2,000 feet. Coral reefs protect the coasts in many parts; they are frequently interrupted, but the passages through them are often difficult of navigation. Upolu, the most important island of the group, is long and narrow; it has a backbone of mountains whose flanks are scored with lovely valleys, at the foot of which are flat cultivable tracts. Of its harbours Apia and Saluafata, both on the north coast, are most important. Mt. Vala, which overlooks Apia and Vailima, the home of Robert Louis Stevenson, is his burial-place and bears a monument to his memory. Tutuila, the principal island belonging to the United States, resembles Upolu, and has on its south side, in the crater of an extinct volcano, the fine harbour of Pago Pago.

Climate, Flora, Fauna.—The climate is moist and sometimes oppressively hot, though pleasant on the whole. A fine season extends from April to October; a rainy season from November to March. The temperature is equable—at Apia the mean annual temperature is about 78° F, the warmest month being December (80°) and the coldest July (75° to 76°). The prevalent winds, which temper the heat, are the south-east trades, but west winds supervene from January to March. The archipelago lies in the track of the fierce hurricanes which occur usually in this period. On March 16, 1889 the heavy tidal waves created havoc in the harbour of Apia. In Jan. 1915, the islands of the Manua group were visited by the severest storm in their history. Most of the houses and public buildings were blown down, and much damage was done to the coco-nut and other food trees. A hurricane on Jan. 1, 1926 did much damage to the Naval station at Pago Pago and destroyed much of the food crop of the Manua group. The whole group is abundantly watered (the average annual rainfall at Pago Pago for the years 1900–25 was over 197 in.), and the igneous soil is marvellously fertile.

The Samoan forests are remarkable for the size and variety of their trees, and the luxuriance and beauty of tree-ferns, creepers and parasites. The coco-nut palm, bread-fruit and banana are of peculiar value to the inhabitants. Hardwood trees, of use in boat-building, etc., are especially characteristic of Savaii.

Of the extremely limited Samoan fauna, consisting mainly of an indigenous rat, four species of snakes, several kinds of lizards and a few birds, the most interesting member is the *Didunculus strigirostris,* a ground pigeon of iridescent greenish-black and bright chestnut plumage, which forms a link between the extinct dodo and the living African Treroninae. Imported domestic animals, especially hogs and cattle, do well.

Native Population.—The Samoans are pure Polynesians, and according to the traditions of many Polynesian peoples Savaii was the centre of dispersion of the race over the Pacific ocean from Hawaii to New Zealand. In any case, the Samoans are the most perfect type of Polynesians, of a light brown colour, splendid physique and handsome regular features, with an average height of 5 ft. 10 in. Their mental and social standard is high among Pacific peoples; they are simple, honourable, generous and hospitable, but brave fighters. Their idolatry (polytheistic) was unaccompanied by human sacrifice. They have become mainly Protestants, Catholics or Mormons, but retain many superstitions connected with their native religion. The women and children are well treated. The principal foods of the natives are vegetables, coco-nut, bread-fruit, bananas, fish and pork. The Samoan language is soft and liquid in pronunciation, and has been called "the Italian of the Pacific." It is difficult to learn thoroughly, because of its many inflections and accents, and its being largely a language of idioms (*see* POLYNESIA). The total native population in American Samoa was (1926) 8,676, as compared with 5,679 in 1900. In addition Swains island had a population of 87. Of the total in 1926, Tutuila had 6,616 and the Manua group 2,060. The chief town, Pago Pago, had 611 inhabitants. The population of western Samoa, at the close of 1925, totaled 40,229, of which 39,002 were natives or contract labourers and 1,227 (chiefly British) were of European stock.

Administration and Commerce.—New Zealand was given a mandate by the League of Nations to administer Western Samoa on Dec. 17, 1920. The Constitution was settled by the Samoan Act of 1921 and an amending act of 1923. The Administrator has the assistance of a legislative council, and a consultative native council. Copra, cocoa and rubber are the principal articles of export. The total exports in 1926 were valued at £320,783, and in 1927 at £335,978; the imports, chiefly British, in the above years, were £324,940 and £304,369 respectively. The revenue in 1926 was £150,039; expenditures, £145,687.

American Samoa is administered by the naval commandant who also holds the governorship by commission from the U.S. President. Under the American governor there is a native governor in each of the three political divisions. Laws proclaimed by the governor are usually ratified at the annual meeting of native delegates. The laws of American Samoa, codified in 1921, are printed in both the English and the Samoan languages. The seat of Government is at the naval station on Pago Pago bay. Almost the whole of the land is owned by the natives, the principal article produced for export being copra. The copra sold in 1925 was 2,945,308 lb.—valued at $139,376 as compared with 3,920,640 lb. valued at $161,236 in 1924. The total imports in 1925 were $192,412 of which $92,610 were from the United States, $96,493 from British colonies and $3,309 from other countries. The budget for 1926 called for an expenditure of $83,401; the estimated income was $86,600. The U.S. Naval Radio station at Pago Pago is also used for ordinary commercial service. Transportation is maintained by the Oceanic Steamship Company.

History.—The Manua group was probably seen by the Dutch navigator Jacob Roggeveen in 1722 and named Baaumann Islands after one of his captains. Louis de Bougainville explored the islands in 1768 and called them the *Iles des Navigateurs.* This name is still used. La Pérouse followed in 1787, Edwards of the "Pandora" in 1791, and Otto von Kotzebue in 1824. Two members of the London Missionary Society came to Samoa in 1830, and in 1839 Charles Walker, the American explorer, surveyed the archipelago. The islands, especially Upolu, now began to attract foreign capitalists; and in 1847, 1853 and 1861 respectively, Great Britain, the United States and Germany appointed representatives. Native wars, and the important geographical position of Samoa soon led the foreigners to consider annexation. The home governments were, however, not anxious to go so far, although the United States was allowed in 1878 to occupy Pago Pago—much the best harbour in the group—as a coaling station, and to make a trading treaty with the natives. Similar privileges were obtained by Germany and Great Britain the following year. Continued civil wars brought the powers to a conference at Berlin in 1889, by which they guaranteed the independence of the islands under what was virtually a protectorate of the three powers. Friction still continued and reached its height in the native wars of 1898, and a new agreement was

reached by England and Germany in 1900, later ratified by the United States. By this, Great Britain withdrew entirely from Samoa, in return for compensation elsewhere. Germany received all rights over Western Samoa, and the United States all rights over Tutuila and the other eastern islands.

On Aug. 30, 1914, the German islands of Western Samoa were occupied by a New Zealand expeditionary force, and in May 1919 the Supreme Council in Paris conferred a mandate for them on New Zealand. The Government of New Zealand, unlike that of South Africa in a similar matter, asked the British Government for legal authority to act under the mandate, not desiring to exercise entirely independent action. It also took over the German holdings of land, amounting to more than 8,000 acres. The constitution was settled by the Samoa Act of 1921, and an amending act of 1923. An administrator was appointed by New Zealand, to have the assistance of a legislative council and a consultative native council.

BIBLIOGRAPHY.—A list of books on The Samoan islands and much factual information can be secured from the *Handbook of Western Samoa* compiled by W. A. G. Skinner (1925), and the *General Report of the Governor of American Samoa* revised by H. F. Bryan (1927). The best history of the islands is R. M. Watson's *History of Samoa* (1918). Other books of interest and value are Robert Louis Stevenson, *A Footnote to History* (1892), and *Vailima Letters* (1895); G. Turner, *Samoa a Hundred Years ago and Long Before* (1884); W. B. Churchward, *My Consulate in Samoa* (1887); *Journal des Muséums Godeffroy* (1871–74); G. Kurze, *Samoa, das Land, die Leute und die Mission* (1899); O. Ehlers, *Samoa, die Perle der Südsee* (1900); and L. P. Leary, *New Zealanders in Samoa* (1918). *See* also the New Zealand Government's report to the League of Nations on the *Mandated Territory of Western Samoa* and the *Annual Report* of the Customs and Marine Department of Western Samoa; *Report* of the joint commission of 1899 (parliamentary papers, c. 9506); annual *Reports* of the commandant at Tutuila, Pago Pago, Samoa (Washington, D.C.); *New Zealand Official Yearbook* (annual, Wellington, N.Z.); Sir James Allen, "The Samoan Mandate" (*United Empire,* vol. xi., pp. 648–663).

SAMOS, an island in the Aegean sea, separated from the mainland of Asia Minor by a strait of only about a mile in width; about 27m. in length, by 14 in greatest breadth; occupied by mountains, of which the highest, Mt. Kerkis, near its western end, is 4,725ft. high. This range continues from Mt. Mycale on the mainland. Samos was annexed to Greece in 1912. The capital is at Vathy, in a deep bay on the north coast, a quite modern town, well paved and connected by carriage roads with villages round both sides of the bay, and with Tigani on the south coast, the site of the ancient city. A third port, Carlovasi, further west on the northern coast, serves a separate lowland district. The island is remarkably fertile, and a great portion of it is covered with vineyards. Oil, raisins, silk, cotton and tobacco are also grown, and barges and sailing vessels are built at Tigani, almost wholly from native timber. Cigarette making employs many women and girls, the tobacco coming chiefly from Thrace. The population in 1923 was 84,294. The predominant religion is the Orthodox Greek; the metropolitan district is Samos and Icaria.

History.—At the time of the great migrations, in the 11th century B.C., Samos received an Ionian population mainly from Epidaurus in Argolis. By the 7th century B.C. it had become one of the leading commercial centres of Greece through its position near the Maeander and Caÿster trade-routes from inner Asia Minor. The Samians also traded with the Black sea and with Egypt, and claimed to be the first Greeks to reach the Straits of Gibraltar. Their commerce brought them into close relations with Cyrene, Corinth and Chalcis, but made them bitter rivals of their neighbour, Miletus. The feud involved both cities in the Levantine war (7th century B.C.) when Corinth built triremes for the Samians. The result favoured Miletus, but in the 6th century the insular position of Samos preserved it from mainland aggressions to which Miletus was exposed. About 535 B.C., when its oligarchy was overturned by the tyrant Polycrates (*q.v.*), Samos reached the height of its prosperity. Its navy "ruled the waves" from its new deep-sea harbour, and blockaded the mainland subjects of Persia; the tunnelled aqueduct (still open) secured copious water, and the great Temple of Hera was built. Polycrates first intrigued, and then quarrelled, with the Persian governor of Lydia, and after his death by treachery, Darius conquered Samos and partly depopulated it. It had regained much when, in 499, it joined the general revolt of the Ionians against Persia; but owing to jealousy of Miletus, part of its contingent, at the decisive battle of Lade (494), deserted. In 479, however, following Xerxes' defeats in Greece, Samos betrayed the Persian fleet to the Greeks at Mycale. In the Delian League the Samians held special privilege and remained loyal to Athens until 440, when a dispute with Miletus, which the Athenians had decided against them, provoked them to secede. With a fleet of 60 ships they held their own for some time against a large Athenian fleet led by Pericles himself, but after a siege, capitulated and were degraded to a tributary rank. Towards the end of the Peloponnesian war, when Miletus became a Spartan naval base, Samos appears as one of the most loyal dependencies of Athens; and a temporary home of the Athenian democracy during the revolution of the Four Hundred at Athens (411 B.C.), and in the last stage of the war, it was rewarded with the Athenian franchise. This friendly attitude towards Athens was accompanied by the establishment of democracy. After the downfall of Athens, Samos was besieged by Lysander and again placed under an oligarchy. In 394, when the Spartan navy withdrew, the island declared its independence and re-established a democracy, but by the Peace of Antalcidas (387) it fell under Persian dominion. Recovered by the Athenians in 366, after a siege, it received a body of military settlers. After 322, when Athens was again deprived of Samos, its fate is obscure. For some time (about 275–270 B.C.) it served as a base for the Egyptian fleet, at other periods it recognized the overlordship of Syria; in 189 B.C. it was transferred by the Romans to the kings of Pergamum. Enrolled from 133 in the Roman province of Asia, it revolted to Aristonicus (132) and Mithridates (88), and forfeited its autonomy, but recovered it between the reigns of Augustus and Vespasian, and remained prosperous. Under Byzantine rule Samos became the head of the Aegean *theme* (military district). After the 13th century it passed through much the same changes as Chios (*q.v.*), and became the property of the Genoese firm of Giustiniani (1346–1566). At the Turkish conquest it was severely depopulated, and provided with new settlers, partly Albanians.

During the Greek War of Independence Samos bore a conspicuous part, and it was in the strait between the island and Mt. Mycale that Canaris blew up a Turkish frigate, in the presence of the army assembled for invasion. The enterprise was abandoned and Samos held its own to the end of the war. On the conclusion of peace the island was, indeed, again handed over to the Turks, but since 1835 held an exceptionally advantageous position, being in fact self-governed, though tributary to the Turkish empire, and ruled by a Greek governor nominated by the Porte, who had the title of "Prince of Samos," and was supported and controlled by a Greek council and assembly. The prosperity of the island bore witness to the wisdom of this arrangement, but did not prevent annexation to Greece when the political situation allowed it.

The ancient capital was on the south coast, at the modern Tigani, directly opposite to the promontory of Mycale. A natural cove, dominated by a low hill, has been converted by ancient and modern breakwaters into a safe port for small vessels. Behind the modern town rises a steep enclosing ridge, Astypalaea, crowned by Polycrates' wall, and perforated by his aqueduct. From this city a road led about 4m. W. to the Temple of Hera, whose site, close to the shore, is still marked by a single column, which has given to the neighbouring headland the name of Capo Colonna. Though so little remains standing, German excavators have revealed its massive foundations.

The modern capital of the island was, until recently, at Khora, about 2m. from the sea and from Tigani, but in the 19th century the capital was transferred to Vathy, on the north coast.

Samos was the birthplace of Pythagoras, the philosopher (*q.v.*) whose name and figure are found on coins of the city in imperial times. It also produced a school of sculptors beginning with Rhoecus and Theodorus, who are said to have invented the art of casting statues in bronze. Rhoecus was also the architect of

the Temple of Hera. Another famous Samian sculptor was Pythagoras, who migrated to Rhegium. The vases of Samos are among the most characteristic Ionian pottery in the 6th century. The name Samian ware, often given to a kind of red pottery found in Roman settlements, has no scientific value; it is derived from a passage in Pliny, *N.H.* xxxv. 160 *sqq.*

See Herodotus, especially book iii.; Thucydides, especially books i. and viii.; Xenophon, *Hellenica,* books i. ii.; Strabo, xiv. pp. 636–639; L. E. Hicks and G. F. Hill, *Greek Historical Inscriptions* (1901), No. 81; B. V. Head, *Historia Numorum* (1887), pp. 515–518; Panofka, *Res Samiorum* (1822); Curtius, *Urkunden zur Geschichte von Samos* (Wesel, 1873); H. F. Tozer, *Islands of the Aegean* (1890); J. Boehlau, *Aus ionischen und italischen Nekropolen,* Pauly Wissowa, *s.v.*

SAMOSATA (Sumeisat, modern Samsat), a city on the right bank of the upper Euphrates on the borders of Mesopotamia and Armenia in 37° 30′ N., 38° 30′ E. Samosata is an important crossing place of the river close to the point where it enters the plain. It forms one of the series of border forts, of which Edessa (*q.v.*) was the most important, which had a stormy history in relation to the frontier defence of Upper Mesopotamia. It had an additional importance as forming a point at which the crossing of the river could be made. Although it is uncertain whether it was ever on the Persian royal road, there was a bridge at this point in Strabo's time, when the city is described as being strongly fortified and the centre of a small but very fertile district. From this point caravan routes diverge to Diarbekr in the north, and downstream to Urfah (Edessa) but it lies off the main route.

The fortunes of Samosata followed those of the great empires at whose boundaries it stood. It appears originally to have been a Hittite city, and it was incorporated in the Assyrian empire in 708 B.C. Later it passed into the hands of the successors of Alexander, and became the capital of Commagene. In A.D. 72 it became a Roman province. In later times it passed through a series of changes, losing its status as the capital city of a district under Constantine, and in the tenth century becoming temporarily a *theme,* or administrative military district of the Byzantine Empire. It is said in the thirteenth century to have been an Armenian settlement, but today it is mainly occupied by Kurds.

SAMOTHRACE (mod. Gr. *Samothraki,* Turk. *Semadrek*), an island in the north of the Aegean Sea, nearly opposite the mouth of the Hebrus (Maritza) north of Imbros and north-east of Lemnos. It has a population of 3,500, nearly all Greek. Though of small extent it is, next to Mount Athos, by far the most conspicuous natural feature in this part of the Aegean (5,240 ft.). In *Iliad* xiii. 12, the poet represents Poseidon using its summit to survey the plain of Troy. This mountainous character and the absence of harbours precluded political importance, while permitting the survival of the archaic worship of the CABEIRI (*q.v.*) which Herodotus (ii. 51) and others attributed to "Pelasgian" aborigines. Probably on account of its sacred character the island always enjoyed autonomy and even in the time of Pliny it ranked as a free state.

The "Victory of Samothrace," set up by Demetrius Poliorcetes *c.* 305 B.C., was discovered in the island in 1863, and is now in the Louvre. The ancient city was situated at Palaeopoli below the modern village on the N. side of the island close to the sea; with considerable remains of ancient walls, in Cyclopean style, of the sanctuary of the Cabeiri, and of other edifices of Ptolemaic and later date. A considerable sponge fishery is carried on. On the N. coast are much-frequented hot sulphur springs.

SAMOVAR [Russ. *samovarū*], an urn for making tea after the Russian fashion; it is usually of copper, and is kept boiling by a tube filled with live charcoal passing through the centre. The word is usually taken in Russia to mean "self-boiler" (*samū,* self, and *baritĭ,* boil), but it is more probably an adaptation of a Tatar word *sanabar,* a tea-urn.

SAMOYEDES, a Neo-Siberian tribe, spread in small groups from the Altai mountains down the basins of the Ob and Yenisei, and along the shores of the Arctic ocean from the mouth of the latter river to the White sea, subdivided into three main groups: (*a*) The Yuraks in the coast-region from the Yenisei to the White sea; (*b*) the Tavghi Samoyedes, between the Yenisei and the Khatanga; (*c*) the Ostiak Samoyedes, intermingled with Ostiaks, in the forest regions of Tobolsk and Yeniseisk.

The Samoyedes, who now maintain themselves by hunting and fishing on the lower Ob, are partly mixed in the S. with Ostiaks. Clothed in skins, they make use of implements in bone and stone, eat carnivorous animals—the wolf included—and cherish superstitions regarding the teeth of the bear. Their huts are erected with stone; their graves are mere boxes left in the tundra. Death is ascribed to an evil female spirit. Personal belongings are buried with the dead. The religion is fetishism mixed with Shamanism, the shaman (*tadji-bei*) being a representative of the great divinity, Nim. Women become Shamans.

Of the S. Samoyedes, who are completely Tatarized, the Beltirs live by agriculture and cattle-breeding in the Abakan steppe. They profess Christianity, and speak a language closely resembling that of the Sagai Tatars. The Kaibals, or Koibals, can hardly be distinguished from the Minusinsk Tatars and support themselves by rearing cattle. Castrén considers that three of their stems are of Ostiak origin, the remainder being Samoyedic. The Kamasins, in the Kansk district of Yeniseisk, are either herdsmen or agriculturists. They speak a language with an admixture of Tatar words, and some of their stems contain a large Tatar element. The interesting nomadic tribe of Karagasses, in the Sayan mountains, is disappearing; the few representatives are rapidly losing their anthropological features, their Turkish language and their distinctive dress. The Motors are now little more than a memory. One portion of the tribe emigrated to China and was there exterminated; the remainder have disappeared among the Tuba Tatars and the Soyotes. The Samoyedes on the Ob in Tomsk may number about 7,000.

See M. A. Castrén *Grammatik der samoyedischen Sprachen* (1854); *Dictionary* (1855); *Ethnologische Vorlesungen über die altaischen Völker* (1857); *Versuch einer koibalischen und karagassischen Sprachlehre* (1857); also A. Middendorf, *Reise in den äussersten Norden und Osten Sibiriens* (1875) and M. A. Czaplicka, *Aboriginal Siberia* (1914).

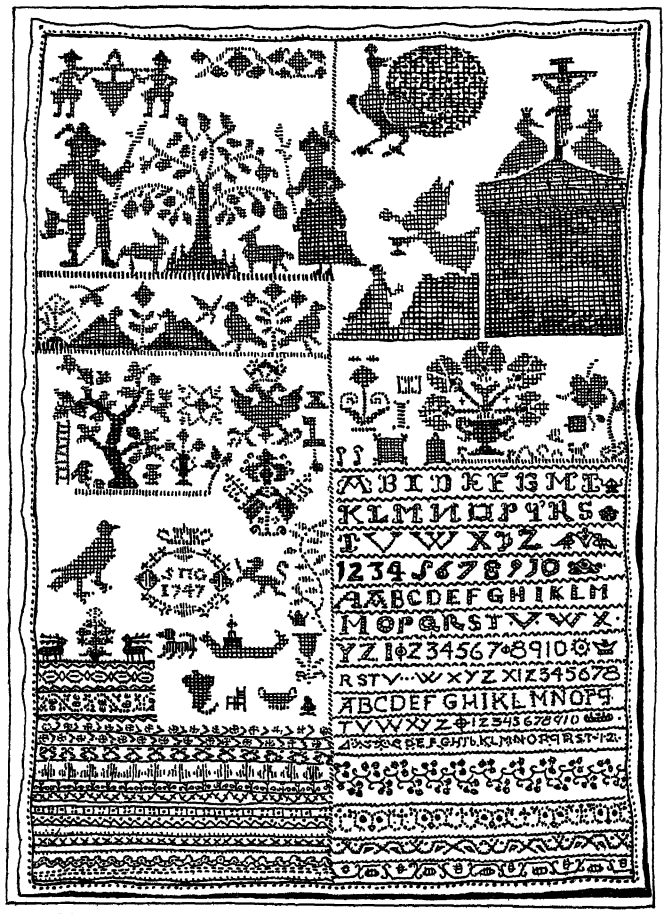
SAMPAN, the name of the typical light boat of far Eastern rivers and coastal waters; it is usually propelled by a single scull over the stern, and the centre and after part is covered by an awning or screen of matting. The word is said to be Chinese, *san,* thin, and *pan,* board. Others take it to be of Malay origin.

SAMPLE, a small portion of merchandise taken from the whole to serve as a specimen or evidence of the whole; hence a pattern or model. (*See* SALE OF GOODS.)

SAMPLER, a model or pattern to be copied, particularly a small rectangular piece of embroidery worked on canvas or other material as a pattern or example of a beginner's skill in needlework, as a means of teaching the stitches. Down to comparatively recent times every little girl worked her "sampler," and examples of 17th century work are still found and have become the object of the collector's search. *See* ill. on p. 924. They usually contained the alphabet, the worker's name, the date and Bible texts, verses, mottoes, the whole surrounded with some conventional design. The earliest sampler in existence is dated 1643 and is in the Victoria and Albert museum, South Kensington.

See M. B. Huish, *Samplers and Tapestry Embroideries* (1900).

SAMPSON, WILLIAM THOMAS (1840–1902), American naval commander, was born at Palmyra, N.Y., on Feb. 9, 1840, and graduated at the head of his class from the U.S. Naval academy in 1861. In this year he was promoted to master, and in the following year was made lieutenant. He was executive officer in the "Patapsco" when she was blown up in Charleston harbour in Jan. 1865. He served on distant stations and (1868–71 and 1876–78) at the Naval academy, and became lieutenant-commander in 1866 and commander in 1874. He was a member of the International Prime Meridian and Time Conference in 1884, and of the board of fortifications in 1885–1886; was superintendent of the Naval academy from 1886 to 1890; and was promoted to captain and served as delegate at the International Maritime Conference at Washington in 1889. He was chief of the Bureau of Ordnance in 1893–97. About 95% of the guns employed in the Spanish-American War were made under his superintendence. His influence was felt decisively in the distribution of guns and armour, and in the training of the personnel of the navy. He



BY COURTESY OF THE METROPOLITAN MUSEUM OF ART

A SAMPLER OF 1747, FROM THE FISHBACK COLLECTION

superintended the gunnery training and prepared a new drill-book for the fleet. In Feb. 1898, Sampson, then a captain, was president of the board of inquiry as to the cause of destruction of the "Maine." At the outbreak of the war with Spain he was placed in charge of the North Atlantic Squadron, and conducted the blockade of Cuba. When it was known that Admiral Cervera, with a Spanish fleet, had left the Cape Verde islands, Sampson withdrew a force from the blockade to cruise in the Windward Passage, and made an attack upon the forts at San Juan, Porto Rico. After his return to the coast of Cuba he conducted the blockade of Santiago, and the ships under his command destroyed the Spanish vessels when they issued from the harbour of Santiago and attempted to escape. (*See* SPANISH-AMERICAN WAR.) Sampson himself was not actually present at the battle, having started for Siboney just before it began to confer with Gen. Shafter, commanding the land forces. He reached the scene of battle as the last Spanish vessel surrendered, and the engagement was fought in accordance with his instructions. He was promoted to commodore in 1898, to rear-admiral on March 3, 1899, and was made commandant of the Boston (Charlestown) navy yard in October of the same year. He died in Washington, D.C., on May 6, 1902.

See W. A. M. Goode, *With Sampson Through the War* (1899); A. T. Mahan, "Sampson's Naval Career," *McClure's Magazine*, vol. xix. (1902); James Parker, *Rear Admirals Schley, Sampson and Cervera* (1910).

SAMSHUI ("Three Waters"), a treaty port in the province of Kwangtung, South China, in latitude 23° 5′ N. and longitude 112° 49′ E., about 25 miles due west of Canton. It commands an important position at the junction of the Si-kiang (West River) and Pei-kiang (North River) and lies at the apex of the deltaic network of river-channels which lead to the Canton River or directly to the sea by the Si-kiang. It is thus favourably situated for the collection and distribution of trade commodities, but since the port was opened to foreign trade in 1897 it has not grown to any considerable extent, largely owing to the proximity of Canton. Its trade is based on the large junk and launch traffic of the delta region. The export trade through the port is largely from Wuchow and Nanning higher up the Si-kiang. Owing to the Cantonese boycott of Hongkong in 1925–26 the foreign trade (especially in imports) of Samshui was seriously affected, as the following figures show:—

	Haikwan Taels (3/8)		Hk. Taels
1924: Net Foreign Imports	8,175,492	1926:	1,417,997
Net Chinese Imports	347,449		415
Exports	1,095,562		350,032
Total	9,618,503	Total	1,768,444

The town has had railway connection with Canton since 1904; its estimated Chinese population is 7,500.

SAMSON, whose deeds are recorded in Judges xiv.–xvi., was a hero of early Hebrew folk-tales. He belonged to the tribe of Dan, and was renowned for his exploits against the Philistines. The narratives are marked by a grim and boisterous humour, and are so little concerned with religion that they may almost be called pagan. But, though they contribute little towards the understanding of Hebrew religion, they add much to our knowledge of early customs, and throw light on Philistine civilization. Their account of the relationships between Hebrews and Philistines, too, is of some historical worth. (*See* PHILISTINES.)

It has often been noted that there are points of resemblance between the story of Samson and the myths of Gilgamesh, Melkart, and Hercules; but, while the kinship must be admitted, Samson is much more human than his counterparts in pagan myth and legend, and is probably to be regarded as a historical person. The story contains many features drawn from solar mythology. The name Samson is a derivative, of uncertain meaning, from the Hebrew word Sun—*shemesh*. It is noteworthy that a shrine of the Sun, Beth-Shemesh, stood in the neighbourhood of Samson's home. Long hair, in which according to the story lay the secret of his strength, is a familiar feature of solar heroes, as a symbol of the sun's rays. His exploit with the gates of Gaza may be connected with the myth which represents the sun as passing through a double-gated door on the eastern horizon. It has, indeed, been argued that the entire Samson story is a solar myth; but it is apparently much more highly probable that in this case the story of a popular hero has been expanded and decorated by mythological motifs.

Why does a story so lacking in religious interest appear in the book, and why is an almost pagan character like Samson reckoned among the saviours of Israel, when the story itself does not record any deliverance of the people from Philistine oppression? There is some evidence that the story was not included in an earlier form of Judges, and that a later editor was constrained by its popularity to insert it. The account of Samson's birth—suspiciously reminiscent of an incident in the history of Gideon—and dedication as a Nazirite, Judges xiii., is an editorial attempt to fit for more respectable company the boisterous, sensual Samson of the folk-tales, who wears his Nazirite costume with some obvious difficulty, and is moved far more by his own erratic impulses than by the spirit of Yahweh. S. A. Cook, comparing Judges xiii. with vi. 11–24, suggests that Samson may have been regarded as the founder of a local Manahathite cult.

See Burney, *Judges*, pp. 335–408, A. S. Palmer, *The Samson-Saga, and its place in comparative Religion;* S. A. Cook, *Journ. of Theol. Stud.* 1927, pp. 372 *sqq.* (W. L. W.)

SAMSONOV, ALEXANDER (1859–1914), Russian general, passed through the cavalry school in St. Petersburg, and served in the war with Turkey in 1877–78. On passing out of the academy of the general staff in 1884 he was appointed on the general staff. He was commandant of the cavalry school at Elisavetgrad (1896–1904), and in 1902 was promoted to the rank of general. In the war with Japan (1904–05) he commanded the Ussuri mounted brigade and the Siberian Cossack division. In 1909 he was made ataman of the Don Cossacks, and became governor-general and commander of troops in Turkestan. In Aug.

1914 he was appointed commander of the II. Army, concentrated on the Narev. The desire to take pressure off France at the earliest possible moment led the Russian supreme command to give an order for an advance into eastern Prussia in spite of Samsonov's report that his army was not ready for an advance. As a result of the absence of support from Rennenkampf's I. Army Samsonov's army was destroyed in the Battle of Tannenberg (Aug. 26–29). Convinced that the battle was hopelessly lost, he ordered his staff to extricate themselves from the German ring, and shot himself in a wood.

SAMSUN (anc. *Amisus*), the chief town of the Janik vilayet in Asiatic Turkey, situated on the south coast of the Black Sea between the deltas of the Kizil and Yeshil Irmaks. Pop. (1927) 75,930. It is connected by metalled roads with Sivas and Kaisarieh, and by sea with Constantinople. It is a thriving town, and the outlet for the trade of the Sivas vilayet. Steamers lie about 1 m. from the shore in an open roadstead, and in winter landing is sometimes impossible. Its district is one of the principal sources of Turkish tobacco, a whole variety of which is known as "Samsun." Samsun exports cereals, tobacco and wool. Amisus, which stood on a promontory about 1½ m. N.W. of Samsun, was, next to Sinope, the most flourishing of the Greek settlements on the Euxine, and under the kings of Pontus it was a rich trading town. By the 1st century A.D. it had displaced Sinope as the north port of the great trade route from Central Asia, and later it was one of the chief towns of the Comneni of Trebizond.

SAMUCAN, a group of tribes of South American Indians, constituting an independent linguistic stock, so called from the Samucos, one of its best known tribes. The area occupied by this stock lies on the borders of the Bolivian Chaco, roughly between 19° 30′ and 21° S. Lat. and from slightly west of the Paraguay river, westward to near the Parapiti. Living in a sub-desert area, the Samucan tribes were mainly a semi-nomadic hunting folk of peaceful and friendly character and simple culture. They wear little or no clothing, and construct flimsy and temporary huts of mats. They have no canoes, but are excellent swimmers. The spear, club and a very long bow are their weapons. Their social organization was of the simplest. Their religious ceremonies were marked by elaborate masked dances.

See G. Boggiani, *I Ciamacoco* (*Atti Soc. Romana Antropologia*, vol. ii.); J. Cardus, *Las Missiones Franciscanas . . . de la Republica de Bolivia* (1886).

SAMUEL, a prophet who played an important part in the establishment of the Hebrew kingdom under Saul, and became naturally the hero of numerous legends, some of which are found interspersed among narratives of greater historical value in the early part of 1 Samuel. This mixture of legend with history tends to obscure the facts, and the difficulties of recovering the true story are aggravated because we find two absolutely contradictory representations of his attitude towards the idea of monarchy. According to one of these, after a severe defeat inflicted upon Israel by the Philistines, involving the temporary loss of the ark (1 Samuel, iv.), Samuel, acting in the tradition of the judges, summons "all Israel" to Mizpah (vii.), performs rites of purification, and offers sacrifice to Yahweh. The Philistines are subdued by the miraculous intervention of Yahweh, and Israel recovers its lost territory. Samuel thereafter rules as a theocratic judge. His sons, whom he would make his successors, are corrupt, and the people demand a king, like those of the surrounding nations, to rule them. Despite the solemn warnings of Samuel as to the arrogant oppression of kings the people are insistent, and, by Yahweh's instruction, Samuel concedes their demand, choosing, by sacred lot, Saul (x. 17–24). The same adverse attitude towards the institution of monarchy is even more emphatically expressed in the long farewell address of abdication made by Samuel (xii.). Quite different is the view we find in 1 Sam. ix.–x. 16. Here Samuel is a local seer of so little renown that his fame is unknown to Saul, who, seeking some lost asses, is advised by a servant to consult him. Samuel receives the divine command to anoint Saul as king, which, seemingly, he does with unqualified enthusiasm. It is obvious that of the two representations the latter will be nearer the truth; had Samuel been really a theocratic judge tradition would hardly have dwarfed him to the grade of a local seer, whereas the contrary proceeding is quite natural. Further, the strong anti-monarchical ideas are surely the product of a later age, when the nation had experienced the exactions and follies of subsequent kings, whom they came to look upon as responsible for the national misfortunes (viii. 7, x. 19, xii. 12).

What, then, is the nucleus of important fact in these traditions? It is probable that the birthplace of Samuel was Ramah, and that—though the story of his dedication to the service of the sanctuary at Shiloh is idyll rather than history—he was a priestly seer who came into prominence during the dark days of Philistine oppression. The strong tradition as to his being the "king-maker" must rest on some historic basis; and, though later tradition has exalted Samuel at the expense of Saul, we may believe that he played an important part in the installation of Israel's first king. Though Samuel's denunciations of the monarchical idea are but the reflections of the views of a later age, they seem to have a point of contact with the history, for it is probable that the breach between Samuel and Saul in connection with Agag, 1 Samuel xv., was only the culmination of earlier divergences. Late tradition emphasizes this by its representation of Samuel as anointing David to replace Saul. (*See* SAMUEL, BOOKS OF.) (W. L. W.)

SAMUEL, SIR HERBERT (1870–), British politician, was born at Liverpool on Nov. 6, 1870. He was educated at University College school, London, and at Balliol college, Oxford, where he graduated in 1893. In 1895 and 1900 he unsuccessfully contested South Oxfordshire as a Liberal, and in 1902 was elected for the Cleveland division of Yorkshire. He entered Campbell-Bannerman's Government in 1905 as parliamentary under-secretary to the Home Office. In 1908 he was sworn into the privy council. From 1909 to 1910 he was chancellor of the Duchy of Lancaster, with a seat in the cabinet, and in 1910 became postmaster-general. He held this office until 1914, and then became for a year president of the Local Government Board. From 1915 to 1916 he was again postmaster-general and chancellor of the Duchy of Lancaster, and in 1916 became home secretary. He acted as chairman of the select committee on national expenditure (1917–18), and in 1919 was special commissioner to Belgium. In 1920 he was appointed high commissioner to Palestine and was created G.B.E. This post he retained until Aug. 1925, when he returned to England and was made chairman of the royal commission appointed to inquire into conditions in the coal industry, as a result of the dispute between the coal-owners and the miners in the summer of that year. The report issued by the commission is often referred to as the Samuel Report (*see* COAL). In 1927 he became chairman of the Liberal party organization.

SAMUEL, BOOKS OF, two books of the Old Testament, which in the Jewish canon are ranked among the Former Prophets (Joshua–Kings) in contrast to the Latter Prophets (Isaiah–Malachi).

Contents.—The books of Judges, Samuel and Kings are made up of a series of extracts from various sources, and freely handled by copyists down to a late date, as is shown by the numerous and often important variations between the Hebrew text and the Greek version (Septuagint). The main redaction of Judges and Kings was made under the influence of the ideas which characterize Deuteronomy, that is, after the reforms ascribed to Josiah (2 Ki. xxiii.); but in Samuel the "Deuteronomic" hand is much less prominent and the chronological system which runs through Judges and Kings occurs only occasionally.

The book of Samuel completes the history of the "Judges" of Israel (11th century B.C.), and begins by relating the events which led to the institution of the monarchy under Saul, the part played by Samuel being especially prominent (1 Sam. i.–xiv.). The interest is then transferred to David, the founder of the Judaean dynasty, and his early life is narrated with great wealth of detail. As Saul loses the divine favour, David's position advances, until, after the death of Saul and the overthrow of Israel, he gains the allegiance of a disorganized people (1 Sam. xv.–2 Sam. iv.), and Jerusalem becomes the centre of his empire (v.–viii.)—*c.* 1000 B.C. A more connected narrative is now given of the history of David (ix.–xx.), which is separated from the

account of his death and Solomon's accession (1 Ki. i., ii.) by an appendix of miscellaneous contents (xxi.–xxiv.).

Samuel and Saul.—The introductory account (i.–iv. 1*a*) of the birth, dedication and calling of the young prophet Samuel is a valuable picture of religious life at the sanctuary at Shiloh. It is connected by the prophecy of the punishment of the house of Eli (iii. 11 *sqq.*) with the defeat of the Israelites by the Philistines at Ebenezer near Aphek, the loss of the ark (iv. 1*b*–22), and its subsequent fortunes (v.–vii. 1). A Philistine oppression of 20 years ends when Samuel, here the recognized "judge" of Israel, gains a great victory at Ebenezer near Mizpah (vii.). But the deliverance of Israel from the Philistines is also ascribed to Saul (xiv.); there is no room for both in the history of the prophet (*see* vii. 14), and it is now generally recognized that two conflicting representations have been combined: (*a*) vii., viii., x. 17–24, xii., (*b*) ix. 1–x. 16, xiii., xiv. (*See* further SAMUEL, SAUL.) The account of Eli, Shiloh and the ark (i.–iii.) is a natural prelude to iv.–vii., where, however, we lose sight of Samuel and the prophecy. The punishment of Eli and his sons (iv.) becomes a passing interest. The sequel of the defeat in iv. is not stated, although other allusions to the fall of Shiloh (Jer. vii. 12–15, xxvi. 6, 9, Ps. lxxviii. 60 *sqq.*), and the subsequent reappearance of the priestly family at Nob (xxi. *seq.*) suggest that a fuller account of the events must have been extant. A narrative of Eli and the priesthood of Shiloh has probably been used to form an introduction to Samuel's victory (vii.), and it has been supplemented partly by the account of the early life of the future prophet and judge (note the present abrupt introduction of Eli in i. 3) and partly by narratives of the history of the ark (v. *seq.*). The section was handled at a relatively late period. This is clear from the presence of the Deuteronomic prophecy in ii. 27–36, which hints at the rise of the Zadokite priests of Jerusalem. Also, Hannah's psalm (ii. 1–10)—the prototype of the "Magnificat"—is a post-exilic passage, "probably composed in celebration of some national success" (Driver); its present suitability rests upon the interpretation of verse 5.

Saul.—Saul's reign is introduced in xiii. 1, where a blank has been left for his age at accession (some mss. insert "30"); the duration of his reign is also textually uncertain. The formula is parallel to that in 2 Sam. ii. 10 *seq.*, v. 4 *seq.*, and frequently in the Book of Kings, with the additional feature that the age at accession, there usually confined to the Judaean kings, is here given for the Israelite Saul and his son Ishbosheth (*i.e.*, Ishbaal). The summary in xiv. 47 *sqq.* is immediately followed by a reference to the continuous Philistine warfare (*v.* 52, contrast vii. 13) which forms an introduction to the life of David. But the summary gives a picture of Saul's ability and position which differs so markedly from the subsequent more extensive narratives of David's history that its genuineness has sometimes been questioned; nevertheless, it is substantiated by the old poem quoted from the Book of Jashar in 2 Sam. i. 17–27, and a fundamental divergence in the traditions may be assumed. Similarly in 2 Sam. ii. 8–10*a*, the length of Ishbaal's reign conflicts with the history of David (ii. 11 and iv. 1–v. 3), and the reorganization of (north) Israel with the aid of Abner does not accord with other traditions, which represent David as the deliverer of (all?) Israel from the Philistine yoke (iii. 18, xix. 9). But ii. 8–10*a*, in common with 1 Sam. xiii. 1, xiv. 47–51 (*cf.*, also the introduction in 1 Sam. vii. 2 and the conclusion vii. 15–17), are of a literary character different from the detailed narratives; the redactional or annalistic style is noticeable, and they contain features characteristic of the annals which form the framework of Kings. In Kings the Israelite and Judaean records are kept carefully separate and the independent standpoint of each is at once obvious. Here, however, much complication arises from the combination of traditions of distinct origin, independent records of Saul having been revised or supplemented by writers whose interest lay in David.

David.—The stories of the relations between the founders of the respective monarchies of Israel and of Judah reflect the popular interest in DAVID (*q.v.*). Apart from the more detailed and continuous history, there are miscellaneous passages in 2 Sam. v.–viii., with an introduction (v. 1–3), and a concluding chapter rounding off David's reign (viii.). A similar collection in xxi.–xxiv. severs the closely-knit sequence of narratives in ix.–xx. (the "Court history of David") from David's death in 1 Ki. i.–ii. Their contents range over all periods, from the Amalekite war (viii. 12, *cf.* 1 Sam. xxx.) to David's "last words" (xxiii. 1; but *see* 1 Kings i. 1 and ii. 1). In particular they narrate the capture of Jerusalem from the Jebusites (v. 6–10) and other fights in that district as far as Gezer (*vv.* 17–25), the purchase of land from a Jebusite for the erection of an altar (xxiv.; *see* 1 Chron. xxi.–xxii. 1, 2 Chron. iii. 1), and the pacification of the Gibeonites (xxi. 1–14). The last two inter-related narratives are severed by the no less inter-related material in xxi. 15 *sqq.*, xxiii. 8 *sq.* (connected with the conflicts in ch. v.); and these in turn are now separated by the psalm in xxii. (Ps. xviii.) and by David's "last words." The repetition of the list of officials in viii. 15–18 and xx. 23–26 is attributed by several authorities (after Budde) to the later insertion of ix.–xx. 22. On this view, the two groups v.–viii., xxi.–xxiv. were once contiguous—though not necessarily in their *present* form or order.

The compiler of 2 Sam. v.–viii. has placed *after* the capture of Jerusalem (v. 6 *sqq.*) the conflict with the Philistines (v. 17 *sqq.*), where the "hold" is not Zion but some place of retreat, perhaps Adullam (*cf.* xxiii. 14). Similarly, the conflicts in xxi. 15 *sqq.*, xxiii. 8 *sqq.*, which are located around Gath, Lehi (so read xxiii. 11), Pas-dammim (so *v.* 9; *see* 1 Chron. xi. 13), Bethlehem, and the valley of Rephaim, should also precede the occupation of Jerusalem and the subsequent partition of territory among David's sons and others (*e.g.*, xiii. 23, near Bethel). These passages combine to furnish a representation of the events leading to the capture of the capital which is distinct from and now superseded by the detailed narratives in ii. 12–iv. Here, Ishbaal is east of the Jordan, David's men are engaged in fighting Benjamin and Israel—even at Gibeon (about 6 m. N.W. of Jerusalem), the interest of the history is in David's former relations with Israel at Saul's court, and he is regarded as the future deliverer of the oppressed people. The fragments preserved in 2 Sam. v.–viii., xxi.–xxiv. throw another light upon David's relations to Saul's family (xxi. 1–14, contrast ix.); and the stories of heroic conflicts with giant-like figures of Gath, etc. (xxiii. 9 *seq.*, 18, *cf.* 1 Chron. xi. 11, 20) find no place by the side of the more detailed records of his sojourn under the protection of a king of Gath, one of a confederation of Philistine cities (1 Sam. xxvii., xxix.). It is possible that popular stories of the conquest of the earlier inhabitants have been applied to the PHILISTINES (*q.v.*); their general character associates them with the legends of the "sons of Anak," who enter into Judaean (perhaps originally Calebite) tradition elsewhere (Num. xiii. 22, 28), and who according to one group of traditions occupied all the hill-country from Hebron northwards (Josh. xi. 21 *sqq.*, xv. 14).

Saul and David.—The accounts of David's conflicts with giant heroes and of the conquest of Jerusalem and its district belong to Judaean traditions which have been almost superseded by other traditions of the rise of the Hebrew monarchy and by popular narratives of early relations between the Judaean David and the (north) Israelite king and people. The emphasis (in 1 Sam.) upon the rejection of Saul, his enmity towards David, the latter's chivalry, and his friendship for Jonathan, partly account for the present literary intricacies. On quite general grounds, divine traditions of distinct origin (Calebite or Jerahmeelite; indigenous Judaean; North Israelite or Benjamite) are to be expected in a work now in post-exilic form. Moreover, the late genealogy of Saul in 1 Chron. viii. 29 *sqq.*, ix. 35 *sqq.*, is evidence of a keen interest in the Saulidae in post-exilic times. David's history is handled independently of Saul in 1 Sam. xxv.; and the narrative, now editorially connected with the context (v. 1, *see* xxviii. 3; and v. 44, *see* 2 Sam. iii. 15), gives a valuable picture of his life in the south of Palestine, with which we may compare his relations with south Judaean cities in xxx. 26–31. (The chapter with the prophecy of Abigail may be of Calebite origin.) His flight northwards to the Philistine king of Gath (xxvii.) is hardly connected with the preceding situations in xxiv. 17–22,

xxv., or xxvi. 21–25, or with his previous slaughter of Philistines at Keilah (xxiii. 1–15). His earlier successes over them are ignored in xxix. 5, although the couplet there quoted now finds its only explanation in xviii. 7 after the death of Goliath and the defeat of the Philistines. These traditions of the relations between Judah and the Philistines (*cf.* xxvii. 5 *seq.*) are distinct from the popular stories of giants of Gath, and now form part of the joint history of David and Saul.

The independent narrative of Saul's fate represents one of the disastrous attacks which recur in earlier and later history of the north (xxviii.–4, xxix.). The geographical data are confused by the stories of David (*see* 1 Sam. xxviii. 4, xxix. 1), and while the "Philistines" march north to Jezreel to deliver their attack, David's presence is not discovered until Aphek is reached (xxix.). His journey is the opportunity for an Amalekite raid (xxx. *cf.* xxvii. 8 *seq.*), and a defeat of Amalek by David proves more successful than that which led to Saul's rejection (xv. 20 *seq.* 26–28). Similarly, Saul's disaster leaves Israel again in the hands of the "Philistines" (xxxi. 7, *cf.* xiii. 6 *seq.*), and it is for David to save the people of Israel out of their hands (2 Sam. iii. 18, *cf.* 1 Sam. ix. 16); so, also, David's wars (2 Sam. viii.) bear a certain resemblance to those of Saul (1 Sam. xiv. 47). The sequel to the joint history has another version of Saul's death (2 Sam. i. 6–10, 13–16), and an Amalekite is the offender; contrast his death in i. 15 *seq.* with iv. 10 *seq.* The chapter explains the transference of the royal insignia from Israel to Judah. Here is quoted (from the "Book of Jashar") the old poetical lament over the death of the valiant friends Saul and Jonathan, describing their successful warlike career, the wealth they brought the people, and the vivid sense of national misfortune (i. 19–27). It is utilized for the history of David, to whom it is attributed.

In general, it appears that those narratives wherein the histories of Saul and David are combined—very much in favour of the latter—were originally distinct from those where (*a*) Saul's figure is more in accord with the old poem from the Book of Jashar, and (*b*) where David's victories over prehistoric giants and his warlike movements to Jerusalem pave the way for the foundation—from a particular Judaean standpoint—of his remarkably long dynasty, for the literary problem of 1 and 2 Samuel is that of the writing of the history of the early monarchy and how it came to be formed.

BIBLIOGRAPHY.—*See* further the (German) commentaries of Löhr (1894), Nowack, Budde (1902) and Caspari (1926); H. P. Smith in the *Internat. Crit. Comm.* (1899) with his *O.T. History* (pp. 107–155), and A. R. S. Kennedy, *Cent. Bible* (1905); articles by Stenning in Hastings' *Dict.* and Stade in *Ency. Bib.* For the text *see* especially Wellhausen's model commentary (1871); Driver, *Text of Samuel* (1913); Budde in Haupt's *Sacred Books of the O.T.* (1894); Dhorme, *Livres de Samuel* (1910). For the psychological character of the several narratives *see* Gressmann's *Schriften d. A.T. in Auswahl* (Göttingen).
(S. A. C.)

SAMUEL OF NEHARDEA, usually called MAR SAMUEL or YARḤINAI (*c.* 165–*c.* 257), Babylonian Rabbi, was born in Nehardea in Babylonia and died there *c.* 257. He is associated with the fame of his great contemporary Rab (Abba Araka *q.v.*). Besides his mastery in the traditional Law, Samuel was famed for his scientific attainments. He was one of the first to compile a Calendar of the Jewish year, thus preparing the way for the fixation of the festivals by means of scientific calculations. But Samuel's fame rests on the service which he rendered in adapting the life of the Jews of the diaspora to the law of the land. "The law of the State is binding law," was the principle which Samuel enunciated. When the king of Persia, Shapur, captured Mazaca-Caesarea, the Cappadocian capital, Samuel refused to mourn for the 12,000 Jews who lost their lives in its defence.

See Graetz, *History of the Jews* (English translation), vol. ii. ch. xix.
(I. A.)

SAN, BATTLES OF THE: *see* DUNAJEC-SAN, BATTLES OF THE; VISTULA-SAN, BATTLES OF THE.

SANA (SENĀ'A), a town of Yemen, south-western Arabia, situated in 15° 22′ N. and 44° 10′ E. It is placed in a broad depression, running locally nearly north and south, on the lofty uptilted western edge of the great Arabian land-block. It is 7,250 ft. above sea-level, and is connected with its chief port, Hodeida (*q.v.*), on the Red sea, by a road which crosses the Karn al Wa'l pass (over 9,000 ft.), 25 m. W. of the city, and then follows the plateau steps down to the coast. The population of Sana is estimated at between 20,000 and 25,000.

Early traditions of ancient Sana connect it with the old kingdom of Himyar. Its early name was Azāl, possibly associated with Uzal of Gen. x. 27. A Syriac writer of the 6th century mentions a Himyarite nation of Auzalites. Its later name, signifying "fortified," is associated with the Abyssinian conquerors of Yemen. Sana was the capital of the Abyssinian, Abraha (*c.* A.D. 530), who built here the famous church (*Kalis*) which was destroyed two centuries later by order of the caliph Mansur (Azraki, p. 91). Its later history has been a record of desert raids interspersed with periods of prosperity. After the withdrawal of the Turks (1918) Sana became the capital of the imam of Yemen Proper.

The town consists of three parts: (1) The Medina, the old city, now the Arab quarter, on the east, containing the principal mosques. Here also, at its south-east corner, is the citadel el Kasr. On the crest of Jebel Nukum (2,000 ft. above the valley) are the ruins of the old fort of el Birash, and the Mutawakkil, formerly containing the palace of the imams, covering its western face; (2) the Bir Azab, west of the city, the residential area; and (3), on the extreme west, the Ka'el Yahud, or Jewish quarter. The city, with the Kasr and Mutawakkil, is surrounded by a lofty and thick wall. The Bir Azab and Ka'el Yahud are enclosed in a similar wall, but of more recent construction, connected with that of the city by the Mutawakkil, the whole forming a rough figure eight, some 2½ m. long from east to west and ¾ m. in breadth. The walls are pierced by eight gates. The city itself has narrow, paved streets, with massive flat-roofed houses of several storeys. The Jami 'Masjid, or principal mosque, with a model of the Ka'ba at Mecca in the centre, stands on the site of the Christian church built by Abraha (*see* above). Among the other mosques, of which there are 48 in all, that of Salah ed din is one of the finest. Ruins alone remain of the Kasr Ghumdan and other ancient buildings, whose splendours were sung by the poets of the early days of Islam.

The neighbourhood of Sana suffers from a lack of water, but, in places where this is brought from the hill streams on the west, fields of barley and lucerne and market gardens are seen, particularly at Randa, a suburb 6 m. N. of the town, and in the deep gorges of the Wadi Dhahr and Wadi Hadda, the terraced orchards of which are celebrated for their fine fruit trees. The water supply of the town is derived from numerous wells and from the Ghail Aswad, a small canal.

SANĀ'Ī, the common name of ABULMAJD MAJDŪD B. ADAM, the earliest among the great Ṣūfic poets of Persia, was a native of Ghazni (in Afghanistan). He flourished in the reigns of the Ghaznevid sultāns Ibrāhīm (1059–1099, 451–492 A.H.), his son Mas'ūd (1099–1114) and his grandson Bahrām (1118–1152). He composed chiefly *qaṣīdas* in honour of his sovereign Ibrāhīm and the great men of the realm, but the ridicule of a half-mad jester is said to have caused him to abandon the career of a court panegyrist and to devote his poetical abilities to higher subjects. For forty years he led a life of retirement and poverty, in which he wrote his great double-rhymed poem on ethics, which served as model to the masterpieces of Farīd-uddīn 'Attār and Jelāl ud-dīn Rūmī, the *Ḥadīqat ul-ḥaqīqat,* or "Garden of Truth" (also called *Alkitāb alfakhrī*). Sanā'ī wrote, besides the *Ḥadīqat* and the *Ṭarīq-i-taḥqīq,* several other Ṣūfic mathnawīs of similar purport: for instance, the *Sair ul'ibād ilā'ma'ād,* or "Man's Journey towards the Other World" (also called *Kunūz-urrumūz,* "The Treasures of Mysteries"); the *'Ishqnāma,* or "Book of Love"; the *'Aqlnāma* or "Book of Intellect"; the *Kārnāma,* or "Record of Stirring Deeds," etc.; and an extensive dīwān or collection of lyrical poetry. He died in 1150.

See Abdullatīf al-'Abbāsi's commentary (completed 1632 and preserved in a somewhat abridged form in several copies of the India Office Library); on the poet's life and works, Ouseley, *Biogr. Notices,* 184–187; Rieu's and Flügel's *Catalogues,* etc.; E. G. Browne, *Literary History of Persia* (1906), ii. 317–322; H. Ethé in W. Geiger's *Grundriss der iranischen Philologie,* ii. 282–284.

SAN ANGELO, a city of western Texas, U.S.A., 230 m. N.W. of San Antonio, on Federal highway 385, at an altitude of 1,847 ft.; county seat of Tom Green county. It is served by the Gulf, Colorado and Santa Fe and the Kansas City, Mexico and Orient railways. Pop. (1920) 10,050 (88% native white), in 1930, 25,308 by the Federal census. It is an important wool and mohair market; has a large jobbing business and various manufacturing industries; and is the trade centre for several oilfields, a wide stock-raising territory, and an irrigated district raising cotton, pecans, grain, strawberries and other fruits. Since 1915 the city has had a commission-manager form of government. The first oil was struck in 1923. Old Fort Concho, a post on the transcontinental mail-stage route, is still standing.

SAN ANTONIO, the largest city (1920) of Texas, U.S.A., and county seat of Bexar county; 80 m. S.S.W. of Austin, on the San Antonio river at the mouth of the San Pedro. It is on Federal highways 81, 90, 181, and 290; has a municipal airport and is an airmail station; and is served by the Missouri-Kansas-Texas, the Missouri Pacific and the Southern Pacific railways (with two direct lines to the new deep-water port of Corpus Christi, 150 m. S.S.E.) and by motor bus lines in all directions. Pop. (1920) 161,379, of whom 14,341 were negroes and 36,346 foreign-born white (including 28,477 Mexicans); in 1930 it was 231,542 by the Federal census.

San Antonio is surrounded by rich agricultural regions and there are still largely undeveloped, producing oilfields. It is the financial and commercial centre of a wide area; headquarters of the principal customs district on the Mexican border; the seat of the largest military establishment of the United States Government; one of the most picturesque and historically interesting of American cities; and a winter resort. The San Antonio, San Pedro and Acequia rivers together provide 30 m. of winding waterways within the city limits, spanned by hundreds of bridges. The city is a square of 36 sq.m., laid out, according to the requirements of the original charter, with the cupola of the cathedral of San Fernando (originally built in 1734) exactly in the centre. Near the cathedral is the historic Alamo, the chapel of the Franciscan mission San Antonio de Valero (founded 1718), which since 1883 has been maintained by the State as a public monument and museum. Facing the Military Plaza, where executions took place under Spanish and Mexican rule, is the former Governor's Palace (1749), and south and west of the Plaza lies the picturesque Mexican quarter. The Veramendi Palace, where Col. B. R. Milam was killed (Dec. 5, 1835) by a sharpshooter, is near by. Above and around the quaint old buildings rise the tall hotels and business structures of the modern city. South of the city are four Franciscan missions: La Purisima Concepción de Acuna (founded in eastern Texas in 1716, and moved here in 1731); San José de Aguayo (1720–31), one of the largest and most beautiful of the missions in America, with an exquisitely carved stone window; San Juan de Capistrano (1731); and San Francisco de la Espada (founded in eastern Texas in 1690 and moved here in 1731). The city's drives are shaded by palms, liveoaks, and pecan trees. Its 57 public parks and plazas cover 1,100 ac., and provide facilities for polo, golf, rifle practice, swimming, tennis, and other sports. The water supply (purchased by the city from a private corporation in 1924 for $7,000,000) comes from 17 artesian wells, with a daily flow of over 50,000,000 gallons. In the southern suburbs are two artesian wells, with a daily flow of 800,000 gal. of hot sulphur water, used for the treatment of rheumatism and skin diseases. Near one of these wells is the South-western State Hospital for the Insane (1892). As a measure for the eradication of malaria, the city has built bat-houses, from which the bats fly out at dusk to devour mosquitoes, returning to their roosts at dawn. The establishment of the United States army at San Antonio includes Ft. Sam Houston on Government Hill, a cavalry post and headquarters of the Eighth Corps Area; three aviation fields and two flying schools; a great motor-transport camp, an artillery camp, an arsenal, an artillery and rifle range, and four polo fields. About 12,000 troops are usually stationed here, and the Army expenditures amount to $18,000,000 annually. An International Fair, to which Mexico sends an exhibit, is held in March, at the permanent fair grounds where in 1898 Theodore Roosevelt organized his "Rough Riders." The anniversary of the Battle of San Jacinto (April 21) is celebrated regularly by a fiesta; and in February each year the Texas open golf tourney and a polo tourney are held. San Antonio has 49 public and 37 private schools, including the College of Our Lady of the Lake (1896) conducted by the Sisters of Divine Providence; 77 churches; and a number of charitable institutions. It is the see of Protestant Episcopal and Roman Catholic bishops. The city operates under a commission form of government, adopted in 1914. The assessed valuation of property for 1927 was $203,898,630.

The area of the trade territory of San Antonio is greater than the combined area of several eastern States. Commerce of the customs district with Mexico was $62,524,850 in 1927, of which 91% represented exports. The city has some 150 wholesale houses, and its manufacturing establishments had an output in 1927 valued at $45,165,212. The principal manufactures are iron and steel, textiles, cigars, leather goods, clothing and soap. The oilfields in the vicinity have developed rapidly since the first one at Somerset (18 m. S.) was opened in 1919. Bank clearings were $662,868,419 in 1927.

San Antonio was important as the capital of Texas under Spanish and Mexican rule, and its history is closely bound up with that of the State (*see* TEXAS).

SAN ANTONIO DE LOS BAÑOS, a small town in Havana Province, Cuba, about 23 m. (by rail) S.W. of Havana. Pop. (1925), 13,500. San Antonio de los Baños is served by the western branch of the United Railways of Havana. It is on the banks of the Ariguanabo river, which drains a lake of the same name, and is itself one of the many "disappearing rivers" of the island; it becomes lost in a cave near San Antonio. The town has mineral springs and baths, and is a summer resort of the people of Havana. The tobacco of the Vuelta Abajo lands immediately around the city is famous. The *pueblo* arose in the middle of the 18th century as a camp for convicts from Mexico. It became a *villa* in 1794. Early in the 19th century refugees from Santo Domingo settled here and founded coffee estates that gave the place great prosperity until the expulsion of the French in 1809; subsequently the cultivation of tobacco renewed its prosperity.

SANATRUCES (*Sinatruces,* Pers. *Sanatruk*), Parthian king. In the troublous times after the death of Mithradates II. (*c.* 88 B.C.) he was made king by the Sacaraucae, a Mongolian tribe who had invaded Iran in 76 B.C. He was eighty years old and reigned seven years; his successor was his son Phraates III. (Lucian, *Macrob.* 15; Phlegon, fr. 12 *ap.* Phot. cod. 97; Appian, *Mithr.* 104: Dio Cass. xxxvi. 45).

SANAVIRONAN, a small group of tribes of South American Indians, supposed, on meagre evidence, to constitute an independent linguistic stock. The Sanavironas from whom the stock is named, and their relatives the Comechingones, lived in the Sierra de Córdoba, in the province of that name in Argentina. Only brief references to them are made by the early writers, and they are now extinct. They were said to have worn long tunics and mantles of wool, and to have had some copper ornaments. They were remarkable in that they lived in semi-subterranean houses, each containing several families. They were agricultural and used irrigation.

See E. Boman, *Antiquités de la Region Andine de la République Argentine, etc.* (Paris, 1908).

SAN BENITO, a city of Cameron county, Texas, U.S.A., in the rich valley of the lower Rio Grande, 20 m. N.W. of Brownsville; on federal highway 96, and served by the Missouri Pacific railway lines. Pop. (1920) 5,070, 38% foreign-born white, in 1930, 10,753 by the Federal census. It is the trade centre of an irrigated region, which produces citrus fruit, vegetables and cotton to the value of $7,000,000 annually. The city was founded in 1908, incorporated in 1910, and by 1928 had an assessed valuation of $5,500,000.

SAN BERNARDINO, a city of southern California, U.S.A., 60 m. E. of Los Angeles, at the entrance to the Cajon Pass from

the north and the San Gorgonio Pass from the east, 1,050 ft. above sea-level; the county seat of San Bernardino county. It is on Federal highways 66 and 99, and is served by the Santa Fe, the Southern Pacific, the Union Pacific and electric railways, and by motor coach and truck lines in every direction. Pop. 18,721 in 1920 (79% native white); 37,481 in 1930 by the Federal census. The city is surrounded by the orange groves, vineyards, orchards and fields of the fertile San Bernardino valley, and has for background the San Bernardino mountain range, with Mt. San Bernardino (11,600 ft.) only 20 m. E. It is a division terminal of the Santa Fe railroad, which maintains extensive repair shops here and employs altogether over 2,500 persons in the city. Other leading industries are the manufacture of iron and steel castings, aeroplanes, lumber and meat products, ice and refrigerators.

In 1810, on the feast day of San Bernardino of Siena, a party of missionaries, soldiers and Indians from the San Gabriel Mission, under the leadership of Father Dumetz, came into the San Bernardino valley to establish a station for travellers between the Mission and the Sierras to the north, and built a chapel on a site now within the southern boundary of the city. In 1851 a colony of Mormons (about 500) came from Salt Lake, laid out a city, and did much to develop the agricultural possibilities of the valley. The county was organized in 1853, with its seat at San Bernardino, which was incorporated as a town in 1854. It was chartered as a city in 1864 and again in 1905. The Southern Pacific in 1876, and the Santa Fe in 1885, connected it first with the ocean and then with the east, and by 1900 the population had grown to 6,150.

SAN BLAS, a tribe of Indians, also known as the Cuna-Cuna or Tule, who live on the north coast of Panama between San Blas point and Port Obaldia. Although in contact with Europeans since the 16th century they have maintained racial purity and independence by vigorous opposition to foreign settlement. Their language is a Chibchan dialect, and their culture also shows South American origin. Reports of white Indians among this tribe have arisen from pronounced cases of hereditary albinism.

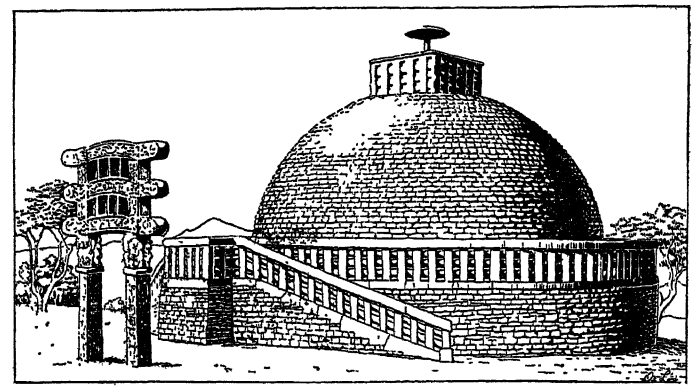
See H. W. Krieger, "Material culture of . . . South-eastern Panama" *U.S. National Museum, Bulletin 134* (1926).

SAN CARLOS, a municipality (with administration centre and 28 *barrios* or districts) and port of the province of Occidental Negros, of the island of Negros, Philippine Islands. Pop. (1918), 42,453. It is a centre of the sugar industry. The product is exported directly from the port to place of destination. In 1918, it had 6 manufacturing establishments and 115 household industry establishments with outputs valued at 43,800 and 40,000 pesos respectively. The 11 schools were all public. The language spoken is a dialect of Bisayan.

SAN CARLOS, a municipality (with administration centre and 42 *barrios* or districts), of the province of Pangasinan, Luzon, Philippine Islands, on the railway running from Manila to Dagupan. Pop. (1918) 35,780. It is the centre of a rich agricultural region and is of commercial importance. In 1918, it had 37 household industry establishments with output valued at 15,600 pesos. The fibre of the *buri* palm is here used for making the *salacot* or native helmet. San Carlos has brickyards and manufactories of pottery. Of the 15 schools in 1918, 13 were public. The language spoken is Pangasinan.

SANCERRE, a town of central France, in the department of Cher, 34 m. N.E. of Bourges by rail. Pop. (1926) 1,759. Sancerre, which gives its name to the small wine-growing district of Sancerrois, stands on an isolated vine-clad hill (1,000 ft.) about 1 m. from the left bank of the Loire. A cylindrical keep of the 15th century is the only relic of an ancient stronghold of the counts of Sancerre. From 1037 to 1152 the title of count of Sancerre was held by the counts of Champagne; from the latter year till 1640 it had its own counts, descended from Theobald IV. of Champagne.

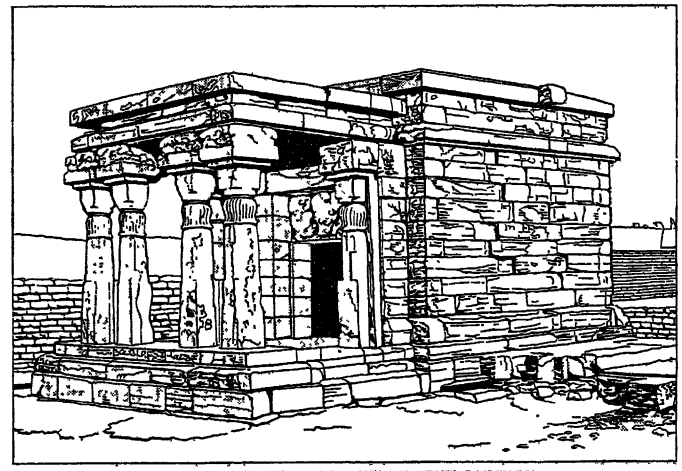
SĀNCHI, a small village in Central India, famous as the site of what are almost certainly the oldest buildings in India now standing. They are Buddhist topes (Pali. *thūpa;* Sanskrit, *stūpa*), that is, memorial mounds, standing on the level top of a small sandstone hill about 300 ft. high on the left bank of the river Betwa. The number of topes on this and the adjoining hills is considerable. On the Sānchi hill itself are only ten, but one of these is by far the most important and imposing of all. It is a solid dome of stone, about 103 ft. in diameter, and now about 42 ft. high. It must formerly have been much higher, the top having



FROM MARSHALL, "THE MONUMENTS OF SANCHI" (INDIAN STATE RAILWAYS)

A STUPA AT SANCHI, INDIA, AN EXAMPLE OF BUDDHIST ARCHITECTURE, SHOWING THE SACRED UMBRELLA ON THE DOME

originally formed a terrace, 34 ft. in diameter, on which stood lofty columns. Round the base is a flagged pathway surrounded by a stone railing and entered at the four points of the compass by gateways some 18 ft. high. Both gateways and railing are elaborately covered with bas-reliefs and inscriptions. The latter give the names of the donors of particular portions of the architectural ornamentation, and most of them are written in the



FROM MARSHALL, "THE MONUMENTS OF SANCHI" (INDIAN STATE RAILWAYS)

GUPTA TEMPLE, SANCHI, INDIA; BUILT ABOUT A.D. 300—500

This Buddhist shrine is an example of Indian "Renaissance" architecture

characters used before and after the time of Asoka in the middle of the 3rd century B.C. The monuments are Buddhist, the bas-reliefs illustrate passages in the Buddhist writings, and the inscriptions make use of Buddhist technical terms.

SANCHUNIATHON, an ancient Phoenician sage, who belongs more to legend than to history. He is said to have flourished "even before the Trojan times." Philo Herennius of Byblus claimed to have translated his writings from the Phoenician originals. According to Philo, Sanchuniathon derived the sacred lore from the mystic inscriptions on the Ἀμμουνεῖς (probably *ḥammānim,* "sun pillars," *cf.* Is. xxvii. 9, etc.) which stood in the Phoenician temples. That any writings of Sanchuniathon ever existed it is impossible to say. Philo conjured with a venerable name to gain credit for his narrative.

See Eusebius, *Praep. Ev.* i. 9 (Müller, *Fragm. hist. Graec.* iii. pp. 563 *seq.*).

SAN CRISTÓBAL (formerly called SAN CRISTÓBAL DE LOS LLANOS, CIUDAD DE LAS CASAS and CIUDAD REAL), a town of Mexico, in the State of Chiapas, on a level tableland about 6,700 ft. above sea-level and 48 m. E.N.E. of Tuxtla Gutiérrez. Pop. (1921) 13,295. The surrounding country is fertile and healthful and is populated chiefly with Indians. San Cristóbal was founded

in 1528 on the site of an Indian village, and afterwards was famous as the residence of Las Casas, bishop of Chiapas. It was the capital of Chiapas until near the end of the 19th century.

SANCROFT, WILLIAM (1616–1693), archbishop of Canterbury, was born at Fressingfield, Suffolk, on Jan. 30, 1616, and entered Emmanuel college, Cambridge, in July 1634. He became fellow in 1642, but was ejected in 1649 for refusing to accept the "Engagement." He remained abroad till the Restoration, after which he was chosen one of the university preachers, and in 1663 was nominated to the deanery of York. In 1664 he was installed dean of St. Paul's, to the rebuilding of which, after the fire of 1666, he gave £1,400. He also rebuilt the deanery, and improved its revenue. In 1668 he was admitted archdeacon of Canterbury upon the king's presentation, but he resigned the post in 1670. In 1677, being now prolocutor of the Convocation, he was unexpectedly advanced to the archbishopric of Canterbury. He attended Charles II. upon his deathbed. He wrote with his own hand the petition presented in 1687 against the reading of the Declaration of Indulgence, which was signed by himself and six of his suffragans. For this they were all committed to the Tower, but were acquitted. Upon the withdrawal of James II. he concurred with the Lords in a declaration to the prince of Orange for a free parliament, and due indulgence to the Protestant dissenters. But, when that prince and his consort were declared king and queen, he refused to take the oath to them, and was accordingly suspended and deprived. From Aug. 5, 1691, till his death on Nov. 24, 1693, he retired to his native place.

He published *Fur praedestinatus* (1651), *Modern Politics* (1652), and *Three Sermons* (1694). *Nineteen Familiar Letters to Mr. North* (afterwards Sir Henry North) appeared in 1757. *See* G. O'Oyly, *Life of Sancroft* (2 vols., 1821); A. Strickland, *Lives of the Seven Bishops* (1866).

SANCTIONS AND GUARANTEES in international law correspond to the means adopted in national law to enforce legal decisions. During the years which followed the World War it became increasingly apparent that the most important and the most enduring of European political problems was that known as the problem of "security" (*q.v.*).

As a deduction from the new conception of security the word "sanctions" began to replace in the language of diplomacy the word "alliance." Security was now to be sought not in limited agreements between small groups of states to fight together whenever any of them should, for whatever cause, be involved in international conflict, but in common agreements among a greater or smaller number of states to act together when—and only when—the established rights of one of them had been violated by force. Security, therefore, must be found in "sanctions" against the wrongdoer. For some time indeed, the word "guarantees" was used instead of, or on an equal footing with, the word "sanctions," but gradually the use of the word "guarantee" disappeared and the word "sanctions" took its place.

This change in phraseology was right, for the security arrangements which European politicians after the war endeavoured to set up constituted nothing more nor less than an attempt to limit and control the use of force in international affairs as it is limited and controlled in national affairs; an attempt, that is to say, to put force behind the law instead of leaving it outside the law to cause the international disorders which have resulted from its use in the past.

The discussions which occurred after the war soon showed that there were two ways by which Governments believed the result in view could be achieved; first, by creating a general system embracing all the States throughout the world; and second, by creating limited arrangements applying to a certain number of States situated in geographical proximity to each other and bound together by common bonds of material interest.

Article 16 of the Covenant.—It was by the general method that the first step was made towards the organization of a true system of international sanctions. This first step consisted in the adoption of the Covenant of the League of Nations, Article 16 of which imposes obligations upon every member of the League to adopt common coercive measures, including especially a financial and economic boycott, against states which, in violation of the undertakings of the Covenant, resort to war. But unfortunately Article 16 contained ambiguities which seriously diminished the confidence of Governments in its efficiency. It was not, therefore, generally regarded as by itself creating a sufficiently sound system of sanctions to solve the problem of security. For that reason the Temporary Mixed Commission set up by the Council of the League of Nations prepared in 1923 the draft treaty of mutual guarantee (or assistance), on the basis of which was prepared the Geneva Protocol of 1924. Both instruments were founded on the clear acceptance by all signatory states of obligations to co-operate by military or other necessary means against an aggressor.

Regional Guarantees.—The second method received its first application in the Anglo-American-French guarantee treaties drawn up in 1919 at Paris. These treaties failed to secure ratification, and were replaced by the Franco-Belgian, Franco-Polish and other similar treaties of alliance. The Little Entente was another example of the same method. But it was recognised even by the authors of these treaties that although they were subject to the Covenant of the League they were, nevertheless, liable to degenerate into alliances of the old sort, and that therefore they would be dangerous unless they were effectively controlled by the League. The Temporary Mixed Commission above mentioned in its draft treaty of mutual assistance for the first time combined the two methods into one coherent system. The Protocol similarly recognised the utility of special treaties in support of general sanctions, but on condition that such special treaties could only be applied *after* it had been recognised by some impartial arbitrator that aggression had taken place.

After the failure of the combination method of the Geneva Protocol, a return was made in the Locarno Agreements to the method of partial treaties. These agreements, however, in no way resembled an old-time alliance; the concern of their authors was plainly to create one more stable element in a new system of general international sanctions against aggression.

Whatever developments may follow the Locarno Agreements, it is certain that the problem of security will only be solved when satisfactory arrangements have been made for the provision of effective sanctions in support of international law, and that such sanctions can only be effective if they are founded on a combination of the two principles of general and partial guarantees. (*See* LEAGUE OF NATIONS and bibliography thereto and INTERNATIONAL LAW.) (P. J. N. B.)

SANCTI SPIRITUS, an old Cuban city in Santa Clara Province, situated on a sandy plain in an angle of the Yayabo river, which winds through the city. Pop. (1925), 23,572. It is connected by railway with Zaza del Medio, on the main railway line of the island, and with its port, Tunas de Zaza, 30 m. (by rail) to the south. The surrounding country is devoted principally to grazing. Sancti Spiritus was one of the seven cities founded by Diego Velásquez. Its settlement was ordered in 1514 and accomplished in 1516, and it is the fifth town of the island in age. The present city is about two leagues from the original site (Pueblo Viejo). In 1518, as a result of the war of the Comunidades of Castille, a mimic war broke out in Sancti Spiritus among its two score villagers. The place was sacked by French and English corsairs in 1719. Illicit trade with Jamaica was the basis of local prosperity in the 18th century.

SANCTORIUS (the Latin form of SANTORIO SANTORIO) (1561–1636), professor at Padua and colleague of Galileo, owes his medical fame to his demonstration that loss by "insensible perspiration" exceeds all other bodily excretions combined. Being inspired by the devices of Galileo, he invented a thermometer and an apparatus for measuring the pulse, and also a trocar and a cannula.

His chief works are the *De Medicina Statica* (1614) and a commentary on the *Canon* of Avicenna.

SANCTUARY, a sacred or consecrated place, particularly one affording refuge, protection or right of asylum. The word is also applied to the privilege itself, the right of safe refuge, and even to places of refuge for animals, such as a "bird sanctuary." In Egyptian, Greek or Roman temples it was applied to the *cella* in which stood the statue of the god, and the Latin word for

altar, *ara*, was used for protection as well. In Roman Catholic usage sanctuary is sometimes applied to the whole church, as a consecrated building, but is generally limited to the choir. The idea that such places afforded refuge to criminals or refugees is founded upon the primitive and universal belief in the contagion of holiness. Hence it was sacrilege to remove the man who had gained the holy precincts; he was henceforth invested with a part of the sacredness of the place, and was inviolable so long as he remained there. The story of the death of Demosthenes (*q.v.*) is a famous instance. Not all Greek and Roman temples, however, had the right of sanctuary. But where it existed, the action of the Roman civil law was suspended, and in imperial times the statues and pictures of the emperors were a protection against pursuit. Roman law did not recognize the use of Christian sanctuaries until toward the end of the 4th century, but the growing recognition of the office of bishop as intercessor helped much to develop it. In 399 the right of Christian sanctuary was finally and definitely recognized, and in 419 the privilege was extended in the western empire to 50 paces from the church door. In 431, by an edict of Theodosius and Valentinian it was extended to include the church court-yard and whatever stood therein, in order to provide some other place than the church for the fugitives to eat and sleep. Justinian in a Novel of the year 535 limited the privilege to those not guilty of the grosser crimes. In the new Germanic kingdoms, while violent molestation of the right of sanctuary was forbidden, the fugitive was given up after an oath had been taken not to put him to death. This legislation was copied by the Church at the council of Orleans in 511; the penalty of penance was added, and the whole decree backed by the threat of excommunication. Thus it passed into Gratian's Decretum, but historians like Gregory of Tours have many tales to tell showing how frequently it was violated.

The earliest extant mention of the right of sanctuary in England is contained in the code of laws issued by the Anglo-Saxon king Aethelberht in A.D. 600. By these he who infringed the church's privilege was to pay twice the fine attaching to an ordinary breach of the peace. Crosses inscribed with the word "Sanctuarium," were common on the highways, serving probably as sign-posts to guide fugitives to neighbouring sanctuaries. The canon law allowed the protection of sanctuary to those guilty of crimes of violence for a limited time only, in order that some compensation (*wergild*) should be made, or to check blood-vengeance. The procedure, upon seeking sanctuary, was regulated in the minutest detail. The fugitive had to make confession of his crime to one of the clergy, to surrender his arms, swear to observe the rules and regulations of the religious houses, pay an admission fee, give, under oath, fullest details of his crime (the instrument used, the name of the victim, etc.), and at Durham he had to toll a special bell as a formal signal that he prayed sanctuary, and put on a gown of black cloth on the left shoulder of which was embroidered a St. Cuthbert's cross. The protection afforded by a sanctuary at common law was this: a person accused of felony might fly for safeguard of his life to sanctuary, and there, within 40 days, go, clothed in sack-cloth, before the coroner, confess the felony and take an oath of *abjuration of the realm*, whereby he undertook to quit the kingdom, and not return without the king's leave. Upon confession he was, *ipso facto*, convicted of the felony, suffered attainder of blood and forfeited all his goods, but had time allowed him to fulfil his oath. The abjurer started forth on his journey, armed only with a wooden cross, bareheaded and clothed in a long white robe, which made him conspicuous among mediaeval wayfarers. He had to keep to the king's highway, was not allowed to remain more than two nights in any one place, and must make his way to the coast quickly. The time allowed for his journey was not long. In Edward III.'s reign only nine days were given an abjurer to walk from Yorkshire to Dover.

Under the Norman kings there appear to have been two kinds of sanctuary; one *general*, which belonged to every church, and another *peculiar*, which had its force in a grant by charter from the king. This latter type could not be claimed by prescription, and had to be supported by usage within legal memory. General sanctuaries protected only those guilty of felonies, while those by special grant gave immunity even to those accused of high or petty treason, not for a time only but apparently for life. Of chartered sanctuaries there were at least 22: Abingdon, Armathwaite, Beaulieu, Battle Abbey, Beverley, Colchester, Derby, Durham, Dover, Hexham, Lancaster, St. Mary le Bow (London), St. Martin's le Grand (London), Merton Priory, Northampton, Norwich, Ripon, Ramsey, Wells, Westminster, Winchester, York. At the Reformation general and peculiar sanctuaries both suffered drastic curtailment of their privileges, but the great chartered ones suffered most. By the reforming act of 1540 Henry VIII. established seven cities as peculiar sanctuaries. These were Wells, Westminster, Northampton, Manchester (afterwards transferred to Chester), York, Derby and Launceston. By an act of James I. (1623), sanctuary, as far as crime was concerned, was abolished throughout the kingdom. The privilege lingered on for civil processes in certain districts which had been the site of former sanctuaries and which became the haunts of criminals who there resisted arrest—a notable example being that known as Whitefriars between Fleet Street and the Thames, east of the Temple. This locality was nicknamed Alsatia (the name first occurs in Shadwell's plays in Charles II.'s reign), and there criminals were able to a large extent to defy the law, arrests only being possible under writs of the lord chief justice. So flagrant became the abuses that in 1697 the "Escape from Prison Act," finally abolished all such alleged privileges. A further amending act of 1723 completed the work of destruction. The privileged places named in the two acts were the Minories, Salisbury Court, Whitefriars, Fulwood's Rents, Mitre Court, Baldwin's Gardens, The Savoy, The Clink, Deadman's Place, Montague Close, The Mint and Stepney.

In Scotland the most famous sanctuaries were those attaching to the Church of Wedale, now Stow, near Galashiels, and that of Lesmahagow, Lanark. All religious sanctuaries were abolished in the northern kingdom at the Reformation. But the debtor found sanctuary from "diligence" in Holyrood House and its precincts until late in the 17th century. This sanctuary did not protect criminals, or even all debtors, *e.g.*, not crown debtors or fraudulent bankrupts; and it was possible to execute a *meditatio fugae* warrant within the sanctuary. The abolition of imprisonment for debt in 1881 practically abolished this privilege of sanctuary.

A presumptive right of sanctuary attached to the royal palaces, and arrests could not be made there. In Anglo-Saxon times the king's peace extended to the palace and 3,000 paces around it: it extended to the king himself beyond the precincts. At the present day members of parliament cannot be served with writs or arrested within the precincts of the houses of parliament, which extend to the railings of Palace yard. During the Irish agitation of the 'eighties Parnell and others of the Irish members avoided arrest for some little while by living in the house and never passing outside the gates of the yard. The houses of ambassadors were in the past quasi-sanctuaries. This was a natural corollary of their diplomatic immunities (*see* DIPLOMACY).

In Europe, generally, the right of sanctuary survived under restrictions down to the end of the 18th century. In Germany the more serious crimes of violence were always excepted. Highwaymen, robbers, traitors and habitual criminals could not claim church protection. In 1418 sanctuary was further regulated by a bull of Martin V. and in 1504 by another of Julius II. In a modified form the German *Asylrecht* lasted to modern times, not being finally abolished till about 1780. In France *le droit d'asile* existed throughout the middle ages, but was much limited by an edict of Francis I. in 1539. It was entirely abolished at the Revolution.

BIBLIOGRAPHY.—Samuel Pegge, "Sketch of History of Asylum or Sanctuary," Soc. of Antiq. of London, *Archaeologia* viii. 1–44 (1787); Henri Wallon, *Droit d'asile* (1837); Aug. von Bulmerincq, *Das Asylrecht* (Dorpat, 1853); A. P. Stanley, *Memorials of Westminster Abbey* (1882); Bissel, *The Law of Asylum in Israel* (1884); J. C. Cox, *The Sanctuaries and Sanctuary Seekers of Medieval England* (1911); J. Groll, *Die Elemente des Kirchlichen Freiungsrechtes* (1911).

SAND, GEORGE (1804–1876), the pseudonym of Madame Amandine Lucile Aurore Dudevant, *née* Dupin.

George Sand was the daughter of Maurice Dupin, a retired lieutenant, and of Sophie Delaborde, the daughter of a Paris bird-fancier. Their ill-assorted marriage took place only a month

before the birth of the child (July 1, 1804; at Paris). Her paternal grandfather was M. Dupin de Francueil, a farmer-general of the revenue, who married the widow of Count Horn, a natural son of Louis XV., she in her turn being the natural daughter of Maurice de Saxe, the most famous of the many illegitimate children of Augustus the Strong, by the lovely countess of Königsmarck. George Sand, who was a firm believer in the doctrine of heredity, devotes a whole volume of her autobiography (*Histoire de ma vie,* 1857 *seq.*) to the elaboration of this strange pedigree. She boasts of the royal blood which ran through her veins, but she is no less frank in declaring that she is *vilaine et très vilaine,* a daughter of the people who shares by birth their instincts and sympathies. Her birth itself was romantic. Her father died when she was a small child, and her mother, after a struggle, abandoned Aurore to the care of her grandmother, Madame Dupin de Francueil, who was a survival of the ancien régime.

Her childhood was spent at Nohant, near La Châtre in Berry, Madame Dupin's country house. Here she imbibed the passionate love of country scenes and country life which neither absence, politics nor dissipation could uproot; here she learnt to understand the ways and thoughts of the peasants, and laid up that rich store of scenes and characters which a marvellously retentive memory enabled her to draw upon at will. Next to the grandmother, the most important person in the household at Nohant was Deschatres. He was an ex-abbé who had shown his devotion to his mistress when her life was threatened during the Revolution, and henceforward was installed at Nohant as factotum. He was maire of the village, tutor to Aurore's half-brother, and undertook the education of the girl. At odd hours of lessons she picked up a smattering of Latin, music and natural science, but most days were holidays and spent in country rambles and games with village children.

From the free out-door life at Nohant she passed at thirteen to the convent of the English Augustinians at Paris, where for the first two years she never went outside the walls. Nothing better shows the plasticity of her character than the ease with which she adapted herself to this sudden change. One day in the convent chapel she underwent conversion in the mystical sense. There is no doubt of the sincerity of her narrative, or even the permanence of her religious feelings under all her many phases of faith and aberrations of conduct.

Again in 1820 Aurore exchanged the restraint of a convent for freedom, being recalled to Nohant by Mme. de Francueil, who had no intention of letting her granddaughter grow up a *dévote.* She rode across country with her brother, she went out shooting with Deschatres, she sat by the cottage doors on the long summer evenings and heard the flax-dressers tell their tales of witches and warlocks. She was a considerable linguist and knew English, Italian and some Latin, though she never tackled Greek. She read widely though unsystematically, studying philosophy in Aristotle, Leibnitz, Locke and Condillac, and feeding her imagination with *René* and *Childe Harold.* Her confessor lent her the *Génie du Christianisme,* and to this book she ascribes the first change in her religious views.

On her grandmother's death she married on Dec. 11, 1822, Casimir Dudevant, natural son of Baron Dudevant. He seems then to have been neither better nor worse than the Berrichon squires around him, and the first years of her married life, during which her son Maurice and her daughter Solange were born, except for lovers' quarrels, were passed in peace and quietness, though signs were not wanting of the coming storm. Among these must be mentioned her friendship with Aurélien de Sèze, advocate-general at Bourdeau, which her husband resented. So long as the conventions were preserved she endured her life, but when her husband took to drinking and made love to the maids under her eyes she resolved to break a yoke that had grown intolerable. She then discovered a paper docketed "Not to be opened till after my death," which was nothing but a railing accusation against herself. She at once quitted Nohant, taking with her Solange, and in 1831 an amicable separation was agreed upon, by which her whole estate was surrendered to the husband with the stipulation that she should receive, in return for this relinquishment on her part, an allowance of £120 a year.

Aurore Dudevant had regained her liberty, and made no secret of her intention to use it to the full. She endeavoured unsuccessfully to eke out her irregularly paid allowance by various expedients, and lived in a garret. She found a friend in Delatouche, the editor of *Figaro.* He was a native of Berry, like herself, a stern but kindly taskmaster who taught her the trade of journalism. On the staff of *Figaro* was another compatriot, Jules Sandeau, a clever and attractive young lawyer. Articles written in common soon led to a complete literary partnership, and in 1831 there appeared in the *Revue de Paris* a joint novel entitled *Prima Donna* and signed Jules Sand. Shortly after this was published in book form with the same signature a second novel, *Rose et Blanche.* The sequel to this literary alliance is best recounted in George Sand's own words: "I resisted him for three months but then yielded; I lived in my own apartment in an unconventional style." Her first independent novel, *Indiana* (1832), was written at the instigation of Delatouche, and the world-famous pseudonym George (originally Georges) Sand was adopted as a compromise between herself and her partner. The one wished to throw *Indiana* into the common stock, the other refused to lend his name, or even part of his name, to a work in which he had had no share. The novel was received with instant acclamation. *Indiana* is a direct transcript of the author's personal experiences (the disagreeable husband is M. Dudevant to the life), and an exposition of her theory of sexual relations which is founded thereon. To many critics it seemed that she had said her whole say and that nothing but replicas could follow. *Valentine,* which was published in the same year, indicated that it was but the first chapter in a life of endless adventures, and that the imagination which turned the crude facts into poetry, and the fancy which played about them like a rainbow, were inexhaustible.

Her liaison with Jules Sandeau, which lasted more than a year, was abruptly terminated by the discovery in their apartment on an unexpected return from Nohant of *une blanchisseuse quelconque.* For a short while she was broken hearted:—"My heart is a cemetery!" she wrote to Sainte-Beuve. "A necropolis," was the comment of her discarded lover when years later the remark was repeated to him.

Her third novel, *Lélia* (1833), is in the same vein, a stronger and more outspoken diatribe against society and the marriage law. Lélia is a female Manfred, and Dumas had some reason to complain that George Sand was giving them "du lord Byron au kilo." But a new chapter in her life was now to open. In her despair she turned for comfort and counsel to Sainte-Beuve, now constituted her regular father confessor. He recommended new friendships, but she found Dumas "trop commis-voyageur," Jouffroy too serenely virtuous and Musset "trop dandy." Mérimée was tried for a week, but the cool cynic and the perfervid apostle of women's rights proved mutually repulsive. Alfred de Musset was introduced, and the two natures leapt together.

The Musset Episode.—Towards the end of 1833 George Sand, after winning the reluctant consent of Musset's mother, set out in the poet's company for Italy, and in January 1834 the pair reached Venice, staying first at the Hôtel Danieli and then in lodgings. At first it was a veritable honeymoon; conversation never flagged and either found in the other his soul's complement. But there is a limit to love-making, and George Sand, always practical, set to work to provide the means of living. Musset, though he depended on her exertions, was first bored and then irritated at the sight of this *terrible vache à écrire,* whose pen was going for eight hours a day, and sought diversion in the cafés and other less reputable resorts of pleasure. The consequence was a nervous illness, through which George Sand nursed him with tenderness and care. But she made love at the same time to a young Venetian doctor whom she had called in, by name Pagello. The two found their way eventually to Paris, leaving Musset in Italy, deeply wounded in his affections, but, to do him justice, taking all the blame for the rupture on himself. George Sand soon tired of her new love, and even before she had given him his congé was dying to be on again with the old. She cut off her hair and sent it to Musset as a token of penitence, but Musset, though he still

flirted with her, never quite forgave her infidelity and refused to admit her to his deathbed. Among the mass of *romans à clef* and pamphlets which the adventure produced, two only have any literary importance, Musset's *Confessions d'un enfant du siècle* and George Sand's *Elle et lui.* In the former woman appears as the serpent whose trail is over all; in the latter, written twenty-five years after the event, she is the guardian angel abused and maltreated by men. *Lui et elle,* the rejoinder of the poet's brother Paul de Musset, was even more a travesty of the facts with no redeeming graces of style.

It remains to trace the influence, direct or indirect, of the poet on the novelist. *Jacques* was the first outcome of the journey to Italy, and in precision and splendour of style it marks a distinct progress. In *Les Lettres d'un voyageur,* which ran in the *Revue des deux mondes* between 1834 and 1836, we have not only impressions of travel, but the direct impressions of men and things not distorted by the exigencies of a novel. The Everard of the *Lettres* introduces us to a new and for the time a dominant influence on the life and writings. Michel de Bourges was the counsel whose eloquent pleadings brought the suit for a judicial separation to a successful issue in 1836. Unlike her former lovers, he was a man of masterful will, a philosopher who carried her intellect by storm before he laid siege to her heart. He preached republicanism to her by the hour, and even locked her up in her bedroom to reflect on his sermons. She was but half converted, and fled before long from a republic in which art and poetry had no place. Other celebrities who figure in the *Lettres* under a transparent disguise are Liszt and Mme. d'Agoult (known to literature as Daniel Stern), whom she met in Switzerland and entertained for some months at Nohant. Liszt, in after years when they had drifted apart, wrote of her: "George Sand catches her butterfly and tames it in her cage by feeding it on flowers and nectar—this is the love period. Then she sticks her pin into it when it struggles—that is the congé and it always comes from her. Afterwards she vivisects it, stuffs it, and adds it to her collection of heroes for novels." There is some truth in the satire, but it wholly misrepresents her rupture with Chopin.

Liaison with Chopin.—It was doubtless a revulsion of feeling against the doctrinaires, especially the strong influence of Lamennais and P. Leroux, and in particular against the puritanic reign of Michel that made her turn to Chopin. She found the *maestro* towards the end of 1837 dispirited by a temporary eclipse of popularity and in the first stage of his fatal malady, and carried him off to winter with her in the south. How she roughed it on an island unknown to tourists is told in *Un hiver à Majorque* (1842), a book of travel that may take rank with Heine's *Reisebilder.* In nearly all George Sand's loves there was a strong strain of motherly feeling. Chopin was first petted by her like a spoilt darling and then nursed for years like a sick child. In the end Chopin remonstrated with her for refusing to receive her ne'er do well son-in-law, Clésinger, at Nohant, and when she resented his interference, he left her in anger.

Meanwhile, during this, her second period, George Sand allowed herself to be the mouthpiece of others—"un écho qui embellissait la voix," as Delatouche expressed it. *Spiridion* (1838) and *Les Sept cordes de la lyre* (1840) are mystic echoes of Lamennais. *Le Compagnon du tour de France* (1841), *Les Maîtres mosaïstes* and *Le Meunier d'Angibault* (1845), *Le Péché de M. Antoine* (1847) are all socialistic novels. George Sand had adopted her socialism from Pierre Leroux, and many works of this period are inspired by his humanitarianism. *Consuelo* (1842–1844) and its sequel *La Comtesse de Rudolstadt* (1843–1845) are *fantaisies à la Chopin,* though the stage on which they are played is the Venice of Musset. Chopin is the Prince Karol of *Lucrezia Floriani* (1847), a self-portraiture unabashed as the *Tagebuch einer Verlorenen* and innocent as *Paul et Virginie.*

George Sand wrote with the rapidity of Walter Scott and the regularity of Anthony Trollope. For years her custom was to retire to her desk at 10 P.M. and not to rise from it till 5 A.M. She wrote *à la diable,* starting with some central thesis to set forth or some problem to investigate, but with no predetermined plot or plan of action. Round this nucleus her characters (too often mere puppets) grouped themselves, and the story gradually crystallized. This unmethodical method produces in her longer and more ambitious novels, in *Consuelo* for instance and its continuation, a tangled wilderness, the clue to which is lost or forgotten; but in her novelettes, when there is no change of scenery and the characters are few and simple, it results in the perfection of artistic writing, "an art that nature makes."

The Pastoral Novels.—From novels of revolt and tendency novels George Sand turned at last to simple stories of rustic life, the genuine pastoral. It is here that she shows her true originality and by these she will chiefly live. George Sand by her birth and bringing-up was half a peasant herself, in M. Faguet's phrase, "un paysan qui savait parler." She had got to know the heart of the peasant—his superstitions, his suspiciousness and low cunning, no less than his shrewdness, his sturdy independence and his strong domestic attachments. *Jeanne* (1844) begins the series which has been happily called the Bucolics of France. To paint a Joan of Arc who lives and dies inglorious is the theme she sets herself, and through most of the novel it is perfectly executed. The last chapters when Jeanne appears as the Velida of Mont Barbot and the Grande Pastoure are a falling off and a survival of the romanticism of her second manner. *La Mare au diable* (1846) is a clear-cut gem, perfect as a work of Greek art. *François le champi* and *La Petite Fadette* are of no less exquisite workmanship. Les *Maîtres sonneurs* (1853) brings the series of village novels to a close, but as closely akin to them must be mentioned the *Contes d'une grande-mère,* delightful fairy tales of the Talking Oak, Wings of Courage and Queen Coax, told to her grandchildren in the last years of her life.

The revolution of 1848 arrested for a while her novelistic activities. She composed manifestos for her friends, addressed letters to the people, and even started a newspaper. But her political ardour was short-lived; she cared little about forms of government, and, when the days of June dashed to the ground her hopes of social regeneration, she returned to her quiet country ways and her true vocation as an interpreter of nature, a spiritualizer of the commonest sights of earth and the homeliest household affections. In 1849 she writes from Berry to a political friend: "You thought that I was drinking blood from the skulls of aristocrats. No, I am studying Virgil and learning Latin!" In her latest works she went back to her earlier themes of romantic and unchartered love, but the scene is shifted from Berry, which she felt she had exhausted, to other provinces of France, and instead of passionate manifestos we have a gallery of *genre* pictures treated in the spirit of *François le champi.* "Vous faites," she said to her friend Honoré de Balzac, "la comédie humaine; et moi, c'est l'églogue humaine que j'ai voulu faire."

George Sand was as fond of acting as Goethe, and like him began with a puppet stage, succeeded by amateur theatricals, the chief entertainment provided for her guests at Nohant. Undaunted by many failures, she dramatized several of her novels with moderate success—*François le champi,* played at the Odéon in 1849, and *Les Beaux Messieurs de Bois-Doré* (1862) were the best; *Claudie,* produced in 1851, is a charming pastoral play, and *Le Marquis de Villemer* (1864) (in which she was helped by Dumas fils) was a genuine triumph. Her statue by Clésinger was placed in the foyer of the Théâtre Français in 1877.

George Sand died at Nohant on the 8th of June 1876. To a youth and womanhood of storm and stress had succeeded an old age of serene activity and then of calm decay. Her nights were spent in writing, which seemed in her case a relaxation from the real business of the day, playing with her grandchildren, gardening, conversing with her visitors—it might be Balzac or Dumas, or Octave Feuillet or Matthew Arnold—or writing long letters to Sainte-Beuve and Flaubert. "Calme, toujours plus de calme," was her last prayer, and her dying words, "Ne détruisez pas la verdure."

BIBLIOGRAPHY.—The collected edition of George Sand's works was published in Paris (1862–83) in 96 volumes, with supplement 109 volumes; the *Histoire de ma vie* appeared in 20 volumes in 1854–55. The *Étude bibliographique sur les œuvres de George Sand* by the vicomte de Spoelberch de Lovenjoul (Brussels, 1868) gives the most complete bibliography. Of Vladimir Karenin's (pseudonym of

Mme. Komarova) *George Sand*, the most complete life, the first two volumes (1899–1901) carry the life down to 1839. There is much new material in *George Sand et sa fille*, by S. Rocheblave (1905), *Correspondance de G. Sand et d'Alfred de Musset* (Brussels, 1904), *Correspondance entre George Sand et Gustave Flaubert* (1904), and *Lettres à Alfred de Musset et à Sainte-Beuve* (1897). E. M. Caro's *George Sand* (1887) is rather a critique than a life. *See* studies by Sainte-Beuve in the *Causeries du lundi* and in *Portraits contemporains;* Jules Lemaître in *Les Contemporains*, vol. iv.; E. Faguet, *XIX^e Siècle;* F. W. H. Myers, *Essays Ancient and Modern* (1883); Henry James in *North American Review* (April 1902); Matthew Arnold, *Mixed Essays* (1879). *See* also René Doumic's *George Sand* (1909), which has been translated into English by Alys Hallard as *George Sand: Some Aspects of her Life and Writings* (1910); C. Maurras, *Les Amants de Venise; George Sand et Musset* (1916); L. Vincent, *George Sand et le Berry* (2 vols. 1919); E. A. A. L. Seillière, *George Sand* (1920); E. W. Schermerhorn, *The Seven Strings of the Lyre. The Life of George Sand (1804–76)* (1928); and Eng. trans., by M. J. Howe, of her *Journal Intime* as *The Intimate Journal of George Sand* (1929).

SAND. If rocks and minerals are broken down by either natural or artificial agencies, the products may be classified as gravels, sands, silts and clays. The term sand is usually applied to the material of diameter ranging from about $\frac{1}{20}$ to 2 mm. Although most of the rock-making minerals occurring on the earth's crust are found in sands, only a limited number are met with at all frequently. For several reasons quartz is by far the commonest ingredient; it is abundant in rocks, is comparatively hard and has practically no cleavage so that it is not readily worn down to a fine state. Moreover it is nearly insoluble in water and does not decompose. In certain localities felspar, calcareous material, iron ores and volcanic glass, among other substances, have been found to be dominant constituents of sand. Most quartzose sands contain a small quantity of felspar. Small plates of white mica, which, though soft and very fissile, decompose very slowly, are often present. In addition all sands contain small quantities of "heavy" rock-forming minerals among which may be garnet, tourmaline, zircon, rutile, topaz, pyroxenes, amphiboles, iron ores, etc.

In certain shore and river sands these heavier constituents become concentrated as a result of current action and the removal of the lighter constituents. Economically valuable deposits may then be yielded. Such are the sands worked for diamonds and other gem-stones, those bearing gold, platinum, tin, monazite and other ores. The greensands, widely distributed over the floor of the ocean and found in ancient strata on the continents, owe their colour to the presence of glauconite, a potash-bearing mineral. These sands are used for water-softening and for land-dressing, and attempts have been made to extract potash from them.

In the pottery, glass-making and silicate (water glass) industries very pure quartzose sands are used in large quantities as a source of silica. Similar sands are required for lining the hearths of acid-steel furnaces and for foundry mixtures. Moulding-sands, that is, the sands utilized in foundries for making the moulds in which metal is cast, usually have a clayey bond uniting the grains of quartz. On account of the hardness and poor cleavage of quartz, sands are used extensively as abrasives. Garnet-sands, although of more restricted occurrence, are similarly used. Ordinary sands find a multitude of other uses, among which may be mentioned the preparation of mortar, cement and concrete. They are frequently sources of water-supply. (P. G. H. B.)

SANDALWOOD, a fragrant wood obtained from various trees of the natural order Santalaceae, and principally from *Santalum album*, a native of India. The use of sandalwood dates as far back at least as the 5th century B.C. It is still extensively used in India and China, wherever Buddhism prevails, being employed in funeral rites and religious ceremonies. In India it is used in the manufacture of boxes, fans and other ornamental articles of inlaid work. The oil, obtained by distilling the wood in chips, is used as a perfume, few native Indian attars or essential oils being free from admixture with it. As a powder or paste the wood is employed in the pigments used by the Brahmans for their distinguishing caste-marks.

Red sandalwood is the product of a small leguminous tree, *Pterocarpus santalinus*, native of S. India, Ceylon and the Philippine Islands. A fresh surface of the wood has a rich deep red colour, which on exposure, however, assumes a dark brownish tint; its principal application is in wool-dyeing. Several other species of *Pterocarpus*, notably *P. indicus*, contain the same dyeing principle and can be used as substitutes for red sandalwood. The barwood and camwood of the Guinea Coast of Africa, from *Baphia nitida* or an allied species, called *santal rouge d'Afrique* by the French, are also closely allied to the red sandalwood of Oriental countries.

As a substitute for copaiba (*q.v.*), sandalwood oil, distilled from the wood of *Santalum album*, is pleasanter to take, but it is less efficient and more expensive.

SANDARACH, in mineralogy realgar or native arsenic disulphide, but generally a resinous body obtained from the small coniferous tree *Callitris quadrivalvis*, native of the north-west regions of Africa, and especially the Atlas mountains. The resin, a natural exudation on the stems, comes into commerce as small round balls or elongated tears, transparent, and having a delicate yellow tinge. It is a little harder than mastic, for which it is sometimes substituted. It is also used as incense, and by the Arabs medicinally as a remedy for diarrhoea. An analogous resin is procured in China from *Callitris sinensis*, and in S. Australia, under the name of pine gum, from *C. Reissii*.

SANDAWE, less correctly Sandawi, a small tribe of about 15,000 persons living in the Kondoa-Irangi district of Tanganyika Territory, Africa, between the rivers Bubu and Mponde. Attention was drawn to their language by the late Dr. Oskar Baumann, who visited their country in 1892, and was able to collect some specimens, being especially struck by the remarkable fact of its containing clicks (*q.v.*), which had up to that time only been observed in the Hottentot and Bushman languages of South Africa, and in those adjacent Bantu languages which had borrowed them. It was investigated at a later date by E. Nigmann (1909) and, more scientifically, by Dr. Otto Dempwolff (1916). The only English writer who has treated the subject in any detail is F. T. Bagshawe, Political Officer at Mbulu, who was in close contact with these people from 1917 to 1923.

It has been assumed, though without sufficient reason, that all languages containing clicks must be related to each other, and that there can be no possible relationship between a click-language and one where clicks are absent. That this position, however, is by no means generally accepted, appears from the disputes which have arisen over the question whether the Hottentot and the Bushman groups (neither consisting of a single language) have a common origin, or are entirely distinct. (*See* AFRICA, *Ethnology.*)

The three clicks found in Sandawe seem to be identical with three of the Nama clicks—those which have been adopted into Zulu and are represented in the current orthography by *c* (dental), *q* (cerebral or "retroflex") and *x* (lateral). The last-named is not produced in quite the same way as by the Nama, but, as observed by Dr. Dempwolff, the sound is exactly the same. Both Nigmann and Bagshawe have noticed the fact that the Sandawe clicks form a distinct syllable, at any rate in some cases (it is not clear from the latter's account whether the rule is invariable), whereas in Zulu they form an integral part of a syllable, the pronunciation of which constitutes one of the greatest difficulties to a European learner.

The word-stress appears to be extremely variable and is often the only distinction between words of similar form, but different meaning (*e.g.*, *nóa* "elephant" and *noá* "claw"). *Intonation* ("tone") is also, as in the Hottentot and Bushman languages, a very important feature: *tsa* with a high tone means "pot," with a low tone "tear." Both these points await fuller investigation.

A large proportion of the Sandawe vocabulary can be correlated with Nama words, and a less amount with other Hamitic languages, such as Tatoga, Iraku and even Somali. But this is an unsatisfactory basis for deducing relationship, otherwise Sandawe might be claimed as a Bantu language, since Dr. Dempwolff gives a longer list of words which can be identified as Bantu (obviously borrowed from Swahili, Gogo, Hehe, Irangi, etc.), than of those which he has traced to Nama. A far more trust-

worthy criterion is to be found in the grammatical framework of the language and here there is little room for doubt. Sandawe possesses grammatical gender, suffixes to denote the plural, case-endings for nouns (an "instrumental case" is almost identical, both in form and meaning with that found in Nama), and other features in common with Nama and also, to a less extent, with other Hamitic languages. One peculiarity, the use of a different form for a verb in singular and plural (*e.g., tha* "he runs," *giribe* "they run"), is neither Hamitic, Bantu nor Sudanic. The order of words in a simple sentence (subject, object, verb: "he cattle herds," instead of "he herds cattle") and the position of the genitive (possessor preceding the thing possessed: *Humbu tse,* "ox's head," not, as in Bantu, "head of ox") are the same as in Nama, but differ from the normal Hamitic type. In both cases there would appear to be sufficient reasons for the difference.

Professor Alfredo Trombetti is inclined to think that the Sandawe are, of all existing peoples, those most nearly related to the Hottentots.

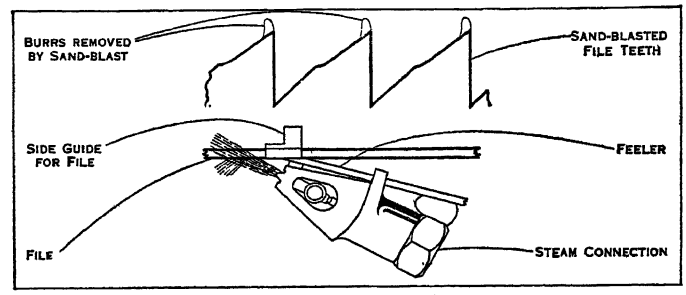
BIBLIOGRAPHY.—F. J. Bagshawe, "The Peoples of the Happy Valley," in *Journal of the African Society,* vol. xxiv. (1924–25), Nos. 93, 95, 96; Oskar Baumann, *Durch Masailand zur Nilquelle* (Berlin, 1894); E. Nigmann, "Versuch eines Wörterbuchs für Kissandaui," *Mitteilungen des Seminars für orientalische Sprachen,* vol. xii. (Berlin, 1909); Alfredo Trombetti, *La Lingua degli Ottentotti e la Lingua dei Wa-Sandawi* (Bologna, 1910); Dr. Otto Dempwolff, *Die Sandawe. Linguistisches und ethnographisches Material aus Deutsch-Ostafrika* (Hamburg, 1916). (A. WE.)

SANDAY, WILLIAM (1843–1920), English theological scholar, was born at Holme Pierrepont, Notts., on Aug. 1, 1843, the son of William Sanday, sheep and cattle breeder. Educated at Repton and Balliol College, Oxford, he became a scholar of Corpus Christi in 1863. He was a fellow and lecturer at Trinity in 1866, and was ordained in 1867. In 1876 after holding various college livings, he was appointed principal of Hatfield Hall, Durham. In 1882 he was appointed Ireland professor of exegesis at Oxford, and in 1895 Lady Margaret professor of divinity and canon of Christ Church, positions which he held until 1919. He died at Oxford on Sept. 16, 1920. Sanday was one of the pioneers in introducing to English students the mass of work done by Continental scholars in biblical criticism. An example of the admirable work he accomplished in this direction is his *Life of Christ in Recent Research* (1907).

His chief works are *The Authorship and Historical Character of the Fourth Gospel* (1872); *The Gospels in the Second Century* (1876); *The Oracles of God* (1891); *The Early History and Origin of the Doctrine of Biblical Inspiration* (1893); *Commentary on the Epistle to the Romans* (with Dr. Headlam, 1895); *Outlines of the Life of Christ* (1905, a republication of an article in Hastings' *Dictionary of the Bible*); *Christologies, Ancient and Modern* (1910) and *Personality in Christ and in Ourselves* (1911); *Bishop Gore's Challenge to Criticism* (1914); *The New Testament Background* (1918).

SAND-BLAST is a method of cleaning or marking surfaces by the discharge of sand, steel shot or grit through a nozzle at high velocity by means of compressed air. The abrasive action can be effected on internal parts without difficulty. Concisely, the applications of the process may be summarized as follows:—Cleaning sand from castings, with or without a view to painting or enameling, or annealing; cleaning scale from stampings for similar reasons; cleaning partly-finished products, as sheets, tubes, strips, sometimes for subsequent electric or gas welding, or motor-car and cycle parts, etc., and numerous fittings, prior to tinning, galvanizing or plating; cleaning tyre moulds, printers' lithographic sheets, pottery ware after firing, iron and stone buildings and painted or rusty ironwork, hardened tools to enable cracks to be detected; sharpening and dressing files; matting ebonite articles to improve insulation and appearance; frosting, badging and marking glassware of all kinds.

Small apparatus for marking and engraving glass is worked with a hand bellows, but in larger outfits a power-driven compressor is employed. Pressures range from about 15 lb. to 80 lb. per square inch. Fine sand is selected for glass decoration and coarse sand or flint for uses where much is lost through no collecting apparatus being installed. For most metal work chilled round or crushed iron shot is best, as it lasts a much longer time than sand or flint before going into useless dust. The outfits are constructed in many ways, some having a flexible hose carrying the blast nozzle, and the operator wears a safety breathing helmet and plays the nozzle on the work. Another way is to have a metal cabinet with window through which the operator looks while he turns the object about under the fixed sand jet nozzle; rubber gauntlets are worn, passed through arm holes in the



BY COURTESY OF TILIGHMAN'S PATENT STEAM SAND BLAST CO.

SAND BLAST SHOWING JET DRIVING A STREAM OF SAND AND WATER AGAINST THE TEETH OF A NEWLY-CUT FILE

door. Castings are dealt with on machines, including the tumbling barrel, which constantly turns the castings over to expose all the surfaces to the action of the jet led through one or both ends. The rotary table cleaner carries the castings past a rubber curtain into a chamber containing one or more jets, and then out again. The reciprocating table design conveys large or long castings through the blast chamber, out to the other side, on which they are turned over and returned through by the table. In the Mathewson file-sharpening system a stream of very fine sand and water (in effect a liquid grindstone) is driven against the teeth by a steam jet. The backs of the teeth are thus ground off; newly-cut files have the burr driven away, much improving the cutting power, and worn files are freshened up practically as new. The sketch shows the apparatus, on which the file is laid and moved to and fro by hand until found to be quite sharp.

SANDBURG, CARL (1878–), American poet, newspaper man, and interpreter of folk-songs, was born at Galesburg (Ill.), Jan. 6, 1878. The son of a poor Scandinavian immigrant, he had a wandering, hard-working youth, with little schooling. During the Spanish-American War he saw active service in Porto Rico, and there got the inspiration for study at Lombard college, Galesburg. As magazine and newspaper writer, and editor of varied experience, and as secretary to the mayor of Milwaukee (1910–12), Sandburg had ample opportunity to acquire the sympathy with the underlings of modern civilization and the knowledge of its ironic contrasts that distinguish his verse. His bludgeon-like phrases alternating with lovely, singing lines, his vivid etchings of the unbroken prairie and the fretted sky-lines of the industrial cities, together with his unaffected humanitarianism, won him several prizes for his verse, which includes *Chicago Poems* (1915), *Corn Huskers* (1918), *Smoke and Steel* (1920), *Slabs of the Sunburnt West* (1922), and *Good Morning, America* (1928). *Rootabaga Stories* (1922) was a favourite with children, but it was *Abraham Lincoln—the Prairie Years* (1926), *Abe Lincoln Grows Up* (1928)—that revealed Sandburg as a prose writer.

See Harry Hansen, *Carl Sandburg, the Man and His Poetry* (Girard, Kan. 1925: "Little Blue Books," No. 814) with bibl.

SAND-EEL, or SAND-LANCE. The fishes known under these names form a small family (*Ammodytidae*). Their body is of an elongate-cylindrical shape, with the head terminating in a long conical snout, the projecting lower jaw forming the pointed end. A low dorsal fin occupies nearly the whole length of the back, and a long anal commences immediately behind the vent, which is placed about midway between the head and caudal fin. The tail is forked and the pectorals are short. The absence of ventral fins indicates the burrowing habits of these fishes. In the Japanese *Bleekeria* small jugular ventral fins are present. The scales, when present, are small; but generally the development of scales has only proceeded to the formation of oblique folds of the integu-

ment. The dentition is quite rudimentary.

Sand-eels are small littoral marine fishes, only one species attaining a length of 18in. (*Ammodytes lanceolatus*). They live in shoals at various depths on a sandy bottom, and bury themselves in the sand on the slightest alarm. Sand-eels destroy a great quantity of fry and other small creatures, such as the lancelet (*Amphioxus*), which lives in similar localities. They are excellent eating, and are much sought after for bait. The eggs of sand-eels are small, heavier than sea-water and slightly adhesive; they are scattered among the grains of sand in which the fishes live.

Sand-eels are common in the north Atlantic; a species scarcely distinct from the European common sand-lance occurs on the Pacific side of North America, another on the east coast of South Africa. On the British coast three species are found.

SANDEFJORD, the oldest and most famous spa in Norway, on the coast, 86 m. south-south-west of Oslo by the Skien railway. The springs are sulphurous, saline and chalybeate. Specimens of *jaettegryder* or giant's cauldrons may be seen at Gaardaasen and Vindalsbugt, some upwards of 23 ft. in depth.

SANDEMAN, SIR ROBERT GROVES (1835–1892), Indian officer and administrator, was the son of General Robert Turnbull Sandeman, and was born on Feb. 25, 1835. He was educated at Perth and St. Andrews University, and joined the 33rd Bengal Infantry in 1856. In 1857, he took part in the final capture of Lucknow as adjutant of the 11th Bengal Lancers. After the suppression of the Mutiny he was appointed to the Punjab Commission by Sir John Lawrence. In 1866 he was appointed district officer of Dera Ghazi Khan, and there first showed his capacity in dealing with the Baluch tribes. He was the first to break through the close-border system of Lord Lawrence, by extending British influence to the independent tribes beyond the border. In his hands this policy worked admirably, owing to his tact in managing the tribesmen and his genius for control. In 1876 he negotiated the treaty with the khan of Kalat, which subsequently governed the relations between Kalat and the Indian government; and in 1877 he was made agent to the governor-general in Baluchistan, an office with he held till his death. During the second Afghan War in 1878 his influence over the tribesmen was of the utmost importance, since it enabled him to keep intact the line of communications with Kandahar, and to control the tribes after the British disaster at Maiwand. For these services he was made K.C.S.I. in 1879. In 1889 he occupied the Zhob valley, a strategic advantage which opened the Gomal Pass through the Waziri country to caravan traffic. He died at Bela, the capital of Las Bela state, on Jan. 29, 1892.

See T. H. Thornton, *Sir Robert Sandeman* (1895); and R. I. Bruce, *The Forward Policy* (1900).

SANDERS, NICHOLAS (*c.* 1530–1581), Roman Catholic agent and historian, born about 1530 at Charlwood, Surrey, was a son of William Sanders, once sheriff of Surrey, who was descended from the Sanders of Sanderstead. Educated at Winchester and New College, Oxford, he was elected fellow in 1548 and graduated B.C.L. in 1551. Soon after Elizabeth's accession he went to Rome where he was befriended by Pole's confidant, Cardinal Morone; he also owed much to the generosity of Sir Francis Englefield (*q.v.*). He was ordained priest at Rome, and was, even before the end of 1550, mentioned as a likely candidate for the cardinal's hat. For the next few years he was employed by Cardinal Hosius, the learned Polish prelate, in his efforts to check the spread of heresy in Poland, Lithuania and Prussia. In 1565, like many other English exiles, he made his headquarters at Louvain, and after a visit to the Imperial Diet at Augsburg in 1566, he threw himself into the literary controversy between Bishop Jewel (*q.v.*) and Harding.

His expectations of the cardinalate were disappointed by Pius V.'s death in 1572, and Sanders spent the next few years at Madrid trying to embroil Philip II., who gave him a pension of 300 ducats, in open war with Elizabeth. Sanders found his opportunity in 1579, when a force of Spaniards and Italians was despatched to Smerwick to assist James Fitzmaurice and his Geraldines in stirring up an Irish rebellion. The Spaniards were, however, annihilated by Lord Grey in 1580, and after nearly two years of wandering in Irish woods and bogs Sanders died of cold and starvation in the spring of 1581.

The writings of Sanders have been the basis of all Roman Catholic histories of the English Reformation. The most important was his *De Origine ac Progressu schismatis Anglicani*, which was continued after 1558 by Edward Rishton, and printed at Cologne in 1585; it has been often re-edited and translated, the best English edition being that by David Lewis (London, 1877).

See Lewis's *Introduction* (1877); *Calendars of Irish, Foreign and Spanish State Papers, and of the Carew MSS.*; Knox's *Letters of Cardinal Allen;* T. F. Kirby's *Winchester Scholars;* R. Bagwell's *Ireland under the Tudors;* A. O. Meyer's *England und die katholische Kirche unter Königin Elisabeth* (1910); the *Catholic Encyclopaedia;* and T. G. Law in *Dict. Nat. Biogr.* i. 259–261 with bibl.

SANDFLY FEVER. "Sandfly" or "phlebotomous fever" is an acute specific fever, common in tropical and sub-tropical countries. It is caused by a virus, possibly a leptospira, conveyed to man by the bite of a small midge of the dipterous family, Psychodidae. The incubation period is about five days.

Symptoms and Treatment.—The fever is sudden in onset, and of short duration, accompanied by severe headache and pains in the limbs. The attack starts with a general feeling of depression and loss of appetite, soon followed by weakness of the legs, and pains and tenderness in the muscles, especially those of calves and back of neck. The temperature rises rapidly to 102 to 104° Fahrenheit. There is flushing and fulness of face and eyes as though some constriction were being applied around the neck. The bloodshot eye is typical and in some countries has led to the disease being called "dog disease" (Hundfieber). Frontal headache and pains in the eyes and leg muscles are usually severe. The pulse is relatively slow throughout. There may be vomiting and diarrhoea. Rashes are uncommon and are not to be confused with insect bites. A blood examination shows a marked decrease in the number of white blood corpuscles. The temperature usually falls to the normal level within four days, although one- to seven-day types of fever are to be seen. Recovery is slow, depression and other nervous symptoms may persist for weeks or months.

As regards treatment, the sooner the patient takes to bed the less severe are the pains likely to be. The bowels should be moved by means of calomel, followed by salts. Then the aches and pains may be relieved by the administration of 10 grains of aspirin every four hours, or by half a teaspoonful of liquid extract of opium. Quinine is useless. Hot tea is very soothing for the pains, especially during the night. It is advisable to surround fever cases with a sandfly net to lessen the chance of the infection spreading. Tonics and a change of climate may be necessary during convalescence.

Etiology.—While the nature of the causal organism is uncertain, *Phlebotomus papatasii* is the proven carrier of the disease.

Sandfly fever is liable to occur wherever the P. papatasii can breed, *i.e.*, where for eight consecutive weeks the mean daily temperature lies between 65° and 90° Fahrenheit.

Epidemics of the fever depend on the number of infected *Phlebotomus*, and the number of susceptible people. Other conditions, such as temperature, humidity, winds and reaction of soil, may modify the prime factors.

Doerr in 1909 and Birt in 1910 showed that, in sandfly fever, the blood of man is infective by direct transmission to other men only in the first day of disease. Kilroy in 1909 infected himself by Phlebotomus bites, and, by inoculation of his blood transmitted the disease to a non-immune subject. Birt in 1910 showed that the virus could pass through a very fine filter. In 1921 Couvy reported that spirochaetes had been seen in cases of dengue in Beirut. In the same year the Royal Air Force Sandfly Commission isolated a leptospira in six cases of so-called sandfly fever in Malta, while in 1922, Vervoort and Van de Velde, working in the Dutch East Indies, found leptospira in cases of fever resembling phlebotomous fever. However, the correct diagnosis of some of these cases was doubtful, and until further transmission experiments have been carried out this organism cannot be accepted as the causal virus.

Doerr and Birt in 1910 claimed that *P. papatasii* which had fed on cases of sandfly fever were capable of transmitting the disease,

but only seven to ten days after sucking virulent blood.

During the years 1907 to 1922, parts of the bionomics of the sandfly had been worked out, but its life history was not fully elucidated.

The R.A.F. Sandfly Commission, working in Malta and London during 1921, 1922 and 1923, bred the sandfly in captivity and extensively studied the bionomics of this insect. The fever was transmitted to man by the bites of *Phlebotomus* bred in captivity in London, showing that these flies were the true carriers of the disease. Further experiments showed that the infection was handed on from generation to generation of sandflies in its breeding grounds, by the grub feeding on the excreta and dead remains of the parent flies.

Phlebotomus papatasii is a small midge measuring about 3mm. in length, of a very delicate build and thickly covered with fine, long hairs. The body is of a pale lemon tint and shows the morphological characters common to its genus. Eyes are relatively large, black and conspicuous. The antennae are long and filamentous. The proboscis is long and prominent. The fine wings are lancet-shaped, covered with hairs and held erect, except when newly hatched and shortly before death. The female fly has a spindle-shaped abdomen.

The life-history of this fly covers a period of about eight weeks, the exact time depending on food supply, temperature and humidity. The egg stage occupies about 9 days; the grub stage about 28 days; and the chrysalis stage about 10 days, ending in the emergence of the adult fly. The wings of the newly hatched fly are crumpled and moist. Until these are dry the young fly can only crawl. The recognition of this stage is most helpful in detecting breeding spots of the insect. During the night, when the atmospheric humidity is usually great, the wings cannot dry. The process of drying is usually completed within three hours after dawn, and the mouth parts are sufficiently hardened to allow of the sucking of blood during the first 24 hours of adult life. Copulation can take place within the next 24 hours, and eggs to the number of 40 are laid 6 to 10 days later. The length of life of the adult female fly in nature is about two weeks, though in the laboratory life may be prolonged for 30 days.

Only the female *Phlebotomus* bites. A feed of blood is essential for the eggs to become fertilised. The insect usually bites after sunset. Man is bitten wherever the skin is exposed. The sandfly progresses by a short hopping flight usually to one side. The distance of a single flight is never more than four yd., and it does not travel more than 50yd. from its breeding haunts. It is attracted by the odours of man and other animals, and enters buildings by apertures in the walls, windows, doorways, ventilators or cracks. The flight of the *Phlebotomus* is so feeble that it avoids all currents of air, natural or artificial. Upstair rooms, which are more exposed to air currents, are less infected than those on the ground-floor. In nature the grub and chrysalis forms are found in the cracks in embankments, in the loose earth at the base of walls and buildings, in cultivated soil and in other places where suitable conditions of food, moisture and temperature exist. The grubs are found even to a depth of a foot or more in loose soil, and can migrate to the level of optimum environment. Hibernation takes place in the last grub stage, a very resistant stage. When ready to pass into the chrysalis form, they seek a drier spot, usually within a few inches of the surface of the ground. Excess of moisture is injurious to all stages of the life of this insect.

About 80% of newcomers to sandfly regions suffer from the fever during their first summer of residence, and about 15% develop a second attack within three years. Such factors as atmospheric temperature and humidity affect the development of the virus in man.

Prevention.—It is necessary to eliminate the hiding and breeding places of the fly. Cracks in the ground or in masonry must be got rid of by levelling, pointing, etc. Premises must be thoroughly cleansed, and dust and cobwebs removed. Good refuse disposal is essential. The sandfly must be kept away by sandfly proof nets (45 meshes to the square inch), electric fans or repellants, such as paraffin or camphor; whilst insects living in corners of rooms must be destroyed by swatting with a damp cloth or spraying with 1% cresol. There must be a daily war against this pest. All the necessary repairs, tarring, painting and lime-washing must be carried out immediately before the warm weather sets in. Each year the interior of all rooms should be washed down and painted or lime-washed.

BIBLIOGRAPHY.—C. Birt, "Phlebotomus Fever in Malta and Crete," *Jour. Roy. Army Med. Corps*, vol. 14, pp. 143, 236 (1910); J. A. Sinton, "Notes on Some Indian Species of the genus Phlebotomus," *Indian Jour. Med. Research*, vol. 10, No. 3, vol. 11, No. 4 (1923–24); H. E. Whittingham and A. F. Rook, "Observations on the Life-history and Bionomics of Phlebotomus papatasii," *Brit. Med. Jour.*, Part 2, p. 1,144 (1923). (H. E. WH.)

SANDFORD, JOHN DE (d. 1294), archbishop of Dublin, was probably an illegitimate son of the baronial leader, Gilbert Basset (d. 1241), or of his brother Fulk Basset, bishop of London from 1241 until his death in 1259. John first appears as an official of Henry III. in Ireland and of Edward I. in both England and Ireland; he was appointed dean of St. Patrick's, Dublin, in 1275. In 1284 he was chosen archbishop of Dublin in succession to John of Darlington; some, however, objected to this choice and Sandford resigned his claim; but was elected a second time while he was in Rome, and returning to Ireland was allowed to take up the office. In 1288, during a time of great confusion, the archbishop acted as governor of Ireland. In 1290 he resigned and returned to England. Sandford served Edward I. in the great case over the succession to the Scottish throne in 1292 and also as an envoy to the German king, Adolph of Nassau, and the princes of the Empire. On his return from Germany he died at Yarmouth on Oct. 2, 1294.

Sandford's elder brother, Fulk (d. 1271), was also archbishop of Dublin (1256–71). He is called Fulk de Sandford and also Fulk Basset owing to his relationship to the Bassets.

SANDGATE, a watering-place of Kent, England, on the S.E. coast, 1½ m. W. of Folkestone, on the S. railway. Pop. of urban district (1931) 2,596. It is connected with Hythe, 3 m. W., by a tramway belonging to the railway company. It is included in the parliamentary borough of Hythe. Sandgate castle was built by Henry VIII., but on the formation of a camp here in 1806 it was considerably altered. The camp of Shorncliffe lies on the heights north of the town.

SAND-GROUSE, the name applied to birds resembling grouse (*q.v.*) in certain features and inhabiting sandy tracts. They comprise the family *Pteroclidae* of the plover order. The commonest form is Pallas's sand-grouse (*Syrrhaptes paradoxus*), inhabiting central Asia and occasionally invading Europe in large flocks. The nest is on the ground and contains four inconspicuous eggs. The wings are very long. The birds' plumage is adapted to the colour of the desert. Sand-grouse supply their young with water by soaking the breast feathers in water, which the little birds drink (*see* P. A. Buxton, *Animal Life in Deserts*). Fossil species occur in the Miocene formation.

SANDHURST, a town in the Wokingham parliamentary division of Berkshire, England, 9m. N. of Aldershot. Pop. 3,799 (1921). Two miles south-east of the town, near the villages of Camberley Town and York Town, and the railway stations of Blackwater and Camberley on the Southern Railway, is the Sandhurst Royal Military College. The college, now at Sandhurst, was established by Royal warrant in March 1802 in a house at Great Marlow. Near Sandhurst is Wellington college, one of the principal modern public schools of England, founded in memory of the great duke of Wellington, and incorporated in 1853.

Since 1877 the course at Sandhurst has varied from one year to two, except during the World War, when it was reduced for a short while to 4 months in order to increase the output. During the war 4,000 cadets were passed through the R.M.C. and at one time the numbers rose to 1,000. After the war subjects of general educational value were re-introduced into the curriculum and the length of the course became eighteen months. The college stands in beautiful grounds, with a large lake and ample space for games. The college is within 10 miles of Aldershot and is thus suitably placed for keeping in touch with military training. The roll of cadets includes Lord Roberts (1847), Lord Allenby (1881)

and Lord Haig (1884). At the R.M.C. cadets are trained for commissions in the Cavalry, Infantry, Royal Tank Corps, Royal Army Service Corps of the British service and for the Indian army. Occasionally when vacancies are available, special candidates are admitted to the Royal Corps of Signals. Since 1922 a number of vacancies at the college have been specially reserved for selected N.C.Os. of the regular army recommended to be trained for commissions.

A few New Zealand cadets are trained for service in their own army. A limited number of Indians also undergo training for service in the Indian army and from time to time a few specially selected Egyptian, Siamese and Iraqi cadets are permitted to attend the course of instruction. The course consists of three terms, of which there are two a year (Feb. 1 to mid-July, and from Sept. 1 to Christmas.) Cadets enter each half-year in batches of 150 to 200, at the age of 18–19 and after passing a competitive entrance examination. The army entrance examination is conducted by the Civil Service commission. With the exception of certain candidates nominated by the Army Council, candidates are required to possess a school certificate before being permitted to sit for the army entrance examination. The cadets are organised in four companies on the lines of an infantry battalion. The staff of the college includes a commandant, a company commander for each company, company officers for each platoon and officers of the Army Educational Corps. These latter are especially responsible for instruction in non-military subjects, viz. constitutional history, European history, geography (obligatory), chemistry, mechanics, political and economic history, languages, electricity (alternative. 1 subject to be chosen by each cadet). The military and obligatory part of the course includes conduct of war, strategy, tactics and organization—illustrated from military history—map reading, military law, drill, riding and physical training.

At the end of the course commissions are allotted in various branches of the service according to existing vacancies, choice of regiment usually being given to those high up in the order of passing out. The normal fee is £100 a term and in addition certain charges are made for uniform, books, etc. The sons of officers of H.M. forces are, subject to certain conditions, admitted at a reduced normal rate of £60 a term. A limited number of cadets are admitted at reduced rates on account of pecuniary need at the discretion of the Army Council. A certain number of scholarships are available for cadets on entering the college (awarded on results of army entrance examination) and other scholarships are available for cadets during their course, and for young officers during the first five years of their service. The conditions of admission and fees, etc., vary from time to time and information with regard to possible changes should be sought from the War Office. (*See* also OFFICER.) In the vicinity of Wellington college is Broadmoor prison for criminal lunatics.

SAN DIEGO, a city of California, U.S.A., on the Pacific ocean, 132 m. S.E. of Los Angeles and 10 m. from the Mexican border; a port of entry, the county seat of San Diego county, and the site of extensive activities of the United States army and navy. It is the terminus of the Pacific Coast highway and of the several transcontinental highways from the Atlantic coast which proceed westward from El Paso over practically the same route, and is served by the San Diego and Arizona (of the Southern Pacific) and Santa Fe railways, motor-coach lines, and nearly two score coastal, inter-coastal, and foreign steamship lines. A municipal airport (Lindbergh Field) of 287 ac., to accommodate both sea and land planes, was under construction (1928) on the bay, within five minutes' drive of the business section of the city; and there are several commercial aviation fields, from one of which daily passenger service is provided to Los Angeles and San Francisco. Pop. (1920) 74,683, 79% native white; in 1930 it was 147,995.

The city has a level site of 91 sq.m., lying around the bay and extending back 8 m. at the extreme width. The climate is equable, with an average annual mean temperature of 61° F and an average annual precipitation (nearly all falling in the winter) of 10 inches. San Diego bay is a crescent-shaped basin 14 m. long, separated from the ocean by a low, narrow sandspit extending west from the mainland below the city and expanding at its western end into two peninsulas, one of which is occupied by the city of Coronado, directly opposite San Diego, the other (North Island) by aviation bases. The business district of the city has, since the World War, assumed a metropolitan appearance, with many tall and massive stores, office buildings and hotels. The residential section is built around Balboa park (1,400 ac.), the site of the Panama-California exposition of 1915–16, which contains an archaeological institute with valuable exhibits of ancient American art, architecture and anthropology; a replica of a Pueblo Indian village, constructed for the exposition and now used by the Boy Scouts; zoological and botanical gardens; a natural history museum; a pavilion with a great outdoor organ on which recitals are given daily throughout the year; and a stadium seating 30,000, occupying a natural amphitheatre. At La Jolla, on the ocean 15 m. N.N.W., is the Scripps Institution of Oceanography (affiliated with the State university), the only institution of its kind in the country. The Universal Brotherhood and Theosophical Society (founded in 1875 at New York by Mme. Blavatsky) has had its international headquarters since 1900 on a beautiful estate on Point Loma, where it conducts several schools. Since 1909 the city has operated under a commission form of government, and since 1915 it has had a "manager of operations." The assessed valuation of property in 1927 was $198,000,000.

The roomy natural harbour (landlocked, free from currents and accessible at all seasons) is the first U.S. port of call for vessels operating through the Panama Canal. It has an area of 21 sq.m. A channel 1,500 ft. wide, with a controlling depth of 32–35 ft. at mean low water, has been provided by government improvements begun in 1875. Terminal facilities include 41 wharves, two of which are large municipal piers, and 11,775 ft. of berthing space. Since 1911, when the tidelands were ceded to the city by the State, about $4,250,000 has been spent in improvements. The cargo handled in 1927 amounted to 966,476 tons, valued at $46,803,718, and represented largely domestic commerce. The fisheries are an important industry, engaging over 800 fishermen and 25 wholesale houses. The total catch for 1927 was 45,012,771 lb., including 800,000 lb. of lobsters and 8–10,000,000 lb. of sardines. The manufactures are numerous and diversified, including some 1,000 different articles, of which canned fish, cotton-seed products, furniture, aeroplanes, parachutes and building materials are among the most important. The aggregate output of factories in the city in 1927 was valued at the sum of $29,546,289.

San Diego is the headquarters for the Eleventh Naval District, with a personnel of about 1,800 officers and men, and the site of the largest naval operating base on the Pacific coast, embracing a naval air station, marine base, fuel depot, supply depot, destroyer base, radio stations, hospital and training station. Ft. Rosecrans is an important military post; Rockwell Field, across the bay, on North Island, is a training school and supply depot of the Army Air Corps; and Camp Lawrence J. Hearn, 8 m. S. at Imperial Beach, is a cavalry post. In addition to the aviation activities of the army and navy (in progress here since 1917), there are six commercial aviation projects of importance, manufacturing planes, motors and parachutes; conducting training-schools; and operating passenger and freight services. At one of them Col. Lindbergh's "Spirit of St. Louis" was built in 1927. Forty-two world records in aviation have been established (to 1928) by the army and navy at San Diego; and it has been the scene of such feats as the taking of the first photographs from the air (1911), the first night flying, the first re-fueling in flight, and the first seaplane flight in the United States. San Diego was the first city in the United States to establish a municipal board of air control. The first transcontinental non-stop flight (by Kelly and Macready, in 1923) ended at San Diego; and from here Lindbergh started for his flight from New York to Paris in May, 1927.

San Diego bay was discovered in 1542 by the Portuguese navigator Cabrillo, in the service of Spain, and was named in 1602 by the Spanish explorer Viscaino. At Old Town, in North San Diego, the first European settlement in Upper California was made in 1769. On July 16 Father Junípero Serra founded the

mission of San Diego de Alcala (the first of the 21 Franciscan missions in the State) and a little later a military presidio was established. The mission was moved in 1774 to a site 8 m. from the centre of the present city, where it still stands in fair preservation. San Diego began the revolt against Governor Victoria in 1831, but in 1836 was intensely loyal to Mexican authority, in opposition to Governor Alvarado and the northern towns. It was made a port of entry in 1828, and in 1840 had a population of 140. In July, 1846, it was occupied by American forces under Gen. Frémont, who raised the first American flag to fly in California. In 1850 it was incorporated as a city, but as it did not grow it lost its charter in 1852. In 1867 there were only a dozen inhabitants. Then a promoter, A. E. Horton (d. 1909), laid out a new city 3 m. below the old site. By 1870 it had a population of 2,300, and in that year the military reservation was established on Point Loma. In 1871 work started on the Santa Fe railroad; in 1872 the new city was incorporated; in 1874 it was made a port of entry. The boom was ended by the depression of 1873–76, but development was resumed when the railroad reached the city in 1884. By 1890 the population had grown to 16,159. In the following decade the increase again was slight, but between 1900 and 1910 it amounted to 124%, between 1910 and 1920 to 89% and between 1920 and 1928 (according to local estimates) to 100%. In 1919 the San Diego and Arizona railway was completed, giving additional transcontinental connections. In the eight years 1920–27 new buildings for which permits were issued represented an aggregate value of $101,749,000; the traffic of the port increased 74%, to 942,476 tons; and bank debits 80%, to $740,691,951.

SAND LILY (*Leucocrinum montanum*), a North American plant of the lily family (Liliaceae, *q.v.*), native to plains and mountain valleys from South Dakota and Nebraska west to California. It is a small stemless perennial with long, narrow, grass-like leaves tufted on a short rootstock from which rise also short flower-stalks, bearing pure white, fragrant, slender-tubed, lily-like flowers, about 2 in. long and ½ in. across. The sand lily is a very abundant and conspicuous early spring flower in many parts of its range. *See* SOAP PLANTS.

SANDOMIERZ, a small town of Poland in the province of Kielce, 140 m. S.S.E. of Warsaw by river and on the left bank of the Vistula, opposite the confluence of the San. It is one of the oldest towns of Poland, being mentioned as early as 1079; from 1139 to 1332 it was the chief town of the principality of the same name. In 1240, and in 1259, it was burned by the Mongols. In 1429 it was the seat of a congress for the establishment of peace with Lithuania, and in 1570 the "Consensus Sandomiriensis" was held here for uniting the Lutherans, Calvinists and Moravian Brethren. Subsequent wars, and especially the Swedish (*e.g.*, in 1655) ruined the town. Here in 1702 the Polish supporters of Augustus of Saxony banded together against Charles XII. of Sweden. The beautiful cathedral was built between 1120 and 1191; it was rebuilt in stone in 1360, and is one of the oldest monuments of Polish architecture. Two of the churches are fine relics of the 13th century. The castle, built by Casimir III. (14th century), still exists. The city gives title to an episcopal see (Roman Catholic).

SANDOWAY, a town and district in the Arakan division of Burma. The town (pop. 1921, 3,762) is a very ancient one and is said to have been at one time the capital of Arakan. The district has an area of 3,784 sq.m.; pop. (1921) 112,029, showing an increase of 9,226 in the decade. The country is mountainous, the Arakan range sending out spurs which reach the coast. Some of the peaks in the north attain 4,000 and more ft. The chief pass is the Taungup pass crossed by a bullock cart track leading from the village of Taungup to Prome on the Irrawaddy. The streams are only mountain torrents to within a few miles of the coast; the mouth of the Khwa forms a good anchorage for vessels of from 9 to 10 ft. draught. The hills are clad with evergreen forest or useless bamboo brake on their lower slopes; by evergreen oak forests on the higher parts. Only small areas of the district are available for cultivation and except for a few acres of tobacco nearly all the cultivation is rice. Sandoway was ceded to the British, with the rest of Arakan (*q.v.*) by the treaty of Yandabo in 1826.

SANDOWN, watering-place, urban district, Isle of Wight, England, 6½ m. S. of Ryde by rail. Pop. (1931) 6,167. Beautifully situated on the south-east coast of the island, with a wide sandy shore, it has excellent bathing.

SAND-PAPER, an abrasive material prepared by coating stout paper with glue and sifting fine sand over its surface before the glue sets. Sand-cloth is prepared in the same way. It is widely used for smoothing the surface of wood, for rubbing down paint, and other purposes. (*See* also EMERY; GLASS-PAPER.)

SANDPIPER, the name given to all of the smaller limicoline birds which are not plovers (*q.v.*), snipe (*q.v.*), or phalaropes (*q.v.*). The greenshank (*q.v.*) and the redshank (*q.v.*) are also related to the common sandpiper or summer-snipe (*Tringa hypoleucus*). This little bird is a summer visitor to northern Europe and Asia. In the British Isles it arrives in May. It frequents clear streams, beside which it nests, on the ground. There are four eggs, protectively coloured, as is also the case with the young. It winters in India, Australia, and the Cape. In America it is replaced by *Actitis macularius,* the peetweet or spotted sandpiper having similar habits. The green sandpiper (*T. ochropus*) is unique among the group, except for the North American solitary sandpiper (*Calidris solitarius*), in using the old nests of other birds wherein to lay her eggs. Another European species is the wood sandpiper (*T. glareola*), like the last, very dark in colour.

Other forms include the knot (*q.v.*), the dunlin (*q.v.*), the sanderling (*Calidris arenaria*), which lacks the hind toe, the purple sandpiper (*C. striata*) and the little, Temminck's, and American stints (*T. minuta, T. temmincki* and *Pisobia minutilla*). The American stint, often called the least sandpiper, is darker and ranges from the Arctic to Brazil. Bonaparte's sandpiper (*P. fuscicollis*) distinguished by its white tail-coverts, is a common American form. It is called the white-rumped sandpiper.

The semipalmated sandpiper (*Ereunetes pusillus*) has partially webbed feet; it is a small form, breeding in arctic America. The buff-breasted sandpiper (*Tryngites subruficollis*) is common in the Mississippi valley in autumn and breeds in Alaska and Keewatin, wintering in Argentine and Uruguay.

SANDRINGHAM, a village in Norfolk, England, 3 m. from the Wash, and 2½ from Wolferton on the L.N.E.R. Pop. (1921) 96. Sandringham House, a country seat of the king, was acquired by King Edward VII. by purchase in 1861. The estate, of 7,000 ac., includes a park of 200 acres. The church of St. Mary Magdalene contains many memorials of the royal family.

SAND SPRINGS, a city of Tulsa county, Oklahoma, U.S.A., on the Arkansas river and Federal highway 64, 8 m. west of Tulsa; served by the Missouri-Kansas-Texas and the Sand Springs railways. The population was 4,076 in 1920 (89% native white) and was 6,674 in 1930 by the Federal census. It has important manufacturing industries, especially glass works, cotton mills, chemical plants, smelters and oil refineries. The town was founded in 1911 and in 1918 it was chartered as a city.

SANDSTONE is a consolidated rock built up dominantly of grains of sand (*q.v.*) held together by a cementing substance. Sandstones are composed mainly of quartz, but may vary in composition in the same manner as sands. By increase in the size of their constituents they pass into conglomerates (*q.v.*) and by decrease into arenaceous shales and clay rocks. When the grains of sand are angular, the rock is termed a grit.

The minerals of sandstones are the same as those of sands. Quartz is the commonest; with it often occurs a certain amount of felspar (as in the rock arkose) and frequently white mica. The flakes of mica may often be seen lying on the bedding-planes and may give the sandstone a fissile character (*e.g.*, paving-stone) of much value in quarrying. The cementing material is often fine chalcedonic silica, or it may be secondary quartz, when a quartzite-like rock is produced. Calcareous material (calcite), glauconite, iron oxides, carbonaceous matter and other substances also act as cements and give the sandstones characteristic colours. Glauconitic sandstones are greenish, ferruginous sandstones, red, brown and yellow or grey. When the cementing substance is clay, the rock is often of white or grey colour and firmly compacted.

Pure sandstones may contain as much as 99% of silica. If relatively soft they are crushed to sand for commercial purposes. If firmly cemented they are utilized, on account of the resistance of silica to heat, for the manufacture of silica-bricks, furnace-linings, hearths, etc. Of this character is the well-known rock "ganister" worked in the districts of Sheffield, South Wales, etc. Less pure, but firmly-cemented siliceous sandstones are used for the making of grindstones and millstones. Similar rocks, as well as calcareous, dolomitic (*see* DOLOMITE) and ferruginous sandstones are extensively worked as building-stones, mostly by quarries but sometimes by mines. As sandstones are always porous, they do not take a good polish, and are not used as ornamental stones, but this property makes them valuable storage-basins and sources of water (*e.g.*, the Trias of the Midlands). (P. G. H. B.)

SANDUSKY, a city of northern Ohio, U.S.A., a port of entry and the county seat of Erie county; on Sandusky bay (an arm of Lake Erie), 56 m. W. by S. of Cleveland. It is served by the Baltimore and Ohio, the Big Four, the New York Central, the Nickel Plate, the Pennsylvania and electric railways, and by lake steamers. Pop. (1920) 22,897 (86% native white); 1930 by Federal census 24,622. It has an extensive lake trade, the largest fresh-water fishing industry in the country, and many diversified manufacturing industries. The traffic of the harbour in 1927 amounted to 8,581,895 tons, valued at $33,821,163, of which $5,046,062 represented foreign commerce (largely exports of coal). The aggregate factory output in 1927 was valued at $15,985,070. Among the leading industries are the manufacture of crayons, paints and chalks, and paper shipping cases and packing material. The city is built on a fine limestone ledge, and there are extensive deposits of marl, sand, gravel and clay in the vicinity. Just south of Sandusky is the Ohio Soldiers and Sailors Home. From Put-in-Bay (an island about 12 m. N.W. of Sandusky) Commodore Perry and his fleet sailed out on the morning of Sept. 10, 1813, for the Battle of Lake Erie. English traders visited the site of Sandusky as early as 1749, and by 1763 a fort had been erected, which was burned by the Wyandot Indians on May 16 of that year, during the Pontiac rising. Permanent settlement began in 1817, and in 1845 Sandusky was chartered as a city. Since 1916 it has had a commission-manager form of government.

SAND VERBENA (Abronia), a numerous genus of plants of the four-o'clock family (Nyctaginaceae), allied to the *Mirabilis* of the gardens, comprising about 50 species, native chiefly to dry sandy soils in western North America. They are low, often prostrate annuals or biennials, with opposite, entire, thick, sometimes viscid leaves; showy, red, yellow or white, usually fragrant flowers, clustered in stalked heads encircled at the base by bracts, and a broadly-winged fruiting achene enclosing a single shining seed. The white sand-verbena (*A. fragrans*), with very numerous fragrant flowers, occurs from Iowa to Idaho and south to Texas and Mexico. The yellow sand-verbena (*A. latifolia*) and the pink sand-verbena (*A. umbellata*), found along the seashore from southern California to British Columbia, are grown as ornamentals in borders and rockeries. Various species bloom in immense profusion in deserts during the short rainy season.

SANDWICH, EDWARD MONTAGU or **MOUNTAGU,** 1ST EARL OF (1625–1672), English admiral, born on July 27, 1625, was a son of Sir Sidney Montagu (d. 1644) of Hinchinbrook, who was a brother of Henry Montagu, 1st earl of Manchester, and of Edward Montagu, 1st Lord Montagu of Boughton. He joined the parliamentary party at the outbreak of the Civil War. In 1643 he raised a regiment, with which he fought at Marston Moor, Naseby and at the siege of Bristol. Though one of Cromwell's intimate friends, he took little part in public affairs until 1653, when he was appointed a member of the council of state. In 1656 he was made a general-at-sea, his colleague being Robert Blake. Having taken some part in the operations against Dunkirk in 1657, he was chosen a member of Cromwell's House of Lords, and in 1659 he was sent by Richard Cromwell with a fleet to arrange a peace between Sweden and Denmark. After the fall of Richard he resigned his command and assisted in the restoration of Charles II. Again general-at-sea early in 1660, Montagu carried the fleet over to the side of the exiled king, and was entrusted with the duty of fetching Charles from Holland. He was then made a knight of the Garter, and in July 1660 was created earl of Sandwich.

During the war with the Dutch in 1664–1665 Sandwich commanded a squadron under the duke of York and distinguished himself in the battle off Lowestoft on the 3rd of June 1665. When the duke retired later in the same year he became commander-in-chief. Trouble arose over certain valuable Dutch prizes which he had taken, and Sandwich was dismissed from his command, but as a solatium was sent to Madrid as ambassador extraordinary. He arranged a treaty with Spain, and in 1670 was appointed president of the council of trade and plantations. When the war with the Dutch was renewed in 1672 Sandwich again commanded a squadron under the duke of York, and during the fight in Southwold Bay on May 28, 1672, his ship, the "Royal George," after having taken a conspicuous part in the action, was set on fire and was blown up. The earl's body was found some days later and was buried in Westminster Abbey.

Lord Sandwich claimed to have a certain knowledge of science, and his translation of a Spanish work on the *Art of Metals* appeared in 1674. Many of his letters and papers are in the British Museum, the Bodleian Library at Oxford, and in the possession of the present earl of Sandwich. He is mentioned very frequently in the *Diary* of his kinsman, Samuel Pepys. *See* also J. Charnock, *Biographia Navalis,* vol. i. (1794); John Campbell, *Lives of the British Admirals,* vol. ii. (1779); and R. Southey, *Lives of the British Admirals,* vol. v. (1840).

SANDWICH, JOHN MONTAGU, 4TH EARL OF (1718–1792), was born on Nov. 3, 1718, and succeeded his grandfather, Edward, the 3rd earl, in the earldom in 1729. Educated at Eton and at Trinity College, Cambridge, he spent some time in travelling, and on his return to England in 1739 he took his seat in the House of Lords as a follower of the duke of Bedford. He was a commissioner of the admiralty, plenipotentiary to the congress at Breda (1746), first lord of the admiralty (1748), and in 1753 a principal secretary of State. He took a leading part in the prosecution of John Wilkes. He had been associated with Wilkes in the notorious fraternity of Medmenham, and his attitude now in turning against the former companion of his pleasures made him very unpopular, and, from a line in the *Beggar's Opera,* he was known henceforward as "Jemmy Twitcher." He was postmaster-general in 1768, secretary of State in 1770, and again first lord of the admiralty from 1771 to 1782. For corruption and incapacity Sandwich's administration is unique in the history of the British navy. He died on April 30, 1792.

The Sandwich Islands (*see* HAWAII) were named after him by Captain Cook. His *Voyage round the Mediterranean in the Years* 1738 *and* 1739 was published posthumously in 1799, with a very flattering memoir by the Rev. J. Cooke; the *Life, Adventures, Intrigues and Amours of the celebrated Jemmy Twitcher* (1770), which is extremely rare, tells a very different tale. *See* also the various collections of letters, memoirs and papers of the time, including Horace Walpole's *Letters* and *Memoirs* and the *Bedford Correspondence.*

SANDWICH, a market town, municipal borough, and one of the Cinque Ports in the Isle of Thanet parliamentary division of Kent, England, 12 m. east of Canterbury, on the S.E. section of the S. R. Pop. (1931) 3,287. It is situated 2 m. from the sea, on the river Stour, which is navigable up to the bridge for vessels of 200 tons. The old line of the walls on the land side is marked by a public walk. The Fisher Gate and a gateway called the Barbican are interesting; but the four principal gates were pulled down in the 18th century. St. Clement's church has a fine Norman central tower, and St. Peter's (restored), said to date from the reign of King John, has interesting mediaeval monuments. The curfew is still rung at St. Peter's. There are three ancient hospitals; St. Bartholomew's has a fine Early English chapel of the 12th century. The establishment of the railway and of the St. George's golf links (1886) rescued Sandwich from the decay into which it had fallen in the earlier part of the 19th century. The links are among the finest in England.

Richborough Castle, 1¼ m. north of Sandwich, is one of the finest relics of Roman Britain. It was called *Rutupiae,* and guarded one of the harbours for continental traffic in Roman times, and was in the 4th century a fort of the coast defence along the Saxon shore.

The situation of Sandwich on the Wantsum, once a navigable channel for ships bound for London, made it a famous port in the time of the Saxons, who probably settled here when the sea receded from the Roman port of Richborough. In 973 Edgar granted the harbour and town to the monastery of Christ Church, Canterbury, and at the time of the Domesday Survey Sandwich supplied 40,000 herrings each year to the monks. As one of the Cinque Ports, Sandwich owed a service of five ships to the king, and shared the privileges granted to the Cinque Ports from the reign of Edward the Confessor onwards. At the end of the 13th century the monks granted the borough, with certain reservations, to Queen Eleanor; a further grant of their rights was made to Edward III. in 1364, the crown being thenceforward lord of the borough. The governing charter until 1835 was that granted by Charles II. in 1684.

During the middle ages Sandwich was one of the chief ports for the continent, but as the sea gradually receded and the passage of the Wantsum became choked with sand the port began to decay, and by the time of Elizabeth the harbour was nearly useless. In her reign Walloons settled here and introduced the manufacture of woollen goods and the cultivation of vegetables; this saved the borough from sinking into unimportance. Representatives from the Cinque Ports were first summoned to parliament in 1265; the first returns for Sandwich are for 1366, after which it returned two members until disfranchised in 1885.

See W. Boys, *Collections for History of Sandwich* (1792); E. Hasted, *History of Kent* (1778–99); *Victoria County History* (Kent).

SANDYS (Sändz), **SIR EDWIN** (1561–1629), British statesman and a founder of the colony of Virginia, was the second son of Edwin Sandys, archbishop of York, and his wife Cecily Wilford. He was born in Worcestershire on Dec. 9, 1561. He was educated at Merchant Taylors' school and at Corpus Christi College, Oxford, and, though he never took orders, became a prebendary of York. He retained his prebend until 1599. He was entered in the Middle Temple in 1589. From the year 1593 till 1599 he travelled abroad. When in Venice he became closely connected with Fra Paolo Sarpi, who helped him in the composition of the treatise on the religious state of Europe, known as the *Europae speculum*. In 1605 this treatise was printed from a stolen copy under the title, *A Relation of the State of Religion in Europe*. Sandys procured the suppression of this edition, but the book was reprinted at the Hague in 1629. He was member for Andover in 1586 and for Plympton in 1589. On James I.'s accession Sandys was knighted. He sat in the king's first parliament as member for Stockbridge. He assailed the great monopolies, and he endeavoured to secure to all prisoners the right of employing counsel. He had been connected with the East India Company before 1614, and took an active part in its affairs till 1629. His most memorable services were, however, rendered to the (London) Virginia Company, to which he became treasurer in 1619. He sat in later parliaments as member for Sandwich in 1621, for Kent in 1624, and for Penrhyn in 1625. He died in Oct. 1629.

See Alex. Brown's *Genesis of the United States* (London, 1890).

SANDYS, GEORGE (1578–1644), English traveller, colonist and poet, the seventh and youngest son of Edwin Sandys archbishop of York, was born on March 2, 1578. He studied at St. Mary Hall, Oxford, but took no degree. On his travels, which began in 1610, he first visited France; from North Italy he passed by way of Venice to Constantinople, and thence to Egypt, Mt. Sinai, Palestine, Cyprus, Sicily, Naples and Rome. His narrative, dedicated, like all his other works, to Charles (either as prince or king), was published in 1615, and formed a substantial contribution to geography and ethnology. He also took great interest in the earliest English colonization in America. In April 1621 he became colonial treasurer of the Virginia Company and sailed to Virginia with his niece's husband, Sir Francis Wyat, the new governor. When Virginia became a crown colony, Sandys was created a member of council in August 1624; he was reappointed to this post in 1626 and 1628. In 1631 he returned to England.

In 1621 he had already published an English translation of part of Ovid's *Metamorphoses;* this he completed in 1626; on this mainly his poetic reputation rested in the 17th and 18th centuries. He also began a version of Virgil's *Aeneid,* but never produced more than the first book. In 1636 he issued his famous *Paraphrase upon the Psalms and Hymns dispersed throughout the Old and New Testaments;* in 1640 he translated *Christ's Passion* from the Latin of Grotius; and in 1641 he brought out his last work, a *Paraphrase of the Song of Songs*. He died, unmarried, at Boxley, near Maidstone, Kent, in 1644.

See Sandys' works as quoted above; the travels appeared as *The Relation of a Journey begun an. Dom. 1610, in four books* (1615); also the Rev. Richard Hooper's edition, with memoir, of *The Poetical Works of George Sandys;* and Alexander Brown's *Genesis of the United States,* pp. 546, 989, 992, 994–995, 1032, 1063; article, "Sandys, George," in *Dictionary of National Biography*.

SAN FERNANDO, a seaport of southern Spain, in the province of Cadiz, on the Isla de León, a rocky island among the salt marshes which line the southern shore of Cadiz bay. Pop. (1920), 26,953. San Fernando was probably a Carthaginian settlement. On a hill to the south stood a temple dedicated to the Tyrian Hercules; to the east is a Roman bridge, rebuilt in the 15th century after partial demolition by the Moors. The arsenal was founded in 1790. During the Peninsular War the cortes met at San Fernando (1810), but the present name of the town dates only from 1813; it was previously known as Isla de León. San Fernando is one of the three principal naval ports of Spain; together with Ferrol and Cartagena it is governed by an admiral. The town is connected with Cadiz (4½ m. N.W.) by a railway, and there is an electric tramway from the arsenal (in the suburb of La Carraca) to Cadiz. In the neighbourhood salt is largely produced and stone is quarried; the manufactures include spirits, beer, leather, esparto fabrics, soap, hats, sails and ropes; and there is a large iron-foundry.

SAN FERNANDO, a municipality (with administration centre and 55 *barrios* or districts), capital and port of the mountainous province of La Unión, Luzon, Philippine Islands, situated on the west coast, 208 m. from Manila. Pop. (1918), 19,881, of whom 23 were whites. A good road connects it with Bauang, whence there is railway connection with Manila. Tobacco, rice, abacá, sugar, corn and coco-nuts are raised in the vicinity. Considerable tobacco is exported from San Fernando to Manila. In 1918, it had 110 household industry establishments, with outputs valued at 20,400 pesos. The language spoken is Ilocano.

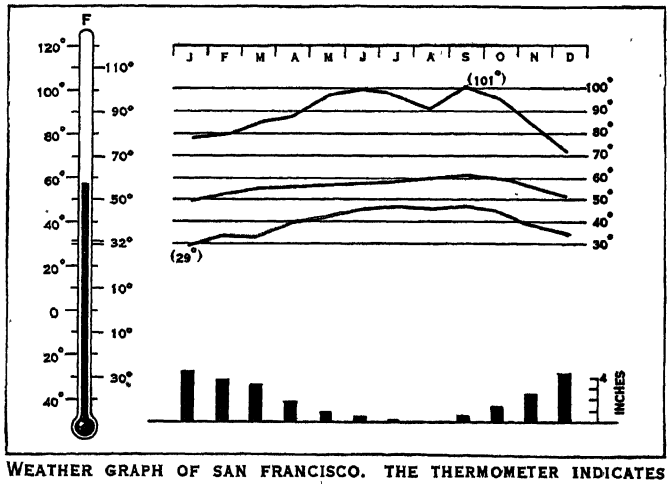
SAN FERNANDO, a municipality (with 31 *barrios* or districts) and capital of the province of Pampanga, Luzon, Philippine Islands, located on the Manila-Dagupan Railway, in the south-east part of the province. Pop. (1918), 20,622. It is situated in the midst of a rich agricultural region and is a commercial town of considerable importance. In 1918, it had 30 manufacturing establishments with output valued at 106,200 pesos; 5 rice mills with output valued at 1,234,000 pesos; and 54 sugar mills, with output valued at 405,200 ps. The language spoken is Pampango.

SANFORD, a city in the interior of Florida, U.S.A., the county seat of Seminole county; on Lake Monroe (the head of navigation on the St. Johns river) about midway (by rail) between Jacksonville and Tampa. It is on Federal highway 92, and is served by the Atlantic Coast Line Railroad and river steamers. Pop. 7,262 in 1925 (State census), of whom 3,117 were negroes; and 10,100 in 1930 by the Federal census. The city lies around a wide curve in the lake shore and has several small lakes within its limits. Sanford is a winter resort, with several hotels and provision for all the sports and pleasures compatible with the climate. Since 1920 it has had a commission-manager form of government, and development is under the supervision of a city-planning and zoning commission established in 1923. It is the centre of a sub-irrigated region devoted chiefly to the growing of celery and other truck-crops, of which 9,000 carloads were shipped in 1927; is a division point on the railroad, which maintains shops here employing 350 men; and has precooling plants, a large icing station and several manufacturing industries. The assessed valuation for 1927 was $21,727,599. The city was founded about 1871 by Gen. Henry S. Sanford and was incorporated in 1877. In 1887 it suffered from a disastrous fire. The first citrus nurseries in Florida were planted here, and Sanford became the chief centre of the production and shipping of

oranges. The "great freeze" of 1895 wiped out this industry. Later the cultivation of citrus fruits was revived.

SAN FRANCISCO, premier port and financial centre of the Pacific coast, is centrally located on the coast of California in 37° 47′ 22·55″ N. lat. and 122° 25′ 40·76″ W. long. It is situated on a peninsula bounded on the west by the Pacific ocean, north and east by San Francisco bay and south by wooded hills and fertile valleys of San Mateo county. The highest elevation is 956 feet. San Francisco bay is one of the largest and safest land-locked harbours in the world, which partially accounts for the city's importance as a port. Entrance from the Pacific to the bay is through the Golden Gate, a channel having a depth of 63 fathoms and a width of 1⅛ miles. The city covers 42 sq.m. and is built on hills, the principal ones being Telegraph, Russian, Nob, Rincon, Bernal Heights, Potrero, Larsen Peak, Twin Peaks, Mt. Davidson (956 ft.), Mt. Olympus, Buena Vista, Lone mountain and Lincoln park. Romantic and cosmopolitan in character, San Francisco holds a lure peculiar to few cities of the world. Its population was 416,912 in 1910 and 506,676 in 1920. By July 1, 1927, it was 576,000, by an estimate of the United States bureau of census; in 1930 it was 634,394 by the Federal census.

San Francisco bay contains several picturesque islands while a number of large cities line the opposite side of the bay. Yerba Buena or Goat island lies nearest to San Francisco, being about half way between San Francisco and the Oakland mole. It is used as a naval station and training school. Alcatraz, 20 ac. in area, stands high above the water and is surmounted by a great military prison, topped by a light-house 214 ft. high. Angel island lies to the north of Alcatraz. Upon it is located Ft. McDowell, the United States quarantine and immigrant station. During the World War the island was used as a training and internment camp. Belvedere island is an exclusive residential and yachting territory and lies to the north-west of Angel island. San Francisco's suburbs consist of well-built cities ranging in population from 15,000 to 175,000. The islands and bay-shore cities are reached from San Francisco by ferry-boats, operated by the Southern Pacific, the Key System, the Santa Fe, the North-western Pacific, Golden Gate ferry company and by United States



WEATHER GRAPH OF SAN FRANCISCO. THE THERMOMETER INDICATES THE ANNUAL MEAN TEMPERATURE. THE MIDDLE CURVE SHOWS THE MONTHLY MEAN TEMPERATURE, THE CURVES ABOVE AND BELOW, THE HIGHEST AND LOWEST EVER RECORDED. THE COLUMNS INDICATE THE NORMAL MONTHLY PRECIPITATION

launches. The Southern Pacific, Key System and North-western Pacific operate fast electric trains in connection with their ferry-boats and handle hundreds of thousands of passengers daily. Within a few hours ride of San Francisco is Mt. Tamalpais, 2,604 ft. high, and Muir Woods, a national redwood park. On the peninsula side the suburbs are reached by steam and electric cars and by motor stages.

The climate is practically free from extremes, with a uniform relative humidity, and an abundance of sunshine. Rainfall constituted the entire precipitation over a period of 50 years, with one or two extreme exceptions, when a very light snowfall was recorded. The greater amount of the rainfall occurs from November to March. The "peaks" range from 7 to 9 in. for a single month and occur intermittently over November, December and January. There was less than ½ in.—with one exception—for any month between March and November. There is much sunshine. The United States weather report for 1927 gives the following data: temperature, mean maximum 63·6°, mean minimum 50·8° and monthly mean 57·2°; relative humidity 77%; total precipitation 24·29 in.; average hourly wind velocity 7·7 m., prevailing direction, west; percentage of sunshine 63, with 153 clear days, 116 partly cloudy, 96 cloudy and 13 days of dense fog.

Government.—San Francisco has a combined city and county government, with legislative powers vested in a board of supervisors consisting of 18 members, nine of whom are elected every two years. The mayor, auditor, treasurer, assessor, tax collector, coroner, recorder, county clerk, sheriff, superior and police court judges are elected by the people and serve for a term of four years. The mayor receives $8,000, while other elective officers receive $6,000 per annum. The mayor appoints and may remove, at his pleasure, members of the police, fire, civil service, school, park, playground, health and public works boards. It requires 14 votes on the board of supervisors to override the mayor's veto. San Francisco has operated under four charters, granted in 1850, 1856, 1861 and 1898. The last embraces the "initiative and referendum" clauses, by which the tax-payers can have the final voice in any act passed by the board of supervisors.

The city experienced periods of "boss-rule" with more or less grafting until 1906, when a progressive-reform-clean-up mayor was elected. Mayor James Rolph, Jr., was elected in Nov. 1927, for the sixth consecutive term. During his administration the city has gone ahead rapidly, and public buildings, streets and boulevards, parks and other outstanding municipal improvements have been introduced. The fire and police departments have been put on a high basis and in 1928 the police department had 1,085 men. The fire department had 1,093 members of the uniform force, 46 engine companies, 14 truck companies, 11 chemical companies; one rescue squad company, one water tower company and two fire-boat companies.

Industries and Commerce.—The Federal census of manufacturing in 1925 showed the following conditions to exist in San Francisco and the territory included in what is known as the metropolitan area: San Francisco,—number of establishments, 2,121; wage earners, 41,800; wages, $61,140,806; value of products, $429,056,540; metropolitan area (five counties),—number of establishments, 3,231; wage earners, 85,081; wages, $122,810,608; value of products, $1,007,398,688. The principal industries ranked by the value of their production in 1925 were:

	Value of output	Number of wage earners
	$	
Printing and publishing	36,648,704	3,559
Coffee and spice	29,070,096	427
Slaughtering and meat-packing	20,012,919	359
Bread and bakery products	15,743,322	1,956
Motor vehicles	15,716,450	895
Men's and women's clothing	15,095,165	2,604
Foundry and machine-shop products	13,187,586	2,379
Canning and preserving	11,772,360	1,183
Furniture	11,036,262	1,716
Other food products	7,740,756	386
Confectionery	7,740,398	1,223

San Francisco's business extends to all parts of the world; in the confines of the immediate trade area are a number of cities and towns, the greater number of which border on the bay. In the west bay section, on the San Francisco peninsula, the outstanding communities are San Francisco, Burlingame, San Mateo, Redwood City, Palo Alto and San Jose. North of San Francisco on the Marin peninsula are the towns of San Rafael, Sausalito, Mill Valley and San Anselmo. In the east bay region are Oakland, Alameda, Berkeley, Richmond and San Leandro. These sections form a central unit from an operating standpoint and are the

immediate market. In the west bay region there are three trunk line highways extending down the peninsula from San Francisco; five railway lines doing an interstate business, three of which are transcontinental, have their western terminus in San Francisco. A deep water channel extends practically the full length of the peninsula.

Nature supplied the San Francisco region with one of the finest land-locked harbours of the world. To this have been added the most comprehensive docking and berthing facilities, rail and freight connections, modern and well-equipped warehouses, etc. The area of San Francisco bay is 540 sq.m.; the harbour has 15 m. or more of berthing space and this is constantly being increased. The harbour is controlled by the State of California and is governed by a board of harbour commissioners appointed by the Government. Of the 46 piers, most are assigned to steamship companies having their own fleets and operating their own schedules. Repairs and maintenance average $1,500,000 annually.

The water-borne commerce of San Francisco bay has trebled since the days before the World War. San Francisco, according to the department of commerce, at the close of 1927, ranked fifth among the 49 customs districts of the United States in the value of imports and exports. In 1927 (the biggest year in the history of the port) 7,042 ships with a registered tonnage of 16,683,265 arrived and 7,135 ships with a tonnage of 16,596,684 departed. San Francisco's exports in 1926 were valued at $210,185,125; imports, $187,165,113. The principal exports are mineral oil and gasolene, barley, canned fruits, raw cotton, cigarettes, tobacco, rice, flour, canned milk, canned salmon, sole leather, etc. The principal imports are raw silk, coffee, sugar, copra, coconut oil, burlap, newsprint, tea, bags, etc. The 1927 report of the United States Shipping Board shows that the San Francisco bay foreign trade does not approach the domestic trade in tonnage, as indicated by the following figures: total (long tons), 25,104,450; foreign, 3,113,177; intercoastal, 2,149,790; coastwise, 18,395,709; non-contiguous, 1,445,782. San Francisco is the port of call for 118 steamship lines. Besides the movement of commodities by water, there is a large rail traffic in San Francisco. During 1927 it reached 234,053 car loads in and out of the city, not including less-than-car-load business.

Finance.—San Francisco was created a financial centre by the gold rush of 1849 and has maintained its position since. In that year $2,000,000 in gold was exported. To-day it leads every city west of Chicago in bank clearings, bank deposits, stock and bond sales and insurance business. It is the headquarters of the 12th Federal Reserve district; it has the highest *per caput* wealth of any large city in the United States; it has the third largest bank in the country and nine of its banks rank among the first hundred financial institutions of the nation. The following figures were furnished by the San Francisco chamber of commerce statistical department after verification: bank clearings in 1927 totalled $10,117,987,269, while only New York, Chicago, Philadelphia and Boston, in the order named, surpassed San Francisco. The total bank deposits in 1925 were $1,313,926,464; in 1927 (up to Oct. 10) $1,575,278,083; total resources in 1925, $1,537,773,969; in 1927 (up to Oct. 10) $1,890,604,665. Stock and bond sales for 1927 were $429,298,882 and the insurance business cleared through San Francisco was approximately $273,000,000. The *per caput* wealth in 1927, based on the total value of all property in the city, was $2,800. The tax rate in 1928 was $3.80 on the $100 assessed valuation, which was approximately 50% of true value. This was the combined city and county tax and since there is no State tax on property in California, this is the only rate collected on real and personal property.

Education.—San Francisco is well supplied with institutions of learning. These include, within the city, the affiliated colleges of the University of California, St. Ignatius and numerous law and medical schools. Eight miles across the bay from San Francisco, at Berkeley, is the University of California, one of the largest in the United States; while at Palo Alto is Stanford university (*q.v.*) one of the richest institutions in the world. At Oakland is St. Mary's university, and in the hills of Oakland is located Mills college, a leading institution for women.

Under the State law, San Francisco authorities must each year take a census of young children in the city for school purposes. The census completed on Dec. 31, 1927, showed that there were 103,783 children in the city under the age of 16 years. Of this total 70,355 were attending the public schools; 15,220 were enrolled in parochial schools; 2,737 were attending private schools; 17,100 were too young to attend school; and 361 were not attending school, though of school age. The census further showed that 94,168 of the children were native-born and 82,071 lived in homes where English was the prevailing language. The public schools were listed as follows: 91 elementary and grammar; 7 junior high-schools; 7 high-schools; 4 evening high-schools; 5 evening elementary schools; one part-time and one ungraded school. The average daily attendance for all public schools in 1927 was 62,159.

Public Buildings and Parks.—The group of buildings in the civic centre consists of (1) City Hall, of classic design, surmounted by an immense dome higher than that of the Capitol at Washington; cost, $4,000,000; (2) Exposition auditorium which has a seating capacity of 12,000 in the main auditorium; cost, $2,000,000; (3) San Francisco Public library; cost, $1,500,000; (4) State building; cost, $1,000,000. There is now being built (1928) a war memorial group of buildings, as a part of the civic centre, to cost $4,000,000, consisting of an opera house, an American Legion hall and other buildings. California palace of the Legion of Honor, in Lincoln park overlooking the Golden Gate, is a replica of the palace of the Legion of Honor in Paris. In Golden Gate park are located the De Young Memorial museum, Academy of Sciences, Steinhart aquarium and the Museum of anthropology. Near the Presidio is located the San Francisco Museum of art. At Kearny and Washington streets is the Hall of Justice erected in 1910 at a cost of $1,000,000, containing police courts and the criminal department of the superior court. Other notable buildings are the United States Mint, built in 1874; the Post-office; the Customs house and United States Appraiser's buildings; and the Ferry building, built by the State in 1896 at a cost of about $1,000,000, which is 659 ft. long and 156 ft. wide, serving as a ferry terminal and containing many State offices.

San Francisco is noted for its beautiful and extensive parks. There are 46 parks, with a total acreage of 3,000 and several large parks are under construction. In addition to the municipal parks, the several Government reservations, the largest of which is the Presidio, comprising 1,542 ac., all go toward augmenting the aggregate area of the city parks. All of San Francisco's parks are "man-made." The Golden Gate park, a well-known playground, comprises 1,013 ac. and is about 3 m. long and ½ m. wide, extending from Stanyan street on the east to the Pacific ocean on the west, and lies in the midst of San Francisco residential districts. In the park are many museums and monuments, an aviary, aquarium, music temple, stadium, tennis courts, baseball and football grounds, bridle paths, an athletic field and running track, paddocks and children's playgrounds. Improved driveways in the park exceed 25 m. in length. At the western end of the park is to be seen the sloop "Gjoa," the only vessel that ever navigated the north-west passage; it was given to San Francisco by its owner, Captain Roald Amundsen.

Streets and Boulevards.—San Francisco's street system was begun in 1835, when Calle de la Fundación or Foundation street was laid out. The first survey, made in 1839, covered what is now the financial and retail sections of the city. Other streets and avenues were gradually added until 1845 when Jasper O'Farrell made a second survey. This system applied the "checker-board lay-out," with Market street the main artery and division point. The streets north of it run due north or west, while on the south side they run at right angles to the Market street slant, which is slightly to the south-east. The first comprehensive system of boulevards was formulated in 1913 by city engineer M. M. O'Shaughnessy. With expenditures at that time of approximately $100,000 per annum, San Francisco is in 1928 spending more than a million dollars yearly on its streets. Among the boulevards are the Marina, Hunters Point, Twin Peaks, Market street extension, Bay Shore and Ocean Shore.

San Francisco's Chinatown comprises two or more thickly populated blocks extending from Stockton to Kearny and from California to Pacific street. The "town" is hedged in by the financial, hotel and apartment-house districts and a part of North Beach or "Latin Quarter." Since 1920 there has been no Government census, but an enumeration taken by the Chamber of Commerce at the close of 1927 gave 7,744 foreign-born and more than 3,500 native born Chinese in the district, while several hundreds are scattered throughout other sections of the city.

Fires, Earthquake and Reconstruction.—Seven times San Francisco has been swept by disastrous fires. The first fire of note occurred on Dec. 24, 1849, and was followed in quick succession by others on May 4, 1850; June 14, 1850; Sept. 17, 1850; May 4, 1851 and June 22, 1851. In 1906 came the greatest conflagration experienced on the western coast. Following the earthquake which occurred early on the morning of April 18, 1906, flames swept through the city creating havoc, especially in the central business and residential sections. Thousands of buildings, hundreds of lives and approximately $500,000,000 were the losses sustained. An area of 497 city blocks, or 4 sq.m., was devastated. According to official records 28,188 buildings valued at $105,000,000 were destroyed. The value of the contents of the structures wiped out was impossible to estimate. Insurance companies and San Francisco financial houses estimate the insurance paid at $300,000,000, though many companies failed in the attempt to meet their obligations, while others repudiated them. Aid in the form of money to the sum of $10,000,000 was contributed by American, European and Asiatic communities, while additional millions in food and clothing were rushed to the stricken city, whose inhabitants slept in the remaining houses, parks and the streets for weeks. The flames were subdued by the generous use of dynamite, with the result that many expensive buildings were sacrificed by "back-fire" to save other sections of the city. While San Francisco had experienced earthquake disturbances in 1868, 1898 and 1900, that of 1906 was the most violent.



BY COURTESY OF THE UNION PACIFIC SYSTEM
ORIENTAL WOMAN SHOPPING IN SAN FRANCISCO'S CHINATOWN

Within a remarkably short time San Francisco began the struggle to rehabilitate itself. Owing to the courage and energy of the people, within a year following the catastrophe the city was taking on a somewhat normal appearance. The new structures were planned along more costly and substantial lines. With the aid of San Francisco banks and the money received from insurance companies, the city went forward step by step and a beautiful San Francisco once more arose from the débris and ashes.

History.—In his search for Monterey, Don Gaspar de Portola, governor of Lower California, left San Diego in July 1769 and some months later members of his little band discovered San Francisco bay and the tip of the peninsula whereon the city is situated. From that time until California became a part of the United States, San Francisco became an objective of international strategy. In 1775, Don Manuel Ayala sailed through the Golden Gate in the "San Carlos," a packet of the Spanish royal navy. It was the first ship to gain entrance to the bay from the Pacific ocean. While the Spaniards won the credit of the discovery, the English, years before, narrowly missed gaining possession of the bay and the surrounding territory as well, for in 1579 Sir Francis Drake, the English explorer, sailed within a few miles of the "Golden Gate" and came to anchor in a little cove a few miles north, in what is known to-day as Drake's bay.

In 1776 a land expedition commanded by Col. Juan Bautista de Anza arrived on the peninsula and established the Presidio and the Misión Dolores. The following year (1777) Padre Junípero Serra, father of the California missions, arrived. With the establishment of the Presidio, and the subsequent establishment of the *pueblo* of Yerba Buena, began the San Francisco of to-day. From 1776 until 1806 the inhabitants, soldiers and missionaries led a quiet, happy existence, occupying themselves with building the mission and the presidio, and doing only work enough to get the necessaries of life. For excitement, they had their Spanish *fiestas,* cock-fights and rodeos, while from time to time sailors, adventurers and visiting ranchers added a novelty. Trading in hides and tallow constituted the principal business of the period, though wines and brandies made by the missionaries were exchanged for ship's goods of varied assortment. Fur trading was also beginning to take on a commercial aspect. Eventually, this proved to be the principal business of the community.

In 1806, Russia made a faint attempt through Count Rezanov to establish a settlement and lay claim to the territory in the name of the tsar. Rezanov eventually planted a colony at Ft. Ross, near Santa Rosa, some miles north of San Francisco, which was intended to serve as a supply station and vegetable farm for the Russian possessions in Alaska. The outpost was established in March 1811. A stockade was built on Bodega bay. When completed, it became the headquarters of those Russians who had made Yerba Buena (San Francisco) their base since landing in 1806. Except for occasional visits by Rezanov and his men, the community soon forgot the Russian enterprise.

With the exception of a few quarrels between Mexicans and foreign colonists, as the Americans and other nationalities were called, all was tranquil until war was declared by the United States on Mexico on May 13, 1846. There was great excitement in San Francisco some weeks later when the news arrived. On July 9, 1848, Capt. John B. Montgomery of the U.S. navy, arrived with the sloop-of-war "Portsmouth" and raised the American flag on the plaza, known to-day as Portsmouth plaza, claiming the territory for the United States. The community continued under the name of Yerba Buena until 1847 when it was changed to San Francisco. At this time there were some 200 buildings and 800 inhabitants in the village.

The discovery of gold at Colma in Jan. 1848 was not taken seriously in San Francisco, and it was not until April of that year that the settlement became infected with the "gold bug." Then every one with an outfit stampeded for the mountains in search of gold. Then a city of tents and shanties arose; gambling was rife and prices extraordinary.

During the early '50s San Francisco experienced her darkest days. Crime was rampant, while the city government was too inefficient or too indifferent to suppress it. Bancroft, in his *History of California,* states that up to 1854 there were 4,200 homicides and 1,200 suicides, while the records of the next few years following show many deaths by violence, the high mark being reached in 1855 with 585. In 1851 the Vigilance Committee was formed and freed the city of most of the lawless element, either by hanging or driving them from the town. It was necessary for the committee to come together again in 1856, when for a second time it succeeded in restoring order in the community. Altogether more than 8,000 reputable citizens served on the two committees.

With the decline of gold production between 1855 and 1860, San Francisco came into her own as the Pacific coast's main port, and through world trade the city grew substantially and conservatively. This reign of conservatism, however, was interrupted by the unparalleled development of the Nevada silver mines and the city again experienced the days of '49. There was a long period of frenzied speculation during which huge fortunes were won and lost within a few minutes. Panic gripped the people and only the financially strong survived. Many descendants of the successful financial giants of the silver period reside in San Francisco and have so handled their heritage that they are numbered among California's wealthiest and most influential citizens of to-day. At the outbreak of the Civil War San Francisco showed evidence of being strongly pro-Union although thousands of arms were shipped in, to Southern sympathizers, for the purpose of winning Californians over to their cause or to encourage them to launch an independent republic. Nothing came of this

venture and San Francisco remained, with California, a Union stronghold. The famed "Pony Express," established in 1860, for a short time gave San Francisco quick mail and express communication with the interior of the country. The city's isolation, however, was not permanently removed until the first transcontinental railway was opened in 1869. The railway to Los Angeles was completed in 1876, thereby giving San Francisco connections with the east and south. (B. P. C.)

SANGER, JOHN (1816–1889), English circus proprietor, was born at Chew Magna, Somerset, in 1816, the son of an old sailor who had turned showman. In 1845 he started with his brother George a conjuring exhibition at Birmingham. The venture was successful, and the brothers, who had been interested spectators of the equestrian performances at Astley's amphitheatre, London, then started touring the country with a circus entertainment consisting of a horse and pony and three or four human performers. Eventually John and George Sanger became lessees of the Agricultural Hall, London, and there produced a large number of elaborate spectacles. In 1871 the Sangers leased Astley's where they gave an equestrian pantomime every winter, touring in the summer with a large circus. Subsequently the partnership was dissolved, each brother producing his own show. John Sanger died while touring, at Ipswich on Aug. 22, 1889, the business being continued by his son.

SANGERHAUSEN, a town in the Prussian province of Saxony, on the Gonna, near the south base of the Harz mountains, 30 m. W. of Halle. Pop. (1925) 11,937. Sangerhausen is mentioned in a document of 991 as appertaining to the estates of the emperor. By marriage it passed to the landgrave of Thuringia, it fell in 1249 to Meissen, and in 1291 to Brandenburg. In 1372 it passed to Saxony and formed a portion of that territory until 1815, when it was united with Prussia.

SAN GERMÁN, a town in the south-western part of Porto Rico, about five miles from the Mona channel on the west and the Caribbean sea in the south. The population of the town by the census of 1920 was 5,019, and of the municipal district 23,848. The original settlement was founded in 1512 by Diego, a son of Columbus. Its early history was marked by many vicissitudes. It was at different times attacked by the Carib Indians, by pirates, by the French in 1528, and as late as 1748 by the English. As a consequence the town was moved for safety from one place to another until it was finally established in its present position. For many years, when there existed only two municipal districts in the island, San Germán was the seat of government of the western, and San Juan of the eastern district. In 1538 a church was built by the Dominican friars which still stands, one of the oldest buildings of the Spanish settlement in the West Indies.

SANGI or **SANGIR ISLANDS,** a group of islands off the north-east coast of Celebes, Dutch East Indies. They continue the north-eastern extension of Celebes towards Mindanao, in the Philippines, and are set upon a long, narrow ridge, along a volcanic band, with very deep water on either side. Although fringed with recent coral formation, they are distinctly volcanic, with active volcanoes, Mount Awu, on Sangi island, having experienced severe recent eruptions, whilst earthquakes also have occurred. Sangi, Siau and Tagulanda are the chief islands and Talisse and Banka (the larger and better-known Banka lies off the east coast of Sumatra) are situated between Tagulanda and the mainland of Celebes. Banka gives its name to Banka passage, the channel by which entry is obtained from Celebes sea to the Molucca passage. Sangi is 27 m. long, and from 9 to 17 in width, is mountainous in the north, elevation decreasing considerably in the south, and has a coast which is generally steep. It has an average rainfall of 195 in., and, with Siau, has an exceptionally fertile volcanic soil with extensive cultivation of nutmegs, coco-nuts and Manila hemp. Taruna, on the west coast, is the capital, where a *contrôleur* resides who is in charge of all of the islands. It, and Peta, on the east coast, are ports visited regularly by vessels of the Royal Packet Navigation company, also Hulu, the capital and port of Siau, and Tagulandang, and Talisse, on the islands of that name. Tagulandang has two mountains of 2,500 ft., sloping from east to west, and Ruang, a small island west of Tagulandang, has an active volcano. The population of the islands, which is mostly on Sangi and Siau, is 114,719, including 91 Europeans and Eurasians, and 1,188 foreign Asiatics, and is a very large one in comparison with their size. The people of Sangi and Siau are closely related to the people of Minahasa and of portions of the Philippine islands, with fair complexion, high nose, and stiff, short black hair. Formerly terrorized by the dreaded pirates of Sulu (islands off the S.E. coast of Mindanao, in the Philippines), of recent years, under direct Dutch rule, the Sangi and Siau islanders have progressed wonderfully, under the peaceful *régime* of Dutch rule, like their near relatives the Minahasese, and like these also, they have become mostly Christians. Society is based on the matriarchal system, and the people, who speak a language of their own, live by agriculture and fishing and trading in wood, copra and nutmegs. The very fine and white Manila hemp they grow is practically only for domestic consumption, and its weaving is the most important industry. The Talaud, or Talaut, islands, consist of a group lying north-east of Sangi, the chief of which is Karakelang, 39 m. long and 15 wide, in the north. Heights of 2,300 ft. are said to exist in the southern part. The coast is steep, except on the south shore, which is fringed by a wide reef. Some tiny islands known as the Nanusa islands lie north-east of Karakelang, and to these, and to Beo, the capital of Karakelang, and of the group, where a *gezaghebber* resides, also to Lirung, the port and capital of a long island lying close to and south-east of Karakelang, vessels of the Royal Packet Navigation company run regularly. The Sangi and Talaud islands were incorporated under the direct rule of the Dutch governor of Ternate as far back as 1677. Now they are attached to the residency of Menado. (E. E. L.)

SAN GIMIGNANO, a town of Tuscany, Italy, in the province of Siena, 24 m. N.W. of Siena, at an elevation of 1,089 ft. Pop. (1921) 4,220 (town); 10,897 (commune). Being surrounded by its ancient walls, and retaining thirteen out of its original 72 towers, it is, with its predominantly Gothic architecture, a thoroughly mediaeval town in appearance. In the Palazzo Comunale (1288–1323) is a fresco by Lippo Memmi of the Madonna enthroned (1317), copied from the "Majestas" at Siena. The Collegiata (the former cathedral) of the 12th century was enlarged after 1466 by Giuliano da Maiano, whose brother Benedetto carved the altar and ciborium in the chapel of S. Fina. The beautiful frescoes with scenes from her life (she was a local saint who died at the age of fifteen in 1253) are the earliest work of Domenico Ghirlandaio (1475). The cathedral contains other 14th-century and early Renaissance paintings, including New Testament scenes by Barna da Siena (1380) and some fine choir stalls. S. Agostino (1280–1298) contains a famous series of frescoes by Benozzo Gozzoli, with scenes from the life of St. Augustine (1463–1467). The town was independent in the 13th century, but in 1353, owing to the dissensions of the Salvucci (Ghibellines) and Ardinghelli (Guelphs), it fell into the hands of Florence.

See R. Pantini, *San Gimignano e Certaldo* (Bergamo, 1905).

SAN GIULIANO, ANTONINO PATERNO-CASTELLI, MARQUIS DI (1852–1914), Italian statesman, was born at Catania on Dec. 10, 1852, a member of a noble Sicilian family. After graduating in law at the University of Catania he became, in 1879, mayor of his native city, and in 1882 was elected to parliament. When in 1892 Signor Giolitti became premier, San Giuliano was selected as under-secretary for agriculture, while in the second Pelloux ministry (1899–1900) he held the portfolio of posts and telegraphs. Having been defeated at the election of 1904, he was nominated senator. When in Dec. 1905 Signor Fortis became prime minister he was appointed minister for foreign affairs, and on the fall of the cabinet early in 1906 he was appointed ambassador in London, where he remained until 1910. From London he was transferred to Paris, but he soon returned to the Consulta as foreign minister in the Luzzati cabinet (1910–1911), and continued at the same post in Signor Giolitti's administration. San Giuliano was an ardent believer in the Triple Alliance but having retained his portfolio under Salandra, after Giolitti's resignation in March 1914, he carried out with complete loyalty the policy of neutrality adopted by Italy on the outbreak of the World War. He died in Rome on Oct. 16, 1914.

SANGLI, a native state of India, in Bombay, ranking as one of the Southern Mahratta Jagirs. The territory is widely scattered among other native states and British districts. Area, 1,083 square miles. Pop. (1921) 221,321. The town of Sangli has a station on the Madras and Southern Mahratta railway, 11 m. from Miraj Junction. Pop. (1921) 21,112.

SANHEDRIN: *see* SYNEDRIUM.

SANITATION: *see* HYGIENE.

SANITATION OF BUILDINGS. To preserve the health of the occupiers of any building, it is imperative that all polluted water and solid organic refuse should be removed from the premises at frequent intervals. Where the buildings are in a town it is usual for the local authority to remove the solid dry refuse by carting, but where a public water supply is available, liquid wastes are flushed away through a system of pipes. These latter comprise waste pipes to carry washing water, soil pipes to carry human excreta and rainwater pipes. If such pipes pass under the grounds of the premises they are termed drains and usually discharge eventually into the sewers in the public highway or into cesspools or septic tanks.

Drains.—Outside drains are usually composed of glazed stoneware or vitrified earthenware pipes, 2 ft long, not often larger than 4 in. diameter for branches and 6 in. diameter for the main drain. All drains inside a building, whether under or above ground, are usually of iron pipe. If the pipes are cast iron the joints are caulked with oakum and molten lead. If of wrought iron or steel they are screw joints.

All drains that carry solids should be provided with accessible clean-out caps, which can be readily unscrewed for the admission of cleaning rods, to remove obstructions which may choke the drains. It is good practice to have a clean-out cap or plug at each change in direction of a drain pipe. The drains must be run straight between these clean-out points.

Soil Pipes.—In British plumbing practice these are not disconnected where they are jointed to the drains, but waste pipes and rainwater pipes discharge into or onto gulley traps at the base of the wall. Each house should have its own system of drains, separated from the sewer by a disconnecting chamber or manhole. The chamber is usually placed near the boundary of the property so as to prevent, as far as possible, the entry of sewer gas into the house drainage system. The intercepting trap is shaped so as to allow of removing obstructions on the outer side of the trap, and it is preferable for the manhole cover to be sealed. If the chamber is in an isolated position, the cover, which should be of cast iron, may be provided with a grating to afford means of ventilation, otherwise the chamber is fitted with a ventilating pipe to form a fresh-air inlet, and this is carried up well above ground level to some position where an accidental emission of drain gas would not cause a nuisance. Any such chamber should be built of the best bricks or cement concrete, suitably provided with curved channels for the branch connections. Such channels may be formed in the concrete or composed of half-round glazed pipes. Where inspection at bends is required, or where branches meet, but where it is considered to be too expensive or unnecessary to build a chamber, a shaft of 6 inch pipes is sometimes substituted, the whole being carefully jointed and supported by concrete. Since complete access to the drain is then impossible, the inspection will be confined to locating the position of a blockage or leakage to any particular length of pipes. When there is any possibility of the drains being flooded by the sewer, special interception traps are used in which a floating ball seals the inlet, and so prevents the reversal of the flow. No traps in which hinged valves or other mechanical contrivances are made use of, should be allowed.

In American plumbing practice all soil and waste stacks are usually installed within the buildings to prevent them from becoming frozen. These stacks generally are connected at their base to a system of iron main drain and branch drains in the basement, either at the basement ceiling or under the basement floor. In some cities, it is compulsory to have a main drain-trap with a fresh air inlet pipe located at the point where the main house-drain leaves the building to disconnect the house from street sewer gas, and to insure a proper ventilation of the house drainage system.

In other sections of the United States, however, the main drain-trap and fresh air inlet are not permitted. In such places the house-drain runs directly to the sewer, cesspool, or septic tanks, without the intervention of a main or intercepting trap.

The gradients of the drains are usually arranged as to not only ensure the system being self-cleansing, but also so that they do not discharge their contents at such a rate that the solids are left behind to putrify on the sides of the channels. It is usual to fix the velocity at about 3 feet per second for these purposes.

Advantage may be taken of an inspection chamber or shaft to provide ventilation to the drains. All connections between branches and the main drain are made by specially designed pipes provided with junctions.

Drain Tests.—Drain testing is undertaken for two reasons:—(a) to ensure that the system of a new house is satisfactory before the dwelling is inhabited, (b) to locate defects in systems already in use. The testing in each case differs somewhat as it is considered that new drains should be able to pass severer tests than those which have been in use some years. New drains are, therefore, usually subjected to the "water test" in which any length of the drain is first closed at the lower end by some form of plug or stopper, and the drain is then filled with water so as to give a maximum head of pressure of not more than about 6 feet. The stopper is fitted with an expanding rubber ring, and constructed in some cases so that the air can escape, and the required head may be obtained by adding vertical lengths of 1 inch diameter pipe to a similar plug at the upper end of the pipe line. A slight diminution in the head may be observed at the commencement of the test, due to absorption by the joints and possibly by the pipes, but this will soon cease, and no further drop should occur for a period of an hour. The pipe trenches should all be left open until the tests have been made, the inspector being thus able to locate any fault if indicated by a fall in water level. For drains already in use it is customary to use the "smoke test." For this machines are used which generate smoke and then, by means of fans or pistons, pump it into the branch or main drain. Compressed air tests are also used, any leakage being shown on the gauge attached to the pump. Smoke "rockets" have been advocated in the past, but the amount of smoke generated is small and the effect is local. Smell tests, using peppermint, calcium carbide, etc., have also been used, but the difficulty in locating the leakage of a smell, and the great difficulty in preventing the chemical getting on the hands or clothes, has made this test almost obsolete. If smoke is used it is generated in a receiver connected to the fan or pump on one side and to a hose on the other, and is formed by the burning of oily waste, or any substance which will give off a dense cloud.

Obstructions in drains are usually removed by rods which can be jointed together to form any length, and occasionally fitted with brushes or scrapers.

Traps.—In British plumbing practice all parts of the drainage system, when there is any possibility of drain air entering the house, are disconnected by traps, the only exception being the soil pipe, which is connected to the drain by a bend. Such traps are placed either on the drainage system itself, or under each of the house plumbing fixtures and the "Seal" should always be about 2 in. to avoid the effect of evaporation. Gulley-traps are installed to disconnect roof-leaders and sink waste-pipes from the drainage system. For sink wastes the liquid has to pass along an open channel outside the building for a length of at least 18 in. before entering the trap. It is intended to so prevent grease entering the drain by causing it to cool and solidify and remain either in the channel or the trap.

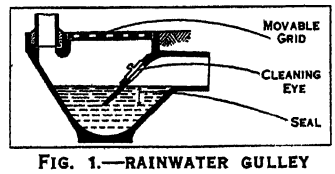


FIG. 1.—RAINWATER GULLEY

Grease traps are frequently specially provided where large quantities of grease may be expected, as from the cooking departments of hotels and clubs. The hot liquid enters near the base of the apparatus and leaves at the same level, and the grease rises

to the surface where it cools and solidifies. The water area is made as large as practicable and a wire basket or galvanized iron tray is provided to remove the grease, which operation should be frequently carried out.

Another type of grease trap operates by means of a syphon, the grease on the water surface being broken up by a flush, but it is generally found unsatisfactory. Traps are always placed under all sanitary fittings and are of the P or S type.

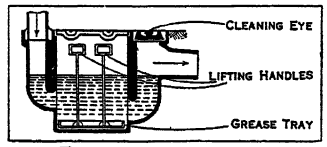


FIG. 2.—GREASE TRAP

In American plumbing practice every plumbing fixture including baths, shower receptors, water closets, urinals, lavatories, or wash basins, sinks, laundry tubs, floor-drains, area-drains, roof water-leaders and every fixture or fitting that discharges into a house drainage system must be properly and effectively trapped as close to the fixture or fitting as conditions will permit. These traps are of a variety of forms such as P. S. bottles, pot or drum, etc. All have water seals. Some are provided with check valves to prevent a back-flow of sewage through them. None, however, are permitted which depend upon mechanical contrivances as a substitute for a water seal. The water seal may, however, be augmented by a float, a check valve or other contrivance which will automatically close against back pressure. This protects the house against a backing-up of sewage as from a choked or flooded street sewer.

All fixture traps within a building must be protected against loss of seal by syphonage or air compression. The seal must remain intact to prevent sewer gas from entering the building through the traps. This trap protection is accomplished by the installation of special arrangements of vent piping which opens to the outer air and maintains the air pressure back of the trap seals practically at atmosphere.

Antisyphonage.—Since every sanitary fixture in a building must be trapped, possibilities might arise in which the seals of such traps would be broken by either increase or decrease of the air pressure unless provided against. Such cases would occur where a range of fixtures were connected to one soil or waste pipe and hence an antisyphonage or vent pipe is always provided. If no ventilating branches were provided it might be possible for a fitting on an upper floor to syphon out the water in the trap of the fittings below by reducing the air pressure in the branch. Unsealing could also happen through the discharge of the upper fitting compressing the air in a branch below and so forcing the seal of a trap below. While such possibilities are not nowadays considered of such importance as formerly, the antisyphonage pipes are always fitted, as they form a convenient method of ventilating the branches. Each antisyphonage pipe connects the head of the trap to a ventilating stack which may be carried up above the eaves of the house, or may be connected into the soil pipe above the highest branch. Such soil pipe has, in any case, to be continued full bore either well above the eaves, or to such a position that the gases let free cannot cause a nuisance or enter the house by means of chimneys, skylights, windows or other openings. The open ends of soil pipes, and any other pipes used as ventilators, are best covered by a wire cage to prevent their being used by birds for nesting purposes.

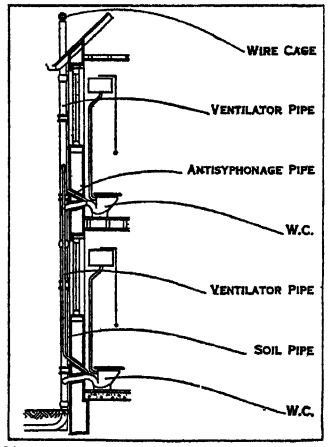


FIG. 3.—VENTILATION SYSTEM FROM LAVATORIES

Water Closets.—Of the sanitary fittings or fixtures usually found in buildings, the water closet is of the most importance. The "wash-down" and syphon closets are now practically the standard types, being simple, self-cleansing, reasonably quiet and having no moving parts. They may either stand on the floor or be supported by brackets.

The "valve" closet is the most modern adaptation of the now obsolete "pan" closet. It has the disadvantage of possessing many moving parts, and requires careful setting and use. It can, however, be quite a successful and hygienic apparatus but is usually expensive.

All closet basins are now made of the plainest and simplest design possible and are usually of white glazed stoneware. All sharp bends or angles are carefully avoided, and no part of the apparatus is allowed to be concealed by woodwork or ornamental finish. The flushing is arranged to not only throw a strong rush of water into the trap, but a portion of the flush is passed round the hollow rim to cleanse the sides of the basin.

Flushing Cisterns.—In Great Britain these are always specified to be of the "waste-water-prevention" type as the Water

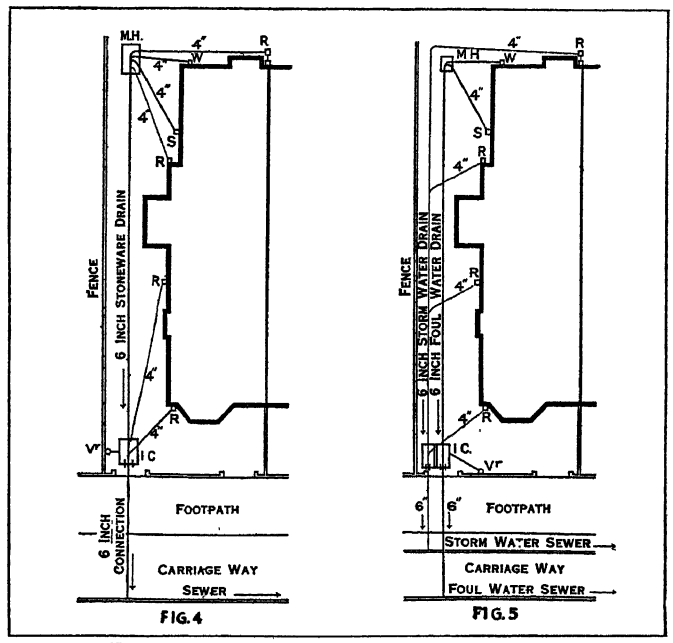


FIG. 4.—COMBINED SYSTEM OF HOUSE DRAINING
FIG. 5.—SEPARATE SYSTEM OF HOUSE DRAINAGE

Companies insist that their discharge shall be limited to a specified amount at each use. Two gallons is usually allowed, but three would be better, and unfortunately as little as one and a half gallons is often found. The cistern should be placed not less than five feet above the fitting flushed and connected to the latter by a 1½ inch diameter pipe, so as to give a good rush of water. An overflow must be placed below the inlet and should discharge direct into the open air, so as to give warning of irregular working of the valve. Similar cisterns are also made to discharge automatically at chosen intervals and so flush such fittings as ranges of urinals and closets. It is compulsory for such cisterns, whether automatic or otherwise, to be fitted to all apparatus receiving human excreta, so that there shall be no possibility of contamination of the rest of the water in the building. As regards the regulations in force for house drainage, reference should be made to the local by-laws, as these vary in detail in the different towns.

In the United States the water closets in general use in residences are flushed by "low-drain" tanks usually of vitreous china. The flush connection is generally about 2 in. diameter and short. The tank is supplied with water through a ball cash and a ½ in. supply pipe. The flushing appliance generally is either in the form of a syphon within the tank or a hollow flush valve usually of rubber. Each tank is provided with an overflow to the closet bowl, and a re-fill tube, which re-establishes the seal in the closet-trap after the flush has stopped and while the tank is being re-filled by the ball cock. Tank closets are generally installed in residences and other buildings where the water supply pipes are comparatively small in diameter.

Direct Flush Valves.—In large buildings such as hotels, office buildings, etc., where the water supply pipes are comparatively large, the water closets are flushed directly from the water supply pipes through slow-closing flush valves. These may be regulated to any length of flush desired. When the closet is properly flushed the valve shuts automatically. It is a mistake to install these valves when the supply pipes are too small or the pressure too low. The pipes should be larger than one inch and the pressure greater than 20 lb. per square inch behind the valve.

Baths.—In Great Britain baths are now usually made of enamelled cast iron or glazed stoneware, but copper and zinc have occasionally been used. The two latter, however, require the support of framing, which is usually of wood, a material which is unsuitable for the hot, moist atmosphere of a bathroom. Cast iron baths may be provided with feet, but the stoneware type generally rest direct on the floor. The end at which the taps and outlet are fixed should be as close to the outer wall of the room as possible, so as to shorten the branch waste-pipe, and an overflow must be provided, which should not discharge into the trap as is sometimes permitted, but into the open air. The bath should be not less than six feet in length and should hold about 30 gallons of water when filled up to the overflow level.

In the United States baths are generally made of cast iron enamelled, both inside and out. Those standing on feet and detached from the wall are now seldom installed, except in cheap buildings. The most popular forms of baths are of the "built-in" type. Their sides are extended down to the floor and their rims are let into the wall, the floors and walls being tiled around the bath and made watertight.

As a sanitary precaution to prevent the bath contents from becoming syphoned back into the water supply pipes, when the water is shut off, and thereby contaminating them, it is advisable to have the bath supply-nozzle above the bath overflow level. Submerged supply-nozzles should not be installed.

Showers.—The shower is the most hygienic form of bath, as one bathes in running water. It is very popular in residences, hotels, schools, factories, gymnasiums, etc. Special care should be taken in designing shower supply piping that the temperature of the shower will not change suddenly while a bather is under it. Otherwise the bather may become scalded. Prevention lies in a proper piping arrangement, or a hot water supply temperature 120 degrees or lower, or by the installation of appliances to control automatically the shower temperature. A shower may be arranged over a bath, or over a floor receptor furnished with a floor drain. The control valves should be located so that they may be reached from outside the shower. Shower bathing has become so popular in America that many of the leading hotels are now equipped with one shower in each room, in addition to the regular plunge baths.

Urinals.—In Great Britain these fittings are not usually provided in private houses but are necessary in such places as hotels and clubs. They should be simple in design and provided with an automatic flushing cistern. They are usually about 4 feet high, are made of glazed porcelain and in as few parts as possible, and flushed by pipes or sprays at the back. The old types with straight sides and back and made of slate or cast iron cannot be kept clean and are to be considered obsolete. The liquids are removed by an open channel to a trapped gulley close to the outside wall. The liquid is then removed by a pipe similar to a soil pipe which is not trapped at ground level.

In the United States there is quite a variety of urinals in use in hotels, clubs and public buildings. Usually they are made of vitreous china and are attached to the wall or stand on the floor. Some are flushed from overhead tanks with chain-pull, or by timed automatic-flush. Others are equipped with direct flush valves which close slowly and automatically, being adjusted to a suitable time and volume of flush. Several makes are provided with local ventilation attachments to which vent pipes may be connected to remove offensive odors and prevent them from diffusing throughout the toilet rooms.

Lavatories.—In America the lavatories, or wash basins, are practically all made of vitreous china. Some are attached to the walls by brackets. Others are supported on legs or china pedestals. To permit of washing in running water, if desired, the hot and cold supplies should connect into a nozzle arranged at a suitable height over the lavatory slab. The waste outlet is preferably of the "pop-up" type, the plug being operated by a knob or handle over the lavatory slab. Every lavatory should have an overflow connection and be separately trapped close to the bowl. The fixture should have no woodwork enclosing any part. It should all be open with access for keeping it clean.

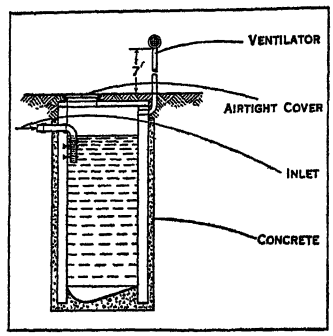


FIG. 6.—CESSPOOL

Kitchen Sinks.—These are made of enamelled cast iron, vitreous china or glazed porcelain and are set on legs, their backs being secured to the wall. There is a great variety of forms on the American market. The latest and best are one-piece fixtures with sink, drain boards, backs and apron all in one casting. The sink supply should be in the form of a combination faucet which permits the user to regulate the temperature of the water drawn. Sinks in some residences are provided with an electric dish washer compartment. Some are made in combination with a laundry tub. Some of the latest combinations comprise a sink in the middle, an electric dish washer at one end, and an electric clothes washer at the other end, all three compartments discharging their wastes through the trap under the sink.

Where much greasy dishwater will pass through a sink trap, the trap should be of a type especially designed to intercept the grease. This prevents the grease from getting into and clogging the house drains. The best type of grease trap for placing under a sink has its body in the form of a cold water jacket. Cold water to the plumbing fixtures passes through the grease trap jacket and so chills the grease in the sink waste water much more effectively than the air, or earth-cooled grease trap. (G. S. Co.; T. N. T.)

SAN JOSE (săn′ hō-zā′), a city of California, U.S.A., 50 m. S.E. of San Francisco and 8 m. S.E. of the southern end of San Francisco bay; the county seat of Santa Clara county. It is served by the Southern Pacific, the Western Pacific and electric railways, and by numerous motor coach and truck lines. Pop. 39,642 in 1920 (78% native white); in 1930, 57,651 by the Federal census, with an additional 10,000 in the contiguous suburbs. It is a delightful residential city in the heart of the beautiful and fertile Santa Clara valley, and the largest fruit-canning and packing centre of the country. The county has 130,000 ac. in orchards (including 70,000 ac. of prunes), 1,100 in berries and 26,000 in vegetables. In and near the city are 40 fruit-canneries, besides evaporators and dehydrators, and 30 packing plants, whose products aggregate 300,000 tons or more annually. The output of all the manufacturing establishments within the city limits in 1927 was valued at $42,769,065. San Jose is the seat of a State teachers college, the oldest one in California (established 1862). The University of Santa Clara (1851) is in an adjoining suburb; the Leland Stanford Junior university is 18 m. N.W.; and on top of Mt. Hamilton (4,209 ft.), 26 m. E., is the Lick observatory (affiliated with the University of California). Besides several parks in the city, San Jose owns a tract of 600 ac. in the foot-hills 7 m. E. (Alum Rock park), which contains many mineral springs, sulphur and mud baths, a large swimming-bath with plunge, children's playgrounds and various other recreational facilities. The New Almaden quicksilver mine, which has been worked since 1824, is 14 m. S. Since 1916 the city has had a city-manager form of government. The assessed valuation for 1927 was $42,182,145. Building permits in the eight years following the World War represented values aggregating $25,000,000. Bank clearings in 1927 were over $148,000,000.

The Pueblo de San José de Guadalupe, the first Spanish pueblo in California, was founded on Nov. 29, 1777, primarily to promote agriculture, so that the country need not be dependent on Mexico for provisions. Father Junípero Serra had already (Jan. 18, 1777) established the Mission of Santa Clara de Asís in the vicinity.

Plants, seeds and cuttings were supplied to the mission and to the settlers. In March 1846, General Frémont, with a party of 62, visited the valley, and in July the town was occupied by Capt. Fallon and the American flag was raised over it. The first State legislature convened in San Jose on Dec. 15, 1849, and this was the seat of government until May 1, 1851. The city was incorporated in 1850 and reincorporated in 1865. By 1870 the population was 9,089. After the secularization of the church properties in 1834 the mission orchards and gardens were neglected, and the Santa Clara valley was given over largely to cattle and horse ranges. The foundation of the fruit industry on a commercial scale is credited to Louis Pellier, who in 1856 brought a number of prune cuttings from his home near Agen.

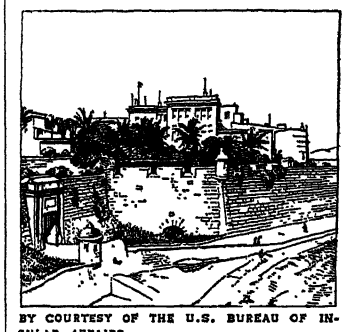
SAN JOSÉ or **SAN JOSÉ DE COSTA RICA,** the capital of the republic of Costa Rica, and of the department of San José; in the central plateau of the country, 3,868 ft. above sea-level, and on the transcontinental railway from the Pacific port of Puntarenas to the Atlantic port of Limón. Pop. (1925) 53,139. San José is an episcopal see, the most populous city in Costa Rica, and the centre of a rich agricultural region; its climate is temperate, its water-supply pure and abundant. The city was founded in 1738, and became the capital in 1823. (*See* COSTA RICA: *History.*) It is thoroughly modern in appearance, with well paved streets lighted by electricity; its houses one- or two-storeyed to minimize the danger from earthquake. The suburbs consist chiefly of cane huts, tenanted by Indians and half-castes. The larger of two public gardens, the Morazán park, contains a representative collection of the Costa Rican flora. The principal buildings are the cathedral, founded in the 18th century but restored after 1870, the hospital, Government offices, institutes of law and medicine and of physical geography, training school for teachers, national bank, museum, library and barracks. The staple trade of San José is in coffee.

SAN JUAN, an Andean province of Argentina, bounded north and east by La Rioja, south by San Luis and Mendoza, and west by Chile, from which it is separated by the Andean Cordilleras. Area, 37,865 sq.m.; pop. (1927, estimate) 156,433. It is roughly mountainous, and belongs to the closed drainage basin of western Argentina, centring in the province of Mendoza. It is traversed by several rivers, fed by the melting snows of the Andes and discharging into the swamps and lagoons in the south-eastern part of the province, the largest of which are the Huanacache lagoons. The largest of these rivers are the Vermejo, Zanjón or Jachal and San Juan. They are all used for irrigation. The climate is extremely hot and dry in summer, but the winter temperature is mild and pleasant. Agriculture is the principal occupation of its inhabitants, though the soil is generally sterile and the rainfall uncertain and very light. Cereals are grown in some localities, and there are large vineyards where irrigation is possible, from which excellent wine is made. The province contains gold, silver, copper, iron, lead, coal and salt, but mining has never been developed to any extent. Pastoral interests are largely in feeding cattle for the Chilean markets, for which large areas of alfalfa are grown in the irrigated valleys of the Andes. The Argentine Great Western railway connects the capital of the province with Mendoza, and thus with the other principal cities of the republic.

The capital of the province is San Juan, once called San Juan de la Frontera (pop., 1914, 16,631), in a great bend of the San Juan river, 95 m. N. of Mendoza and 730 m. from Buenos Aires by rail. The great bend of the river affords easy irrigation, and the surrounding country is covered by a network of irrigating canals, even the paved streets of the town having streams of cool water running through them. The public buildings include a cathedral, three churches and several schools, including the "Escuela Sarmiento," a fine edifice with a Greek façade, named after President Domingo Faustino Sarmiento (1811–86), who was a native of this city. There is also a botanical garden.

San Juan was founded in 1561 by Juan Yufré, a companion of Captain Castillo, the founder of Mendoza. Both came from Chile, to which these outlying colonies were at first subject. From 1776 to 1820 it was governed from Mendoza, and then a popular uprising made the province independent and the town its capital. It has suffered severely from political disorders, and in 1894 was nearly destroyed by an earthquake. The original settlement, now called Pueblo Viejo, 4 m. N., was abandoned on account of frequent inundations. The present town is situated about 2,165 ft. above sea-level and is defended from inundations by an embankment above the town, called the Murallón. San Juan exports wine, and has trade with Chile over the Patos and Uspallata passes.

SAN JUAN, the capital of Porto Rico and its oldest, largest and most important city. Its population according to the census of 1920 was 70,707; and was in 1930, 114,715. The present and permanent location of the city is on an island near the north coast of Porto Rico. In its growth it has crossed the San Antonio channel until its extensions—Santurce, Condado, Miramar and other suburban districts—have been absorbed and have become the residential portions of the city, leaving the principal business sections on the older site. Its harbour is a large and almost land-locked bay with a rather narrow entrance from the Atlantic.



BY COURTESY OF THE U.S. BUREAU OF INSULAR AFFAIRS
THE GOVERNOR'S PLACE, SAN JUAN

The city owes its foundation to the noted explorer and colonizer, Juan Ponce de León. This romantic and gallant leader accompanied Columbus on his second voyage, when he discovered Porto Rico, in 1493. Afterward, in 1508, Ponce de León was sent on an exploring expedition to the island, and then for the first time saw the bay on which San Juan is situated and called it "Puerto Rico," or Rich Port. After reporting his discoveries he was again sent to the island to effect a settlement, and did so near the present site of the city. The first settlement, known as "Caparra," was on the mainland, because of its greater safety from enemies approaching from the sea. Soon, however, that site was abandoned, and the present one was selected and has ever since been maintained. Substantial buildings, forts and fortifications were built during the following years. The city was completely surrounded by a massive wall, with moats and gates and bridges which made San Juan a typical walled city of the Spanish type. On a high bluff overlooking and commanding the entrance to the harbour Morro Castle was built for the protection of the harbour and city against the numerous fleets of the enemies of Spain. Along the harbour walls were other fortifications, and on the ocean front, besides Morro Castle, the great fortress of San Cristóbal, the Escambrón, the Princesa and other batteries were built.

Streets and Buildings.—The city is of the Spanish type, with narrow streets and numerous and rather low buildings, with balconies. Among the notable modern buildings are the new marble capitol, of classic type, nearing completion in 1928; the Condado-Vanderbilt hotel, one of the best in the tropics; the Federal building, housing the post office, the U.S. Court and other Federal offices; the U.S. customs house; the beautiful building of Spanish type, the School of Tropical Medicine; the Porto Rico casino; the Atheneum, the Y.M.C.A. building; the Carnegie Library and the Central High School building. The city retains much of its ancient characteristics however.

There are many buildings of historic interest. Besides the old castles, El Morro and San Cristóbal, are the Casa Blanca, built for the son of Ponce de León, and the cathedral, which contains his tomb. The imposing and interesting building, La Fortaleza, now and for many years the governor's residence and offices, was commenced and partially built in 1533, only 40 years after Columbus's discovery of the island. It was also called in Spanish times, "The Palace of Santa Catalina."

Commerce.—The harbour is one of the best and most commodious in the West Indies. Several passenger steamers are in regular service between San Juan and New York. Steamers from France and Spain visit the island. Freight lines connect the city and nearly all Southern and Eastern ports of the States, and

regular service is maintained with other West Indian islands. Passenger and freight service is also maintained with South American ports. The number of vessels entering and clearing San Juan is nearly 3,000 annually, and is steadily increasing.

A large proportion of both exports and imports from and to the island pass through San Juan. Sugar, coffee, tobacco and fruits are the principal products exported, while the principal imports are lumber, iron and steel, machinery, automobiles and trucks, flour, rice and other food products. The city is a distributing point for the West Indies of many important manufactured products. (H. M. T.)

SAN JUAN or **HARO ISLANDS,** an archipelago (San Juan, Orcas, Shaw, López, Blakely, Cypress, etc.) lying between Vancouver island and the mainland of North America. These islands were for many years the subject of dispute between the British and the U.S. Governments, and were finally assigned to the latter country by the arbitration of the emperor of Germany (on Oct. 21, 1872). Geographically, the cluster certainly belongs to the mainland, from which it is separated by Rosario Strait, generally much under 50 fathoms in depth, while Haro Strait, separating it from Vancouver island, has depths ranging from 100 to 190 fathoms. In 1873 the islands, formerly considered part of Whatcom county, Wash., were made the separate county of San Juan. Of the total area of 200 sq.m., about 60 are in San Juan, 60 in Orcas and 30 in López.

See *Papers relating to the Treaty of Washington,* vol. v. (1872), and the map in *Petermann's Mitteilungen* (1873).

SANKARAN NAIR, SIR CHETTUR (1857–), Indian jurist and politician, was born in the Malabar country on July 11, 1857, and educated for a legal career. Enrolled as a vakil of the Madras high court, he was appointed in 1899 government pleader and public prosecutor in Madras. In 1907 he was appointed advocate general, being the first Indian to hold the post in the province. In the following year he was made puisne judge of the Madras high court. He was by this time well known as a strong social reformer, a supporter of the Indian National Congress (being president of the 13th meeting, held at Amraoti in 1897), as a publicist and as founder and editor of the *Madras Review* and *The Madras Law Journal.* He was for many years a member of the Madras legislature. One of the first Indians and the first Madrasi to become a member of the Government of India he was selected for the education portfolio in 1915, but resigned in July 1919, on the ground that martial law was being continued in the Punjab too long after the disturbances had ceased. Taking a favourable view of the Montagu-Chelmsford reforms, he was appointed to the India Council in London in January 1920, but resigned to take office in the Indore State in November 1921. A vigorous condemnation of the non-cooperation movement entitled *Gandhi and Anarchy* (1922) contained references to the Punjab troubles, which led Sir Michael O'Dwyer, late lieutenant-governor of the Punjab, to bring a successful libel action against the author in London in the summer of 1924. Elected a member of the Council of State of India in 1925 Nair continued to pursue an independent line, and when that house decided in 1928 to co-operate with the Statutory Commission under Sir John Simon, the viceroy appointed him chairman of the all-India Committee to sit with the Commission, comprising members of both houses of the legislature. (F. H. Br.)

SANKEY, SIR JOHN, Lord Justice (1866–), British lord chancellor, was born on Oct. 26, 1866. Educated at Lancing and at Jesus College, Oxford, he was called to the bar at the Middle Temple in 1892. He took silk in 1909, and from that time advanced rapidly in his profession. He became a judge in the King's Bench division in 1914, and a lord justice of appeal in 1928. Sankey was chairman of the royal commission on the coal industry in 1919 which advocated far reaching reorganisation of the mining industry. On the formation of the Ramsay MacDonald government of 1929 he became lord chancellor.

SANKEY COMMISSION: *see* Coal and Coal Mining.

SĀNKHYA or **SĀMKHYA,** the oldest system of Indian philosophy, its founder, Kapila, having been born at Kapilavastu, probably a century before Buddha's birth. For an account of the system *see* Sanskrit Language and Literature: *Philosophy.*

SAN LEANDRO, a city of Alameda county, California, U.S.A., adjoining Oakland on the south. It is served by the Southern Pacific and the Western Pacific railways. Pop. (1920) was 5,703 (32% foreign-born white) and was 11,455 in 1930 by the Federal census. Its manufactures include caterpillar tractors, ladders, hay presses, and canned and evaporated fruit. A cherry festival is held annually. The city was settled in 1836 and incorporated in 1874. It has a council-manager form of government.

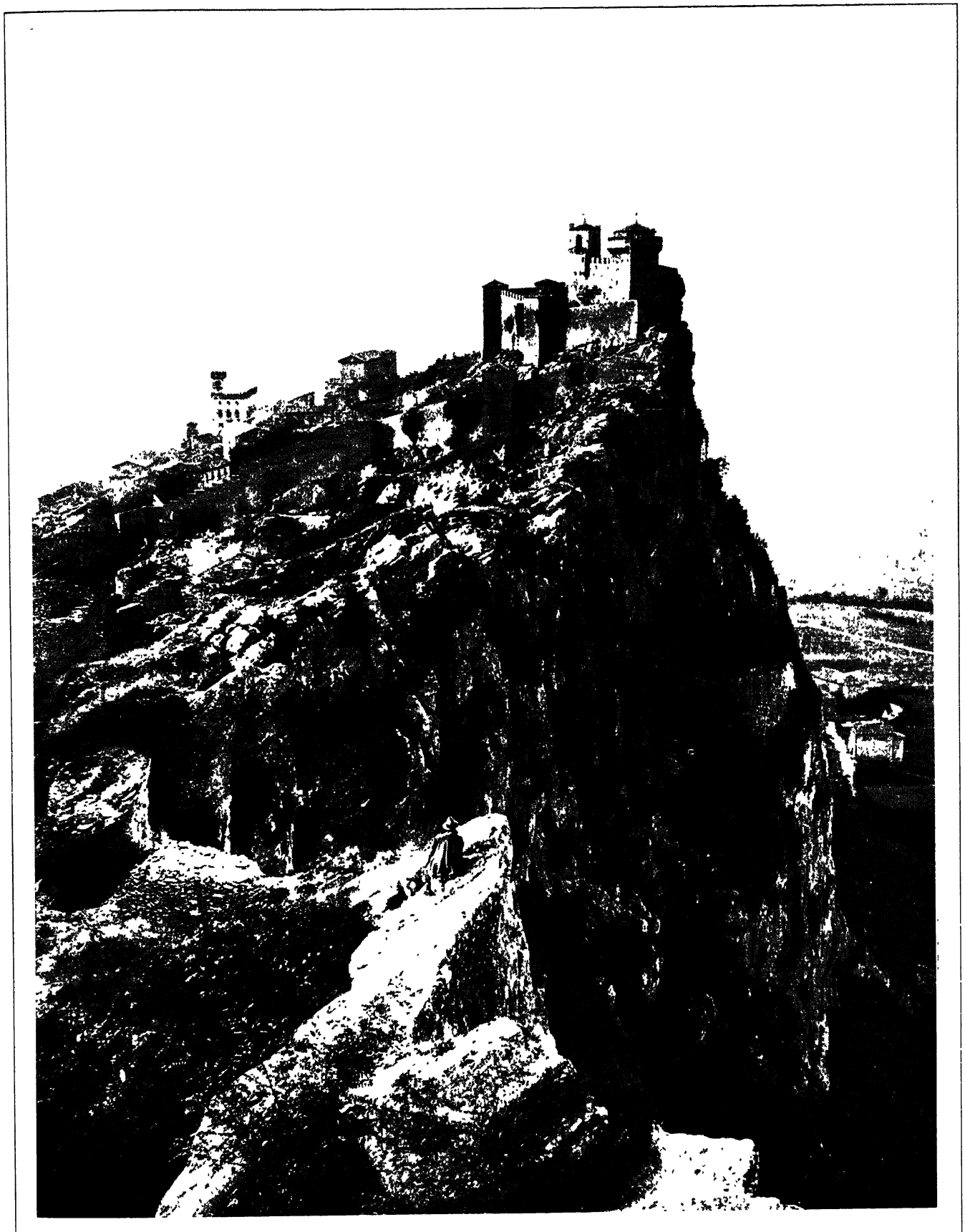
SAN LUCAR (Sanlúcar de Barrameda), a fortified seaport of southern Spain, in the province of Cadiz; 27 m. by sea from Cadiz, on the left bank of the Guadalquivir estuary, and on the Puerto de Santa Maria-San Lucar and Jerez de la Frontera-Bonanza railways. Pop. (1920), 27,103. Inscriptions and ruins prove that San Lucar and Bonanza were Roman settlements, though the original names are unknown. San Lucar was captured from the Moors in 1264, after an occupation lasting more than five and a half centuries. After 1492 it became an important centre of trade with America. From this port Columbus sailed across the Atlantic in 1498, and Magellan started in 1519 to circumnavigate the world. The 14th-century church and the palace of the dukes of Medina Sidonia contain many valuable pictures. The hospital of St. George was established by Henry VIII. of England. The Guadalquivir estuary is deep and sheltered. Bonanza, 2 m. by rail up the river, and on the same bank, is the headquarters of the shipping and fishing trades. It is named after a chapel dedicated here by the South American Company of Seville to the Virgin of Fair Weather (*Virgen de la Bonanza*). The fisheries and agricultural trade of San Lucar are considerable; there are flour mills in the town.

SAN LUIS, a province of Argentina, bounded N. by Rioja, E. by Córdoba, S. by the La Pampa territory and W. by Mendoza. Area, 29,035 sq.m. Pop. (1914) 116,266; 1927 estimate 149,722. San Luis belongs partly to the semi-arid pampa region, and partly to the mountainous region of the eastern Andes and Córdoba, whose ranges terminate between the 33rd and 34th parallels. It is one of the least important of the Argentine provinces because of its aridity and lack of available resources. Agriculture and grazing occupy some attention in the north, but are handicapped by lack of water. The mountains are rich in minerals, however, and a number of gold mines have been opened. The exports include cattle, hides, skins, wool and ostrich feathers. The capital is San Luis (pop. 1914, about 14,000) on the Arroyo Chorillos, a little S. of the *cerro* called Punta de los Venados, 161 m. by rail from Mendoza, and magnificently situated on a plateau 2,490 ft. above sea-level. Next in importance is the town of Mercedes or Villa Mercedes (pop. 1914, about 18,250) on the Río Quinto, an important railway junction where the railways from Buenos Aires, Rosario, Mendoza and San José unite.

San Luis was founded in 1697 by Martín de Loyola and was for nearly 200 years only a frontier outpost.

SAN LUIS OBISPO, a city of south-western California, U.S.A., 8 m. from the ocean and 190 m. N.W. of Los Angeles; the county seat of San Luis Obispo county. It is served by the Pacific Coast and the Southern Pacific railways. Pop. (1920) 5,895; 1930 it was 8,276. Its harbour (Port San Luis, on the bay 9 m. S. of the city) is one of the important oil ports of California. The city was founded by Father Junípero Serra, who built here his fifth mission, now used as a parish church.

SAN LUIS POTOSÍ, a central State of Mexico, bounded north by Coahuila, east by Nuevo León, Tamaulipas and Veracruz, south by Hidalgo, Querétaro and Guanajuato, and west by Zacatecas. Area, 24,412 sq. miles. Pop. 445,681 in 1921. The State belongs wholly to the high plateau region, with the exception of a small area in the S.E. angle, where the tableland breaks down into the tropical valley of the Pánuco. The surface is comparatively level, with some low mountainous wooded ridges. The mean elevation is about 6,000 ft., ensuring a temperate climate. The rainfall is light and uncertain and the State is poorly provided with rivers. The soil is fertile and in favourable seasons large crops of wheat, Indian corn, beans and cotton are grown on the uplands. In the low tropical valleys, sugar, coffee,



PHOTOGRAPH, DONALD MCLEISH

THE TOWN OF SAN MARINO, CAPITAL OF THE REPUBLIC

San Marino, founded probably in the 4th century, is situated on the slopes of the mountain whose steep sides and crags constitute in great part the territory of the Republic. It has three citadels, all overlooking Rimini (Italy) and the Adriatic. The turreted building on the left is the Parliament house



tobacco, peppers and fruit are staple products. Stock-raising is an important industry and hides, tallow and wool are exported. Fine cabinet and construction woods are also exported to a limited extent. San Luis Potosí ranks among the leading mining states of Mexico. The Catorce district has some of the richest silver mines in the country. Other well-known silver mining districts are Peñón Blanco, Ramos and Guadalcázar. The development of Guadalcázar dates from 1620 and its ores yield gold, copper, zinc and bismuth, as well as silver. In the Ramos district, Cocinera lode is said to have had a total yield of over $60,000,000. Railway facilities are provided by the Mexican Central and Mexican National lines. The capital is San Luis Potosí, and other towns, with populations as of 1921, are: Matehuala (12,493), a mining town 20 m. E. by W. of Catorce, with which it is connected by a branch railway; Catorce (7,000 in 1910 and only 733 in 1921), an important mining town 110 m. N. (direct) of San Luis Potosí (capital) and 8 m. from its railway station on the Mexican National; at an elevation of 8,780 ft., Santa María del Río (2,663), 37 m. S.E. of the capital; Venado (2,003), 45 m. N. of the capital; Río Verde (7,999), an agricultural centre with a national agriculture experiment station in its vicinity; Soledad Díez Gutiérrez (3,676), near the capital.

SAN LUIS POTOSÍ, a city of Mexico and capital of a State of the same name, near the head of the valley of the Río Verde (a tributary of the Pánuco), 215 m. N.W. of Mexico City. Pop. (1921) 57,353. The city is served by the Mexican Central and the Mexican National railways. The altitude of the city, 6,168 ft. above sea-level, gives it a cool temperate climate, though the sun temperatures are high. Notable buildings are the cathedral and Government palace fronting on the Plaza Mayor, the latter conspicuous for its façade of rose-coloured stone; the churches of El Carmen, San Francisco and Guadalupe; the La Paz theatre, mint, penitentiary and the Instituto Científico, in which law, medicine and science are taught. San Luis Potosí is an important railway and distributing centre, with a considerable trade in cattle, tallow, wool, hides and minerals. Its proximity to the port of Tampico, with which it was connected by a branch of the Mexican Central railway in 1885, has greatly increased its commercial importance, though in earlier days it was also one of the principal centres of the diligence and pack-train traffic of this part of Mexico. The city has cotton and woollen factories using modern machinery, and large smelting works.

San Luis Potosí was founded in 1586. It was the centre of colonial administration and played a very important part in the civil wars and political disorders following Mexican independence. It was the seat of the Mexican Government of Benito Juárez in 1863, but was soon afterwards captured by the French under Bazaine. It was recovered by Juárez in 1867, after the French had retired.

SAN MARCOS, a city of southern Texas, U.S.A., on Federal highway 81, about midway between Austin and San Antonio; county-seat of Hays county. It is served by the Missouri-Kansas-Texas and the Missouri Pacific railways. Pop. (1920) 4,527 (75% native white), 5,134 in 1930 by the Federal census. It is the seat of the Southwest Texas State Teachers College and of a station of the United States Fisheries Commission. There are cotton gins, cottonseed-oil mills, a cotton mill with 10,000 spindles, and other manufacturing industries. Near by are the largest cattle raising farms in the State. San Marcos was founded in 1848 and was chartered as a city in 1877.

SAN MARINO, a republic in northern Italy, 14m. S.W. of Rimini by road. It is the smallest republic in the world (32 sq.m. in area). According to tradition, the republic was founded by Marinus, a native of Arbe, probably after the middle of the 4th century. The *Castellum Sancti Marini* is mentioned in 755, the oldest document in the Republican archives mentions the abbot of San Marino in 885. The republic, as a rule, avoided the faction fights of the middle ages, but joined the Ghibellines and was interdicted by the pope in 1247–49. After this it was protected by the Montefeltro family, later dukes of Urbino, and the papacy and successfully resisted the attempts of Sigismondo Malatesta against its liberty. In 1503 it fell into the hands of Caesar Borgia, but soon regained its freedom. Other attacks failed, but civil discords in the meantime increased. Its independence was recognized in 1631 by the papacy. In 1739 Cardinal Alberoni attempted to deprive it of its independence, but this was restored in 1740 and was respected by Napoleon. The arms of the republic are three peaks, each crowned with a tower. There are traces of three different enceintes of the 14th, 15th, and 16th centuries. The principal church (Pieve), in classical style, dates from 1826–38 and contains the body of St. Marinus. The old church is first mentioned in 951. The available armed forces of the republic form a total of about 1,200 men, all citizens able to bear arms being technically obliged to do so from the age of 16 to 60 years. It issues its own copper coinage, which circulates in Italy also; but Italian money is current for the higher values. Most of the republic falls within the diocese of Montefeltro, a small portion within that of Rimini.

The peaceful revolution of March 25, 1906, restored the original system of election to the council (which had become a close corporation, renewed by co-option) by the *Arengo,* or assembly of heads of families, one-third of the council being henceforth renewable every three years. But in Sept. 1920 the council resigned in a body and enlarged the *Arengo* into a single constituency, electing the 60 councillors under practically universal suffrage and proportional representation.

San Marinese public life takes its colour from Italy; thus, the Catholic Popular Party there, as in Italy, was powerful in 1920 and Socialism, imported from abroad, was largely represented, while Fascism has appeared. Pending the election of their successors after the vote of 1920, the two half-yearly presidents of the republic, for the first time since 1787, remained in office after their six months' legal tenure had expired, and, for the first time since 1740, the new *Capitani Reggenti* came into power on Dec. 5 instead of Oct. 1 or April 1, the time-honoured dates, a return to which was effected at the ensuing election of presidents.

In the World War the Germans accused the Republic of espionage through the wireless station on Mt. Titano, which stands 2,437ft. above the sea. When Italy entered the war, San Marino showed its sympathies by voting £1,500 for the Italian sufferers, and one of the regents publicly expressed his hope for an Italian victory. San Marino has been since 1862 in treaty relations with Italy. In 1921 the flight of socialists into the republic, and the "punitive expedition" of the Fascisti in search of them, led San Marino to invoke the aid of the Italian Carabinieri.

The republic no longer confers titles for a consideration, but finds a fruitful source of revenue in the frequent changes of its postage stamps (first issued in 1877 and divided into two series, one for foreign and the other for internal postage, in 1899). However, it has had to resort to a loan, and new taxes were imposed to provide higher salaries for officials, causing the peasant rising in 1910. But it has steadily refused the offer of a gaming table. In recent years newspapers have been published. The only exports, besides postage stamps, are stone from Mt. Titano—the legendary founder of San Marino was a Dalmatian stone cutter—and the strong wine grown on this volcanic soil. The museum contains among other curiosities the banner of Garibaldi's "Italic Legion," which sought refuge at San Marino in 1849. The archives were re-arranged and described by Malagola. The population in 1925 was 12,952.

BIBLIOGRAPHY.—M. Delfico, *Memorie storiche della Repubblica di S. Marino* (4th ed., Naples, 1865); J. T. Bent, *A Freak of Freedom, or the Republic of San Marino* (1879); C. Malagola, *L'Archivio Governativo della Repubblica di San Marino* (Bologna, 1891); C. Ricci, *La Repubblica di San Marino* (Bergamo, 1903); *Verbale dell' Arringo Generale dei Capi-Famiglia tenutosi il giorno di Domenica, 25 Marzo, 1906* (S. Marino, 1906); Marino Fattori, *Ricordi storici della Repubblica di S. Marino,* 6th ed., edit. by O. Fattori (1912); *Verbale del Consiglio Grande e Generale della Seduta, 18 Settembre, 1920* (S. Marino, 1920); W. Miller, "Democracy at San Marino," *History* vol. vii. (April, 1922).

SAN MARTÍN, JOSÉ DE (1778–1850), South American soldier and statesman, was born at Yapeyú, on the river Uruguay, on Feb. 25, 1778. He was educated in Madrid for a military career and served against the Moors and in the struggle against Napoleon. In 1812 he offered his services to the Government of

Buenos Aires in its war for independence. Early in 1814 he was placed in command of the revolutionary army operating against the Spaniards in upper Peru, but soon resigned his command, realizing that the permanent success of the revolutionary movement depended upon the expulsion of the Spaniards from Chile, and also from their stronghold in Peru. To carry out this purpose, he enlisted the co-operation of the Government of Buenos Aires, and, assisted by Bernardo O'Higgins, raised and equipped at Mendoza, a well-trained army of Argentines and Chileans for the invasion of Chile. In Jan. 1817, he suddenly carried his army (3,000 infantry, 1,000 cavalry and baggage) across the Andes through the Uspallata pass, outgeneraled the Spanish commanders, and routed a large part of their forces at Chacabuco, on Feb. 12, 1817. Northern Chile, including Santiago, the capital of the country, being now freed of the Spanish, he turned the government over to O'Higgins, and set about the reconquest of the south, which he effected in the decisive victory of Maipú (April 5, 1818), thus completely establishing the independence of Chile.

With half of his programme accomplished, he laid his plans for the attack upon Peru. He not only reorganized the army, but with the aid of Lord Cochrane constructed a fleet to operate simultaneously with it. In July 1821, the Spaniards evacuated Lima before the combined forces of the army and navy, and retired to the mountains. San Martín entered the city, proclaimed the independence of Peru, and assumed the reins of government under the title of protector. His position, however, was not yet secure. He was threatened by royalist operations in the interior, by jealousy among the patriots, and by the rivalry of Bolívar, whose victories in Colombia and Ecuador had carried him southward to the northern borders of Peru. The great Colombian's ambition could brook no rival, and on Sept. 20, 1822, San Martín, having paved the way for the conclusive victories of Junín (1823) and Ayacucho (1824), resigned his authority and retired from the country. Finding it impossible to live a peaceful private life in South America, he withdrew as an exile to Europe. There he lived in poverty until his death at Boulogne on Aug. 17, 1850, from time to time vainly offering his services to the distracted nations he had helped to found.

San Martín did more than any other man for the cause of independence in the Argentine, Chile and Peru. He was an able soldier, and a clear-sighted and vigorous statesman.

See W. S. Robertson, *Rise of the Spanish Republics* (1918); Anna Schoelkopf, *Don José de San Martín, 1778–1850, A Study of His Career* (1924); and B. Moses, *The Intellectual Background of the Revolution in South America, 1810–1824* (1926). (W. B. P.)

SAN MARTÍN, a department of Peru, estimated to contain 17,450 sq.m., created in 1906. It includes mountainous areas and the valley of the Huallaga river, a tributary of the Marañón, which flows into the Amazon. It is bounded north and east by the department of Loreto, from which it was formed, south by Huánuco and west by the departments of Libertad and Amazonas. Its population is estimated at 70,361. The capital is Moyobamba, situated on the Mayo river, a tributary of the Huallaga. The principal trade outlet is through Yurimaguas (Loreto), a river port on the Huallaga, down to Iquitos on the upper Amazon, about 500 m. distant.

SAN MATEO, a city of San Mateo county, California, U.S.A., on the west side of San Francisco Bay, 21 m. S. of San Francisco. It has a commercial airport and is served by the Southern Pacific railway. Pop. (1930) 13,444. The city operates under a city-manager form of government.

SANMICHELE, MICHELE (1484–1559), Italian architect, was born in San Michele near Verona. He was a pupil of his father Giovanni and his uncle Bartolommeo, both architects at Verona and went at an early age to Rome to study classic sculpture and architecture. Among his first works are the duomo of Montefiascone, the church of San Domenico at Orvieto, several palaces and a fine tomb in S. Domenico. He was also employed by the signoria of Venice as a military architect. One of Sanmichele's most graceful designs is the Cappella de' Peregrini in the church of S. Bernardino at Verona. He built a number of fine palaces at Verona, including those of Canossa, Bevilacqua and Pompei, as well as the graceful Ponte Nuovo. In 1527 Sanmichele began to transform the fortifications of Verona according to the newer system of corner bastions which he did much to advance. His last work (1559) was the round church of the Madonna di Campagna, 1½ m. from Verona. He also wrote a work on classic architecture, *I Cinque Ordini dell' architettura,* printed at Verona in 1735.

See Ronzani and Luciolli, *Fabbriche . . . di M. Sanmichele* (Venice, 1832); and Selva, *Elogio di Sanmichele* (Rome, 1814).

SAN MIGUEL, the capital of the department of San Miguel, Salvador; 80 m. E. by S. of San Salvador, near the right bank of the Río Grande, and at the foot of the volcano of San Miguel or Jucuapa (7,120 ft.). Pop. (1925) 35,546. San Miguel is an important and attractive city, on the main line of the International railways of Central America. It possesses several handsome churches, municipal buildings, law courts and two well-equipped hospitals. Near it are the ruins of an ancient Indian town. San Miguel has a flourishing trade in grain, rubber, cattle and indigo. Its port is La Union (*q.v.*). San Miguel was founded in 1530 by Spanish settlers, and became a city in 1586. It is now third in size among the cities of the republic.

SAN MIGUEL DE MAYUMO, a municipality (with administration centre and 18 *barrios* or districts) of the province of Bulacan, Luzon, Philippine Islands, about 40 m. N. of Manila on the Manila-Dagupan railway. Pop. (1918), 17,988. It lies in a fertile district and has a comparatively wealthy class which has acquired its riches from the cultivation of rice. Sugar, corn and cotton are also produced abundantly and cattle are raised. It is a centre for the manufacture of hats and silk textiles and for the industries of weaving, tanning, distilling alcohol from the nipa palm, the making of furniture and fish breeding. About 8 m. N.E. are the springs of Sibul, whither many people go annually to take the waters. In 1918, San Miguel had 16 manufacturing establishments, 7 rice mills and 41 household industry establishments, with outputs valued at 68,100, 1,248,000 and 19,100 pesos respectively. Of the 15 schools, 14 were public. The language spoken is Tagalog.

SAN MINIATO, a town and episcopal see of Tuscany, Italy, in the province of Florence, 26 m. W. by S. of Florence by the railway to Pisa, 512 ft. above sea-level, on a hill 2 m. S. of the railway. Pop. (1921) 7,792 (town); 21,398 (commune). Its cathedral was remodelled in 1489 and has a façade decorated with disks of majolica. It has other churches of some interest. It manufactures glass, olive oil, leather and hats and has a castle of Frederick II., the residence of the imperial governors of Tuscany from 1226 to 1286, and from them bears the name of San Miniato al Tedesco.

SAN NICOLÁS DE LOS ARROYOS, a town and river port of Argentina, in the Province of Buenos Aires, on the west bank of the Paraná, 150 m. by rail N.W. of the city of Buenos Aires. Pop. (1925) about 30,000. It is a flourishing commercial town, and a port of call both for river and ocean-going steamers of medium tonnage. It is a station on the main line of the Central Argentine railway, and the terminus of a branch line from Pergamino. It exports wheat, flour, wool and frozen mutton. The town is the judicial centre for the northern district of Buenos Aires. San Nicolás was founded in 1749 by José de Aguilar on lands given for that purpose by his wife (*née* Ugarte). Its growth was very slow until near the end of the 19th century.

SANOCRYSIN. A gold compound used in the treatment of pulmonary tuberculosis. (*See* MEDICAL RESEARCH.)

SAN PABLO, a municipality (with administration centre and 42 *barrios* or districts) of the province of La Laguna, Luzon, Philippine Islands, about 9 m. S. of Laguna de Bay, and about 35 m. S.S.E. of Manila. Pop. (1918), 31,399. It has railway connections with Manila by way of Malvar, in the province of Batangas. Coco-nut palms grow in great abundance and copra is the chief product. Abacá and rice are also grown. In 1918, it had 46 manufacturing establishments, 7 rice mills and 61 household industry establishments with outputs valued at 800,000, 142,000 and 35,200 pesos respectively. Of the 25 schools, 16 were public. The language spoken is Tagalog.

SANQUHAR, a royal burgh and parish of Dumfriesshire, Scotland. Pop. (1931) 1,753. It is situated on the Nith, 26 m. N.W. of Dumfries by the L.M.S. railway. It became a burgh of barony in 1484 and a royal burgh in 1596, and was the scene of the exhibition of the Covenanters' Declaration, attached to the market cross in 1680 by Richard Cameron and in 1685 by James Renwick. The industries include coal-mining and the making of iron and steel, bricks and tiles, spades and shovels. The coalfield is very extensive. There are cattle and sheep fairs, and an agricultural show is held every May. Sanquhar castle, on a hill overlooking the Nith, once belonged to the Crichtons, ancestors of the marquess of Bute, but is now a ruin.

SAN RAFAEL, a beautiful residential city of California, U.S.A., 10 m. N. of San Francisco, on San Pablo Straits, at the foot of Mount Tamalpais; the county seat of Marin county. It is served by the North-western Pacific railroad and by ferries. Pop. (1920) 5,512; 1930 Federal census 8,022. It is the seat of several private schools and of the Dominican college (established in 1850, at Monterey). A Franciscan mission was established here in 1817 and around it a settlement grew up. Of the mission nothing remains but a group of pear trees planted by the Fathers and still bearing in 1928. The city was incorporated in 1874.

SAN REMO, a seaport of Liguria, Italy, in the province of Imperia, on the Riviera di Ponente, 9¾ m. E. of Ventimiglia by rail, and 84 m. S.W. of Genoa. Pop. (1921) 20,538 (town); 24,739 (commune). Climbing the slope of a steep hill it looks south over a small bay, and, protected towards the north by hills rising gradually from 500 to 8,000 ft., it is in climate one of the most favoured places on the whole coast, which accounts for its reputation as a winter resort. The older town, with its narrow steep streets and lofty sombre houses protected against earthquakes by arches connecting them, contrasts with the new visitors' town, containing all the public buildings, which has grown up at the foot of the hill. The small harbour is sheltered by its sickle-shaped mole, 1,300 ft. long. Besides the Romanesque cathedral of San Siro, the white-domed church of the Madonna della Costa, at the top of the old town, may be mentioned. The Emperor Frederick's residence at San Remo in 1887–1888 greatly increased its repute as a winter resort. Flowers, especially roses and carnations, are extensively grown for export, and olives, lemons and palms are also cultivated.

SAN REMO, CONFERENCE OF (April 19–26, 1920). This conference was preceded by a meeting of the Supreme Allied Council (Mr. Lloyd George, M. Millerand, and Sig. Nitti) from Feb. 12 to 23 in London, where the main lines of the future Treaty of Sèvres (*see* SÉVRES, TREATY OF) with Turkey were laid down, and the draft treaty with Hungary and the Fiume question were discussed. At San Remo itself, where the three statesmen above mentioned were joined by representatives of Greece, Belgium and Japan, the Turkish Treaty was the first and principal business dealt with, and the framework of the Sèvres Treaty was there constructed. The mandates for Syria, Palestine and 'Iraq were assigned to France and Great Britain respectively, and an Anglo-French oil agreement was negotiated which covered Rumania and the French and British non-self-governing colonies as well as the Middle East. The most controversial question dealt with, as between the Allies, was that of the maximum strength of the German army—both its total and the number of troops allowed in the neutral zone skirting the area under Allied occupation. On account of the Kapp *Putsch* and other internal disorders the German Government asked the conference to permit the increase of the German army to twice the strength allowed by the Versailles Treaty. This request was refused and Germany charged with default in respect both of reparations and disarmament. At the same time the German Government was informed of the intention of the Allies to invite them to a direct conference. (*See* SPA, CONFERENCE OF.)

SAN SALVADOR, the capital of the republic of Salvador; situated in the valley of Las Hamacas, on the river Asalguate, at an altitude of 2,115 ft., and 30 m. inland from the Pacific. Pop. (1925) 84,315. San Salvador is connected by rail with La Unión on the West and with all of the chief cities of Salvador, and by the through line of the International [redacted] America, with Guatemala and the Caribb[redacted] Barrios, Guatemala, also with the Pacific po[redacted] older Salvador railway. It is connected wit[redacted] Libertad by a fine, hard-surfaced highway. In [redacted] Government offices, its buildings include a handso[redacted]rsity, a modest cathedral, a national theatre, an academy of science and literature, a chamber of commerce, an astronomical observatory and a number of hospitals and charitable institutions. There are two large parks and an excellent botanical garden. In the Plaza Morazán, the largest of many shaded squares, is a handsome bronze and marble monument to the last president of united Central America, from whom the plaza takes its name. San Salvador is the only city in the republic which has important manufactures; these include the production of soap, candles, ice, shawls and scarves of silk, cotton cloth, cigars, flour and spirits. The city is excellently paved with concrete, is admirably policed, has an abundant water supply, and can in many respects compare favourably with the smaller provincial capitals of Europe and America. It was founded by Don Jorge de Alvarado in 1528, at a spot near the present site, to which it was transferred in 1539. Except for the year 1839–40 it has been the capital of the republic since 1834. It was temporarily ruined by earthquakes in 1854 and 1873.

SAN SALVADOR DO CONGO: *see* ANGOLA.

SANS-CULOTTES, the term originally given during the early years of the French Revolution to the ill-clad and ill-equipped volunteers of the Revolutionary army, and later applied generally to the ultra-democrats of the Revolution. They were for the most part men of the poorer classes, or leaders of the populace, but during the Terror public functionaries and persons of good education styled themselves *citoyens sans-culottes* ("citizens without knee-breeches"). The distinctive costume of the typical sans-culotte was the *pantalon* (long trousers)—in place of the *culottes* worn by the upper classes—the *carmagnole* (short-skirted coat), the red cap of liberty and *sabots* (wooden shoes). The influence of the Sans-culottes ceased with the reaction that followed the fall of Robespierre (July 1794), and the name itself was proscribed. In the Republican Calendar the complementary days at the end of the year were at first called *Sans-culottides;* this name was, however, suppressed by the Convention when the constitution of the year III. (1795) was adopted, that of *jours complémentaires* being substituted.

SAN SEBASTIAN (Basque *Iruchulo*), a seaport and the capital of the Spanish province of Guipúzcoa, on the Bay of Biscay, and on the Northern railway from Madrid to France. Pop. (1920), 61,774. In 1886 San Sebastian became the summer residence of the court. The city occupies a narrow sandy peninsula, which terminates on the northern or seaward side in a lofty mass of sandstone, Monte Urgull; it is flanked on the east by the estuary of the river Urumea, on the west by the broad bay of La Concha. The old town, rebuilt after the fire of 1813, lies partly at the foot of Monte Urgull, partly on its lower slopes. Until 1863 it was enclosed by walls and ramparts, and a strong fort, the Castillo de la Mola, still crowns the heights of Urgull. The Alameda separates the old town from the new and gardens and villas now extend right up Monte Igueldo. The bay of La Concha has a broad sandy shore. There are saw and flour mills, and manufactures of preserves, soap, candles, glass and paper, especially in the busy suburb that has sprung up on the right bank of the Urumea. The fisheries are important. Vessels of 12 ft. draught can nearly always enter both dock and harbour. Larger vessels anchor south-east of Santa Clara island. From its position near the frontier San Sebastian was long a first-class fortress, and has sustained many sieges.

SAN SEVERINO (anc. *Septempeda*), a town and episcopal see of the Marches, Italy, in the province of Macerata, from which it is 18 m. W. by S. by rail. Pop. (1921) 6,599 (town); 14,127 (commune). The lower town is situated 781 ft. above sea-level, and contains the new cathedral of S. Agostino, with a fine altar-piece by Pinturicchio (1489). S. Lorenzo in Doliolo and S. Domenico are both Romanesque churches. The Palazzo

interesting pictures by artists of the Marches. Salimbeni da San Severino, who painted of frescoes in the oratory of S. Giovanni in 1416, were natives of the town. So was Alessandro, of the end of the 15th century, whose pictures are mainly to be found in the Marches. The old cathedral of S. Severino is in the upper town (1,129 ft. above sea-level); it contains frescoes by the two Salimbeni, and very fine choir stalls (1483–1513). The ancient Septempeda lay 1 m. below the modern town, on the branch road which ran from Nuceria Camellaria, on the Via Flaminia.

SAN SEVERO, a city in Apulia, Italy, in the province of Foggia, from which it is 17 m. N.N.W. by rail. Pop. (1921) 34,606. San Severo lies at the foot of the spurs of Monte Gargano, 292 ft. above sea-level. It is the see of a bishop (since 1580), and has some remains of its old fortifications. San Severo dates from the middle ages. It was laid in ruins by Frederick II. In 1799 the town was almost entirely destroyed by the French. In 1627, 1828 and 1851 the town suffered from earthquakes. It is surrounded by fertile vineyards and oliveyards.

SANSKRIT LANGUAGE AND LITERATURE. The most important branch of the Indo-European family of languages (*q.v.*) in Asia is Aryan or Indo-Iranian, with two main divisions: Iranian and Indo-Aryan. Languages belonging to the latter are spoken to-day by 250 million people in India, where they are the dominant languages except in the south, in Ceylon and the Maldive Islands, and throughout western Asia and Europe by colonies of Gypsies (*see* ROMANY LANGUAGE). As languages of administration they spread at one time far into central Asia, where now is Chinese Turkestan; and as vehicles of Buddhism they have influenced through translation the whole of central and eastern Asia; Hindu civilization carried their vocabulary into the East Indies and the Malay peninsula. The oldest documents of Indo-Aryan are composed in Sanskrit. These are the Vedic texts. Their exact date is unknown, but it is probable that the oldest of them belong to the latter half of the second millennium B.C. They were probably composed before the Aryans had learned the use of writing; but being religious texts which it was essential to preserve unchanged they were handed down by an oral tradition which by various controls was made exceedingly exact. Even at the time of entry into India there must have been some dialectical differences in the language as spoken by the various invading tribes; with their further extension into India itself these differences became accentuated. The language of the Vedic texts shows a certain mixture, but is in the main founded upon the dialect of the north-west of India. With the advance of Aryan culture into the Punjab and the Gangetic plain the eastern dialects gained in importance; and this eastern influence, discernible in the earliest texts, constantly gains ground.

The most archaic of these texts is the Rig-veda, a collection of liturgical hymns; this is followed by the Atharva-veda, consisting chiefly of magical formulas, of prayers, curses and incantations. Considerably later come the first compositions in prose, commentaries on the Veda and philosophical treatises termed Brāhmaṇas and Upaniṣads. Although originally preserved as a religious language, Sanskrit was finally used for secular purposes. The earliest inscription in Sanskrit dates from 150 A.D., but it became the regular language of official inscriptions only in the 4th century A.D. But long before that the grammarians (of whom the most celebrated was Pāṇini in the 4th century B.C.) had fixed it as a learned language to which alone a strict interpretation confines the name Sanskrit, "the perfected," but which may conveniently be termed Classical Sanskrit as opposed to the Vedic or older form. As a literary language it is still cultivated; and a vast literature—philosophical, narrative, lyrical, dramatic, technical—has been written in it. Standing, in form at least, between the later Vedic and the Classical, but more nearly approaching the latter, is the language of the two great epics, the Mahābhārata and the Rāmāyaṇa, in which the influence of the spoken language can clearly be seen. For in the meantime the spoken dialects continued to develop. Some of these, such as Pali and the Prakrits (*qq.v.*), were in turn crystallized and used as religious languages by new sects as well as for secular purposes before Sanskrit was so employed. From these vernaculars are eventually derived the modern Indo-Aryan languages. Sanskrit, the literary language, although preserving the sound-system of Vedic practically unchanged, did not escape the influence of its descendants. The grammar was considerably changed, chiefly in a simplifying and normalizing direction; meanings of words were altered and developed, and vast quantities of new words were gradually absorbed after being given a Sanskrit form. On the other hand Sanskrit has continued to influence the spoken languages.

VOWELS			CONSONANTS					
Initial.	Medial.	Equivalent.	Equivalent.			Equivalent.		
अ	–	a	क	k	GUTTURALS	प	p	LABIALS
आ	ा	ā	ख	kh		फ	ph	
इ	ि	i	ग	g		ब	b	
ई	ी	ī	घ	gh		भ	bh	
उ	ु	u	ङ	ṅ		म	m	
ऊ	ू	ū	च	c	PALATALS	य	y	SEMIVOWELS
ऋ	ृ	ṛ (or ṭ)	छ	ch		र	r	
ॠ	ॄ	ṝ (or ṭ̄)	ज	j		ल	l	
ऌ	ॢ	ḷ (or ḷ)	झ (or ज्ह)	jh		व	v	
			ञ	ñ				
ए	े	e	ट	ṭ	CEREBRALS	श	ś (or ç)	SPIRANTS
ऐ	ै	ai	ठ	ṭh		ष	ṣ	
ओ	ो	o	ड	ḍ		स	s	
औ	ौ	au	ढ	ḍh		ह	h	
			ण	ṇ				
			त	t	DENTALS	ः	ḥ (Visarga)	
			थ	th				
			द	d				
			ध	dh		ं	ṁ (or ṃ) (Anusvāra)	
			न	n				

FROM MACDONELL, "SANSKRIT GRAMMAR FOR STUDENTS" (CLARENDON PRESS)

Sounds.—The sound-system of Sanskrit consisted of: (*a*) Fourteen vowels, viz.: Twelve simple vowels: *a, ā, i, ī, u, ū, ṛ, ṝ, ṛ, ḷ, (ḹ), ē, ō* . Two diphthongs: *ai, au.*

(*b*) Thirty-six consonants, viz.: Five series of stops and nasals: guttural: *k, kh, g, gh, ṅ;* palatal: *c, ch, j, jh, ñ;* cerebral: *ṭ, ṭh, ḍ, ḍh, ṇ;* dental: *t, th, d, dh, n;* labial: *p, ph, b, bh, m.* Four semi-vowels: *y, r, l, v.* Three sibilants: palatal *ś,* cerebral *ṣ,* dental *s.* Two aspirates: voiced *h,* unvoiced *ḥ* (*visarga*). A nasal with loose closure of the lips *ṁ* (*anusvāra*), and another nasal *m̐* (*anunāsika*) which probably was a simple nasalization of the vowel rather than a consonant proper.

Vowels.—The vowel-system was inherited practically unchanged from the common Indo-Iranian period, the only specific Sanskrit development being the change of the Indo-Iranian short diphthongs **ai, *au* (=Avestic *aē, ao*) to *ē, ō* (still classed as diphthongs by Indian grammarians) and of the long diphthongs **āi, *āu* to *ai, au.* Thus to Avestic *daēvo haomo uxδāiš gāuš* Sanskrit corresponds with *dēváḥ sōmáḥ ukthāíḥ gáuḥ.* The comparative simplicity of the vowel-system and the great predominance of the vowels *a* and *ā* were due to the fact that in the Indo-Iranian period four distinct Indo-European sounds—*e, o, a, ᵊ* (*ṅ, ñ, ṃ*)—had coalesced in the one sound *a* (similarly *ē, ō, ā* had all become *ā*). The only trace left of the earlier differentiation was the fact that an original guttural before *ă̄* representing older *ĕ* had become a palatal: thus we have *sácatē,* "follows," from **sekʷetai* (Greek *hépetai,* Latin *sequitur*), but *sákṣat,* "he shall follow" beside Gk. *hépsetai.* Similarly the 12 I.E. diphthongs—*ei, oi, ai, eu,*

ou, au, ēi, ōi, āi, ēu, ōu, āu—were merged in four Skt. sounds *ē, ō, ai, au*. In this way the vowel-alternation (especially between *e* and *o*), a characteristic feature of Indo-European, was largely lost. Nevertheless, where the word contained a sonant the alternation, although diminished in scope, was still discernible: *e.g.*, I.E. *ei: oi: i* became Skt. *ē: i* (*e.g.*, Gk. *leípei: loipós: élipe*=Skt. *rēcati: rēkaḥ: aricat*), I.E. *e, o: ē, ō* became Skt. *a: ā*. The correspondences thus resulting—*a: ā; i: ē: ai; u: ō: au; ṛ: ar: ār*—being associated with particular grammatical formations were still further developed in Sanskrit into a system, which, early recognized by the Indian grammarians, was used by them in their description of the formation of the language.

Consonants.—The consonant-system has remained much truer to the original Indo-European. It is characterized by the rarity of spirants and by the opposition of unaspirated and aspirated stops (both surd and voiced) in each series. In preserving the voiced aspirate stops unchanged, Sanskrit and its descendants (for most of the modern Indo-Aryan languages still possess these sounds) are unique among the Indo-European languages, in which these sounds either became surd aspirates and later spirants (as in Greek and Latin) or lost their aspiration (as in Iranian, Balto-Slavonic, Armenian, Albanian, Germanic, Celtic). Thus to Greek *phérō*, Latin *fero*, Eng. *bear*, Sanskrit corresponds with *bhárāmi*, to Gk. *éthēke*, Lat. *fēcit*, Eng. *deed* with *ádhāt*.

Some consonants were restricted in their use: *ñ* appeared only before or after palatals, *ṅ* only finally or before gutturals (and where a guttural had subsequently disappeared), *ṇ* only between vowels and semi-vowels or before cerebral stops, *ḥ* only finally or before sibilants and surd gutturals or labials, *ṁ* only finally or before consonants. Neither aspirate nor *h* nor *ś* ended a word. At the end of a sentence only the following consonants were used: *k, ṭ, t, p, ṅ, n, m, ḥ*.

Of the palatals *ch* appears as a single consonant only initially: elsewhere it is always doubled unless preceded by another consonant, for it corresponds to the Indo-European group *sḱ*$_1$: *e.g.*, *chindánti* "they cut"=Latin *scindunt*, *gácchāmi* "I go"=Greek *báskō*, *vāñchā* "wish"=Germ. *Wunsch*. *j* represents two I.E. sounds (1) palatal g_1 (=Gk. *g*, Avestic *z*): *jánaḥ* "birth"=Av, *zanō*, Gk. *génos*, Lat. *genus*; (2) velar g^w before an original *ĕ* or *ŏ* (=Av. *j*): *jīváḥ* "alive"=Av. *jīvō*, Lat. *vīvos*, *cf.* Gk. *bíos*, Eng. *quick*. *jh* does not belong to the Indo-European part of the vocabulary, but appears only in onomatopoeic and borrowed words, or in words taken from the vernacular in which the frequent Sanskrit groups *dhy* and *hy* became *(j)jh*.

Of the sibilants *ś* corresponds to I.E. palatal *k*$_1$: in this Sanskrit agrees with the other eastern I.E. languages (Balto-Slavonic, Albanian, Armenian, Iranian) which have an *s* or *sh* sound as opposed to the *k* (*h* in Germanic) of the western languages: *e.g.*, *śatám* "100"=Av. *satem*, Lithuanian *šimtas*, but Gk. *he-katón*, Lat. *centum*, Eng. *hundred*. Before the surd dentals this *ś* became *s*: *viśáti* "enters," *viṣṭáḥ* "entered." But *ṣ* also corresponds to I.E. *s* when preceded by *i, u, r* or *k*, agreeing in this with Iranian and partly with Armenian and Balto-Slavonic.

The chief innovation in the consonant-system is the introduction of the third series, the cerebrals or linguals (better termed retroflex). The dentals were formed by the tip of the tongue striking the roots of the teeth, the cerebrals by the tip of the tongue, bent backwards, striking further back on the palate. In the oldest Sanskrit they are derived from the dentals when immediately preceded by *ṣ* or **ẓ* (which subsequently disappeared): thus **diśtas* (=Lat. *dictus*) became **diṣtas* and then *diṣṭáḥ*; **miẓdham* (=Gk. *misthós*) became **miẓḍham* and then *mīḍhám*. Later also under the influence of a preceding *r* or *ṛ* dentals became cerebrals: such words are really loans from the popular dialect, but they begin to appear in the literary language even as early as the Rigveda: thus *víkaṭaḥ* "monstrous" is derived from *víkṛtaḥ* "strange." Some words, however, contain cerebrals which cannot be explained as derived from dentals in either of these ways. It is probable that these sounds were characteristic of both the families of languages, Muṇḍā and Dravidian, which the Aryan speakers of Sanskrit found in possession of India; and the appearance of them in Sanskrit and its descendants (and in a few of the adjoining Iranian languages such as Baluchi and Pashto) can scarcely be unconnected with this fact.

The Indian grammarians emphasized the difference in the pronunciation of consonants according as they came at the beginning, in the middle or at the end of a word or before other consonants. These differences, though slight, have ended in transforming the whole Sanskrit consonant-system in its descendants, the modern Indo-Aryan languages. Final consonants were pronounced without being fully exploded: in the spoken languages these final consonants had disappeared before the middle of the 3rd century B.C. A similar pronunciation is assigned to consonants before stops: in the spoken languages these were early assimilated (*e.g.*, *suptáḥ* became *suttō*). *y* and *v* were pronounced more strongly initially than intervocalically: in the modern languages initial *y*– has remained or become *j*, but intervocalic *–y–* has been lost. [This contrast is observable even in the dialect of the Rigveda. For in the phonetically weak position of the termination and in certain accessory words intervocalic *–dh–* has lost its occlusion and become *–h–*: *ihí* "go"=Greek *íthi*, *śēmahē* "we lie"=Gk. *keímetha*. Further in all words intervocalic *–ḍ–* has become *–ḷ–*, although other more easterly dialects still preserve it (through whose influence it was afterwards re-established in Classical Sanskrit): thus Classical *nīḍaḥ* "nest" (from **niẓḍa-*) is *nīḷáḥ* in Vedic.]

Accent.—Our knowledge of the accent of Sanskrit words is derived from its marking in the more important Vedic texts and from the statements of grammarians. It was predominantly a musical or tonic, not a stress, accent. Three different types are generally distinguished, the *udātta* "raised," *anudātta* "unraised" and *svarita* the rising-falling accent following the *udātta*. Generally the position of the *udātta* agrees, as far as can be ascertained by comparison, with that of the chief word-accent of Indo-European. The rhythm of Sanskrit was purely quantitative; in verse metre depended only on the number and the length of the syllables composing a line, and was entirely independent of accent.

GRAMMAR

Nouns.—Sanskrit makes a perfect distinction between nouns (including adjectives, pronouns and indeclinables) and verbs. The declension of nouns comprises three numbers—singular dual and plural; and eight cases, viz. nominative, accusative, instrumental, dative, ablative, genitive, locative, vocative. In the majority of declensions ablative and genitive are not distinguished in the singular, nor dative and ablative in the plural, while the dual universally has only three separate forms,—(1) nom.–acc.–voc., (2) inst.–dat.–abl., (3) gen.–loc. These confusions were inherited from Indo-European, but the tendency to confuse still further the forms and functions of the cases continued within Sanskrit itself, the genitive especially enlarging its sphere at the expense of other cases. This process, continued in the spoken languages down to the present day, has resulted in a noun-declension, which for the most part consists of two cases only—(1) a direct case founded on the Sanskrit nominative and accusative; (2) an oblique case founded on the Sanskrit genitive or, perhaps, in some forms, the dative. Among the numbers the dual by itself was reserved to express natural pairs (such as *akṣī* "the eyes," *karṇáu* "the ears"), or any two objects or persons already referred to or present in the mind of the speaker or hearer; otherwise the use of the word for "two" itself was required.

Although the idea of case was in the main expressed by the termination (as, *e.g.*, the nominative by *–s* in *dēvás*=Latin *deus*, the accusative by *–m* in *dēvám*=*deum*), it was sometimes accompanied by change in the pre-terminational element, and was connected with a shift of accent:

	Skt.	Greek	Skt.	Greek	Skt.	Greek
nom.	*pā́t*	*pṓs* (Doric)	*dyáuḥ*	*Zeús*	*pitā́*	*patḗr*
acc.	*pā́dam*	*póda*	*dyā́m*	*Zḗn-a*	*pitáram*	*patéra*
gen.	*padáḥ*	*podós*	*diváḥ*	*Diós*	*pitúḥ*	*cf. patrós*
dat.	*padḗ*	*cf. podí*	*divḗ*	*cf. Dií*	*pitrḗ*	*cf. patrí*
loc.	*padí*	*podí*	*dyávi*	Lat. *Jove*	*pitári*	
voc.			*dyàuḥ*	*Zeū*	*pítar*	*páter*

There was, however, one important class of stems, namely masc. and neut. in *–a* and fem. in *–ā* (corresponding to the *–o* and *–ā*

stems of Greek and Latin), in which the accent was fixed either on the stem or on the termination throughout the paradigm without any change in the form of the stem, of the type *áśvaḥ* =Gk. *híppos*, Lat. *equos*. There had, moreover, been a tendency in the pre-Sanskrit period to fix the form even of the variable stems, especially those consisting only of a root: thus the long vowel was generalized in *vāc-* "voice" (nom. *vāk*):

	Skt.	Latin	Avestic	Greek
acc.	*vā́cam*	*vōcem*	*vācim*	
gen.	*vā́caḥ*	*vōcis*	*vacō*	*opós*

But in the process of normalization the vowel-declension (and especially with the stems in *-a -ā*) was predominant, and even in Sanskrit itself there was a considerable transference of consonant-stems and root-stems to this declension: *e.g.*, *pā́da-* "foot," *dvā́ra-* "door," *dánta-* "tooth" replaced *pād- pad-*, *dant- dat-*, *dvār- dur-*. This proceeded apace in the spoken tongue, for the declension of the modern languages rests exclusively on vowel-stems and of these chiefly on the *-a -ā* stems.

As in Indo-European, the pronominal declension differed from the nominal, that of the personal pronouns radically, that of the demonstratives and others to a varying degree. In the personal pronoun each number had a different root (*t[u]vám* "thou," *yūyám* "you"), while that of the first person had different roots also for the nominative and the oblique cases (*ahám* "I," *mā́m* "me," *vayám* "we," *asmā́n* "us"). The tendency of the two declensions, the nominal and the pronominal, to influence each other is observable: *e.g.*, the nominal ending of the neuter sing. nom. and acc. *-m* as in *kím* "what?" (=Lat. *quid*) replaced the *-d* or *-t* still found in other pronouns (*tát* "that"=Lat. *is-tud*). In the spoken language this mutual influence continued to react until practically all distinction between the two types of declension was lost.

Numerals.—The numeral-system, built upon a decimal basis, is that of Indo-European. There are separate names for the numbers up to 10; from 11 to 19 compounds of the units with the word for 10 partly correspond with those of Greek and Latin: *e.g.*, *d(u)vā́daśa* "12"=Gk. *dṓdeka*, Lat. *duōdecim*. Above that the tens (20, 30, etc.) were in origin probably compounds expressing a number of tens, and the intermediate numbers were formed by compounds of the units with these: *e.g.*, *páñca* "5" (Gk. *pénte*, Lat. *quīnque*), *pañcā́śát* "50" (*cf.* Gk. *pentḗkonta*, Lat. *quīnquāginta*), *páñcapañcā́śat* "55." There are separate words for 100 and 1000. The special word for 100,000 (*lakṣaḥ*, whence modern *lākh*) is post-vedic. The numerals from 1 to 19 are adjectives; the rest are substantives.

Gender.—Traces of the distinction of gender between animate (=masculine and feminine) and inanimate (=neuter) are seen in the use of the neut. *udakám* "water as a medium of floating, etc.," and the fem. *ápaḥ* "water as personified as sentient beings." But for the most part in Sanskrit gender is grammatical and largely independent of nature, except that male and female living beings are usually (though not always) respectively masculine or feminine. There were three genders—masculine, feminine and neuter. The neuter was distinguished by its termination (or lack of termination) in the nominative and accusative, and by the fact that the form of the accusative was the same as that of the nominative. But the masculine and feminine substantives were primarily distinguished only by the form of an adjective, if there were one, in agreement with them (as often, *e.g.*, in French or German). But there was a tendency to reserve certain types of stem for one or other gender. Thus the *-a* stems in Sanskrit are reserved only for masculine and neuter nouns (although in Greek they may still be feminine, *e.g.*, *hē híppos* "the mare"); and the *-ā* stems are mostly feminine. In the older language the *-i* stems might be masculine or feminine; in the later language they are almost all feminine. Similarly even in Classical Sanskrit *-i* stems are either masculine or feminine; but in the spoken language there was a growing tendency to confine them to feminine: thus words of this declension which are masculine in Sanskrit become feminines in the modern languages: *agníḥ* m. "fire" (=Lat. *ignis*) becomes Hindi *āg* f.

Verbs.—In the Vedic language the verbal system is of considerable complexity. A verb might have various stems, viz. present (sometimes more than one), aorist (three in number, root *e.g.*, *ástham*=Gk. *éstēn*, strong, *e.g.*, *aricam*=Gk. *élipon*, sigmatic, *e.g.*, *araikṣam*=Gk. *éleipsa*); perfect (characterized by reduplication and peculiar terminations); future (rare in the old language). The significance of the stems lay in the mode of action they expressed. Very generally speaking, the present indicated continuous action, the aorist momentary action, the perfect a state resulting from past action. The various present stems indicated various types of present-stem action, such as intensive, repetitive, inchoative, causative, desiderative, etc. Each of the first three stems had five moods—indicative expressing fact, injunctive and subjunctive expressing will and futurity, optative expressing wish, imperative expressing command. In the indicative of the present, perfect and future stems there were two tenses, present and past; the aorist stem was in the indicative confined to the past tense. Each tense had three persons and three numbers—singular, dual and plural. Finally each tense could be conjugated in two voices with different terminations—active and middle. Among the parts of the infinite verb there was connected with each stem a participle which could be either active or middle, and independent of tense stems a past participle, one or more infinitives (for the most part case-forms of verbal nouns), a gerundive and an indeclinable participle or gerund. The total number of possible forms belonging to any one verb is thus very great.

The idea of time was expressed in the indicative primarily by the termination: the primary endings expressing present and future time, the secondary endings past (and also, to some extent, future) time. Past time was usually still further defined by the prefixing of a particle, *a* or *ā*, before the verb (corresponding to the Greek and Armenian augment), *e.g.*, *dádhāmi* "I place," *ádadhām* "I placed"=Gk. *títhēmi*, *étithēn*. The active voice indicated that the action performed had reference to some person or thing other than the doer, the middle that the action had reference to the doer in some way or other: *e.g.*, active *taṇḍulā́n nēnēkti* "he washes the rice" (French *il lave*), middle *pā́ṇī nēniktē* "he washes his hands" (*il se lave les mains*). As in Greek, the middle could also be used to express passive sense, but this use was later confined to the perfect and especially the aorist stems, while a special present stem (characterized by the suffix *-yá-* with middle terminations) was used for the present passive: *e.g.* *labhatē* "he takes," *labhyatē* "is taken." The expression of person was inherent in the verbal form, and pronouns were used only when emphasis was desired.

As with the nouns, there were two types of stems—the athematic with variable accent and variable stem form to which the terminations were directly attached (type *ás-ti* "he is"=Gk. *esti*, Lat. *est*), the thematic with invariable accent and stem between which and the termination the vowel *a* was inserted (type *váh-a-ti* =Lat. *veh-i-t*). There was a growing tendency for verbs to be brought into this class from the other, since its conjugation was the more normal; thus *yunák-ti* (3rd plur. *yuñj-ánti*) "joins," contrasted with the already thematic Lat. *jung-i-t*, became later *yuñj-a-ti* (3rd plur. *yuñj-a-nti*). This type almost alone survives in the modern languages.

This verbal system was greatly simplified in Classical Sanskrit. The injunctive mood almost, and the subjunctive entirely, disappeared or were incorporated in the imperative. The aorist and perfect stems remained only in the indicative, and the aorist participle disappeared. The infinitive was reduced to one form only (the accusative of a noun in *-tu-*, corresponding in form to the Latin supine, *e.g.*, *jñā́tum* "to know"=*[g]nōtum*), and the absolutive to two, one for simple, one for compound verbs. This left the present stem predominant; and though the aorist and the perfect survived in the indicative, their meaning was scarcely, if at all, to be distinguished from that of the past tense of the present stem (*i.e.*, the imperfect). Finally even in Sanskrit itself the imperfect tended to be replaced by the past participle used as a finite verb. Among the spoken languages in some areas the aorist seems to have been developed further as a past tense, but as a whole the verb of the modern languages possesses a present

system based on the Sanskrit present stem and a past system based on the Sanskrit past participle.

Syntax.—In its main lines the syntax of Sanskrit is Indo-European, and the primary uses of its cases, moods and tenses can be paralleled from other Indo-European languages. Its most peculiar development was in the region of composition. Compounds, usually of not more than two members, are common in the Vedic texts. Even in the Epic their extension is considerable, and compounds consisting of three or four separate members are not rare. In the later, more artificial, language compounds may be met with which extend over a page or more.

Vocabulary.—Sanskrit shows a constant change and development of vocabulary. Part of this is in the natural evolution of already existing material. The main constituent of the vocabulary of Vedic Sanskrit is Indo-European, but even here there are some words which are not Indo-European. One source of such words is undoubtedly the languages which the Aryans found in India; and recently J. Przyluski has demonstrated that some (such as *bāṇáḥ* "arrow," *mayūraḥ* "peacock," *karpāsam* "cotton") were received from *Muṇḍā* or Austro-Asiatic languages. Another source for new words was found in the spoken Aryan languages: words taken from these were given a Sanskrit form. In this way even original Sanskrit words returned under a new form: we have already seen how *vikrita–*, having in the spoken language become *vikaṭa–*, was readopted in that form in the literary tongue, and retained side by side with *vikrita–*.

BIBLIOGRAPHY.—Grammar, Elementary: E. D. Perry, *Sanskrit Primer* (1901); C. R. Lanman, *Sanskrit Reader* (1912); A. A. Macdonell, *Sanskrit Grammar for Beginners* (1927), *Vedic Reader* (1917), *Vedic Grammar for Students* (1916). Advanced: W. D. Whitney *Sanskrit Grammar* (1889); A. A. Macdonell, *Vedic Grammar* (1910). Comparative Grammar: J. Wackernagel, *Altindische Grammatik* (1896–1905); A. Thumb, *Handbuch des Sanskrit* (1905); K. Brugmann, *Vergleichende Grammatik der indogermanischen Sprachen* (1897–1916). Dictionaries: O. Boehtlingk and R. Roth, *Sanskrit-Wörterbuch* (1852–75). Based on this is M. Monier-Williams, *Sanskrit-English Dictionary* (1899), and the smaller dictionaries of C. Capeller (1891) and A. A. Macdonell (1924). (R. L. T.)

LITERATURE

The history of Sanskrit literature like the political history of ancient India suffers from the total want of anything like a fixed chronology. In its vast range there is scarcely a work of importance the date of which can be fixed with absolute certainty. The original composition of most Sanskrit works can indeed be confidently assigned to certain general periods but as to many of them, there is reason to doubt whether they have come down to us in their original shape.

The history of Sanskrit literature readily divides itself into two main periods—the Vedic and the classical. These periods partly overlap, and some of the later Vedic works are included in that period on account of their subject matter, and archaic style, rather than for any claim to a higher antiquity than some of the oldest works of classical Sanskrit. The first period may be put at 1500–200 B.C. and the second 500 B.C.–A.D. 1000.

THE VEDIC PERIOD

Saṃhitās.—The term *veda, i.e.* (sacred) "knowledge," "lore"—embraces a body of writings the origin of which is ascribed to divine revelation (*śruti*, literally "hearing"), and which forms the foundation of the Brāhmanical system of religious belief. This sacred canon is divided into three or (according to a later scheme) four co-ordinate collections, likewise called Veda: (1) the *Rig-veda*, or lore of praise (or hymns); (2) the *Sāma-veda*, or lore of tunes (or chants); (3) the *Yajur-veda*, or lore of prayer (or sacrificial formulas); and (4) the *Atharva-veda*, or lore of the Atharvans. Each of these four Vedas is a collection (*saṃhitā*) of sacred, mostly poetical, texts of a devotional nature, called *mantra*. This entire body of texts (and particularly the first three collections) is also known as the *trayī vidyā*, or threefold wisdom, of hymn (*rich*), tune or chant (*sāman*), and prayer (*yajus*)—the fourth Veda, when included, being classed together with the Rik.

Classes of Priests.—The Brāhmanical religion finds its practical expression chiefly in sacrificial performances. The Vedic sacrifice requires for its proper performance the attendance of four officiating priests, each of whom is assisted by one or more (usually three) subordinate priests, viz.: (1) the *Hotar* (or *hotri, i.e.*, either "sacrificer," or "invoker"), whose chief business is to invoke the gods, in prayers or hymns; (2) the *Udgātar* (udgātri), or chorister, who has to perform chants (*stotra*) in connection with the hotar's invocations; (3) the *Adhvaryu*, or offering priest *par excellence*, who performs all the material duties of the sacrifice, such as the kindling of the fires; (4) the *Brahman*, or chief "priest," who superintends the performance and rectifies any mistakes that may be committed. The Sāmaveda and Yajurveda form special song and prayer books, arranged for the practical use of the udgātar and adhvaryu respectively; whilst the Rik-saṃhitā, though not arranged for any such practical purpose, contains the entire body of sacred lyrics whence the hotar draws the material for his recitations. The brahman, however, had no special text-book assigned to him, but was expected to be familiar with all the Saṃhitās as well as with the practical details of the sacrificial performance. (*See* BRAHMAN and BRĀHMAṆA.)

Brāhmaṇas.—The several Saṃhitās have attached to them certain theological prose works, called *Brāhmaṇa*, which also form part of the canon. Their object is to explain the relationship of the Vedic texts to the now very elaborate sacrificial ceremonial and to explain their mystic import. (*See* BRĀHMAṆA.)

Āraṇyakas and Upanishads.—Closely connected with the Brāhmaṇas are two classes of treatises called *Āraṇyaka* and *Upanishad*. The Āraṇyakas, *i.e.*, works "relating to the forest," intended to be read or expounded by anchorites in the quiet of the forest, resemble the Brāhmaṇas, which they supplement by dealing with special points of ritual. The Upanishads are of a more mystical nature, and form the first attempts at a systematic treatment of metaphysical questions. From their pantheistic views later developed the Vedānta philosophy. The Upanishads have to be assigned to very different periods of Sanskrit literature. The oldest treatises of this kind are doubtless those which form part of the Saṃhitās, Brāhmaṇas and Āraṇyakas of the three older Vedas.

Different Recensions.—As the sacred texts were not committed to writing till a much later period, but were handed down orally in the Brāhmaṇical schools, it was inevitable that local differences of reading should spring up, which in course of time gave rise to a number of independent versions. Such different text-recensions, called *śākhā* (*i.e.*, branch), were at one time very numerous, but only a limited number have survived. As regards the Saṃhitās, the poetical form of the hymns, as well as the concise style of the sacrificial formulas, rendered these texts less liable to change.

Vedāṅgas.—Besides the purely ceremonial matter, the Brāhmaṇas also contained a considerable amount of matter bearing on the correct interpretation of the Vedic texts; and, indeed, the sacred obligation incumbent on the Brāhmans of handing down correctly the letter and sense of those texts necessarily involved a good deal of serious grammatical and etymological study in the Brāhmaṇical schools. These literary pursuits resulted in the accumulation of much learned material, which it became desirable to throw into a systematic form. These practical requirements were met by a class of treatises, grouped under six different heads or subjects, called *Vedāṅgas, i.e.*, members, or limbs, of the (body of the) Veda. In their present form these works represent a rather advanced stage of scientific development. Though a few of them are composed in metrical form—the majority belong to a class of writings called *sūtra, i.e.*, "string," consisting of strings of rules in the shape of tersely expressed aphorisms, intended to be committed to memory.

Sūtras.—The Sūtras form a connecting link between the Vedic and the classical periods of literature. These treatises are included among the Vedic writings, and in point of language may be considered as the latest products of the Vedic age, but they are no longer *śruti* or revelation. They are of human, not of divine, origin. The Sūtras are regarded nevertheless as works of great authority, second only to that of the revealed Scriptures;

in contrast to the latter they are called *smriti,* or tradition.

The six branches of Vedic science, included under the term Vedāṅga, are as follows:—

1. *Śikshā,* or Phonetics.—In addition to a small treatise ascribed to the great grammarian Pāṇini, the *Pāṇinīyā śikshā,* there are usually included under this head certain works, called *Prātiśākhya, i.e.,* "belonging to a certain *śākhā* or recension," which deal minutely with the phonetic peculiarities of the several Saṃhitās, and are of great importance for Vedic textual criticism.

2. *Chhandas,* or Metre.—Tradition makes the *Chhandaḥ-sūtra* of Piṅgala the starting-point of prosody. The Vedic metres, however, occupy but a small part of this treatise; they are particularly dealt with in the Nidāna-sūtra of the Sāmaveda, and in a chapter of the Rik-prātiśakhya. For later profane prosody, on the other hand, Piṅgala's treatise is valuable.

3. *Vyākaraṇa,* or Grammar.—Pāṇini's famous grammar is said to be *the* Vedāṅga; but it marks the culminating point of grammatical research rather than the beginning, and treats chiefly of the post-Vedic language.

4. *Nirukta,* or Etymology.—Yāska's *Nirukta* deals entirely with Vedic etymology and exegesis. It consists, in the first place, of strings of words in three chapters: (1) synonymous words; (2) such as are purely or chiefly Vedic; and (3) names of deities. These lists are followed by Yāska's commentary, interspersed with numerous illustrations. Yāska quotes the works of several predecessors but his is by several centuries the oldest surviving work of its kind. The above four studies deal with the correct understanding of texts, the next two with rites and their proper seasons.

5. *Jyotisha,* or Astronomy.—The metrical treatise which has come down to us in two different recensions under the title of Jyotisha, ascribed to one Lagadha, or Lagata, seems to be the oldest existing systematic treatise on astronomical subjects.

6. *Kalpa,* or Ceremonial.—Sacrificial practice gave rise to a large number of systematic sūtra-manuals for the several classes of priests. The most important of these works have come down to us, and they occupy by far the most prominent place among the literary productions of the sūtra-period. The Kalpa-sūtras, or rules of ceremonial, are of two kinds: (1) the *Śrauta-sūtras,* which are based on the śruti, and teach the performance of the great sacrifices, requiring three sacrificial fires; and (2) the *Smārta-sūtras,* or rules based on the smṛiti or tradition. The latter class again includes two kinds of treatises: (1) the *Grihya-sūtras,* or domestic rules, treating of ordinary family rites, such as marriage, birth, name-giving, etc., connected with simple offerings in the domestic fire; and (2) the *Sāmayāchārika-* (or *Dharma-*) *sūtras,* which treat of customs and temporal duties, and are supposed to have formed the chief sources of the later law-books.

THE FOUR VEDAS

After this brief characterization of the various branches of Vedic literature, we proceed to take a rapid survey of the several Vedic collections.

Rigveda.—The *Rigveda-saṃhitā* has come down to us in the recension of the Śākala school, which shows that it consists of 1,028 hymns, including eleven so-called *Vālakhilyas,* probably of later date. The hymns are composed in a great variety of metres, and consist, on an average, of rather more than 10 verses each, or about 10,600 verses altogether. This body of sacred lyrics has been subdivided by ancient authorities in a twofold way, viz. either from a purely artificial point of view, into eight *ashṭakas* of about equal length, or, on a more natural principle, based on the origin of the hymns, and invariably adopted by European scholars, into ten books, or *maṇḍalas,* of unequal length. Tradition has handed down the names of the reputed authors, or rather inspired "seers" (*rishi*), of most hymns. These indications have enabled scholars to form some idea as to the probable way in which the Rik-saṃhitā originated, though much still remains to be cleared up by future research.

Maṇḍalas ii.–vii. are evidently arranged on a uniform plan. Each of them is ascribed to a different family of rishis, whence they are usually called the six "family-books": ii., the Gritsamadas; iii., the Viśvāmitras or Kuśikas; iv., the Vāmadevyas; v., the Atris; vi., the Bharadvājas; and vii., the Vasishṭhas. Further, each of these books begins with the hymns addressed to Agni, the god of fire, which are followed by those to Indra, whereupon follow those addressed to minor deities—the Viśve Devāh ("all-gods"), the Maruts (storm-gods), etc. Again, the hymns addressed to each deity are arranged in a descending order, according to the number of verses of which they consist.

Maṇḍala i., the longest in the whole Saṃhitā, contains 191 hymns, ascribed, with the exception of a few isolated ones, to sixteen poets of different families, and consisting of one larger (50 hymns) and nine shorter collections. Here again the hymns of each author are arranged on precisely the same principle as the "family-books." Maṇḍalas viii. and ix., on the other hand, have a special character of their own. To the Sāmaveda, these two maṇḍalas have contributed a much larger proportion of verses than any of the others. The hymns of the eighth book are ascribed to a number of different ṛishis, mostly belonging to the Kāṇva family. The chief peculiarity of this maṇḍala, however, consists in the strophic character of its composition and the numerous repetitions throughout it. It is closely connected with the first half of the first maṇḍala and they were evidently added as beginning and end to the collected ii.–vii. The ninth maṇḍala consists entirely of hymns (114) addressed to *Soma,* the deified juice of the so-called "moon-plant" (*Sarcostemma viminale,* or *Asclepias acida*), and ascribed to poets of different families. They are called *pavamānī,* "purificational," because they were to be recited by the hotar while the juice expressed from the soma plants was clarifying. The hymns are by poets of the same families as ii.–vii. and it is evident that when these hymns were collected the soma hymns were taken out and put into a single collection. There are also a few soma hymns in the later books (i., viii., x.).

Maṇḍala x. contains the same number of hymns (191) as the first, which it nearly equals in actual length. In the latter half of the book the hymns are clearly arranged according to the number of verses, in decreasing order—occasional exceptions to this rule being easily adjusted by the removal of a few apparently added verses. This maṇḍala came into existence after the other nine were in their present form, a fact of which there is abundant evidence. It shows considerable uniformity and is all older than the latest insertions in other books of the former collectors.

It is usual to call the Rik-saṃhitā (as well as the Atharvan) an historical collection, as compared with the two Saṃhitās put together for purely ritualistic purposes. And indeed, although the Rigveda itself, in its oldest form, may have been intended as a common prayer-book, for the whole of the Brāhmaṇical community, it is certain that in the stage in which it has been finally handed down it includes a certain portion of hymn material (and even some secular poetry) which could never have been used for purposes of religious service. It may, therefore, be assumed that the Rik-saṃhitā contains all of the nature of popular lyrics that was accessible to the collectors, or seemed to them worthy of being preserved. The question as to the exact period when the hymns were collected cannot be answered with any approach to accuracy. For many reasons, however, which cannot be detailed here, scholars have come to fix on the year 1000 B.C. as an approximate date for the collection of the Vedic hymns. From that time every means that human ingenuity could suggest was adopted to secure the sacred texts against the risks connected with oral transmission. But, as there is abundant evidence to show that even then not only had the text of the hymns suffered corruption, but their language had become antiquated to a considerable extent, and was only partly understood, the period during which the great mass of the hymns were actually composed must have lain considerably farther back, and may very likely have extended over the earlier half of the second millenary, or from about 2000 to 1500 B.C.

As regards the people which raised for itself this imposing monument, the hymns exhibit it as settled in the regions watered by the mighty Sindhu (Indus), with its eastern and western tributaries, the land of the five rivers (Panj-āb) thus forming the central home of the Vedic people. But, while its advanced guard

has already debouched upon the plains of the upper Gaṅgā and Yamunā, those who bring up the rear are still found loitering far behind in the narrow glens of the Kubhā (Cabul) and Gomatī (Gomal). Scattered over this tract of land, in hamlets and villages, the Vedic Āryas are leading chiefly the life of herdsmen and husbandmen. The numerous clans and tribes, ruled over by chiefs and kings, have still constantly to vindicate their right to the land but lately wrung from an inferior race of darker hue. Not infrequently, too, the light-coloured Āryas wage internecine war with one another—as when the Bharatas, with allied tribes of the Panjāb, goaded on by the royal sage Viśvāmitra, invade the country of the Tṛitsu king Sudās, to be defeated in the "ten kings' battle," through the inspired power of the priestly singer Vasishṭha. The priestly office has already become one of high social importance by the side of the political rulers, and to a large extent an hereditary profession; though it does not yet present the baneful features of an exclusive caste.

The religious belief of the people consists in a system of natural symbolism, a worship of the elementary forces of nature, regarded as beings endowed with reason and power superior to those of man. In giving utterance to this simple belief, the priestly spokesman has, however, frequently worked into it his own speculative and mystic notions. Indra, the stout-hearted ruler of the cloud-region, receives by far the largest share of the devout attentions of the Vedic singer. His ever-renewed battle with the malicious demons of darkness and drought, for the recovery of the heavenly light and the rain-spending cows of the sky, forms an inexhaustible theme of spirited song. Next to him, in the affections of the people, stands Agni (*ignis*), the god of fire, invoked as the genial inmate of the Aryan household, and as the bearer of oblations, and mediator between gods and men. Indra and Agni are thus, as it were, the divine representatives of the king (or chief) and the priest of the Aryan community; and if, in the arrangement of the Saṃhitā, the Brāhmanical collectors gave precedence to Agni, it was but one of many avowals of their own hierarchical pretensions. Hence also the hymns to Indra are mostly followed, in the family collections, by those addressed to the Viśve Devāḥ (the "all-gods") or to the Maruts, the warlike storm-gods and faithful companions of Indra, as the divine impersonations of the Aryan freemen, the *viś* or clan. But, while Indra and Agni are undoubtedly the favourite figures of the Vedic pantheon, there is reason to believe that these gods had but lately supplanted another group of deities who play a less prominent part in the hymns, viz., Father Heaven (Dyaus Pitar, Ζεὺς πατήρ, Jupiter); Varuna (probably οὐρανός), the all-embracing (esp. nocturnal) heavens; Mitra (Zend. Mithra), the genial light of day; and Savitar, the quickener, and Sūrya (ἥλιος), the vivifying sun.

Brāhmaṇas of Rigveda.—Of the Brāhmaṇas that were handed down in the schools of the *Bahvṛichas* (*i.e.*, "possessed of many verses"), as the followers of the Rigveda are called, two have come down to us, viz. those of the Aitareyins and the Kaushītakins. The *Aitareya-brāhmaṇa* and the *Kaushītaki-* (or *Śānkhāyana-*) *brāhmaṇa* evidently have for their groundwork the same stock of traditional exegetic matter. They differ, however, considerably in their arrangement of this matter. There is also a certain amount of material peculiar to each of them. The Kaushītaka is, upon the whole, far more concise in its style and more systematic in its arrangement—features which would lead one to infer that it is probably the more modern work of the two. While the Aitareya deals almost exclusively with the Soma sacrifice, the Kaushītaka first treats of the several kinds of *haviryajña*, or offerings of rice, milk and ghee, and then of the Soma sacrifice. Sāyaṇa, in the introduction to his commentary on the work, ascribes the Aitareya to the sage Mahidāsa Aitareya (*i.e.*, son of Itarā), also mentioned elsewhere as a philosopher; and it seems likely enough that this person arranged the Brāhmaṇa and founded the school of the Aitareyins. Regarding the authorship of the sister work we have no definite statement. Probably it is what one of the manuscripts calls it—the Brāhmaṇa of Śānkhāyana (composed) in accordance with the views of Kaushītaki.

Each of these two Brāhmaṇas is supplemented by a "forest-book," or Āraṇyaka. The *Aitareyāraṇyaka* is not a uniform production. It consists of five books (*āraṇyaka*), three of which, the first and the last two, are of a liturgical nature, treating of the ceremony called *mahāvrata*, or great vow. The last of these books, composed in sūtra form, is, however, doubtless of later origin. The second and third books are purely speculative, and are also styled the *Bahvricha-brāhmaṇa-upanishad*. Again, the last four chapters of the second book are usually singled out as the *Aitareya-upanishad*, ascribed, like its Brāhmaṇa (and the first book), to Mahidāsa Aitareya; and the third book is also referred to as the *Saṃhitā-upanishad*. As regards the *Kaushītaki-āraṇyaka*, this work consists of fifteen adhyāyas, the first two (treating of the mahāvrata ceremony) and the seventh and eighth of which correspond to the first, fifth, and third books of the Aitareyāraṇyaka respectively, whilst the four adhyāyas usually inserted between them constitute the highly interesting *Kaushītaki-* (*brāhmaṇa-*) *upanishad*, of which we possess two different recensions. The remaining portions (9–15) of the Āraṇyaka treat of the vital airs, the internal Agnihotra, ending with the vaṃśa, or succession of teachers. Of *Kalpa-sūtras*, or manuals of sacrificial ceremonial, composed for the use of the hotar priest, two different sets are in existence, the *Āśvalāyana-* and the *Śānkhāyana-sūtra*. Each of these works follows one of the two Brāhmaṇas of the Rik as its chief authority: the Aitareya and Kaushītaka respectively. Both consist of a *Śrauta-* and a *Grihya-sūtra*. Āśvalāyana seems to have lived about the same time as Pāṇini (? *c.* 400 B.C.)—his own teacher, Śaunaka, who completed the Ṛik-prātiśākhya, being probably intermediate between the great grammarian and Yāska, the author of the Nirukta. Śaunaka himself is said to have been the author of a *Śrauta-sūtra* (which was, however, more of the nature of a Brāhmaṇa) and to have destroyed it on seeing his pupil's work. A *Grihya-sūtra* is still quoted under his name by later writers. The *Āśvalāyana Śrauta-sūtra* consists of twelve, the *Grihya* of four, adhyāyas.

Regarding Śānkhāyana still less is known; but he, too, was doubtless a comparatively modern writer, who, like Āśvalāyana, founded a new school of ritualists. Hence the Kaushītaki-brāhmaṇa, adopted (and perhaps improved) by him, also goes under his name, just as the Aitareya is sometimes called Āśvalāyana-Brāhmaṇa. The Śānkhāyana Śrauta-sūtra consists of eighteen adhyāyas. The last two chapters of the work are, however, a later addition, while the two preceding chapters, on the contrary, present a comparatively archaic, brāhmaṇa-like appearance. The Grihya-sūtra consists of six chapters, the last two of which are likewise later appendages. The *Śāmbavya Grihya-sūtra*, of which a single ms. is at present known, seems to be closely connected with the preceding work. Professor Bühler also refers to the Rigveda the *Vāsishṭha-dharmaśāstra*, composed of mixed sūtras and couplets.

A few works remain to be noticed, bearing chiefly on the textual form and traditionary records of the Rik-saṃhitā. The Prātiśākhyas have already been referred to as the chief repositories of śikshā or Vedic phonetics. Among these works the *Rik-prātiśākhya* occupies the first place. The original composition of this important work is ascribed to the same Śakalya from whom the vulgate recension of the (Śākala) Saṃhitā takes its name. He is also said to be the author of the existing *Pada-pāṭha* (*i.e.*, the text-form in which each word is given unconnected with those that precede and follow it).

Sāmaveda.—The term *sāman*, of uncertain derivation, denotes a solemn tune or melody to be sung or chanted to a *rich* or verse. The set chants (*stotra*) of the Soma sacrifice are as a rule performed in triplets, either actually consisting of three different verses, or of two verses which, by the repetition of certain parts, are made, as it were, to form three. The three verses are usually chanted to the same tune; but in certain cases two verses sung to the same tune had a different *sāman* enclosed between them. One and the same *sāman* or tune may thus be sung to many different verses; but, as in teaching and practising the tunes the same verse was invariably used for a certain tune, the term *sāman*, as well as the special technical names of *sāmans*, are

not infrequently applied to the verses themselves with which they were ordinarily connected.

In accordance with the distinction between *rich* or text and *sāman* or tune, the sāman-hymnal consists of two parts: the *Sāma-veda-saṃhitā,* or collection of texts (*rich*) used for making up sāman-hymns, and the *Gāna,* or tune-books, song-books. The textual matter of the Saṃhitā consists of somewhat under 1600 different verses, selected from the Rik-saṃhitā, with the exception of some seventy-five verses, some of which have been taken from Khila hymns, whilst others which also occur in the Atharvan or Yajurveda, as well as such not otherwise found, may perhaps have formed part of some other recension of the Rik. The *Sāma-veda-saṃhitā* is divided into two chief parts, the *pūrva-* (first) and the *uttara-* (second) *ārchika.* The second part contains the texts of the sāman-hymns, arranged in the order in which they are actually required for the *stotras* or chants of the various Soma sacrifices. The first part, on the other hand, contains the body of tune-verses, or verses used for practising the several *sāmans* or tunes upon—the tunes themselves being given in the *Grāma-geya-gāna* (*i.e.,* songs to be sung in the village), the tune-book specially belonging to the Pūrvārchika.

Sāmaveda-brāhmaṇas.—The title of *Brāhmaṇa* is bestowed by the Chhandogas, or followers of the Sāmaveda, on a considerable number of treatises. The majority of the Sāmaveda-brāhmaṇas present, however, none of the characteristic features of other works of that class; but they are rather of the nature of sūtras and kindred treatises, with which they probably belong to the same period of literature. Moreover, the contents of these works —as might indeed be expected from the nature of the duties of the priests for whom they were intended—are of an extremely arid and technical character, though they all are doubtless of some importance, either for the textual criticism of the Saṃhitā or on account of the legendary and other information they supply.

If the Sāmaveda has thus its ample share of Brāhmaṇa-literature, though in part of a somewhat questionable character, it is not less richly supplied with sūtra-treatises, or works on exegesis, some of which probably belong to the oldest works of that class.

Yajurveda.—This, the sacrificial Veda of the Adhvaryu priests, divides itself into an older and a younger branch, or, as they are usually called, the Black (*krishṇa*) and the White (*śukla*) Yajurveda. Tradition ascribes the foundation of the Yajurveda to the sage Vaiśampāyana. Of his disciples three are specially named, viz.: Kaṭha, Kalāpin and Yāska Paiṅgi, the last of whom again is stated to have communicated the sacrificial science to Tittiri. We have three old collections of Yajus-texts, viz. the *Kāṭhaka,* the *Kālāpaka* or *Maitrāyaṇī Saṃhitā,* and the *Taittirīya-saṃhitā.* The *Kāṭhaka* and *Kālāpaka* are frequently mentioned together; and the author of the "great commentary" on Pāṇini once remarks that these works were taught in every village. From the *Kaṭhas* and *Kālāpas* proper schools seem early to have branched off, each with their own recensions of the text. As regards the Taittirīya-saṃhitā, that collection, too, in course of time gave rise to a number of different schools, the text handed down being that of the Āpastambas.

The four collections of old Yajus texts, so far known to us, while differing more or less considerably in arrangement and verbal points, have the main mass of their textual matter in common. This common matter consists of both sacrificial prayers (*yajus*) in verse and prose, and exegetic or illustrative prose portions (*brāhmaṇa*). A prominent feature of the old Yajus texts, as compared with the other Vedas, is the constant intermixture of textual and exegetic portions. The Charakas and Taittirīyas thus do not recognize the distinction between Saṃhitā and Brāhmaṇa in the sense of two separate collections of texts, but they have only a Saṃhitā, or collection, which includes likewise the exegetic or Brāhmaṇa portions. The Taittirīyas seem at last to have been impressed with their want of a separate Brāhmaṇa and to have set about supplying the deficiency in rather an awkward fashion: instead of separating from each other the textual and exegetic portions of their Saṃhitā, they merely added to the latter a supplement (in three books), which shows the same mixed condition, and applied to it the title of *Taittirīya-brāhmaṇa.*

The *Maitrāyaṇī Saṃhitā,* the identity of which with the original Kālāpaka has been proved pretty conclusively by Dr. L. v. Schröder, who attributes the change of name of the Kālāpa-Maitrāyaṇīyas to Buddhist influences, consists of four books, attached to which is the *Maitri-* (or *Maitrāyaṇī*) *upanishad.* The *Kāṭhaka,* on the other hand, consists of five parts, the last two of which, however, are perhaps later additions, containing merely the prayers of the hotar priest, and those used at the horse-sacrifice. There is, moreover, the beautiful *Kaṭha-* or *Kāṭhaka-upanishad,* which is also, and more usually, ascribed to the Atharvaveda, and from which Sānkhya-Yoga ideas may have developed.

Saṃhitā of the White Yajurveda.—The defective arrangement of the Yajus texts was at last remedied by a different school of Adhvaryus, the Vājasaneyins. The reputed originator of this school and its text-recension is Yājñavalkya Vājasaneya (son of Vājasani). The result of the rearrangement of the texts was a collection of sacrificial mantras, the *Vājasaneyi-saṃhitā,* and a Brāhmaṇa, the *Śatapatha.* On account of the greater lucidity of this arrangement, the Vājasaneyins called their texts the White (or clear) Yajurveda—the name of Black (or obscure) Yajus being for opposite reasons applied to the Charaka texts. Both the Saṃhitā and Brāhmaṇa of the Vājasaneyins have come down to us in two different recensions, viz., those of the *Mādhyandina* and *Kāṇva* schools. In several points of difference the Kāṇva recension agrees with the practice of the Rik-saṃhitā, and there probably was some connection between the Yajus school of Kāṇvas and the famous family of ṛishis of that name to which the eighth maṇḍala of the Rik is attributed.

The *Vājasaneyi-saṃhitā* consists of forty adhyāyas, the first eighteen of which contain the formulas of the ordinary sacrifices. The last fifteen (or even twenty-two) adhyāyas are doubtless a later addition. The last adhyāya is commonly known under the title of *Vājasaneyi-saṃhitā* (or *Iśāvāsya-*) *upanishad.* Its object seems to be to point out the fruitlessness of mere works, and to insist on the necessity of man's acquiring a knowledge of the supreme spirit.

The last book is of the Upanishad order, and bears the special title of *Brihad-* (great) *āraṇyaka;* its last six chapters are the *Brihadāraṇyaka-upanishad,* the most important of all Upanishads. As regards the age of the Śatapatha, the probability is that the main body of the work is considerably older than the time of Pāṇini, but that some of its latter parts were considered by Pāṇini's critic Kātyāyana to be of about the same age as, or not much older than, Pāṇini.

The consolidation of the Brāhmanical hierarchy and the institution of a common system of ritual worship, which called forth the liturgical Vedic collections, were doubtless consummated in the so-called Madhya-deśa, or "midland," lying between the Sarasvatī and the confluence of the Yamunā and Gaṅgā; and more especially in its western part, the Kuru-kshetra, or land of the Kurus, with the adjoining territory of the Pañchālas, between the Yamunā and Gaṅgā. From thence the original schools of Vaidik ritualism gradually extended their sphere over the adjacent parts. The Charakas seem for a long time to have held sway in the western and north-western regions; while the Taittirīyas in course of time spread over the whole of the peninsula south of the Narmadā (Nerbudda), where their ritual has remained pre-eminently the object of study till comparatively recent times. The Vājasaneyins, on the other hand, having first gained a footing in the lands on the lower Ganges, chiefly, it would seem, through the patronage of King Janaka of Videha, thence gradually worked their way westwards, and eventually succeeded in superseding the older schools north of the Vindhya.

Atharvaveda.—The Artharvan was the latest of Vedic collections to be recognized as part of the sacred canon. That it is also the youngest Veda is proved by its language, which in vocabulary and grammar marks an intermediate stage between the main body of the Rik and the Brāhmaṇa period. In regard also to the nature of its contents, and the spirit which pervades them, this Vedic collection occupies a position apart from the others. Whilst the older Vedas seem clearly to reflect the recognized religious

notions and practices of the upper, and so to speak, respectable classes of the Āryan tribes, as jealously watched over by a priesthood deeply interested in the undiminished maintenance of the traditional observances, the fourth Veda, on the other hand, deals mainly with all manner of superstitious practices such as have at all times found a fertile soil in the lower strata of primitive and less advanced peoples, and are even apt, below the surface, to maintain their tenacious hold on the popular mind in comparatively civilized communities. Although the constant intermingling with the aboriginal tribes may well be believed to have exercised a deteriorating influence on the Vedic people in this respect, it can scarcely be doubted that superstitious practices of the kind revealed by the Atharvan and the tenth book of the Rik must at all times have obtained amongst the Āryan people, and that they only came to the surface when they received the stamp of recognized forms of popular belief by the admission of these collections of spells and incantations into the sacred canon. If in this phase of superstitious belief the old gods still find a place, their character has visibly changed so as to be more in accordance with those mystic rites and magic performances and the part they are called upon to play in them, as the promoters of the votary's cabalistic practices and the averters of the malicious designs of mortal enemies and the demoniac influences to which he would ascribe his fears and failures as well as his bodily ailments. The fourth Veda may thus be said to supplement in a remarkable manner the picture of the domestic life of the Vedic Āryan as presented in the Grihya-sūtras or house-rules; for whilst these deal only with the orderly aspects of the daily duties and periodic observances in the life of the respectable householder, the Atharvaveda allows us a deep insight into "the obscurer relations and emotions of human life"; and, it may with truth be said that "the literary diligence of the Hindus has in this instance preserved a document of priceless value for the institutional history of early India as well as for the ethnological history of the human race" (M. Bloomfield). It is worthy of note that the Atharvaveda is practically unknown in the south of India.

This body of spells and hymns is traditionally associated with two old mythic priestly families, the Atharvans and Aṅgiras, their names, in the plural, serving either singly or combined (Atharvāṅgirasas) as the oldest appellation of the collection. The two families or classes of priests are by tradition connected with the service of the sacred fire; but whilst the Atharvans seem to have devoted themselves to the auspicious aspects of the fire-cult and the performance of propitiatory rites, the Aṅgiras, on the other hand, are represented as having been mainly engaged in the uncanny practices of sorcery and exorcism. The current text of the *Atharva-saṃhitā*—apparently the recension of the Śaunaka school—consists of some 750 different pieces, about five-sixths of which is in various metres, the remaining portion being in prose. The whole mass is divided into twenty books. The principle of distribution is for the most part a merely formal one, in books i.-xiii. pieces of the same or about the same number of verses being placed together in the same book. The next five books, xiv.-xviii., have each its own special subject: xiv. treats of marriage and sexual union; xv., in prose, of the Vrātya, or religious vagrant; xvi. consists chiefly of prose formulas of conjuration; xvii. of a lengthy mystic hymn; and xviii. contains all that relates to death and funeral rites. Of the last two books no account is taken in the Atharva-prātiśākhya, and they indeed stand clearly in the relation of supplements to the original collection. The nineteenth book evidently was the result of a subsequent gleaning of pieces similar to those of the earlier books, which had probably escaped the collectors' attention; while the last book, consisting almost entirely of hymns to Indra taken from the Rik-saṃhitā, is nothing more than a liturgical manual of recitations and chants required at the Soma sacrifice; its only original portion being the ten so-called *kuntāpa* hymns (127–136), consisting partly of laudatory recitals of generous patrons of sacrificial priests and partly of riddles and didactic subjects.

The Atharvan has come down to us in a much less satisfactory state of preservation than any of the other Saṃhitās. The discovery in Kashmir of a second recension of the Atharva-saṃhitā, contained in a single birch-bark ms., written in the Śāradā character, has provided further material for its study. This new recension, ascribed to the Paippalāda school, consists likewise of twenty books (*kāṇḍa*), but in textual matter and arrangement it differs very much from the current text. While lacking much of the latter the new version offers a good deal of fresh matter, amounting to about one-sixth of the whole. From the Mahābhāshya and other works quoting as the beginning of the Atharva-saṃhitā a verse that coincides with the first verse of the sixth hymn of the current text, it has long been known that at least one other recension must have existed; but the first leaf of the Kashmir ms. having been lost, it cannot be determined whether the new recension (as seems all but certain) corresponds to the one referred to in those works.

Atharvaveda-brāhmaṇa.—The only Brāhmaṇa of the Atharvan, the *Gopatha-brāhmaṇa,* is one of the most modern and least important works of its class. It consists of two parts, the first of which contains cosmogonic speculations, interspersed with legends, mostly adapted from other Brāhmaṇas, and general instructions on religious duties and observances; while the second part treats, in a very desultory manner, of various points of the sacrificial ceremonial.

Atharvaveda-sūtras.—The Kalpa-sūtras belonging to this Veda comprise both a manual of śrauta rites, the *Vaitāna-sūtra,* and a manual of domestic rites, the *Kauśika-sūtra.* The teacher Kauśika is repeatedly referred to in the work on points of ceremonial doctrine. The last sūtra-work to be noticed in connection with this Veda is the *Śaunakīyā Chaturādhyāyikā,* being a Prātiśākhya of the Atharva-saṃhitā, so called from its consisting of four lectures (adhyāya). Although Śaunaka can hardly be credited with being the actual author of the work, considering that his opinion is rejected in the only rule where his name appears, there is no reason to doubt that it chiefly embodies the phonetic theories of that teacher, which were afterwards perfected by members of his school. Whether this Śaunaka is identical with the writer of that name to whom the final redaction of the Sākalaprātiśakhya of the Rik is ascribed is not known.

Upanishads.—Another class of writings traditionally connected with the Atharvaveda are the numerous *Upanishads* which do not specially attach themselves to one or other of the Saṃhitās or Brāhmaṇas of the other Vedas. The Ātharvaṇa-upanishads, mostly composed in ślokas, may be roughly divided into two classes: those of a purely speculative or general pantheistic character, treating chiefly of the nature of the supreme spirit, and the means of attaining to union therewith, and those of a sectarian tendency. Of the former category, a limited number—such as the Praśna, Muṇḍaka and Māṇḍūkya-upanishads—have probably to be assigned to the later period of Vedic literature; whilst the others presuppose more or less distinctly the existence of some fully developed system of philosophy, especially the Vedānta or the Yoga. The sectarian Upanishads, on the other hand—identifying the supreme spirit either with one of the forms of Vishṇu (such as the Nārāyaṇa, Nṛisiṃha-tāpanīya, Rāma-tāpanīya, Gopāla-tāpanīya Upanishads), or with Śiva (*e.g.,* the Rudra-upanishad), or with some other deity—belong to post-Vedic times.

THE CLASSICAL PERIOD

The Classical Literature of India is almost entirely a product of artificial growth, in the sense that its vehicle was not the language of the general body of the people, but of a small and educated class. It would scarcely be possible, even approximately, to fix the time when the literary idiom ceased to be understood by the common people. We only know that in the 3rd century B.C. there existed several dialects in different parts of northern India which differed considerably from the Sanskrit; and Buddhist tradition states that Gautama Śākyamuni himself, in the 6th century B.C., used the local dialect of Magadha (Behar) in preaching his new doctrine. Not unlikely, indeed, popular dialects, differing perhaps but slightly from one another, may have existed as early as the time of the Vedic hymns, when the Indo-Aryans, divided into clans and tribes, occupied the Land of the Seven Rivers; but such dialects must have sprung up

after the extension of the Aryan sway and language over the whole breadth of northern India. But there is no reason why, even with the existence of local dialects, the literary language should not have kept in touch with the people in India, as elsewhere, save for the fact that from a certain time that language remained altogether stationary, allowing the vernacular dialects more and more to diverge from it. Although linguistic research had been successfully carried on in India for centuries, the actual grammatical fixation of Sanskrit seems to have taken place about contemporaneously with the first spread of Buddhism; and indeed that popular religious movement undoubtedly exercised a powerful influence on the linguistic development of India.

Epic Poems.—The Hindus, like the Greeks, possess two great national epics, the *Mahābhārata* and the *Rāmāyaṇa*. The *Mahābhārata, i.e.*, "the great (poem or tale) of the Bhāratas," is not so much a uniform epic poem as a great collection of poetry, consisting of a mass of legendary and didactic matter, worked into and round a central heroic narrative. The authorship of this work is aptly attributed to Vyāsa, "the arranger," the personification of Indian recension. Only the bare outline of the leading story can here be given.

At Hastināpura (sixty miles from the modern Delhi) in the Bharata country Dhritarāshṭra, the elder of the princes, being blind, was passed over for his brother Pāṇḍu on the death of their father. On the death of Pāṇḍu, however, Dhritarāshṭra assumed the government, assisted by his uncle Bhīshma, the Nestor of the poem. Pāṇḍu had five sons, Yudhishṭhira, Bhīma and Arjuna, by his chief wife Kūntī, and the twins Nakula and Sahadeva by his wife Mādrī. From their great-grandfather Kuru both families are called *Kauravas;* but for distinction that name is more usually applied to the sons of Dhritarāshṭra, while their cousins, as the younger line, are named, after their father, *Pāṇḍavas*. The Pāṇḍavas were brought up at their uncle's court like his own sons. The rivalry and varying fortunes of these two houses form the main plot of the great epic. The Pāṇḍu princes soon proved themselves greatly superior to their cousins; and Yudhishṭhira, the eldest of them all, was to be appointed heir-apparent. But they had to leave the country to escape the plots of their jealous cousins. In their exile Draupadī, daughter of King Drupada of Panchāla, won by Arjuna in open contest, and became the wife of the five brothers. At the contest they met their cousin, nephew of their mother Kuntī, the famous Yādava prince Krishṇa of Dvārakā, who ever afterwards remained their faithful friend and confidential adviser. Dhritarāshṭra now divided the kingdom between the two houses; whereupon the Pāṇḍavas built for themselves the city of Indraprastha (on the site of the modern Delhi). After a time of great prosperity, Yudhishṭhira, in a game of dice, lost everything to Duryodhana, when it was settled that the Pāṇḍavas should retire to the forest for twelve years, but should afterwards be restored to their kingdom if they succeeded in passing an additional year in disguise. During their forest-life they met with many adventures, among which may be mentioned their encounter with King Jayadratha of Chedi, who had carried off Draupadī from their hermitage. After the twelfth year has expired they leave the forest, and, assuming various disguises, take service at the court of King Virāṭa of Matsya. Here all goes well for a time till the queen's brother Kīchaka, a great warrior and commander of the royal forces, falls in love with Draupadī, and is slain by Bhīma. The Kauravas, profiting by Kīchaka's death, now invade the Matsyan kingdom, when the Pāṇḍavas side with King Virāṭa, and there ensues, on the field of Kurukshetra, during eighteen days, a series of fierce battles, ending in the annihilation of the Kauravas; only the Pāṇḍavas, Arjuna and his charioteer Krishṇa survived on the victorious side. Yudhishṭhira now at last becomes yuva-rāja, and eventually king—Dhritarāshṭra having resigned and retired with his wife and Kuntī to the forest, where they soon after perish in a conflagration. Learning also of the death of Krishṇa, Yudhishṭhira himself at last becomes tired of life and resigns his crown; and the five princes, with their faithful wife, and a dog that joins them, set out for Mount Meru, to seek admission to Indra's heaven. On the way one by one drops off, till Yudhishṭhira alone, with the dog, reaches the gate of heaven; but, the dog being refused admittance, the king declines entering without it, when the dog turns out to be no other than the god of Justice himself, having assumed that form to test Yudhishṭhira's constancy. But, finding neither his wife nor his brothers in heaven, and being told that they are in the nether world to expiate their sins, the king insists on sharing their fate, when this, too, proves a trial, and they are all reunited to enjoy perpetual bliss.

The complete work consists of upwards of 100,000 couplets—its contents thus being nearly eight times the bulk of the *Iliad* and *Odyssey* combined. It is divided into eighteen books, with a supplement, entitled Harivaṃśa, or genealogy of the god Hari (Krishṇa-Vishṇu). The portion relating to the feud of the rival houses constitutes somewhere between a fourth and a fifth of the work; and it is by no means improbable that this portion once formed a separate poem, called the *Bhārata*. While some of the episodes are so loosely connected with the story as to be readily severed from it, others are so closely interwoven with it that their removal would seriously injure the very texture of the work. This, however, only shows that the original poem must have undergone some kind of revision, or perhaps repeated revisions. That such has indeed taken place, at the hand of Brāhmans, for sectarian and caste purposes, cannot be doubted. According to Lassen's opinion, which has been very generally accepted by scholars, the main story of the poem would be based on historical events: on a destructive war waged between the two neighbouring peoples of the Kurus and Panchālas, who occupied the western and eastern parts of the Madhyadeśa (or "middle land" between the Ganges and Jumna) respectively, and ending in the overthrow of the Kuru dynasty. On the original accounts of these events—perhaps handed down in the form of lays or sagas—the Pāṇḍava element would subsequently have been grafted as calculated to promote the class interests of the Brāhmanical revisers.

Date of the Epic.—The earliest direct information regarding the existence of epic poetry in India is in a passage of Dion Chrysostom (*c.* A.D. 80)—"even among the Indians, they say, Homer's poetry is sung, having been translated by them into their own dialect and tongue." It is generally agreed that this does not imply an Indian translation of Homer but means that the Indians had similar works. Whence Dion derived his information is not known; but as many leading names of the Mahābhārata and even the name of the poem itself are mentioned in Pāṇini's grammatical rules, not only must the Bhārata legend have been current in his time (? *c.* 400 B.C.), but most probably it was at the time of Patañjali, the author of the "great commentary" on Pāṇini (*c.* 150 B.C.). It cannot, however, be doubted that long before that time heroic song had been diligently cultivated in India at the courts of princes and among Kshatriyas, the knightly order, generally. In the *Mahābhārata* itself the transmission of epic legend is in some way connected with the Sūtas, a social class which, in the caste-system, is defined as resulting from the union of Kshatriya men with Brāhmaṇa women, and which supplied the office of charioteers and heralds, as well as (along with the Māgadhas) that of professional minstrels. Be this as it may, there is reason to believe that, as Hellas had her ἀοιδοί who sang the κλέα ἀνδρῶν, and Iceland her skalds who recited favourite sagas, so India had from olden times her professional bards, who delighted to sing the praises of kings and inspire the knights with warlike feelings. If in this way a stock of heroic poetry had gradually accumulated which reflected an earlier state of society and manners, we can well understand why, after the Brāhmanical order of things had been definitely established, the priests should have deemed it desirable to subject these traditional memorials of Kshatriya chivalry and prestige to their own censorship, and adapt them to their own canons of religious and civil law. Such a revision would doubtless require considerable skill and tact; and if in the present version of the work much remains that seems contrary to the Brāhmanical code and pretensions—*e.g.*, the polyandric union of Draupadī and the Pāṇḍu princes—the reason probably is that such features were too firmly rooted in the popular tradition to be readily eliminated; and all the revisers could do was to explain them away as best

they could. Thus Draupadī's abnormal position is actually accounted for in five different ways, one of these representing it as an act of duty and filial obedience on the part of Arjuna who, on bringing home his fair prize and announcing it to his mother, is told by her, before seeing what it is, to share it with his brothers. The epic in time became a great treatise on duty (*dharma*) inculcating the divine origin of Brāhman institutions, the caste system and the superiority of the priestly caste not only over the people but over kings. From inscriptions we know that by the end of the 5th century A.D. the Mahābhārata was appealed to as an authority on matters of law, and that its extent was practically what it now is, including its supplement, the Harivaṃśa. Indeed, everything seems to point to the probability of the work having been complete by about A.D. 200. But, whilst Bhārata and Kuru heroic lays may, and probably do, go back to a much earlier age, it seems hardly possible to assume that the Pāṇḍava epic in its present form can have been composed before the Greek invasion of India, or about 300 B.C. Moreover, it is by no means impossible that the epic narrative was originally composed—as some other portions of the works are—in prose, either continuous or mixed with snatches of verse. The leading position occupied in the existing epic by Krishṇa (whence it is actually called *kārshṅa-veda,* or the veda of Krishṇa), and the Vaishṇava spirit pervading it, make it very probable that it assumed its final form under the influence of the Bhāgavata sect with whom Vāsudeva (Krishṇa), originally apparently a venerated local hero, came to be regarded as a veritable god, and incarnation of Vishṇu. Its culminating point this sectarian feature attains in the *Bhagavat-gītā* (*i.e.,* the upanishad), "sung by the holy one"—the famous theosophic episode, in which Krishṇa, in lofty and highly poetic language, expounds the doctrine of faith (*bhakti*) and claims adoration as the incarnation of the supreme spirit. Of the purely legendary matter incorporated with the leading story of the poem, not a little, doubtless, is at least as old as the latter itself. Some of these episodes—especially the well-known story of Nala and Damayantī, and the touching legend of Sāvitrī—themselves form epic gems of high poetic value.

The Rāmāyaṇa, *i.e.,* poem "relating to Rāma," is ascribed to the poet Vālmīki; and, allowance being made for some later additions, the poem indeed presents the appearance of being the work of an individual genius. In its present form it consists of some 24,000 ślokas, or 48,000 lines of sixteen syllables, divided into seven books.

(I.) King Daśaratha of Kośala, reigning at Ayodhyā (Oudh), has four sons borne him by three wives, viz., Rāma, Bharata and the twins Lakshmaṇa and Śatrughna. Rāma wins for a wife Sītā, daughter of Janaka, king of Videha. (II.) On his return to Ayodhyā he is to be appointed heir-apparent; but Bharata's mother persuades the king now to grant her a long promised boon and insists on his banishing his eldest son for fourteen years, and appointing her son instead. Separation from his favourite son soon breaks the king's heart, whereupon the ministers call on Bharata to assume the reins of government. He refuses, however, and, betaking himself to Rāma's retreat on the Chitrakūṭa mountain (in Bundelkhund), implores him to return; but, unable to shake Rāma's resolve to complete his term of exile, he consents to take charge of the kingdom in the meantime. (III.) After a ten years' happy residence in the forest, Rāvaṇa, the demon-king of Ceylon, carries off Sītā to his capital Laṅkā while her two protectors are away in pursuit of a golden deer sent to mislead them. While she resolutely rejects the Rākshasa's addresses, Rāma sets out with his brother to her rescue. (IV.) After numerous adventures they enter into an alliance with Sugrīva, king of the monkeys; and, with the assistance of the monkey-general Hanumān, and Rāvaṇa's own brother Vibhīshaṇa, they prepare to assault Laṅkā. (V.) The monkeys, tearing up rocks and trees, construct a passage across the straits—the so-called Adam's Bridge, still designated Rāma's Bridge in India. (VI.) Rāma crosses with his allies, slays the demon and captures the stronghold; Sītā successfully undergoes an ordeal by fire to clear herself of the suspicion of infidelity; they return to Ayodhyā, where, after a triumphal entry, Rāma is installed. (VII.) Rāma, however, seeing that the people are not yet satisfied of Sītā's purity, resolves to put her away; whereupon, in the forest, she falls in with Vālmīki himself, and at his hermitage gives birth to two sons. While growing up there, they are taught by the sage the use of the bow, as well as the Vedas, and the Rāmāyaṇa as far as the capture of Laṅkā and the royal entry into Ayodhyā. Ultimately Rāma discovers and recognizes them by their wonderful deeds and their likeness to himself, and takes his wife and sons back with him.

The first and last books are later additions by which the poem has been turned to the glory of Vishṇu. In these two books Rāma has become deified and identified with the god Vishṇu, whilst in the body of the poem his character is simply that of a perfect man and model hero. The background of the epic is a purely mythological one—Rāma representing the god Indra, and Sītā—in accordance with the meaning of the name—the personified "Furrow," as which she is already invoked in the *Rigveda,* and hence is a tutelary spirit of the tilled earth, wedded to Indra, the Jupiter Pluvius. Rāvana would correspond to the demon Vritra of the *Rigveda.*

One version of the same story, with, however, many important variations of details, forms an episode of the *Mahābhārata,* the *Rāmopākhyāna,* the relation of which to Vālmīki's work is still a matter of uncertainty. In respect of both versification and diction the Rāmāyaṇa is of a distinctly more refined character than the larger poem; and, indeed, Vālmīki is seen already to cultivate some of that artistic style of poetry which was carried to excess in the later artificial poems (Kāvyas), whence the title of *ādi-kavi,* or first poet, is commonly applied to him. The *Rāmāyaṇa* itself contains a prophecy like that of Horace's to the effect that it will always live on the lips of men, and it has been more than fulfilled. No story in India has attained such popularity. It has been translated into many vernaculars and through the version of Tulsi Das has exerted a tremendous influence on the spiritual life of India. To characterize the Indian epics in a single word: though often disfigured by fancies and exaggerations, they are yet noble works, abounding in passages of remarkable descriptive power, intense pathos, and high poetic grace and beauty; and while, as works of art, they are far inferior to the Greek epics, in some respects they appeal far more strongly to the romantic mind of Europe, namely, by their loving appreciation of natural beauty, their exquisite delineation of womanly love and devotion, and their tender sentiment of mercy and forgiveness.

Purāṇas and Tantras.—The *Purāṇas* are partly legendary, partly speculative histories of the universe, compiled for the purpose of promoting some special, locally prevalent form of Brāhmanical belief. They deal with cosmogony, stories of gods, sages and heroes, Vishnu's avatars, the solar and lunar lines of kings and other pseudo-historical matter. They are sometimes styled a fifth Veda, and may indeed in a certain sense be looked upon as the scriptures of Brāhmanical India. The term *purāṇa,* signifying "old," applied originally to prehistoric, especially cosmogonic, legends, and then to collections of ancient traditions generally. They are popular encyclopaedias of useful knowledge mostly with a Vaishṇava tendency. They are connected in subject matter with the *Mahābhārata* and have some relationship to the law books and go back to a common source.

They are almost entirely composed in the epic couplet, and indeed in much the same easy flowing style as the epic poems, to which they are, however, as a rule greatly inferior in poetic value.

According to the traditional classification of these works, there are said to be eighteen (*Mahā-,* or great) *Purāṇas,* and as many *Upa-purāṇas,* or subordinate Purāṇas. The former are by some authorities divided into three groups of six, according as one or other of the three primary qualities of external existence—goodness, darkness (ignorance), and passion—is supposed to prevail in them, viz. the *Vishṇu, Nāradīya, Bhāgavata, Garuḍa, Padma, Varāha—Matsya, Kūrma, Liṅga, Śiva, Skanda, Agni—Brahmāṇḍa, Brahmavaivarta, Mārkaṇḍeya, Bhavishya, Vāmana* and *Brahma-Purāṇas.* The eighteen principal Purāṇas are said to consist of together 400,000 couplets. In northern India the Vaishṇava Purāṇas, especially the *Bhāgavata* and *Vishṇu,* are by far the

most popular. The former is held in the highest estimation, and, especially through the vernacular versions of its tenth book, treating of the story of Kṛishṇa, has powerfully influenced the religious belief of India.

From the little we know regarding the Upa-purāṇas, their character does not seem to differ very much from that of the principal sectarian Purāṇas. Besides these two classes of works there is a large number of so-called *Sthala-purāṇas,* or chronicles recounting the history and merits of some holy "place" or shrine, where their recitation usually forms an important part of the daily service.

The *Tantras* have to be considered as partly a collateral and partly a later development of the sectarian Purāṇas; though, unlike these, they can hardly lay claim to any intrinsic poetic value. These works are looked upon as their sacred writings by the numerous *Śāktas,* or worshippers of the female energy (*śakti*) of some god, especially the wife of Śiva, in one of her many forms (Pārvatī, Devī, Kālī, Bhavānī, Durgā). This worship of a female representation of the divine power appears already in some of the Purāṇas; but in the Tantras it assumes quite a peculiar character, being largely intermixed with magic performances and mystic rites, partly, indeed, of a grossly immoral nature. (*See* HINDUISM.) *See* the series of Tantric works edited by A. Avalon.

Artificial Epics and Romances.—About the beginning of the Christian era a new class of epic poems begins to make its appearance, differing widely in character from those that had preceded it. These later productions are of a decidedly artificial character, and must necessarily have been beyond the reach of any but the highly cultivated. They are, on the whole, singularly deficient in incident and invention, their subject matter being almost entirely derived from the old epics. Nevertheless, these works are by no means devoid of merit and interest; and a number of them display considerable descriptive power and a wealth of genuine poetic sentiment. The simple heroic couplet has been largely discarded for various more or less elaborate metres; and in accordance with this change of form the diction becomes gradually more complicated.

The generic appellation of such works is *kāvya,* which, meaning "poem," or the work of an individual poet (*kavi*), is, as we have seen, already applied to the *Rāmāyaṇa.* Six poems of this kind are singled out by native rhetoricians as standard works, under the title of *Mahākāvya,* or great poems. Two of these are ascribed to the famous dramatist Kālidāsa, the most prominent figure of this period of Indian literature and truly a master of the poetic art. In a comparatively modern couplet he is represented as having been one of nine literary "gems" at the court of a king Vikramāditya. Whether this name refers to Chandragupta II. Vikramāditya or not, Kālidāsa must have flourished about this time, *c.* A.D. 400. Of the principal poets of this class, whose works have come down to us, he appears to be one of the earliest; but there can be little doubt that he was preceded in this as in other departments of poetic composition by many lesser lights, eclipsed by the sun of his fame, and forgotten. Thus the *Buddhacharita,* a Sanskrit poem on the life of the reformer, which was translated into Chinese about A.D. 420, and the author of which, Aśvaghosha, is placed by Buddhist tradition as early as the time of Kanishka (who began to reign in A.D. 78), calls itself, not without reason, a "mahākāvya"; and the panegyrics contained in some of the inscriptions of the 4th century likewise display, both in verse and ornate prose, many of the characteristic features of the kāvya style of composition.

Of the six universally recognized "great poems" here enumerated, the first two, and doubtless the two finest, are those attributed to Kālidāsa. (1) The *Raghuvaṃśa,* or "race of Raghu," celebrates the ancestry and deeds of Rāma. The work, consisting of nineteen cantos, is manifestly incomplete; but hitherto no copy has been discovered of the six additional cantos which are supposed to have completed it. (2) The *Kumāra-sambhava,* or "the birth of (the war-god) Kumāra" (or Skanda), the son of Śiva and Pārvatī, consists of seventeen cantos, the last ten of which are looked upon as spurious by some scholars, mainly on account of their erotic character, not a strong argument. There is no reason to doubt that the eighth canto is by Kālidāsa but he cannot have written much of the other nine. (3) The *Kirātārjunīya,* or combat between the Pāṇdava prince Arjuna and the god Śiva, in the guise of a Kirāta or wild mountaineer, is a poem in eighteen cantos, by Bhāravi, who is mentioned together with Kālidāsa in an inscription dated A.D. 634. (4) The *Śiśupāla-badha,* or slaying of Śiśupāla, who, being a prince of Chedi, reviled Kṛishṇa, who had carried off his intended wife, and was killed by him at the inauguration sacrifice of Yudhishthira, is a poem consisting of twenty cantos, attributed to Māgha (ninth cent.), whence it is also called *Māghakāvya.* (5) The *Rāvaṇabadha,* or "slaying of Rāvaṇa," more commonly called *Bhaṭṭikāvya,* was composed for the practical purpose of illustrating the less common grammatical forms and the figures of rhetoric and poetry. Bhaṭṭi, apparently the author's name, is usually identified with the well-known grammarian Bhartṛihari, whose death Professor M. Müller, from a Chinese statement, fixes at A.D. 650, while others make him Bhartṛihari's son. (6) The *Naishadhīya,* or *Naishadha-charita,* the life of Nala, king of Nishadha, is ascribed to Śrī-Harsha (son of Hīra), who is supposed to have lived in the latter part of the 12th century. The *Nalodaya* deals with the same subject but the author's main object is to show his skill in tricks of style and metre. The long lost and recently discovered *Janakīharana of Kumāradāsa* (eighth cent.) takes its subject (the rape of Sītā) from the *Rāmāyaṇa* strongly imitative of Kālidāsa; it is, however, the work of a poet of no mean ability. The stanzas of the *Rāghavapāṇḍavīya* are so ambiguously worded that the poem may be interpreted as relating to the leading story of either the *Rāmāyaṇa* or the *Mahābhārata.* Less ambitious in composition, though styling itself a mahākāvya, is the *Vikramāṅka-devacharita,* a panegyric written about A.D. 1085 by the Kashmir poet Bilhaṇa, in honour of his patron the Chālukya king Vikramāditya of Kalyāṇa, regarding the history of whose dynasty it supplies some valuable information.

In this place may also be mentioned, as composed in accordance with the Hindu poetic canon, Kalhaṇa's *Rājataraṅgiṇī* (*c.* A.D. 1150) or "river of kings," being a chronicle of the kings of Kashmir, and the only important historical work in the Sanskrit language, although even here considerable allowance has to be made for poetic licence and fancy.

Under the general term "kāvya" Indian critics include, however, not only compositions in verse, but also certain kinds of prose works composed in choice diction richly embellished with flowers of rhetoric. The feature generally regarded by writers on poetics as the chief mark of excellence in this ornate prose style is the frequency and length of its compounds; whilst for metrical compositions the use of long compounds is expressly discouraged by some schools of rhetoric.

The Drama.—The Hindus ascribe the origin of dramatic representation to the sage Bharata (the word in Sanskrit means also "actor"). We know that treatises on the dramatic art existed at the time of Pāṇini, as he mentions two authors of *Naṭa-sūtras,* or "rules for actors," Śilālin and Kriśāśva. Now the words *naṭa* and *nāṭya*—as well as *nāṭaka,* the common term for "drama"—being derived (like the modern vernacular "Nautch"=*nritya*) from the root *naṭ* (*nrit*) "to dance," seem to point to a pantomimic or choral origin of the dramatic art. Fortunately, however, Patañjali, in his "great commentary," speaks of the actor as singing, and of people going "to hear the actor." Nay, he even mentions two subjects, taken from the cycle of Vishṇu legends: the slaying of Kaṃsa (by Krishṇa) and the binding of Bali (by Vishṇu)—which were represented on the stage both by mimic action and declamation. Judging from these allusions, theatrical entertainments in those days seem to have been very much on a level with the old religious spectacles or mysteries of Europe. It is not, however, till some centuries later that we meet with the first real dramas, which mark at the same time the very culminating point of Indian dramatic composition. Although we know the names of at least five predecessors of Kālidāsa, nothing but a few quotations from them have been preserved.

The long disputed possibility of Greek influence on the Sanskrit drama is not now maintained, although there are some superficial points of resemblance. The Hindu dramatist has little regard for

the "unities" of the classical stage, though he is hardly ever guilty of extravagance in his disregard of them. Unlike the Greek dramatic theory, it is an invariable rule of Indian dramaturgy, that every play, however much of the tragic element it may contain, must have a happy ending. A death never takes place on the stage, nor is anything indecorous allowed. The dialogue is invariably carried on in prose plentifully interspersed with those neatly turned lyrical stanzas in which the Indian poet delights to depict some aspect of nature, or some temporary physical or mental condition. The outstanding feature of the Hindu play, however, is the mixed nature of its language. While the hero and leading male characters speak Sanskrit, women and inferior male characters use various Prākrit dialects. As regards these dialectic varieties, it can hardly be doubted that at the time when they were first employed in this way they were local vernacular dialects; but in the course of the development of the scenic art they became permanently fixed for special dramatic purposes, just as the Sanskrit had, long before that time, become fixed for general literary purposes. Thus it would happen that these Prākrit dialects, having once become stationary, were soon left behind by the spoken vernaculars, until the difference between them was as great as between the Sanskrit and the Prākrits.

The *Mrichchhakatikā,* or "little clay cart," has been considered earliest of the existing dramas because of a certain clumsiness of construction, but probably does not antedate the sixth century. According to several stanzas in the prologue, the play was composed by a king Śūdraka, but it is probably the work of a poet patronized by him. Chārudatta, a Brāhman merchant, reduced to poverty, and Vasantasenā, an accomplished courtezan, meet and fall in love with each other. This forms the main plot, which is interwoven with a political underplot, resulting in a change of dynasty. The connection between the two plots is effected by means of the king's rascally brother-in-law, who pursues Vasantasenā with his addresses, as well as by the part of the rebel cowherd Āryaka, who, having escaped from prison, finds shelter in the hero's house. The wicked prince, on being rejected, strangles Vasantasenā, and accuses Chārudatta of having murdered her; but, just as the latter is about to be executed, his lady love appears again on the scene. Meanwhile Āryaka has succeeded in deposing the king, and, having himself mounted the throne of Ujjain, he raises Vasantasenā to the position of an honest woman, to enable her to become the wife of Chārudatta. The play is one of the longest, consisting of not less than ten acts, some of which, however, are very short. The interest of the action is, on the whole, well sustained; and, altogether, the piece presents a vivid picture of the social manners of the time, whilst the author shows himself imbued with a keen sense of humour, and a master in the delineation of character.

Kālidāsa.—In Kālidāsa the dramatic art attained its highest point of perfection. From this accomplished poet we have three well-constructed plays, abounding in stanzas of exquisite tenderness and fine descriptive passages: the two well-known mytho-pastoral dramas, *Śakuntalā* in seven and *Vikramorvaśī* in five acts, and a piece of court intrigue, distinctly inferior to the other two, entitled *Mālavikāgnimitra* in five acts. The plot of the last named is as follows: King Agnimitra, who has two wives, falls in love with Mālavikā, maid to the first queen. His wives endeavour to frustrate their affection for each other, but in the end Mālavikā turns out to be a princess by birth, and is accepted by the queens as their sister.

Śrī Harshadeva.—Śrī-Harshadeva—identical with the king (Śīlāditya) Harshavardhana of Kānyakubja (Kanauj) mentioned above, who ruled in the first half of the 7th century—has three plays attributed to him; they are probably only dedicated to him by poets patronized by him. This at least commentators state to have been the case as regards the *Ratnāvalī,* the authorship of which they assign to Bāṇa. Indeed, had they been the king's own productions, one might have expected the Chinese pilgrims (especially I-tsing, who saw one of the plays performed) to mention the fact. The *Ratnāvalī,* "the pearl necklace," is a graceful comedy of domestic manners, with well-drawn characters. Ratnāvalī, a Ceylon princess, is sent by her father to the court of King Udayana of Vatsa to become his second wife. She suffers shipwreck, but is rescued and received into Udayana's palace under the name of Sāgarikā, as one of Queen Vāsavadattā's attendants. The king falls in love with her, and the queen tries to keep them apart, but, on learning the maiden's origin, she becomes reconciled, and recognizes her as a "sister." Very similar in construction, but inferior, is the *Priyadarśikā,* in four acts, having for its plot another amour of the same king. The scene of the third play, the *Nāgānanda,* or "joy of the serpents" (in five acts), on the other hand, is laid in semi-divine regions. In spite of its shortcomings of construction the *Nāgānanda* is a play of considerable merit, the characters being drawn with a sure hand, and the humour is by no means despicable.

Bhavabhūti, a Brāhman of Vidarbha, passed his literary life chiefly at the court of Yaśovarman of Kanauj (*c.* A.D. 700). Bhavabhūti was the author of three plays, two of which, the *Mahāvīracharita* ("life of the great hero") and the *Uttararāmacharita* with very little action ("later life of Rāma"), in seven acts each, form together a dramatized version of the story of the *Rāmāyaṇa.* The third, the *Mālatīmādhava,* is a domestic drama in ten acts, representing the fortunes of Mādhava and Mālatī, the son and daughter of two ministers of neighbouring kings, who from childhood have been destined for each other, but, by the resolution of the maiden's royal master to marry her to an old and ugly favourite of his, are for a while threatened with permanent separation. The action of the play is full of life, and abounds in stirring, though sometimes improbable, incidents. The poet is considered by native critics to be not only not inferior to Kālidāsa, but even to have surpassed him in his *Uttararāmacharita.*

Minor Dramatists.—Bhaṭṭa Nārāyaṇa, the author of the *Veṇīsaṃhāra* ("the binding up of the braid of hair," based on an incident in the Mahābhārata), is known to have been alive in A.D. 840. The piece is composed in a style similar to that of Bhavabhūti's plays, but is inferior to them in dramatic construction and poetic merit, though valued by critics for its strict adherence to the rules of the dramatic theory, and popular in India, owing to its partiality for the cult of Krishṇa. The *Hanumān-nāṭaka* is a dramatized version of the story of Rāma, interspersed with numerous purely descriptive poetic passages. Contrary to the general practice, Sanskrit alone is employed in it. The play is attributed to Dāmodara Miśra (11th cent.), but gives the impression of being the production of different hands. Bhāsa is traditionally one of the great dramatists of India, a predecessor of Kālidāsa, but nothing of his has survived.

The *Mudrārākshasa,* or "Rākshasa (the minister) with the signet," is unique in being a drama of political intrigue, partly based on historical events, the plot turning on the reconciliation of Rākshasa, the minister of the murdered king Nanda, with the hostile party, consisting of Prince Chandragupta (the Greek Sandrocottus, 315–291 B.C.), who succeeded Nanda, and his minister Chāṇakya. The plot is developed with considerable dramatic skill, in vigorous, if not particularly elegant, language. The play was composed by Viśākhadatta, not much later than A.D. 860.

The *Prabodha-chandrodaya,* or "the moon-rise of intelligence," composed by Krishṇamiśra about the 12th century, is an allegorical play, in six acts, the *dramatis personae* of which consist entirely of abstract ideas and symbolical figures divided into two conflicting hosts; it is full of vigour, however. It depicts the struggle between the wicked king Error and the good king Reason.

Lyrical, Descriptive and Didactic Poetry.—Allusion has already been made to the marked predilection of the mediaeval Indian poet for depicting in a single stanza some peculiar physical or mental situation. The profane lyrical poetry consists chiefly of such little poetic pictures, which form a prominent feature of dramatic compositions. Numerous poets and poetesses are only known to us through such detached stanzas, preserved in native anthologies or manuals of rhetoric, and enshrining a vast amount of descriptive and contemplative poetry. An excellent specimen of a longer poem, of a partly descriptive, partly erotic character, is Kālidāsa's *Meghadūta,* or "cloud messenger," in which a

banished yaksha (demi-god) sends a love-message across India to his wife in the Himālaya, and describes, in verse-pictures of the stately mandākrāntā metre the various places over which the messenger, a cloud, will have to sail in his airy voyage. Another much-admired descriptive poem by Kālidāsa is the *Ritu-saṃhāra,* or "collection of the seasons," in which the attractive features of the six seasons are successively set forth.

As regards religious lyrics, the fruit of sectarian fervour, a large collection of hymns and detached stanzas, extolling some special deity, might be made from Purāṇas and other works. Of independent productions of this kind only a few of the more important can be mentioned here. Śankara Āchārya, the great Vedāntist, who seems to have flourished about A.D. 800, is credited with several devotional poems, especially the *Ānanda-laharī,* or "wave of joy," a hymn of 103 stanzas, in praise of the goddess Pārvatī. The *Sūrya-śataka,* or century of stanzas in praise of Sūrya, the sun, is ascribed to Mayūra, the contemporary (and, according to a tradition, the father-in-law) of Bāṇa (in the early part of the 7th century). The latter poet himself composed the *Chaṇḍikāstotra,* a hymn of 102 stanzas, extolling Śiva's consort. The *Khaṇḍaprośasti,* a poem celebrating the ten avatāras of Vishṇu, is ascribed to no other than Hanumān, the monkey general, himself. Jayadeva's beautiful poem *Gītagovinda,* which, like most productions concerning Kṛishṇa, is of a very sensuous character, is a religious drama.

Didactic Poetry.—The particular branch of didactic poetry in which India is especially rich is that of moral maxims, expressed in single stanzas or couplets, and forming the chief vehicle of the *Nīti-śāstra* or ethic science. Excellent collections of such aphorisms have been published—in Sanskrit and German by Böhtlingk, and in English by John Muir. Probably the oldest original collection of this kind is that ascribed to Chāṇakya, but really much later.

Fables and Narratives.—For purposes of popular instruction stanzas of an ethical import were early worked up with existing prose fables and popular stories. A collection of this kind, a mirror for princes, was translated into Pahlavī in the reign of the Persian king Khusru Anushirvan, A.D. 531–579; but neither this translation nor the original is any longer extant. A Syriac translation, however, made from the Pahlavī in the same century, under the title of "Qualilag and Dimnag"—from the Sanskrit "Karataka and Damanaka," two jackals who play an important part as the lion's counsellors—has been discovered and published. The Sanskrit original, which probably consisted of fourteen chapters, was afterwards recast—the result being the *Panchatantra,* or "five books" (or headings), of which several recensions exist. A popular but late summary of this work, in four books, the *Hitopadeśa,* or "Salutary Counsel," has been shown by Peterson to have been composed by one Nārāyaṇa. Other highly popular collections of stories and fairy tales, interspersed with sententious verses, are: the *Vetālapanchaviṃśati,* or "twenty-five (stories) of the Vetāla" (the original of the Baitāl Pachīsī), older than the 11th century, since both Kshemendra and Somadeva have used it; and the *Śuka-saptati,* or "seventy (stories related) by the parrot," the author and age of which are unknown.

SCIENTIFIC AND TECHNICAL LITERATURE

Law (*Dharma*).—Among the technical treatises of the later Vedic period, certain portions of the Kalpa-sūtras, or manuals of ceremonial, peculiar to particular schools, are the earliest attempts at a systematic treatment of law subjects. These are the *Dharma-sūtras,* or "rules of (religious) law." The Dharmasūtras consist chiefly of strings of terse rules, containing the essentials of the science, and intended to be committed to memory, and to be expounded orally by the teacher—thus forming, as it were, epitomes of class lectures. These rules are interspersed with stanzas or "gāthās," in various metres, either composed by the author himself or quoted from elsewhere, which generally give the substance of the preceding rules. One can well understand why such couplets should gradually have become more popular, and should ultimately have led to the appearance of works entirely composed in verse. Such metrical law-books did spring up in large numbers, not all at once, but over a long period of time. These works are the metrical *Dharma-śāstras,* or, as they are usually called, the *Smriti,* "recollection, tradition,"—a term which, as we have seen, belonged to the whole body of Sūtras (as opposed to the *Śruti,* or revelation), but which has become the almost exclusive title of the versified institutes of law (and the few Dharmasūtras still extant). Of metrical Smritis about forty are known to exist, but their total number probably amounted to at least double that figure.

Manu.—With the exception of a few of these works—such as the *Agni-, Yama-* and *Vishṇu-Smritis*—which are ascribed to the respective gods, the authorship of the Smritis is attributed to old rishis, such as Atri, Kāṇva, Vyāsa, Śāṇdilya, Bharadvāja. It is, however, extremely doubtful whether, as a rule, there really existed a traditional connection between these works and their alleged authors or schools named after them. The idea, which early suggested itself to Sanskrit scholars, that Smritis which passed by the names of old Vedic teachers and their schools might simply be metrical recasts of the Dharma- (or Grihya-) sūtras of these schools, was a very natural one, and, indeed, is still a very probable one, though the loss of the original Sūtras makes it difficult to prove. One could, however, scarcely account for the disappearance of the Dharmasūtras of some of the most important schools except on the ground that they were given up in favour of other works; and it is not very likely that this should have been done, unless there was some guarantee that the new works, upon the whole, embodied the doctrines of the old authorities of the respective schools. Thus, as regards the most important of the Smritis, the *Mānava-Dharmaśāstra,* there exist both a Śrauta- and a Grihya-sūtra of the Mānava school of the Black Yajus, but no such Dharmasūtra has hitherto been discovered, although the former existence of such a work has been made all but certain by Professor Bühler's discovery of quotations from a *Mānavam,* consisting partly of prose rules, and partly of couplets, some of which occur literally in the Manusmriti, whilst others have been slightly altered there to suit later doctrines, or have been changed from the original trishṭubh into the epic metre. The idea of an old lawgiver Manu Svāyambhuva—"sprung from the self-existent (svayam-bhū)" god Brahman (m.)—reaches far back into Vedic antiquity: he is mentioned as such in early texts; and in Yāska's *Nirukta* a śloka occurs, giving his opinion on a point of inheritance. But whether or not the Mānava-Dharmasūtra embodied what were supposed to be the authoritative precepts of this sage on questions of sacred law we do not know; nor can it as yet be shown that the Manusmriti, which seems itself to have undergone considerable modifications, is the lineal descendant of that Dharmasūtra.

The Mānava Dharmaśāstra consists of twelve books, the first and last of which, treating of creation, transmigration and final beatitude, are, however, generally regarded as later additions. In them the legendary sage Bhrigu, here called a Mānava, is introduced as Manu's disciple, through whom the great teacher has his work promulgated. Except in these two books the work shows no special relation to Manu, for, though he is occasionally referred to in it, the same is done in other Smritis. The oldest existing commentary on the *Mānava-Dharmaśāstra* is by Medhātithi, who is usually supposed to have lived in the 10th century. The most esteemed of the commentaries is that of Kullūka Bhaṭṭa, composed at Benares in the 15th century.

Yājñavalkya.—Next in importance among Smritis ranks the *Yājñavalkya Dharmaśāstra.* Based on the Manusmriti, it represents a more advanced stage of legal theory and definition than that work. Yājñavalkya, as we have seen, is looked upon as the founder of the Vājasaneyins or White Yajus, and the author of the Śatapatha-brāhmaṇa. The work bears some resemblance to the *Pāraskara-grihyasūtra* of the *white Yajur Veda* but a connection between it and the *Mānava-grihyasūtra* seems, however, likewise evident. As in the case of Manu, ślokas are quoted in various works from a *Brihat-* and a *Vriddha- Yājñavalkya.* The Yājñavalkya-smriti consists of three books, corresponding to the three great divisions of the Indian theory of law: *āchāra,* rule of conduct (social and caste duties); *vyavahāra,* civil and criminal law; and *prāyaśchitta,* penance or expiation.

Nāradasmriti.—The *Nāradīya-Dharmaśāstra,* or *Nāradasmriti,* is a more practical work; indeed, it is probably the most systematic and businesslike of all the Smritis. It does not concern itself with religious and moral precepts, but is strictly confined to law.

Whether any of the Dharmaśāstras were ever used in India as actual "codes of law" for the practical administration of justice is doubtful. No doubt these works were held to be of the highest authority as laying down the principles of religious and civil duty; but it was not so much any single text as the whole body of the Smriti that was looked upon as the embodiment of the divine law. Hence, the moment the actual work of codification begins in the 11th century, we find the jurists engaged in practically showing how the Smritis confirm and supplement each other, and in reconciling seeming contradictions between them. This new phase of Indian jurisprudence begins with Vijñāneśvara's *Mitākharā,* which, although primarily a commentary on Yājñavalkya, is so rich in original matter and illustrations from other Smritis that it is far more adapted to serve as a code of law than the work it professes to explain. This treatise is held in high esteem all over India, with the exception of the Bengal or Gaurīya school of law, which recognizes as its chief authority the digest of its founder, Jīmūtavāhana, especially the chapter on succession, entitled *Dāyabhāga.* Based on the Mitākharā are the *Smritichandrikā,* a work of great common sense, written by Devāṇḍa Bhaṭṭa, in the 13th century, and highly esteemed in Southern India; and the *Vīramitrodaya,* a compilation consisting of two chapters, on āchāra and vyavahāra, made in the first half of the 17th century by Mitramiśra, for Rājā Vīrasiṃha, or Bīrsinh Deo of Orchhā, who murdered Abul Fazl, the minister of the emperor Akbar, and author of the *Āīn-i Akbarī.* There is no need here to enumerate any more of the vast number of treatises on special points of law, the more important of which will be found mentioned in English digests of Hindu law.

Philosophy.—The contemplative Indian mind shows at all times a strong disposition for metaphysical speculation. In the old religious lyrics this may be detected from the very first. Not to speak of the abstract nature of some even of the oldest Vedic deities, this propensity betrays itself in a certain mystic symbolism, tending to refine and spiritualize the original purely physical character and activity of some of the more prominent gods, and to impart a deep and subtle import to the rites of the sacrifice. The primitive worship of more or less isolated elemental forces and phenomena had evidently ceased to satisfy the religious wants of the more thoughtful minds. Various syncretist tendencies show the drift of religious thought towards some kind of unity and of the divine powers, be it in the direction of the pantheistic idea, or in that of an organized polytheism, or even towards monotheism. In the latter age of the hymns the pantheistic idea is rapidly gaining ground, and finds vent in various cosmogonic speculations; and in the Brāhmaṇa period we see it fully developed. The fundamental conception of this doctrine finds its expression in the two synonymous terms *brāhman* (neutr.), probably originally "mystic effusion, devotional utterance," then "holy impulse," and *ātman* (masc.), "breath, self, soul."

The recognition of the essential sameness of the individual souls, emanating all alike (whether really or imaginarily) from the ultimate spiritual essence (*parama-brahman*) "as sparks issue from the fire," and destined to return thither, involved some important problems. Considering the infinite diversity of individual souls of the animal and vegetable world, exhibiting various degrees of perfection, is it conceivable that each of them is the immediate efflux of the Supreme Being, the All-perfect, and that each, from the lowest to the highest, could re-unite therewith directly at the close of its mundane existence? The difficulty implied in the latter question was at first met by the assumption of an intermediate state of expiation and purification, a kind of purgatory; but the whole problem found at last a more comprehensive solution in the doctrine of transmigration (*saṃsāra*). This doctrine not found in the *Rigveda* was probably aboriginal and adopted by the Aryan invaders. The notion of *saṃsāra* has become an axiom, a universally conceded principle of Indian philosophy. Thus the latter has never quite risen to the heights of pure thought; its object is indeed *jijñāsā,* the search for saving knowledge; but it is an inquiry (*mīmāṃsā*) into the nature of things undertaken not solely for the attainment of the truth, but with a view to a specific object—the discontinuance of *saṃsāra,* the cessation of mundane existence after the present life. The task of the philosopher is to discover the means of attaining *moksha,* "release" from the bondage of material existence, and union with the Supreme Self—in fact, salvation. Desire is due to ignorance or wrong knowledge of the true nature of things and is the cause of transmigration. The purpose of each philosophical school is to attain true and saving knowledge. Intense self-contemplation being the only way of attaining the all-important knowledge, this doctrine left little or no room for those mediatorial offices of the priest, so indispensable in ceremonial worship; and indeed we actually read of Brāhman sages resorting to Kshatriya princes to hear them expound the true doctrine of salvation. But, in spite of their anti-hierarchical tendency, these speculations continued to gain ground; and in the end the body of treatises propounding the pantheistic doctrine, the Upanishads, were admitted into the sacred canon, as appendages to the ceremonial writings, the Brāhmaṇas. The Upanishads thus form literally "the end of the Veda," the *Vedānta;* but their adherents claim this title for their doctrines in a metaphorical rather than in a material sense, as "the ultimate aim and consummation of the Veda."

In later times the radical distinction between these speculative appendages and the bulk of the Vedic writings was strongly accentuated in a new classification of the sacred scriptures. According to this scheme they were supposed to consist of two great divisions —the *Karma-kāṇḍa,* "the work-section," or practical ceremonial (exoteric) part, consisting of the Saṃhitās and Brāhmaṇas (including the ritual portions of the Āraṇyakas), and the *Jñānakāṇḍa,* "the knowledge-section," or speculative (esoteric) part. These two divisions are also called respectively the *Pūrva-* ("former") and *Uttara-* ("latter," or higher) *kāṇḍa;* and when the speculative tenets of the Upanishads came to be formulated into a regular system it was deemed desirable that there should also be a special system corresponding to the older and larger portion of the Vedic writings. Thus arose the two systems—the *Pūrva-* (or *Karma-*) *mīmāṃsā,* or "prior (practical) speculation," and the *Uttara-* (or *Brāhma-*) *mīmāṃsā,* or higher inquiry (into the nature of the godhead), usually called the Vedānta philosophy.

Philosophical Systems.—It is not yet possible to determine, even approximately, the time when the so-called *Darśanas* (literally "demonstrations"), or systems of philosophy which subsequently arose, were first formulated. And, though they have certainly developed from the tenets enunciated in the Upanishads, there is some doubt as to the exact order in which these systems succeeded each other. Of all the systems the Vedānta has indeed remained most closely in touch with the speculations of the Upanishads, which it has further developed and systematized. The authoritative expositions of the systems have, however, apparently passed through several redactions; and, in their present form, these sūtra-works evidently belong to a comparatively recent period, none of them being probably older than the early centuries of our era. By far the ablest general review of the philosophical systems (except the Vedānta) produced by a native scholar is the *Sarva-darśana-saṅgraha* ("summary of all the Darśanas"), composed in the 14th century, from a Vedāntist point of view, by the great exegete Mādhava Āchārya.

Among the different systems, six are generally recognized as orthodox, as being (either wholly or for the most part) consistent with the Vedic religion—two and two of which are again more closely related to each other than to the rest, viz.:

(1) *Pūrva-mīmāṃsā* (*Mīmāṃsā*), and (2) *Uttara-mīmāṃsā* (*Vedānta*);
(3) *Sānkhya,* and (4) *Yoga;*
(5) *Nyāya,* and (6) *Vaiśeshika.*

Mīmāṃsā.—1. The (*Pūrva-*) *Mīmāṃsā* (First Inquiry) is not a system of philosophy in the proper sense of the word, but rather a system of dogmatic criticism and scriptural interpretation. It maintains the eternal existence of the Veda, the different parts of

which are minutely classified. Its principal object, however, is to ascertain the religious (chiefly ceremonial) duties enjoined in the Veda, and to show how these duties must be performed, and what are the special merits and rewards attaching to them. Hence arises the necessity of determining the principles for rightly interpreting the Vedic texts, as also of what forms its only claim to being classed among speculative systems, namely, a philosophical examination of the means of, and the proper method for, arriving at accurate knowledge. The foundation of this school, as well as the composition of the Sūtras or aphorisms, the *Mīmāṃsā-darśana,* which constitute its chief doctrinal authority, is ascribed to Jaimini. The Sūtras were commented on by Śabara Svāmin in his *Bhāshya;* and further annotations (*Tantra-vārtika* and *Śloka-vārttika*) thereon were supplied by the great theologian Kumārila Bhaṭṭa (about A.D. 700). The most approved general introduction to the study of the Mīmāṃsā is the metrical *Jaiminīya-Nyāya mālāvistara,* with a prose commentary, both by Mādhava Āchārya.

Vedānta.—2. The *Vedānta* philosophy or *Uttara-mīmāṃsā* (Second Inquiry) in the comparatively primitive form in which it presents itself in most of the older Upanishads, constitutes the earliest phase of sustained metaphysical speculation. In its essential features it remains to this day the prevalent belief of Indian thinkers, and enters largely into the religious life and convictions of the people. It is an idealistic monism, which derives the universe from an ultimate conscious spiritual principle, the one and only existent from eternity—the *Ātman,* the Self, or the *Purusha,* the Person, the *Brahman.* It is this primordial essence or Self that pervades all things, and gives life and light to them, "without being sullied by the visible outward impurities or the miseries of the world, being itself apart"—and into which all things will, through knowledge, ultimately resolve themselves. "The wise who perceive him as being within their own Self, to them belongs eternal peace, not to others." But, while the commentators never hesitate to interpret the Upanishads as being in perfect agreement with the Vedāntic system, as elaborated in later times, there is often considerable difficulty in accepting their explanations. In these treatises only the leading features of the pantheistic theory find utterance, generally in vague and mystic, though often in singularly powerful and poetical language, from which it is not always possible to extract the author's real idea on fundamental points, such as the relation between the Supreme Spirit and the phenomenal world—whether the latter was actually evolved from the former by a power inherent in him, or whether the process is altogether a fiction, an illusion of the individual self.

The foundation of the Vedānta system, as "the completion of the Veda," is naturally ascribed to Vyāsa, the mythic arranger of the Vedas, who is said to be identical with Bādarāyaṇa the reputed author of the *Brahmā-* (or *Śārīraka-*) *sūtra,* the authoritative, though highly obscure, summary of the system. The most distinguished interpreter of these aphorisms is the famous Malabar theologian Śankara Āchārya, who also commented on the principal Upanishads and the Bhagavadgītā, and is said to have spent the greater part of his life in wandering all over India, as far as Kashmir, and engaging in disputations with teachers—whether of the Śaiva, or Vaishṇava, or less orthodox persuasions—with the view of rooting out heresy and re-establishing the doctrine of the Upanishads. In Śankara's philosophy the theory that the material world has no real existence, but is a mere illusion of the individual soul wrapt in ignorance,—that, therefore, it has only a practical or conventional (*vyāvahārika*) but not a transcendental or true (*pāramārthika*) reality,—is strictly enforced. In accordance with this distinction, a higher (*parā*) and a lower (*aparā*) form of knowledge is recognized; the former being concerned with the Brahman (n.), whilst the latter deals with the personal Brahmā, the Īśvara, or lord and creator, who, however, is a mere illusory form of the divine spirit, resulting from ignorance of the human soul. To the question why the Supreme Self (or rather his fictitious development, the Highest Lord) should have sent forth this phantasmagory this great thinker (with the author of the Sūtras) can return no better answer than that it must have been done for sport (*līlā*), without any special motive—since to ascribe such a motive to the Supreme Lord would be limiting his self-sufficiency—and that the process of creation has been going on from all eternity. Śankara's *Śārīraka-mīmāṃsā-bhāshya* has given rise to a large number of exegetic treatises, of which Vāchaspati-miśra's exposition, entitled *Bhāmatī,* is the most esteemed. Of numerous other commentaries on the Brahma-sūtras, the *Śrī-bhāshya,* by Rāmānuja, the founder of the Śrī-Vaishṇava sect, is the most noteworthy. This religious teacher, who flourished in the first half of the 12th century, caused a schism in the Vedānta school. Instead of adhering to Śankara's orthodox *advaita,* or non-duality, doctrine, he interpreted the obscure Sūtras in accordance with his theory of *viśishṭādvaita, i.e.,* non-duality of the (two) distinct (principles), or, as it is more commonly explained, non-duality of that which is qualified (by attributes). According to this theory the Brahman is neither devoid of form and quality, nor is it all things; but it is endowed with all good qualities, and matter is distinct from it; whilst bodies consist of souls (*chit*) and matter (*achit*); and God is the soul. On the religious side, Rāmānuja adopts the tenets of the ancient Vishnuite Pāñcharātra sect, and, identifying the Brahman with Vishṇu, combines with his theory the ordinary Vaishṇava doctrine of periodical descents (*avatāra*) of the deity, in various forms, for the benefit of creatures; and allowing considerable play to the doctrine that faith (*bhakti*), not knowledge (*vidyā*), is the means of final emancipation. This phase of Indian religious belief, which has attached itself to the Vedānta theory more closely than to any other, makes its appearance very prominently in the *Bhagavadgītā,* the episode of the *Mahābhārata,* already referred to—where, however, it attaches itself to Sānkhya-yoga rather than to Vedānta tenets—and is even more fully developed in some of the Purāṇas, especially the Bhāgavata. Its highest phase of development this doctrine probably reached in the Vaishṇava sect founded, towards the end of the 15th century, by Chaitanya, whose followers subsequently grafted the Vedānta speculations on his doctrine. In opposition both to Śankara's theory of absolute unity, and to Rāmānuja's doctrine of qualified unity—though leaning more towards the latter—Mādhava Āchārya, or Pūrṇaprajña (A.D. 1118–1198), started his *dvaita,* or duality doctrine, according to which there is a difference between God and the human soul (*jīva*), as well as between God and nature; whilst the individual souls, which are innumerable, eternal, and indestructible, are likewise different from one another; but, though distinct, are yet united with God, like tree and sap, in an indissoluble union. This doctrine also identifies the Brahman with Vishṇu, by the side of whom, likewise infinite, is the goddess Lakshmī, as Prakṛiti (nature), from whom inert matter (*jaḍa*) derives its energy. Here also *bhakti,* devotion to God, is the saving element. A popular summary of the Vedānta doctrine is the *Vedānta-sāra* by Sadānanda, which has been frequently printed and translated.

Sānkhya.—The *Sānkhya* system seems to derive its name from its systematic enumeration (*sankhyā*) of the twenty-five principles (*tattva*) it recognizes—consisting of twenty-four material and an independent immaterial principle. In opposition to the Vedānta school, which maintains the eternal coexistence of a spiritual principle of reality and an unspiritual principle of unreality, the Sānkhya assumes the eternal coexistence of a material first cause, which it calls either *mūla-Prakṛiti* (fem.), "prime Originant" (matter), or *Pradhāna,* "the principal" cause, and a plurality of individual souls, *Purusha,* which continually interact on one another. The system recognizes no intelligent creator (such as the *Iśvara,* or demiurgus, of the Vedānta)—whence it is called *nirīśvara,* godless; but it conceives the Material First Cause, itself unintelligent, to have become developed, by a gradual process of evolution, into all the actual forms of the phenomenal universe, excepting the souls. Its first emanation is *buddhi,* intelligence; whence springs *ahaṃkāra,* consciousness; thence the subtle elements of material forms, namely, five elementary particles (*tanmātra*) and eleven organs of sense; and finally, from the elementary particles, five elements. The souls have from all eternity been connected with matter,—having in the first place become invested with a subtle frame (*liṅga-*, or

sūkshma-, śarīra), consisting of seventeen principles, namely, intelligence, consciousness, elementary particles, and organs of sense and action, including mind. To account for the spontaneous development of matter, the system assumes the latter to consist of three constituents (*guṇa*) which are possessed of different qualities, viz. *sattva,* of pleasing qualities, such as "goodness," lightness, luminosity; *rajas,* of pain-giving qualities, such as "force," passion, activity; and *tamas,* of deadening qualities, such as "darkness," rigidity, dullness, and which, if not in a state of equipoise, cause unrest and development. Through all this course of development, the soul itself remains perfectly detached, its sole properties being those of purity and intelligence, and the functions usually regarded as "psychic" being due to the mechanical processes of the internal organs themselves evolved out of inanimate matter. Invested with its subtle frame, which accompanies it through the cycle of transmigration, the soul, for the sake of fruition, connects itself ever anew with matter, thus, as it were, creating for itself ever new forms of material existence; and it is only on attaining perfect knowledge, which reveals the absolute distinction between soul and matter, that the Purusha is liberated from the miseries of Saṃsāra, and continues to exist in a state of absolute consciousness and detachment from matter. The existence of God, on the other hand, is denied by this theory, or rather considered as incapable of proof; the existence of evil and misery, for one thing, being thought incompatible with the notion of a divine creator and ruler of the world.

The reputed originator of this school is the sage Kapila, to whom tradition ascribes the composition of the fundamental text-book, the *Sānkhya-sūtra,* or *Sānkhya-pravachana,* as well as the *Tattva-samāsa,* a mere catalogue of the principles but these are comparatively modern. Probably the oldest existing work is Īśvarakrishṇa's excellent *Sānkhya-kārikā,* which gives, in the narrow compass of sixty-nine ślokas, a lucid and complete sketch of the system.

Yoga.—The *Yoga* system is a branch of the preceding school, holding the same opinions on most points treated in common in their Sūtras, with the exception of one important point, the existence of God. To the twenty-five principles (*tattva*) of the Nirīśvara Sānkhya, the last of which was the *Purusha,* the Yoga adds, as the twenty-sixth, the *Nirguṇa Purusha,* or Self devoid of qualities, the Supreme God of the system. Hence the Yoga is called the *Seśvara* (theistical) *Sānkhya.* But over and above the purely speculative part of its doctrine, which it has adopted from the sister school, the theistic Sānkhya has developed a complete system of mortification of the senses—by means of prolonged apathy and abstraction, protracted rigidity of posture, and similar practices—many of which are already alluded to in the Upanishads—with the view of attaining complete concentration (*yoga*) on, and an ecstatic vision of, the Deity, and the acquisition of miraculous powers. It is from this portion of the system that the school derives the name by which it is more generally known.

Nyāya and Vaiśeshika.—The *Nyāya* and *Vaiśeshika* (the latter the older) are separate branches of one and the same school, which supplement each other and the doctrines of which have virtually become amalgamated into a single system of philosophy. The term Nyāya (*ni-āya,* "in-going," entering), though properly meaning "analytical investigation," as applied to philosophical inquiry generally, has come to be taken more commonly in the narrower sense of "logic," because this school has entered more thoroughly than any other into the laws and processes of thought, and has worked out a formal system of reasoning which forms the Hindu standard of logic.

The followers of these schools generally recognize six categories (*padārtha*): substance (*dravya*), quality (*guṇa*), action (*karma*), generality (*sāmānya*), particularity (*viśesha*), intimate relation (*samavāya*) to which was added a seventh, non-existence (*abhāva*). Substances forming the substrata of qualities and actions are of two kinds: eternal (without a cause), namely, space, time, ether, soul and the atoms of mind, earth, water, fire and air; and non-eternal, comprising all compounds, or the things we perceive, and which must have a cause of their existence. Causality is of three kinds: that of intimate relation (material cause); that of non-intimate relation (between parts of a compound); and instrumental causality (effecting the union of component parts). Material things are thus composed of atoms (*aṇu*), *i.e.,* ultimate simple substances, or units of space, eternal, unchangeable and without dimension, characterized only by "particularity (*viśesha*)." It is from this predication of ultimate "particulars" that the Vaiśeshikas, the originators of the atomistic doctrine, derive their name. The Nyāya draws a clear line between matter and spirit, and has worked out a careful and ingenious system of psychology. It distinguishes between individual or living souls (*jīvātman*), which are numerous, infinite and eternal, and the Supreme Soul (*Paramātman*), which is one only, the seat of eternal knowledge, and the maker and ruler (*Īśvara*) of all things. It is by his will and agency that the unconscious living souls (soul-atoms, in fact) enter into union with the (material) atoms of mind, etc., and thus partake of the pleasures and sufferings of mundane existence.

The original collection of *Nyāya-sūtras* is ascribed to Gautama, and that of the *Vaiśeshika-sūtras* to Kaṇāda. The etymological meaning of the latter name seems to be "atom eater," whence in works of hostile critics the synonymous terms *Kaṇa-bhuj* or *Kaṇa-bhaksha* are sometimes derisively applied to him, doubtless in allusion to his theory of atoms.

Heretical Systems.—As regards the different heretical systems of Hindu philosophy, there is no occasion, in a sketch of Sanskrit literature, to enter into the tenets of the two great anti-Brāhmanical sects, the Jainas and Buddhists. Among the minor systems may be mentioned the following:

The *Chārvākas* are an ancient sect of undisguised materialists, who deny the existence of the soul, and consider the human person (*purusha*) to be an organic body endowed with sensibility and with thought, resulting from a modification of the component material elements, but their authoritative text-book, the *Bārhaspatya-sūtra,* is only known so far from a few quotations in polemics against the school. The sect was anti-Brāhmanical and such moral teaching as it taught was pure hedonism.

The *Pāñcharātras,* or *Bhāgavatas,* are an early Vaishṇava sect, in which the doctrine of faith, already alluded to, is strongly developed. Hence their tenets are defended by Rāmānuja, though they are partly condemned as heretical in the Brahma-sūtras.

The *Pāśupatas,* one of several *Śaiva* (Māheśvara) sects, hold the Supreme Being (*Īśvara*), whom they identify with Śiva (as *paśu-pati,* or "lord of beasts"), to be the creator and ruler of the world, but not its material cause. With the Sānkhyas they admit the notion of a plastic material cause, the *Pradhāna;* while they follow Patañjali in maintaining the existence of a Supreme God.

Grammar (Vyākaraṇa).—*Pāṇini.* Linguistic inquiry, phonetic as well as grammatical, was early resorted to both for the purpose of elucidating the meaning of the Veda and with the view of settling its textual form. The particular work which came ultimately to be looked upon as the "vedāṅga" representative of grammatical science, and has ever since remained the standard authority on Sanskrit grammar in India, is Pāṇini's *Ashṭādhyāyī,* so called from its "consisting of eight lectures (*adhyāya*)," of four *pādas* each. For a comprehensive grasp of linguistic facts, and a penetrating insight into the structure of the vernacular language, this work stands probably unrivalled in the literature of any nation—though few other languages, it is true, afford such facilities as the Sanskrit for a scientific analysis. Pāṇini's system of arrangement differs entirely from that usually adopted in our grammars, namely, according to the parts of speech. As the work is composed in aphorisms intended to be learnt by heart, economy of memory-matter was the author's paramount consideration. His object was chiefly attained by the grouping together of all cases exhibiting the same phonetic or formative feature, no matter whether or not they belonged to the same part of speech. For this purpose he also makes use of a highly artificial and ingenious system of algebraic symbols, consisting of technical letters (*anubandha*), used chiefly with suffixes and indicative of the changes which the roots or stems have to undergo in word-formation. The date of

Pāṇini has been the subject of much discussion but may be safely put at about 400 B.C.

Pāṇini mentions some sixty-four predecessors which shows that this study had undergone a long process of development. Perhaps the most important of his predecessors was Sākaṭāyana, also mentioned by Yāska—the author of the Nirukta, who is likewise supposed to have preceded Pāṇini—as the only grammarian (*vaiyākaraṇa*) who held with the etymologists (*nairukta*) that all nouns are derived from verbal roots.

Pāṇini's Sūtras continued for ages after to form the centre of grammatical activity. But, as his own work had superseded those of his predecessors, so many of the scholars who devoted themselves to the task of perfecting his system have sunk into oblivion.

Kātyāyana.—The earliest of his successors whose work has come down to us (though perhaps not in a separate form) is Kātyāyana, the author of a large collection of concise critical notes, called *Vārttika,* intended to supplement and correct the Sūtras, or give them greater precision.

Patañjali.—Kātyāyana was followed by Patañjali, the author of the (*Vyākaraṇa-*) *Mahā-bhāshya,* or Great Commentary, who flourished about 150 B.C. For the great variety of information it incidentally supplies regarding the literature and manners of the period, this is, from an historical and antiquarian point of view, one of the most important works of the classical Sanskrit literature. The Mahābhāshya is not a continuous commentary on Pāṇini's grammar, but a collection of the critical comments or *kārikās* on 1,713 of the 4,000 rules of Pāṇini. Patañjali is also called Gonardīya perhaps meaning "a native of Gonarda," a place, probably identical with Goṇḍa, a town some 20 m. northwest of Oudh—and Goṇikāputra, or son of Goṇikā.

Lexicography.—Sanskrit dictionaries (*kośa*), invariably composed in verse, are either homonymous or synonymous, or partly the one and partly the other. There are occasional attempts at alphabetical order in the former but not in the latter. There are many intended for the use of poets and are collections of rare words and synonyms, rather than lexicons of the language. The great dictionary is the famous *Amara-kośa.* ("immortal treasury") by Amarasiṃha, who probably lived early in the 6th century. This dictionary consists of a synonymous and a short homonymous part; whilst in the former the words are distributed in sections according to subjects, such as heaven and the gods, time and seasons, etc.; in the latter they are arranged according to their final letter, without regard to the number of syllables.

Prosody (Chhandas).—The oldest treatises on prosody have already been referred to in the account of the technical branches of the later Vedic literature. Among more modern treatises the most important is the *Mrita-sanjīvanī,* a commentary on Piṅgala's Sūtra, by Halāyudha (perhaps identical with the author of the glossary above referred to). Sanskrit prosody, which is probably not surpassed by any other either in variety of metre or in harmoniousness of rhythm, recognizes two classes of metres, namely, such as consist of a certain number of syllables of fixed quantity, and such as are regulated by groups of breves or metrical instants, this latter class being again of two kinds, according as it is or is not bound by a fixed order of feet.

Music (Saṅgīta).—The musical art has been practised in India from early times. The theoretic treatises on profane music now extant are, however, quite modern productions. The two most highly esteemed works are the *Saṅgīta-ratnākara* ("jewel-mine of music"), by *Śārngadeva,* and the *Saṅgīta-darpaṇa* ("mirror of music"), by Dāmodara. Each of these works consists of seven chapters, treating respectively of—(1) sound and musical notes (*svara*); (2) melodies (*rāga*); (3) music in connection with the human voice (*prakīrṇaka*); (4) musical compositions (*prabandha*); (5) time and measure (*tāla*); (6) musical instruments and instrumental music (*vādya*); (7) dancing and acting (*nṛitta* or *nṛitya*).

Rhetoric (Alaṅkāra-śāstra).—Treatises on the theory of literary composition are very numerous. Indeed, a subject of this description—involving such nice distinctions as regards the various kinds of poetic composition, the particular subjects and characters adapted for them, and the different sentiments or mental conditions capable of being both depicted and called forth by them—could not but be congenial to the Indian mind. The *Nātya Śāstra* of Bharata is possibly as early as the sixth century. Not much later is the *Kāvyādarśa,* or "mirror of poetry," by Daṇḍin, the author of the novel *Daśakumāracharita.* The work consists of three chapters, treating—(1) of two different local styles (*rīti*) of poetry, the Gauḍī or eastern and the Vaidarbhī or southern (to which later critics add four others, the Pāñchālī, Māgadhī, Lāṭī, and Āvantikā); (2) of the graces and ornaments of style, as tropes, figures, similes; (3) of alliteration, literary puzzles and twelve kinds of faults to be avoided in composing poems. Other important works are the *Kāvyālaṅkāra,* by the Kashmirian Rudraṭa (9th century), the *Daśarūpa,* or "ten kinds of drama," by Dhanaṃjaya (10th century), the *Sarasvatī-kaṇṭhābharaṇa,* "the neck-ornament of Sarasvatī (the goddess of eloquence)," a treatise, in five chapters, on poetics generally (11th century), the *Kāvya-prakāśa,* "the lustre of poetry," (12th century) by Mammaṭa, a Kashmirian, and the late but important *Sāhitya-darpaṇa* (*c.* A.D. 1450).

Medicine (Āyur-veda, Vaidya-śāstra).—Though the early cultivation of the healing art is amply attested by frequent allusions in the Vedic writings, it was doubtless not till a much later period that the medical practice advanced beyond a certain degree of empirical skill and pharmaceutic routine. From the simultaneous mention of the three humours (wind, bile, phlegm) in a *vārttika* to Pāṇini (v. 1, 38), some kind of humoral pathology would, however, seem to have been prevalent among Indian physicians several centuries before our era. The oldest existing work is supposed to be the *Charaka-saṃhitā,* a bulky cyclopaedia in ślokas, mixed with prose sections, which consists of eight chapters, and was probably composed for the most part in the early centuries of our era. Whether the Chinese tradition which makes Charaka the court physician of King Kanishka (*c.* A.D. 100) rests on fact is uncertain. Of equal authority, but doubtless somewhat more modern, is the *Suśruta* (*-saṃhitā*), which Suśruta is said to have received from Dhanvantari, the Indian Aesculapius, whose name, however, appears also among the "nine gems." It consists of six chapters, and is likewise composed in mixed verse and prose—the greater simplicity of arrangement, as well as some slight attention paid in it to surgery, betokening an advance upon Charaka. Both works are, however, characterized by great prolixity, and contain much matter which has little connection with medicine.

Astronomy and Mathematics.—Early Indian astronomical knowledge is summed up in the *Jyotisha Vedānga* (ed. Weber. 1862). A more scientific era is marked by the appearance of the five original Siddhāntas (partly extant in revised redactions and in quotations), the very names of two of which suggest Western influence, namely, the *Paitāmaha-, Sūrya-, Vasishtha-, Romaka-* (*i.e.,* Roman) and *Pauliśa-siddhāntas.* Based on these are the works of the most distinguished Indian astronomers, namely, Āryabhaṭa, probably born in 476; Varāha-mihira, probably 505–587; Brahma-gupta, who completed his *Brahma-siddhānta* in 628; Bhaṭṭa Utpala (10th century), distinguished especially as commentator of Varāha-mihira; and Bhāskara Āchārya, who, born in 1114, finished his great course of astronomy, the *Siddhānta-śiromaṇi,* in 1150. In the works of several of these writers, from Āryabhata onwards, special attention is paid to mathematical (especially arithmetical and algebraic) computations. The question whether Āryabhaṭa was acquainted with the researches of the Greek algebraist Diophantus (*c.* A.D. 360) remains still unsettled, but, even if this was the case, algebraic science seems to have been carried by him beyond the point attained by the Greeks.

BIBLIOGRAPHY.—Lassen, *Indische Altertumskunde,* 4 vols. (1842); A. A. Macdonell, *India's Past* (1927); L. D. Barnett, *Antiquities of India* (1913); J. G. Bühler (ed.), *Grundriss d. Indo-Arischen Philologie* 1896 ff.; J. Muir, *Original Sanskrit Texts* 5 vols. (1889); F. Max Müller, *Ancient Sanskrit Literature;* L. von Schroeder, *India's Literature and Culture* (1888); A. A. Macdonell, *Sanskrit Literature* (1909); A. B. Keith, *Classical Sanskrit Literature* (1927), *History of Sanskrit Literature* (1928); M. Winternitz, *Geschichte d. Indischen Litteratur*

(1905–20); A. Kaegi, *Rig-Veda* (1886); A. A. Macdonell and A. B. Keith, *Vedic Index* 2 vols. (1912); R. H. T. Griffith, *Translation of the Rig-Veda,* 2 vols. (1896–97); A. B. Keith, *Religion and Philosophy of the Veda,* 2 vols. (1925); H. Oldenburg, *Die Religion des Vedas* (1896); P. Deussen, *Philosophie des Vedas* (1896), *Die Philosophie der Upanishads* (1899, Eng. trans. 1906), *Sechzig Upanishads* (1897); A. Holtzmann, *Das Mahābhārata,* 4 vols. (1892–95); Translations of the Mahābhārata by P. C. Roy (1883–94) and by M. N. Dutt (5 vols. 1896); W. Hopkins, *The Great Epic of India* (1902); H. Jacobi, *Das Rāmāyana* (1893); Baumgartner, *Das Rāmāyana* (1896); M. N. Dutt, *Translation of the Rāmāyana* (1896); F. E. Pargiter, *The Dynasties of the Kali Age* (1913); J. G. Bühler, *Die indischen Inschriften und das Alter der indischen Kunstpoesie* (1890); A. Hillebrandt, *Kālidasa* (1912); H. H. Wilson, *Specimens of the Theatre of the Hindus,* 2 vols. (1871); Sylvais Lévi, *Le Theatre Indien* (1890); A. B. Keith, *The Sanskrit Drama* (1926); J. Hertel, *Das Panchatantra* (1912); F. Max Müller, *Six Systems of Indian Philosophy* (1889); A. Garbe, *Philosophy of Ancient India* (1897), *Sānkhya Philosophie* (1894); P. Deussen, *System des Vedanta* (1893). (J. Eg.; J. Al.)

SANSON, CHARLES HENRI (b. 1739), public executioner of Paris from 1788 to 1795, was the son of Charles Sanson or Longval, who received in 1688 the office of *exécuteur des hautes oeuvres de Paris,* which became hereditary in his family. Sanson's brothers exercised the same trade in other towns. In the last days of 1789 Gorsas in the *Courrier de Paris* accused Sanson of harbouring a Royalist press in his house. Sanson was brought to trial, but acquitted, and Gorsas withdrew the accusation. After the execution of Louis XVI., a statement by Sanson was inserted in the *Thermomètre politique* (13th February 1793) in contradiction of the false statements made in respect of the king's behaviour when confronted with death. He surrendered his office in 1795 to his son Henri, who had been his deputy for some time, and held his father's office till his death in 1840. There is no record of the elder Sanson's death. Henri's son Clément Henri was the last of the family to hold the office.

The romantic tales told of C. H. Sanson have their origin in the apocryphal *Mémoires pour servir à l'histoire de la Révolution Française par Sanson* (2 vols., 1829). Other *Mémoires of Sanson,* edited by A. Grégoire (ps. for V. Lombard) in 1830, and by M. d'Olbreuze (6 vols., 1862–63) are equally fictitious. The few facts definitely ascertainable are collected by G. Lenôtre in *La Guillotine pendant la Révolution* (1893).

SANSOVINO, ANDREA CONTUCCI DEL MONTE (1460–1529), Florentine sculptor and architect, was the son of a shepherd, Niccolo di Domenico Contucci, and was born at Monte Sansovino near Arezzo, whence he took his name. He was a pupil of Antonio Pollaiuolo, and at first worked in the style of 15th-century Florence. Early works are: the terra-cotta altarpiece in Santa Chiara at Monte Sansovino, and the marble reliefs of the "Annunciation," the "Coronation of the Virgin," a "Pietà," the "Last Supper," and various statuettes in the Corbinelli chapel of S. Spirito at Florence. In 1490 he was invited to Portugal by King John II. and some pieces of sculpture by him still exist in the monastic church of Coimbra. These early reliefs show strongly the influence of Donatello. The beginning of a more pagan style is shown in the statues of "St. John baptizing Christ" over the east door of the Florentine baptistery. This group was, however, finished by the weaker hand of Vincenzo Danti. In 1502 he executed the marble font at Volterra, with good reliefs of the "Four Virtues" and the "Baptism of Christ." The statues of the Virgin and John the Baptist in the cathedral of Genoa were completed in 1503. His earliest work in Rome is probably the monument of Pietro da Vicenza (1504), in the church of Ara Coeli. The monuments of Cardinal Ascanio Maria Sforza and of the bishop Hieronimus Bassus for the church of S. Maria del Popolo are among his most important works. In 1512, Sansovino executed a group of the "Madonna and Child with St. Anne," now over one of the side altars in the church of S. Agostino. From 1513 to 1528 he was at Loreto, where he cased the outside of the Santa Casa in white marble, covered with reliefs and statuettes in niches between engaged columns; the greater part of his sculpture was executed by his assistants, and though the general effect is rich and magnificent, the individual pieces are both dull and feeble, the greater part of the work being executed by his assistants. The earlier reliefs, executed by Sansovino himself, are interesting. Jacopo Sansovino was his best pupil.

SANSOVINO, JACOPO (1486–1570), Italian sculptor and architect, was born at Caprese near Florence, his family name being Tatti. He became a pupil of Andrea Sansovino, from whom he received his name. In 1503 he accompanied Giuliano di Sangallo to Rome, devoting himself there to the study of the antique. Julius II. employed him to restore damaged statues, and he made a copy of the Laocoön group, which was afterwards cast in bronze. In 1511 he returned to Florence, and began the statue of St. James the Elder, which is now in a niche in one of the great piers of the Duomo. He carved a nude figure of "Bacchus and Pan," now in the Bargello. Soon afterwards Jacopo returned to Rome, and designed for his fellow-citizens the church of S. Giovanni dei Fiorentini, carried out by Antonio Sangallo the younger. A marble group of the "Madonna and Child," now in S. Agostino, was his next important work. In 1527 Jacopo fled from the sack of Rome to Venice, where he remained the rest of his life. He had charge of the public buildings adjacent to the Piazza di S. Marco, with the exception of the Doge's Palace. His most important works of sculpture at Venice are the colossal statues of "Neptune" and "Mars" on the grand staircase of the ducal palace; the bronze doors of the sacristy of St. Mark, cast in 1556 and the series of six bronze reliefs round the choir of the same church. In 1565 he completed a small bronze gate with a graceful relief of "Christ surrounded by Angels"; this gate shuts off the altar of the Reserved Host in the choir of St. Mark's. He made the monument of the Doge Francesco Venier, who died in 1556.

Jacopo's chief claim to distinction rests upon the numerous fine Venetian buildings which he designed, such as the public library, the mint and the Palazzo Corner della Cà Grande and the Palazzo Manin on the grand canal; also the graceful Loggetta of the Campanile di San Marco with the bronze statues of Peace, Mercury, Apollo and Pallas. Among his ecclesiastical works the chief were the choir of S. Fantino, the church of S. Martino and the façades of S. Maria Mater Domini and of the Scuola di S. Giorgio dei Schiavoni.

In 1545 the roof of the public library, which he was then constructing, fell in; on this account he was imprisoned and fined. However, he was soon set at liberty, and in 1548 he was restored to his post. He died on Nov. 27, 1570. Sansovino's architectural works have much beauty of proportion and grace of ornament, a little marred in some cases by an excess of sculptured decoration, though the carving itself is always beautiful, both in design and execution. He used the classic orders with great freedom and tasteful invention, and was instrumental in introducing the High Renaissance into Venice. He was much assisted by Alessandro Vittoria (1524–1608).

See Vasari, *Vite* (ed. Milanesi); T. Temanza, *Vita di J. Sansovino* (Venice, 1752); L. Pittoni, *J. Sansovino* (Venice, 1909).

SAN STEFANO, TREATY OF, a treaty signed between Russia and Turkey on March 3, 1878, concluding the Russo-Turkish War. It created a very great vassal principality of Bulgaria, enlarged Serbia, and increased Montenegro to three times its size. The independence of all three States was recognized by the Porte. Russia obtained the Dobrudja, Ardahan, Kars, Bayazid and Batum, and the demolition of all the Danube fortresses. Improved conditions were promised the Armenian Christians; the autonomy of Bosnia-Hercegovina was to be admitted. But the treaty was viewed with concern by other countries.

In effect this treaty would have disintegrated the Turkish empire. The additional power falling to Russia directly and indirectly would have been tremendous. In the Balkans themselves there were protests from the Armenians and Greeks who, especially, would be sufferers in the rearrangement of territories, and from all the inhabitants of the different ceded provinces. Great Britain was especially opposed to the treaty because of the almost certainty that the Big Bulgaria would prove to be entirely under Russian influence. Austria also saw her Balkan interests threatened, and it was Austria who first demanded that the whole matter should be discussed by a European congress. The consequence was the meeting of the Congress of Berlin (*q.v.*), June 13–July 13, 1878, which entirely redrafted the Treaty of San

Stefano. (*See* also EASTERN QUESTION.)

SANTA ANA, the capital of the department of Santa Ana, Salvador, 50 m. by rail N.W. of San Salvador. Pop. (1927) about 74,200. It is situated about 2,100 ft. above sea-level, in a valley surrounded by high mountains, which are covered by coffee and sugar plantations and woods. It is the second city of the republic in size. Cigars, pottery, starch, spirits, sugar and various textiles are manufactured, and the export trade in coffee and sugar has developed rapidly since the opening in 1900 of a railway to San Salvador and the Pacific port of Acajutla.

SANTA ANA, a city of southern California, U.S.A., 30 m. S.E. of Los Angeles and 10 m. from the ocean on the west and the Santa Ana mountains on the east; the county seat of Orange county. It is served by the Pacific Electric, the Santa Fe, and the Southern Pacific railways, and by motor-coach lines. Pop. (1920) was 15,485; 1930 Federal census 30,322. It is the commercial centre of the rich Santa Ana valley (producing especially oranges, walnuts, celery and beans) and the neighbouring oilfields; and has numerous factories making a variety of products, including aeroplanes, glass, beet-sugar, farm machinery, woollen goods, tiles, pumps, perfumes, preserved fruits, tools and horse collars. There are many fruit-packing plants and canneries in and about the city. Santa Ana was platted in 1869 and incorporated in 1888. In 1900 the population was 4,933, and it increased more than threefold in the next 20 years.

SANTA ANNA, ANTONIO LOPEZ DE (1795–1876), Mexican revolutionist, dictator, president and soldier, was born in Jalapa, Vera Cruz, on Feb. 21, 1795. Entering the Spanish colonial army as cadet in 1810, he served against the revolutionists in Tamaulipas, Tex., and Vera Cruz until March 29, 1821, when he declared in favour of the *Plan de Iguala.* This revolution resulted in Mexican independence and the empire of Itúrbide. Santa Anna advanced rapidly under the empire until Itúrbide attempted to remove him from Vera Cruz. He pronounced opportunely for a republic and the subsequent revolution led to the downfall of Itúrbide. Santa Anna was sent to San Luis Potosí, where he failed in another attempt at revolution, was recalled, and next sent to Yucatán, where he spent about a year as governor and military commander, returning to Mexico in 1825 and in 1827 to civil and military command in Vera Cruz. He subverted the election of 1828 by a revolution in favour of Guerrero, who became president. He defeated an ill-advised attempt of the Spaniards to recapture Mexico in 1829 and, resigning his commands, retired to his *hacienda,* Manga de Clavo, where, except for a futile effort to sustain Guerrero, he was quiescent until 1832, when he headed a revolution which made Pedraza president. In 1833, Santa Anna became president, an office that alternating with various substitutes, he occupied until his defeat and capture by the Texans at San Jacinto, April 21, 1836. He returned to Mexico in 1837, retiring to his *hacienda* until called to command forces against the French. He lost a leg in action against them at Vera Cruz. Santa Anna was president *ad interim* for a few weeks in 1839 and in 1841 again seized the office by revolution. He was captured by the counter-revolutionists in 1845 and was exiled. He retired to Havana but returned to Mexico the following year upon the outbreak of war with the United States. He was offered the presidency but, preferring to lead in the field, commanded the Mexicans in the battles of Angostura and Cerro Gordo and minor engagements. Early in 1847 he also assumed the presidency but, after his final defeats in the siege of Mexico City, retired to exile in Jamaica, from which, in 1850, he removed to New Granada. Recalled by the conservatives, he resumed the presidency for the fifth and last time on April 29, 1853. He became supreme Dictator but was again exiled August 11, 1855. He twice attempted to return to Mexico, but was turned back by the French in 1864 and by American naval forces in 1867. As a result of amnesty, he returned to Mexico in 1874 and, poor, broken and blind, died June 20, 1876. Santa Anna was unscrupulous, immoral and of no fixed principles, but he was energetic and of a magnetic personality. He fancied himself a western Napoleon and was the chief contributor to the disturbed condition of Mexico for 30 years. He fostered a tradition of success not entirely justified by facts and in time of national crisis his turbulent countrymen again and again turned to him as the one possible leader.

See: Cambas, *Gobernantes de Mejico;* Wharton, *El Presidente.*

SANTA BARBARA, a municipality (with administration centre and 72 *barrios* or districts) of the province of Iloilo, island of Panay, Philippine Islands, on the Jalaur river, a few miles north of Iloilo (the provincial capital), on the Iloilo-Capiz railway. Pop. (1918) 28,467. The chief industries are the cultivation of sugar, corn, rice, cacao, coco-nuts and tobacco, and the raising of cattle. In 1918, it had four manufacturing establishments; 225 household industry establishments with output valued at 40,000 pesos; and 10 sugar mills with output valued at 42,500 pesos. Almost every house has one or more looms for the weaving of textiles. Of the 23 schools, 16 are public. The language is a dialect of Bisayan.

SANTA BARBARA, a city of south-western California, U.S.A., on the Pacific ocean, 90 m. above Los Angeles; the county seat of Santa Barbara county. It has airport facilities, and is served by the Southern Pacific railway and motor-coach lines. Pop. (1920) 19,441 (77% native white); 1930 Federal census 33,613. The city lies around a crescent beach, on the southern slope of the Santa Ynez mountains. The beauty of the situation, the ideal climate throughout the year, the luxuriant semi-tropical vegetation, the historic interest, and the picturesque modern architecture, combine to make it one of the most delightful resorts of the State. A modified Spanish type of architecture generally prevails. The Mission of Santa Barbara, established by Father Junípero Serra in 1786, is the largest and best preserved of the California missions, and is now the Franciscan headquarters for the Pacific coast. The Santa Barbara State Teachers' college (established 1909) has a magnificent location on Mission ridge. A *fiesta* is held in August every year commemorating the old Spanish days. In the Painted Cave, 13 m. distant, are fine rock-paintings generally attributed to prehistoric Indians. This region produces a great variety of fruits, nuts and vegetables, including about half the entire commercial crop of lima beans grown in the United States. There are oilfields north-west of the city. A Spanish presidio was established here in 1782, four years before the Mission. Santa Barbara took part in the revolution of 1829, and in the following sectional struggles inclined to the side of Monterey and the North. It was occupied by the Americans in Aug. 1846; then by the Californians in Oct.; again by the American forces on Nov. 27, 1846. In 1850 it was incorporated as a city. The railroad reached it in 1887. On June 29, 1925, a disastrous earthquake visited it, but the city made a speedy recovery.

SANTA CATALINA, an island in the Pacific Ocean, one of the Santa Barbara group, about 50 miles south of Los Angeles. San Pedro Channel and the Gulf of Santa Catalina separate it from the mainland. It was discovered in 1542 by Cabrillo.

SANTA CATHARINA, a southern maritime State of Brazil, bounded north by Paraná, east by the Atlantic, south by Rio Grande do Sul, and west by Rio Grande do Sul and the Misiones territory of Argentina. Pop. (1920) 668,743; area 36,669 square miles. The Serra do Mar rises not far from the coast and leaves only a narrow coast zone, and the plateau above is much broken with irregular ranges of mountains. The coast region, though in the temperate zone, is hot and humid. It is densely forested, is broken by swamps and lagoons, and is crossed by numerous short streams from the wooded slopes of the *serras.* The plateau is less densely wooded, but has some highly fertile plains, the open *campos* being partly devoted to stock raising. Except in the malarious coast zone, the climate is temperate.

The drainage is westward to the Paraná, the rivers being tributaries of the Iguassú, which forms its northern boundary, and of the Uruguay, which forms its southern boundary. A number of prosperous German colonies—the largest and best known of which are Blumenau, Dona Francisca, Joinville, Itajahy, Brusque, Dom Pedro and São Bento—are devoted chiefly to agriculture. There is not so much cultivation on a large scale as in São Paulo and the northern provinces. Coffee is produced to a limited extent, as are also Indian corn, beans, onions, fruit and mandioca. A prominent industry is the gathering and preparation of *maté* or Paraguayan tea (*Ilex paraguayensis*), which is an article of

export. The mineral resources include coal, iron, silver, gold and petroleum, the first alone is mined. A railway, the Dona Thereza Christina, runs from Laguna, at the mouth of a lagoon of that name on the southern coast, northward to the port of Imbituba, as also westward up the valley of the Rio Tubarão to the coal-fields of that name (69 m.) and inland to Muller. Another, a branch of the São Paulo–Rio Grande, runs from São Francisco island inland to União da Victoria, on the main line which crosses the western part of this State. Another short line connects Blumenau with Itajahy. The capital of the State is Florianopolis (*q.v.*), also called Santa Catharina and Desterro; other towns (the population given being that of the municipal district, 1920) are Blumenau (72,213), Lages (37,314), Laguna (27,573), Joinville (42,854), Itajahy (33,327), Brusque (13,203), São José (18,688), opposite Florianopolis, Araranguá (40,108), Tubarão (36,657), and São Francisco (14,386), a good port in the northern part of the State in direct communication with a majority of the German colonies.

SANTA CLARA or **VILLA-CLARA,** the capital of Santa Clara Province, Cuba, about 185 m. (by rail) E.S.E. of Havana. Pop. (1925) 21,694. It is situated near the centre of the island, on a plateau, between two small streams, and is served by the United Railways of Havana and by the Cuba and the Cuba Central railways, the last connecting the east and west lines with the north and south coasts. The streets are straight and wide, and there are many fine buildings. The oldest church is of the latter part of the 18th century. The city is surrounded by fertile plains, which are cultivated in cane or devoted to grazing. Santa Clara was founded in 1689 by a band of schismatics from Remedios.

SANTA CLARA, a town of Santa Clara county, California, U.S.A., adjoining San Jose on the north-west. It is served by the Southern Pacific railway and by electric interurban, motor coach and truck lines. Pop. (1920) 5,220; and was 6,302 in 1930. It has immense fruit canneries and green-fruit and dried-fruit packing plants, a large windmill factory, and other manufacturing industries. It is the seat of the Mission of Santa Clara de Asis, founded by Father Junípero Serra in 1777, and of the University of Santa Clara (Roman Catholic), established in 1851.

SANTA CRUZ, ÁLVARO DE BAZAN, 1ST MARQUIS OF (1526–1588), Spanish admiral, born at Granada on Dec. 12, 1526, of an ancient family. In 1564 he aided in the capture of Velez de Gomera, was appointed in 1568 to command the galleys of Naples and was thus brought into close relations with Don John of Austria during the formation of the Holy League (1570). In the operations at Lepanto (Oct. 7, 1571) Bazan was always in favour of the more energetic course: his prompt action averted disaster when the allied line was broken. He accompanied Don John at the taking of Tunis (1572). When Philip II. of Spain enforced his claim as heir to the crown of Portugal (1580–81), Santa Cruz held a naval command. In 1583 he was sent against the prior of Crato, an illegitimate representative of the Portuguese royal family, who with his friends held the island possessions of Portugal in the Atlantic. His victory off Terceira decided the struggle in favour of Spain. A zealous advocate of war against England, he made to Philip, on Aug. 9, 1583, the first definite suggestion of the Armada. The King's political and financial embarrassments caused many delays, and Santa Cruz, who was to have commanded, was hindered from acting with effect. He was at Lisbon without the means of fitting out his fleet, when Drake burnt the Spanish ships at Cadiz (1587). Santa Cruz's independence of judgment finally offended the king and he was held responsible for failures and delays. He died on Feb. 9, 1588, at Lisbon. He was the designer of the great galleons which were employed to carry the trade between Cadiz and Vera Cruz in Mexico.

See C. Fernández Duro, *La Armada Invencible* (1884–85, 2 vols.); A. Altolaguirre y Duvale, *Don Alvaro de Bazán . . . estudio histórico-biográfico* (1888); W. Stirling Maxwell, *Don John of Austria . . .* (1883, 2 vols.).

SANTA CRUZ, an eastern department of Bolivia, bounded north by El Beni, east by Brazil, south by Chuquisaca and west by Chuquisaca and Cochabamba. Area 144,941 sq.m. Pop. (1915 est.) 341,640. It is only partly explored. It consists of a great plain extending eastward from the base of the Andes to the frontiers of Brazil, broken by occasional isolated hills, and in the north-east by a detached group of low sierras known collectively under the name Chiquitos, which belong to the Brazilian highlands rather than to the Andes. On the western side of the department is an upland zone belonging to the eastern slope of the Andes, and here the Bolivian settlements are chiefly concentrated. The great plains, whose general elevation is about 900 ft. above the sea, are so level that the drainage does not carry off the water in the rainy season, and immense areas are flooded for months at a time. Extensive areas are permanently swampy. There are forests in the north and west, but the larger part of the department consists of open grassy plains, suitable for grazing. There are two river systems, one belonging to the Amazon and the other to the La Plata basins. The first includes the Guapay or Río Grande, Piray or Sara, Yapacani and Maracó, upper tributaries of the Mamoré, and the San Miguel, Blanco, Baures and Paraguay tributaries of the Guaporé—both draining the western and northern parts of the department. In the extreme east a few streams flow eastward into the Paraguay, the largest of which is the Otuquis; their channels are partly hidden in swamps and lagoons. The climate of the plains is hot, nevertheless, on the Andean slopes the temperature is more agreeable. Products of the western districts are sugar, rum, cacao, rice, cotton, coffee and maize. Rubber and medicinal products are also exported. The Guapay is navigable for small boats in high water, and also the lower courses of the other rivers named. The principal markets for Santa Cruz products are in the Bolivian cities of the Andes. There is a poor road across the plains from Santa Cruz de la Sierra to Puerto Suárez, on the Paraguay, and one to Cochabamba, but no railway leads to Santa Cruz as yet, and it requires 10 to 12 days to reach it by mule from Cochobamba or twice that time from Puerto Suárez. An air-mail line, however, has been established between Cochabamba and Santa Cruz, which carries passengers also, and makes the trip in 2½ to 3 hours.

The capital and only large town of the department is Santa Cruz de la Sierra (pop., 1924, est., 18,315), on the Piray, a tributary of the Mamoré, 1,450 ft. above sea-level. It is situated on a lower terrace of the Andean slope in a highly fertile district, devoted to sugar-cane and stock-raising. It is a dusty, straggling, frontier town with a population consisting chiefly of whites. There are flour mills, sugar mills, distilleries, tanneries and leather manufactories. The original site of Santa Cruz de la Sierra was in the uplands, but it was removed to its present site about 1590, the phrase "de la Sierra" being kept.

SANTA CRUZ, a municipality (with administration centre and 17 *barrios* or districts), capital of the province of La Laguna, Luzon, Philippine islands, on the south-east shore of Laguna de Bay, about 35 m. south-east of Manila, with which it has railway connection. Pop. (1918), 14,156. It is an important commercial centre and has considerable trade with Manila. Agriculture and manufacturing are important pursuits; its manufacture of palm wine is noted. It is an important sugar centre and in 1918 had 15 sugar mills with an output valued at 45,500 pesos. It also has a factory for making rope out of abacá. In 1918 it had 61 manufacturing establishments and 42 home industry establishments with outputs valued at 605,100 and 25,900 pesos respectively. Of the ten schools, eight are public. The language is Tagalog.

SANTA CRUZ, a city of California, U.S.A., on the northern headland of Monterey bay, 80 m. S. of San Francisco; the county seat of Santa Cruz county. It is served by the Southern Pacific railway, and has a municipal airport at Capitola, 6 m. S.E. Pop. (1920) 10,917 (82% native white); 1930 Federal census 14,395. From a curving beach the city slopes up to the foothills of the Santa Cruz mountains, in surroundings of great natural beauty. The mountains are covered with one of the noblest redwood forests of the State. Among the Santa Cruz Big Trees, 6 m. from the heart of the city, are some 65 ft. in circumference and 300 ft. high. The State Redwood park is 23 m. north. Poultry, bulbs (especially narcissus, freesia and gladiolus), berries, cherries,

grapes, other fruits and vegetables, are the principal products of the region. Loganberries were originated here; strawberries are picked nine months of the year; and the strip of land along the coast from Santa Cruz to San Francisco produces most of the artichokes grown in the United States. The city has a large fruit and vegetable cannery and a considerable fishing industry. The commerce of the harbour (7,873 tons in 1927) consists of receipts of lumber and general merchandise for local consumption and shipments of fish, glue stock, canned vegetables, cement and other local products. The city owns the long wharf, which extends out 2,600 ft. into deep water. A Franciscan mission (no longer in existence) was established here in 1791, and the Pueblo of Branciforte (never very important) was founded near by in 1797. In July, 1846, the American flag was raised over the town, and in 1876 it was chartered as a city.

SANTA CRUZ DE TENERIFE or **DE SANTIAGO,** a seaport and the capital of Teneriffe and of the Canary Islands; in 28° 28′ N. and 16° 15′ W., on the east coast. Estimated pop. (1926) 52,757. Santa Cruz occupies a small plain bounded by rugged volcanic rocks, and seamed by watercourses which are dry almost throughout the year. Scarcely any vegetation, except cactuses and euphorbias, is to be seen in the neighbourhood. Almost the entire town was rebuilt in the 19th century, when its population more than trebled. There are many good public buildings, including a school of navigation, technical institute, library, natural history museum and hospital. An aqueduct 5 m. long brings pure water from the mountains of the interior. Dromedaries from the adjacent islands of Lanzarote and Fuerteventura are used to convey merchandise and in agriculture. The town was bombarded by the British fleet under Blake in 1657, and by Nelson, who lost his arm during the attack, in 1797. Some British flags lost on that occasion hang in one of the churches. Santa Cruz is an important coaling station and commercial centre. (*See* CANARY ISLANDS.)

SANTA FÉ, a central province of Argentina, bounded north by the Chaco territory, east by Entre Ríos and Corrientes, south by Buenos Aires, and west by Córdoba and Santiago del Estero. Area, 50,713 sq. miles. Pop. (1914) 899,640 (1927 estimate) 1,214,571. Santa Fé belongs to the great pampa region of Argentina, and has no wooded districts in the south except on the river courses. In the north, which is borderland to the Gran Chaco region, there are extensive forests, intermingled with grassy *campos*. The surface is a level alluvial plain, with a saline substratum at no great depth. Salt is found on the surface over large areas, and throughout the province the water is brackish 15 to 20 ft. below the surface. The soil, however, produces wheat, corn, alfalfa, linseed and other crops in abundance. Stock-raising (cattle, horses, sheep and swine) is also an important industry, with the related industries of butter and cheese-making, meat-curing and lard-refining. Many colonies have been made, especially near the provincial capital. It is one of the most productive provinces in the republic, in spite of notorious mis-government. The Paraná forms its eastern boundary for about 435 m., and provides unfailing transport facilities. The great river, however, is broken into many channels, forming islands and sand bars which are constantly changing their outlines. It receives two large tributaries flowing across the province—the Salado, the upper course of which is called the Pasage and Juramento (the last given to commemorate the circumstance that the oath to wrest their independence from Spain was sworn on its banks in 1816), and which enters the Santa Fé channel of the Paraná near the capital; and the Carcarañá, or Carcarañal, whose sources are in the Córdoba sierras. The northern districts are well drained by numerous tributaries of the Salado. The railway communications of the province are good, comprising the trunk lines of the Buenos Aires and Rosario railway with its extension to Tucumán, which crosses the province from south-east to north-west; the Central Argentine from Rosario to Córdoba, and to Buenos Aires; the Córdoba Central; Santa Fé to Tucumán; and Provincia de Santa Fé, and the Buenos Aires and Pacific which crosses near its southern boundary. Small railway lines connect the important towns.

SANTA FÉ, a city of Argentina and capital of the province of that name, on the Santa Fé channel of the Paraná near the mouth of the Salado, about 299 m. N.W. of Buenos Aires. Pop. (1914) 59,574. It is built on a sandy plain a little above the river level. It is regularly laid out and contains a cathedral, bishop's palace, Jesuits' college and church dating from 1654, a university, the cabildo or town hall facing on the principal square and provincial government buildings. It serves as headquarters of the Santa Fé railway. The town is less modern in appearance than Rosario, and has a number of old residences and educational and charitable institutions. It is a port of call for small river steamers and is in ferry communication with Paraná on the opposite bank of the river. Its shipping port for larger steamers was at Colastiné, until 1911, when the modern port of Santa Fé was opened, with two large docks capable of accommodating some 25 ocean-going vessels. Santa Fé has railway communications with Rosario, Córdoba, Tucumán and the frontier of the Chaco.

Santa Fé was founded by Juan de Garay in 1573.

SANTA FE (săn'tą fā'), capital of New Mexico, U.S.A., in the northern part of the State, on the Rio Santa Fe, 20 m. E. of the Rio Grande; county seat of Santa Fe county and the oldest seat of government in the United States. It is on Federal highways 66, 85 and 485, and is served by the Denver and Rio Grande Western and the Santa Fe railways. Pop. (1920) 7,236; in 1930, 11,176 by Federal census. It lies 7,000 ft. high, at the foot of the Sangre de Cristo Range. The climate is dry, sunny and invigorating, with an average annual rainfall of 14·49 in. and an average monthly mean temperature ranging from 28·8° F in Jan. to 69° in July. The original Spanish plaza is still the heart of the city. On the north side of the plaza is the old Governor's Palace, built in 1609; occupied continuously until 1909 by the Spanish, Indian, Mexican and American governors of New Mexico; and now housing the collections of the Historical Society of New Mexico and the archaeological exhibits of the State Museum. The new State Museum (an art gallery), is an example of the "Santa Fe" architecture (reproducing in a blended unity the façades of six early New Mexico missions), where the members of the Santa Fe and Taos "art colonies" exhibit their work before sending it east. Near the plaza is the chapel of San Miguel (built in 1636), and close by is "the oldest house in the United States," of Indian construction, antedating the Spanish occupation. St. Francis cathedral dates in part from 1711–14 and occupies the site of a church built in 1622. In the north-eastern part of the city are the ruins of Fort Marcy, built by General Kearny in 1846. A stone in the plaza marks the end of the old Santa Fe Trail. The modern structures are mainly in the distinctive "Santa Fe" type of architecture, developed (largely since 1910, through the efforts of a small group of persons connected with the School of American Research and the State Museum) by combining features from the terraced dwellings of the Pueblo Indians, the crumbling Franciscan missions, and the *haciendas* of Spaniard and Mexican. The Pecos Division of the Santa Fe National Forest lies 5 m. east of the city. Farther away, at distances ranging from 9 to 75 m., are the Indian pueblos of Tesuque, San Juan, Santa Clara, San Ildefonso (home of Maria, the pottery maker), and Taos (one of the few remaining pueblos where the Indians still live in terraced houses); Chimayo, a Spanish plaza, where pilgrims come to be healed at the Sanctuario, and where blankets are woven on looms 100 years old; the Puyé cliff dwellings and those of Rito de los Frijoles; the Pecos River canyon, the hot springs of Ojo Caliente, the petrified forest near Cerrillos, and the turquoise mines near Bonanza.

Santa Fe was the site of prehistoric Indian pueblos, of which few remains above ground were left when the Spaniards came. The Villa Real de Santa Fe de San Francisco was founded in 1609, during the administration of Don Pedro de Peralta, and the building of the presidio was begun at the same time. By 1630 there was a population of 250 Spaniards, 700 Indians and 50 half-breeds. In 1680, the Pueblo Indians drove out their conquerors (*see* NEW MEXICO) and enjoyed independence until Diego de Vargas quietly secured their submission again in 1692. Minor revolts took place in 1694 and 1696. Since 1712 an annual fiesta has been held in commemoration of the reconquest of 1692. During the 18th

century a considerable trade in sheep, wool, pelts and wines developed, chiefly with Chihuahua and the Indians of the Plains. Later, Santa Fe became the centre of an extensive commerce with the United States, carried on at first by pack animals, and from 1822 by wagon trains over the old Santa Fe Trail from Independence and Kansas City. In the later years of Spanish rule a number of American citizens were imprisoned in the dungeons of the Governor's Palace, charged with entering the province for trade and commerce; among whom were Major Zebulon M. Pike (1807), Auguste Pierre Chouteau and Joseph de Mun (1817) and David Meriwether (later a governor of New Mexico) in 1819. On Aug. 18, 1846, the city was occupied by an American force under General S. W. Kearny. A few months later the Mexicans assassinated the new governor, Charles Bent, and other Americans, but the revolt was quickly suppressed. In 1847 an English newspaper was established (the first in New Mexico) and in 1848 an English school was opened. At the outbreak of the Civil War the officers at Fort Marcy sympathized with the Southern cause. In 1862 the city was taken by General H. H. Sibley, and for two weeks the flag of the Confederacy floated over the Governor's Palace. The first railway reached the city in 1880.

SANTAL, an aboriginal tribe of Bengal, which gives its name to the Santāl Parganas. Immigrants from Hazārībāgh, they occupied the Parganas about 100 years ago. They are short, dark skinned, with broad noses, thick and everted lips, with coarse and occasionally curly hair, but not woolly, and prominent cheekbones. They are good cultivators and cattle-breeders in the plains, and skilful hunters. They have an elaborate tribal structure, with 12 exogamous clans; their villages are well-built and clean, and each has its cadre of village officials and each *pargana* or group of villages its chiefs, who are assisted or controlled by a council. In religion the Santals worship the sun and have totemistic beliefs.

See H. A. Risley, *Tribes and Castes of Bengal,* 1891.

SANTALACEAE, in botany, the sandalwood family, dicotyledonous, semi-parasitic shrubs, trees and herbs of tropical and temperate regions. There are 26 genera and about 250 species. *Santalum album* is the true sandalwood (*q.v.*). The bastard toad-flax (*Thesium humifusum*), an herbaceous root-parasite with green leaves, native to Great Britain, belongs to this family. To it belong the North American species of *Comandra,* likewise called bastard toad-flax and sometimes parasitic, and also the oil-nut or buffalo-nut (*Pyrularia pubera*), of the Appalachian region.

SANTAL PARGANAS, THE, a district of British India, in the Bhagalpur division of Behar and Orissa. Area 5,462 sq.m. Pop. (1921) 1,798,639.

In the east a sharply defined belt of hills stretches for about 100 m.; west of this a rolling tract of long ridges with intervening depressions covers about 2,500 sq.m.; while there is a narrow strip of alluvial country about 120 m. long, lying for the most part along the loop line of the East Indian railway. The principal range is that of the Rajmahal hills which cover about 2,000 sq.m.; they nowhere exceed 2,000 ft. The alluvial tract has the damp heat and moist soil characteristic of Bengal, while the undulating and hilly portions are swept by the hot westerly winds of Behar, and are very cool in the winter months. Coal is worked in the small Jaintia field, which produced 106,000 tons in 1921. Shellac is manufactured; Pakaur is the chief centre of the industry.

The early history of British administration is a record of the measures taken to pacify and civilize the Paharias of the Rajmahal hills, who under Mohammedan rule had been turbulent robbers and marauders. The Santals, who give their name to the district and now number 669,000, began to migrate there from Chota Nagpur and the adjoining districts towards the close of the 18th century. Permission to settle in the valleys and on the lower slopes stimulated immigration to an enormous extent. The oppression of landlords, the exactions of Hindu money-lenders and the consequent loss of land caused a rebellion (the Santal War) in 1855–56. The insurrection led to the establishment of a form of administration congenial to the immigrants; and a land settlement has since been carried out on conditions favourable to the occupants of the soil. The Daman-i-Koh, meaning "the skirts of the hills," which is a Government estate of 1,356 sq.m., is treated as a reserve for them and other aboriginals, such as the Paharias. The district is traversed by both the chord and loop lines of the East Indian railway. It contains the old Mohammedan city of Rajmahal and the modern commercial mart of Sahibganj (pop. 11,880), both on the Ganges; and also the Hindu place of pilgrimage of Deoghar (pop. 12,355). The administrative headquarters are at Dumka, or Naya Dumka: pop. (1921) 7,396.

SANTA MARIA (Da Bocca do Monte), an inland town of Brazil, in Rio Grande do Sul, 162 m. by rail west of Margem do Taquary, the railway terminus for Porto Alegre, about 80 m. by water north-west of that city. The population, including the municipal district, in 1920 was 57,469. Santa Maria, which lies 382 ft. above the sea, is the commercial centre of a rich district on the slopes of short mountain ranges, one of which, the Serra do Pinhal, forms the water parting between the eastern and western river systems of the State. The town derives its chief importance from its becoming the junction of the railway from Porto Alegre and the Brazilian railway running from São Paulo to the Uruguay border.

SANTA MARTA, a city and port of Colombia and the capital of the department of Magdalena, on a small bay 40 m. E.N.E. of the mouth of the Magdalena river. Pop. (1918) 18,040. It is built partly on the beach and partly on the slopes of the Sierra Nevada de Santa Marta towards the south-east. Though small, the harbour is one of the best and safest on the coast, as no river flows into it to fill its anchorage with silt. The depth ranges from 18 to 19 fathoms at the entrance to 4½ fathoms along the inner shore line. The city is an episcopal see and has a cathedral. A 176 m. railway runs southward to Fundación. Ciénaga (on the large lagoon of Ciénaga) connects with steamers running to Barranquilla (50 m. farther).

Santa Marta was founded by Rodrigo de Bástidas in 1525, and became an important port and centre of trade during the Spanish colonial era. It was also a base of operations in the exploration and conquest of the interior.

SANTA MAURA or Leucadia (Λευκάδα, ancient Λευκάς), one of the Ionian Islands (20 m. north to south, 5–8 m. east to west; area 110 sq.m.; population about 30,000), off the coast of Acarnania (Greece), S. of the entrance to the Gulf of Arta. It is a rugged mass of limestone and bituminous shales (partly Tertiary), rising to 2,000 and 3,000 ft. with limited areas of level ground. The grain crop suffices only for a few months' local consumption; but much olive oil of good quality is produced. The vineyards (in the west especially) yield red wine (bought mainly by Rouen, Cette, Trieste and Venice); the currant, introduced about 1859, has come to be the principal source of wealth (averaging 2,500,000 lb.); and cotton, flax, tobacco and valonia are grown. The salt trade, formerly of importance, has suffered from customs regulations. The chief town, Amaxichi (more usually Santa Maura, after the neighbouring fort), is at the north-east end opposite the lagoon. In the south-west is the village of Vasiliki, whence the currant crop is exported.

Cyclopean and polygonal walls at Kaligoni (south of Amaxichi) probably mark the ancient acropolis of Neritus (or Nericus), and the later Corinthian settlement of Leucas. From this point a Roman bridge seems to have crossed to the mainland. Between the town and Fort Santa Maura extends a Turkish aqueduct partly destroyed with the town by the earthquake of 1825. Forts Alexander and Constantine commanding the bridge are relics of the Russian occupation; the other forts are of Turko-Venetian origin. The magnificent cliff, 2,000 ft. high, at Cape Ducato at the S. end of the island, still bears the ruined temple of Apollo Leucatas (hence the modern name). At the annual festival of Apollo a criminal was obliged to plunge from the summit into the sea, where, however, an effort was made to pick him up; and it was by the same leap that Sappho and Artemisia, daughter of Lygdamis, are said to have ended their lives.

A theory has been proposed by Professor Dörpfeld that Leucas is the island described in the *Odyssey* under the name of Ithaca; arguing that the Homeric description of the island and its position, and also the identification of such sites as the palace or

Odysseus, the harbour of Phorcys, the grotto of the Nymphs and the island Asteris, where the suitors lay in wait for Telemachus, suit Leucas better than does the island called Ithaca (*q.v.*).

The shallow strait separating it from the mainland is liable to be silted. In 1903, however, a canal was completed 50 ft. broad and 17 ft. deep.

See CORFU; also P. Goessler, *Leukas-Ithaka* (Stuttgart, 1904); W. Doerffeld, *Alt-Ithaka*, 2 vols. (Stuttgart, 1927).

SANTA MONICA, a city of Los Angeles county, California, U.S.A., on the Pacific ocean, 15 m. W. of Los Angeles. It has a municipal airport (Clover Field) and is served by the Pacific Electric and the Southern Pacific railways. Pop. (1920) 15,252 (80% native white); 1930 Federal census 37,146. It is primarily a year-round seaside resort, beautifully situated on the Palisades, facing broad Santa Monica bay, and protected by mountains on the north. The elaborate and varied recreation facilities include a municipal fishing-pier. Santa Monica was incorporated in 1886 and chartered as a city in 1907. In 1880 the population was 417. By 1926 the assessed valuation of property had reached $43,870,530 and bank clearings for the year totalled $119,396,863. Since 1915 the city has been under a commission form of government.

SANTANDER, a maritime province of northern Spain, bounded north by the Bay of Biscay, east by the province of Biscay, south by Burgos and Palencia, and west by Leon and Oviedo. Pop. (1920) 327,669; area 2,108 square miles. Santander was part of the Roman province of Cantabria, which, after passing under the empire of the Goths, became the principality of Asturias (*q.v.*). The portion called Asturia de Santa Juliana, or Santillana, was included in the kingdom of Old Castile, and, on the subdivision of the old provinces of Spain in 1833, became the province of Santander. The province is traversed from east to west by the Cantabrian Mountains (*q.v.*), which in the Picos de Europa reach a height of over 8,600 ft., and send off numerous branches to the sea. The province is traversed from north to south by the railway and high road from Santander by Palencia to Madrid; the highest point on the railway (Venta de Pazozal) is 3,229 ft. above the sea. Other railways connect Santander with Bilbao on the east and with Cabezona de la Sal on the west; there are also many good state, provincial and municipal roads, besides several narrow-gauge mining railways.

SANTANDER, the capital of the Spanish province of Santander, the seat of a bishop and one of the chief seaports of Spain; 316 m. by rail N. of Madrid, on the Bay of Santander, an inlet of the Bay of Biscay. Pop. (1920) 72,469. It is on the inside of a rocky peninsula, Cabo Mayor, which shelters a harbour from 2 to 3 m. wide and 4 m. long. Santander is divided into an upper and a lower town. The Muelle is officially named Paseo de Pereda, in honour of the great novelist. The harbour was greatly improved during the second half of the 19th century. In the same period the population nearly trebled; and there was a corresponding development of commerce and manufactures.

SANTAREM, a city of Brazil in the State of Pará, on the right bank of the Tapajos, near its entrance into the Amazon. Pop. (1920) of the town and municipio, 41,546. It is one of the most important towns of the Amazon between Pará and Manáos, and is a port of call for all river steamers, and a station on the Amazon cable line. The national Government has made it a station in its system of wireless telegraphy in the Amazon valley. Seen from the river the town is attractive in appearance, and consists of a European (white) and an Indian quarter, the latter of palm-thatched huts. Ruins remain of a fort built in colonial times to protect the population against hostile Indians. Its principal public buildings are a municipal hall and tribunal, a large municipal warehouse, a market, theatre and two churches. The productions of the neighbourhood are cacao, Brazil nuts, rubber, tobacco, sugar-cane and cattle; and the rivers furnish an abundance of fish, which are cured here at the season of low-water, when turtle eggs are also gathered up-stream for the manufacture of oil and butter. The Tapajos is navigable for steamers to the rapids, 170 m. above Santarem, and for small boats nearly to Diamantino, Matto Grosso, and a considerable trade comes from Matto Grosso and the settlements along its banks. Santarem was founded by a Jesuit missionary in 1661 as an Indian *aldeia*, and became a city in 1848.

SANTAREM, a city on the right bank of the river Tagus, 51 m. by rail N.E. of Lisbon. Pop. (1911) 9,897. The older part of the city contains the ruined castle of Alcaçova, famous in the middle ages as a royal residence. Below is Ribeira de Santarem, a comparatively modern river-port, and on the opposite bank is Almeirim, a village which was also a royal residence until 1755, when it was almost entirely destroyed by earthquake. Santarem has some trade in fish and agricultural produce, including wine and olive oil. Its chief buildings are an ecclesiastical seminary; the late Gothic church of the Convento da Graça, which contains the tomb of Pedro Alvares Cabral, the first Portuguese to visit South America (1502); the Igreja do Milagro, an early Renaissance church; and the church of Santa Iría (St. Irene), from which the name of the city is derived. There is a fine bridge.

Santarem is the Roman *Scallabis*, renamed *Praesidium Iulium* by Julius Caesar. From its position in the Tagus valley it became an important fortress during the wars between the Moors, Portuguese and Spaniards. Alphonso VI. of Castile first took it from the Moors in 1093, but it was recaptured and occupied by them until 1147, when Alphonso I. of Portugal recovered it. The Almohades endeavoured to win it back in 1184, but were defeated. The Miguelites were defeated here in 1834 (*see* PORTUGAL: *History*).

The administrative district of Santarem coincides with the eastern part of the ancient province of Estremadura (*q.v.*); pop. (1920) 332,012; area 2,555 sq. miles.

SANTAROSA, ANNIBALE SANTORRE DI ROSSI DE POMAROLO, COUNT OF (1783–1825), Piedmontese insurgent, and leader in the revival (Risorgimento) of Italy, was born at Savigliano, near Coni, on Nov. 18, 1783. He was the son of a general officer in the Sardinian army who was killed at the battle of Mondovi in 1796. Santarosa entered the service of Napoleon during the annexation of Piedmont to France, and was sub-prefect of Spezia from 1812 to 1814. After the restoration of the king of Sardinia in 1814, he continued in the public service. When in 1821 the Austrian army was moved south to coerce the Neapolitans, Santarosa conspired to obtain the intervention of the Piedmontese in favour of the Neapolitans by an attack on the Austrian lines of communication. The conspirators sought the co-operation of the prince of Carignano, afterwards King Charles Albert. On March 6, 1821, Santarosa and three associates had an interview with the prince, and on the 10th they carried out the military "pronunciamiento" which proclaimed the Spanish Constitution. The movement had no real popular support, and very soon collapsed. Santarosa was arrested, but escaped, and fled to France, living for a time in Paris under the name of Conti. Here he wrote in French and published in 1822 his *La révolution piémontaise*, which attracted the notice of Victor Cousin, by whom he was finally concealed. He was imprisoned and expelled from Paris. He passed over to England, where he found refuge in London with Ugo Foscolo. He accompanied his countryman Giacinto Collegno to Greece in Nov. 1824. He was killed when the Egyptian troops attacked the island of Sphacteria, near Navarino, on May 8, 1825.

See Atto Vannucci, *I Martiri della libertà italiana* (Milan, 1877), and vol. ix. of the series called *I Contemporanei italiani* (Turin), in which there is a life by Angelo de Gubernatis. Santarosa's correspondence was edited by Bianchi, *Lettere di Santorre Santarosa* (Turin, 1877). A personal description by Victor Cousin will be found in the *Revue des deux mondes* for March 1, 1840.

SANTA ROSA, a city of California, U.S.A., 52 m. N. by W. of San Francisco, in a broad valley of the Coast Ranges, at an altitude of 180 ft.; the county seat of Sonoma county. It is served by the Northwestern Pacific, the Southern Pacific, and electric railways, and by motor-stage and truck lines. Pop. (1920) 8,758 (82% native white); 1930 Federal census 10,636. It is the trading centre and shipping point for a wide area, producing large quantities of poultry, eggs, cheese, butter, prunes, grapes, berries, hops, wool and other agricultural products. Because of the favourable conditions of climate and soil which it presented for horticultural experiments, Luther Burbank in 1875 chose Santa

Rosa for his home. The city has varied manufacturing industries, supplying local needs and utilizing local products. Santa Rosa was settled about 1838 and incorporated in 1853. In 1854 it replaced Sonoma as the county seat and in 1867 it was chartered as a city. It suffered severely in the earthquake of April 18, 1906. Since 1920 it has had a council-manager form of government.

SANTA TECLA or **NUEVA SAN SALVADOR,** the capital of the department of La Libertad, Salvador; on a branch railway from San Salvador (10 m. N.). Pop. (1925), 27,279. The town was founded in 1854, and intended to replace the capital, San Salvador, which was ruined by an earthquake in that year but soon afterwards rebuilt. Santa Tecla is an attractive town with a large and growing trade.

SANTAYANA, GEORGE (1863–), American philosopher and poet, was born at Madrid. At the age of eleven he was taken to America. He received the degree of B.A. from Harvard university in 1886, and served there, first as instructor, and then as professor of philosophy, from 1889 to 1912. For a long time his attachment to literature competed with "the love of wisdom." In 1894 he published *Sonnets and Other Poems;* and at intervals ever since he has issued small volumes of classically compact and severely beautiful poetry, warmed with the restrained emotionalism of a Spaniard and an aristocrat, and coloured with the peculiar melancholy of an ex-Catholic who envies the consolations of "that splendid error which conforms better to the impulses of the soul" than life itself can do. His first essay in philosophy was *The Sense of Beauty* (1896), which even the matter-of-fact Münsterberg rated as the best American contribution to aesthetics; five years later appeared *Interpretations of Poetry and Religion;* then for seven years he worked on his *magnum opus, The Life of Reason.* These five volumes, *Reason in Common Sense, Reason in Society, Reason in Religion, Reason in Art,* and *Reason in Science,* at once lifted Santayana to fame.

In 1912 he abandoned his position at Harvard, and went to live in Europe. Since then he has wandered from country to country, from Oxford and London to Paris and Rome, adding industriously to his philosophical product and repute. In 1923 he issued *Scepticism and Animal Faith,* as an introduction to "one more system of philosophy"; and in 1927 he published *Realms of Essence,* as the first of two volumes on *Realms of Being.* These later works have given form and completeness to a world-view which, in the *Life of Reason,* modestly announced itself as merely a contemporary application of Aristotle's thought. Epistemologically, Santayana's position is that idealism is true, but irrelevant and useless. Certainly the only reality is experience; and the "realm of essence" means the colours, forms, tastes, odours, pressures and temperatures which sensation gives, and the ideas, words, images and other interpretative representations which thought weaves around these essential experiences of the flesh. Our belief that these perceptions, by and large, fairly report the "external world" (the "realm of matter") is a form of "animal faith," a rough hypothesis which has the sufficient sanction of pragmatic use, and embodies the concordant element in the experience of all normal men.

Consequently we may accept as real what the senses report, and in every case this is matter. "In natural philosophy I am a decided materialist—apparently the only one living." Matter is far more complex in its structure, and far subtler in its possibilities, than we supposed; and to Santayana there is nothing strained in viewing thought as a function quite as natural and corporeal as digestion, and as transitory. "I believe there is nothing immortal. . . . No doubt the spirit and energy of the world is what is acting in us, as the sea is what rises in every little wave; but it passes through us; and cry out as we may, it will move on. Our privilege is to have perceived it as it moved." Mechanism is universal, and prevails even in the inmost recesses of the soul. Consciousness has no causal efficacy; it may see, and enjoy or deplore, the operations of life, but it cannot further or impede them in any way. Despite this materialism and scepticism, Santayana has discussed the problems and ideals of religion with the sympathy of a poet and the tolerance of a sage. "Religion is human experience interpreted by human imagination. . . . Matters of religion should never be matters of controversy. . . . We seek rather to honour the piety and understand the poetry embodied in these fables."

In ethics Santayana cleaves to Aristotle: "In Aristotle the conception of human nature is perfectly sound: everything ideal has a natural basis, and everything natural an ideal fulfilment. His ethics, when thoroughly digested and weighed, will seem perfectly final." A rational morality, based upon secular education and intelligence, would serve for a society of philosophers; but for the majority of mankind morality will have to retain its emotional basis in natural affection and the social training of the home. So too with government: we must put up with the second best, which so admirably accords with our own quality. Democracy has many faults, but it has the great virtue of providing a more equal opportunity than other forms of government to talent and genius of whatever origin and rank. Perhaps in the distant future men will be sufficiently intelligent to combine aristocracy with democracy, giving the franchise to all, but limiting office to the fit. Till then we must suffer fools gladly.

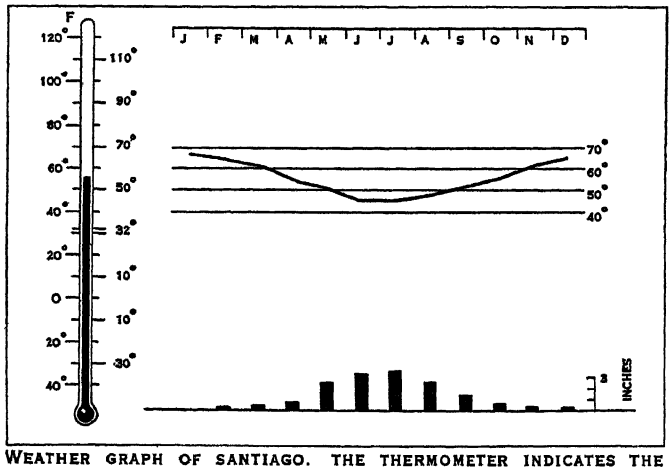
WRITINGS.—*Sonnets and Other Poems* (1894); *The Sense of Beauty* (1896); *Lucifer, a Theological Tragedy* (1899); *Interpretations of Poetry and Religion* (1900); *The Hermit of Carmel, and Other Poems* (1901); *The Life of Reason, or the Phases of Human Progress* (1905–06); *Three Philosophical Poets* (Lucretius, Dante and Goethe) (1910); *Winds of Doctrine* (1913); *Character and Opinion in the United States* (1920); *Egotism in German Philosophy* (1916); *Poems* (1923); *Scepticism and Animal Faith* (1923); *Soliloquies in England* (1925); *Dialogues in Limbo* (1925); *Platonism and the Spiritual Life* (1927); *Realms of Essence* (1927); L. P. Smith, *Little Essays drawn from the writings of George Santayana* (1921). (W. Du.)

SANTIAGO or **SANTIAGO DE CHILE,** a city of Chile, capital of the republic and chief town of a province of the same name, on the Mapocho river, a small tributary of the Maipú or Maipo, 115m. south-east of Valparaiso, in 33° 26′ 42″ S., 70° 40′ 36″ W. Pop. (1895) 256,413; (1920) 507,296. The city had 9·5% of the people of the country in 1895 and 13·5% in 1920. It is built on a wide, beautiful plain about 1,860ft. above sea-level, between the main range of the Andes and the less elevated heights of Cuesta del Prado. In the centre of the city rises the rocky hill of Santa Lucia, once forming its citadel, but now converted into a pleasure-ground, with winding walks, picturesque views, theatres, restaurants and monuments. Immediately north-north-west and north-east are other hills, known as Colina, Renca and San Cristóbal, and overshadowing all are the snow-clad Andean peaks of La Chapa and Los Amarillos, visible from all parts of the city. The Mapocho, once the cause of destructive inundations (especially in 1609 and 1783), was enclosed with solid embankments during the administration of Ambrosio O'Higgins, and is now crossed by several handsome bridges; the oldest (1767–79) of these has 11 arches. Santiago is laid out with great regularity, and its comparatively broad straight streets form parallelograms and enclose several handsome public squares, the Plaza de la Independencia, the Campo de Marte and others. It has all the characteristics of a modern capital: fine public buildings and private residences, broad avenues, well-paved and well-lighted streets and modern conveniences of every sort. Among the new buildings in 1925 were the Palacio de Bellas Artes, in the Parque Forestal; the national library then under construction, for which a site was purchased in 1913; the Agronomical Institute and the School of Engineering; and two banks of steel construction. The electric tramway and lighting company, which before the war had been in German hands, was reorganized as a Chilean enterprise. It constructed hydro-electric projects at Santiago in 1921, and secured the contract for supplying power to the railway from Santiago to Valparaiso after its electrification, as well as for lighting the city and running its tram-cars. In Oct. 1924 the Government granted a concession to a local firm for the construction of an underground way through the centre of the city (9km. long, 10 metres below the surface). Water is brought in through two aqueducts, one 5m. long (1865), and the other from Laguna Negra 33m. away. There is a railway communicating with Valparaiso, with Los Andes and the international tunnel and with the provincial capitals of the south and the north.

In 1923 Santiago had over 1,300 industrial establishments, with

a capitalization of 163,000,000 pesos. Among the leading industries were breweries, flour-mills, foundries, machine-shops, woodworking plants, tanneries, knitting-mills, soap factories, factories for making shoes, hats, umbrellas and articles of clothing.

The cathedral, facing on the Plaza de la Independencia, is the oldest of the churches. Originally erected by Pedro de Valdivia, it was rebuilt by García Hurtado de Mendoza, was destroyed by



WEATHER GRAPH OF SANTIAGO. THE THERMOMETER INDICATES THE ANNUAL MEAN TEMPERATURE. THE CURVE SHOWS THE MONTHLY MEAN TEMPERATURE, AND THE COLUMNS, THE NORMAL MONTHLY PRECIPITATION

the earthquake of 1647 and was rebuilt on a new plan subsequent to 1748. It is 351ft. long and 92ft. wide, has only one tower and is not striking in appearance. Its interior decorations, however, are rich and in good taste. Among the other ecclesiastical buildings are the church of San Augustin, erected in 1595 by Cristóbal de Vera, and in modern times adorned with a pillared portico; the churches of San Francisco, La Merced and Santo Domingo, dating from the 18th century; the church of the Reformed Dominicans, rich in monolithic marble columns; the Carmen Alto, or church of the Carmelite nunnery, a small Gothic structure; the Augustine nunnery, founded by Bishop Medellin in 1576; the episcopal palace; and the chapel erected in 1852 to the memory of Pedro de Valdivia, next to the house in which he is reputed to have lived. There are two cemeteries—one exclusively Roman Catholic and the other secularized. Mural interment is the custom in Santiago.

Among the secular buildings the more noteworthy are the capitol with its rows of massive columns and its beautiful gardens; the Moneda, or executive residence, which contains the offices of the cabinet ministers also; the municipal palace; the courts, or palace of justice; the post office and telegraph department; the exposition palace in the Quinta Normal which houses the national museum; the University of Chile, dating from 1842; the national library with over 100,000 volumes; the School of Arts and Trades (Lyceo de Artes y Oficios); the national conservatory of music; the medical school; the astronomical observatory; the national institute; the mint; and a municipal theatre. There are also a military school, a school of agriculture, mining school, normal schools and a number of charitable institutions. The old Universidad de San Felipe, founded in 1747, was closed in 1839, and was succeeded three years later by the present national university. Facing the capitol, which includes the two halls of Congress, is a small park and commemorative shaft, marking the spot where stood the Jesuits' church, burned down on the night of Dec. 8, 1868, and with it "2,000 victims, more or less," chiefly women.

Santiago was founded in 1541 by Pedro de Valdivia, who was engaged in the conquest of Chile, and it received the title of Santiago del Nuevo Estremo. It has suffered from earthquakes and from political disorder. After the defeat of the royalists at Chacabuco (Feb. 12, 1817), it was occupied by the revolutionary forces under Gen. José de San Martin. Though the scene of many revolutionary outbreaks, it has never been subjected to a regular siege. The fifth international conference of American States was held in Santiago March 25 to May 3, 1923.

The province of Santiago, bounded N. by Aconcagua, E. by Argentina, S. by O'Higgins and Colchagua and W. by the Pacific, has an area, exclusive of the department of Maipo, annexed in 1928, of 5,665 sq.m. and a population (1920) of 685,358. It forms part of the "Valle of Chile," celebrated for its fertility and fine climate.

SANTIAGO DE COMPOSTELA or **SANTIAGO,** a city of north-west Spain, in the province of Corunna; at the northern terminus of a railway from Tuy, near the confluence of the Sar and Sarela rivers, and 32 m. S. by W. of the city of Corunna. Pop. (1920) 25,870. The Galician region, of which the city is the centre, is composed of hills which have been strongly folded and faulted and where in consequence metal veins occur. In the ages when metal began to be known in the West people from the Mediterranean moved along the coasts of western Europe, and with these movements was associated the cult of the megaliths.

In those days navigation was precarious and sailors made for one of a number of small ports which had a common focus inland. Santiago was probably a focus for the numerous ports on the Galician rias. (*Cf.* Canterbury and St. David's.) At Padron, one of the ports of Santiago, there are two great stones called *Barca* and *Patron* (the ship and the skipper). The tradition of the sanctity of the old stone monuments lingered for centuries and the legend arose that St. James the Apostle had, after his martyrdom in Palestine, been borne hither for burial and that the body was brought ashore at Padron.

After the Moorish conquest the north-west-corner was the only part of Spain that retained its independence and it was the region from which the reconquest of Spain for Christendom was begun. This produced a great enthusiasm for the Christian religion, an enthusiasm fanned by the reputed discovery of the bones of St. James at Compostela. A church was built over the relics and a bishopric transferred thither. The city thus became a centre for pilgrims and when the royal family of Castile became connected by marriage with that of Burgundy, which was associated with the Cluniac monks, the site gained an international significance. The road (*route de S. Jacques*) of the pilgrims became famous and many of the great romances of the middle ages developed from the tales told by the pilgrims to while away the tedium of the long journey to this remote corner of Spain. (*Cf.* the *Canterbury Tales.*) There were also many pilgrims from those western fringes of Europe, which had been connected with Galicia ages before in the early days of metal. The city was formerly the capital of Galicia, and is still the seat of a university and of an archbishopric, which long disputed the claim of Toledo to the primacy of all Spain. Its chief industries, apart from agriculture, are brewing, distillation of spirits, and the manufacture of linen, paper, soap, chocolate and matches. The city has also been long celebrated for its silversmiths' work.

In 1078 the erection of the present cathedral was begun and was consecrated in 1211. It is a cruciform Romanesque building. The Puerta Santa is kept closed, except in jubilee years, when it is opened by the archbishop. Perhaps the chief beauty of the cathedral is the Portico de la Gloria, behind the western classic portal. It is a work of the 12th century, and probably the utmost development of which round-arched Gothic is capable. The shafts, tympana, and archivolts of the three doorways which open on to the nave and aisles are a mass of strong sculpture.

The Hospicio de los Reyes, on the north of the Plaza Mayor, for the reception of pilgrims, was begun in 1504 by Enrique de Egas under Ferdinand and Isabella.

SANTIAGO DE CUBA, a city and seaport of Cuba, on the southern coast of the eastern end of the island, capital of the province of Oriente, and next to Havana the most important city of the republic. Pop. (1925) about 70,000, of whom more than 50% were coloured. It is connected by the Cuba railway with Havana, 540 m. to the W.N.W.; short railways extend into the interior through gaps in the mountains northward; and there are steamer connections with other Cuban ports and with New York and Europe.

Santiago is situated about 6 m. inland on a magnificent land locked bay (6 m. long and 3 m. wide), connected with the Carib-

bean sea by a long, narrow, winding channel with rocky escarpment walls, in places less than 200 yd. apart. The largest vessels have ready entrance to the harbour but direct access to the wharves is impossible for those of more than moderate draught (about 14 ft.). Smith key, an island used as a watering-place, divides it into an outer and an inner basin. To the east of the sea portal stand the Morro, a picturesque fort (built 1633 *seq.*), on a jutting point 200 ft. above the water, and the Estrella; and to the west the Socapa. West of the harbour are low hills, to the east precipitous cliffs, and north and north-east, below the superb background of the Sierra Maestra, is an amphitheatre of hills, over which the city straggles in tortuous streets. The houses are mostly of one storey. In the cathedral, Diego Velázquez (*c.* 1460–1524), conqueror of Cuba, was buried. It has suffered much from earthquakes and has been extensively repaired. Probably the oldest building in Cuba is the convent of San Francisco (a church since the secularization of the religious orders in 1841), which dates in part from the first half of the 16th century. Great improvements have been made in the city since the end of colonial rule, especially as regards the streets, the water-supply and other public works and sanitation. On a hill overlooking the city is a beautiful school-house of native limestone, erected by the American military government as a model for the rest of the island. Santiago is the hottest city of Cuba (mean temperature in winter about 82° F, in summer about 88°), owing mainly to the mountains that shut off the breezes from the east. There is superb mountain scenery on the roads to El Caney and San Luis in the thickly populated valley of the Cauto. In the barren mountainous country surrounding the city are valuable mines of iron, copper and manganese. On these the prosperity of the province largely depends. There are also foundries, soap-works, tan-yards and cigar factories. The city has an important trade with the interior, with other Cuban ports, and to a less extent with New York and European ports. Mineral ores, tobacco and cigars, coffee, cacao, sugar, rum and cabinet-woods are the main articles of export.

History.—Santiago is less important politically under the republic than it was when Cuba was a Spanish dependency. The place was founded in 1514 by Diego Velázquez, and the capital of the island was removed thither from Baracoa. Its splendid bay, and easy communication with the capital of Santo Domingo, then the seat of government of the Indies, determined its original importance. From Santiago in 1518–19 departed the historic expeditions of Juan de Grijalva, Hernan Cortés and Pánfilo de Narváez—the last of 18 vessels and 1,100 men-at-arms, excluding sailors. So important already was the city that its *ayuntamiento* had the powers of a Spanish city of the second class. In 1522 it received the arms and title of *ciudad*, and its church was made the cathedral of the island. But before 1550 the drain of military expeditions to the continent, the quarrels of civil, military and ecclesiastical powers, and of citizens, and the emigration of colonists to the Main produced a fatal decadence. In 1589 Havana became the capital. Santiago was occupied and plundered by French corsairs in 1553, and again by a British military force from Jamaica in 1662. The capture of that island had caused an immigration of Spanish refugees to Santiago that greatly increased its importance; and the illicit trade to the same island—mainly in hides and cattle—that flourished from this time onward was a main prop of prosperity. From 1607 to 1826 the island was divided into two departments, with Santiago as the capital of the eastern department. After 1826 Santiago was simply the capital of a province. In July 1741 a British squadron from Jamaica under Admiral Edward Vernon and Gen. Thomas Wentworth landed at Guantánamo and during four months operated unsuccessfully against Santiago. The climate made great ravages among the British, who lost perhaps 2,000 out of 5,000 men. The bishopric became an archbishopric in 1788, when a suffragan bishopric was established at Havana. J. B. Vaillant (governor in 1788–96) and J. N. Quintana (governor in 1796–99) did much to improve the city and encourage literature. After the cession of Santo Domingo to France, and after the French evacuation of that island, thousands of refugees settled in and about Santiago. They founded coffee and sugar plantations and gave a great impulse to trade. There were destructive earthquakes in 1675, 1679, 1766 and 1852. In the 19th century some striking historical events are associated with Santiago including the "Virginius" affair of 1870. The most notable military and naval events (in Cuba) of the Spanish-American War (*q.v.*) of 1898 took place at and near Santiago. Monuments commemorate the actions at El Caney and San Juan Hill.

SANTIAGO DE LAS VEGAS, an inland city of Havana Province, Cuba, about 12 m. S. of Havana. Pop. (1919), 14,427. Tobacco is the principal industry. An agricultural experiment station is maintained here by the Cuban Government. The town dates from 1688, when a church was built for a colony of tobacco cultivators of the neighbourhood.

SANTIAGO DEL ESTERO, a province of Argentina, bounded north by Salta and the Chaco territory, east by the Chaco and Santa Fé, south by Córdoba, and west by Catamarca, Tucumán and Salta. Area 55,385 sq.m.; pop. (1914) 261,678; (1927, estimate) 350,816, chiefly Christianized Indians. The surface of the province is flat and low, chiefly open plains thinly covered with grass. There are forests in the west and north, extensive swamps along the river courses and large saline areas, especially in the south-west. The Salado (called Pasage, and Juramento in Salta) crosses the province from north-west to south-east and empties into the Paraná, and the Dulce, or Saladillo, which has its sources in the Sierra de Aconquija, crosses the province in the same general direction, and is lost in the great saline swamps of Porongos, on the Córdoba frontier. The climate is extremely hot in the summer, the maximum temperature being 111° F (Mulhall); a minimum of 32° is occasionally experienced in the winter. There is an annual rainfall of 25 inches. Sugar, wheat, alfalfa, Indian corn, tobacco and hides are the principal products, and cotton, which was grown here under the Incas, is still produced. The province is traversed by the Tucumán extension of the Buenos Aires and Rosario railway, by a line from Santa Fe to Tucumán, and by a branch of the Central Northern (Córdoba section) railway.

The provincial capital, SANTIAGO DEL ESTERO, is on the left bank of the Río Dulce, 745 m. N.W. of Buenos Aires, with which it is connected by rail. Pop. (1914) 23,479, chiefly of Indian descent. The city stands on a level open plain, 520 ft. above sea-level, and in the vicinity of large swamps (*esteros*) bordering the Río Dulce, from which its name is derived. There are a number of interesting old buildings in the city—a Government house, several churches, a Jesuit college, a Franciscan convent and a girls' orphanage. The city was founded in 1553 by Francisco de Aguirre and was the first capital of the province of Tucumán, the earliest settled of the La Plata provinces.

SANTI QUARANTA, a seaport of Albania, on the Bay of Butrinto, and opposite the island of Corfu (Corcyra). Pop. (1924) about 5,000, of whom 75% are Orthodox and the remainder Muslims. It is in a dilapidated condition and has no water within 2 km.; malaria is very prevalent.

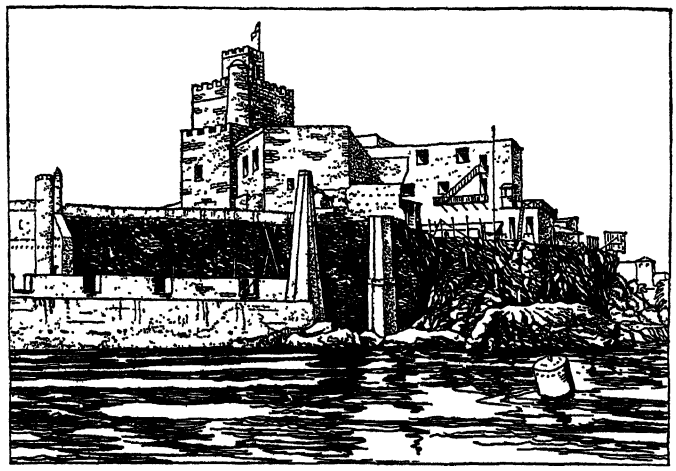
In the neighbourhood are the ruins of the ancient Buthrotum, traditionally founded by Helenus, son of Priam (*see* Virgil, *Aen.* iii. 291 *seq.*). In the 1st century B.C. Buthrotum became a Roman colony and derived some importance from its position near Corcyra, and on the main highway between Dyrrachium (Durazzo) and Apollonia. The modern city belonged to the Venetians from the 14th century till 1797 when it was captured by Ali Pasha of Yannina. A good road runs to Yannina and Monastir.

SANTLEY, SIR CHARLES (1834–1922), English vocalist, son of an organist at Liverpool, was born on Feb. 28, 1834. He studied at Milan under Gaetano Nava. He had a fine baritone voice, and while in Italy he began singing small parts in opera. In 1857 he returned to London and on Nov. 16 made his first appearance in the part of Adam in *The Creation* at St. Martin's Hall. In 1859 he sang at Covent Garden as Hoel in the opera *Dinorah*, and in 1862 he appeared in Italian opera in *Il Trovatore*. He was then engaged by Mapleson for Her Majesty's, and continued to appear regularly in opera until 1870, when he sang as Vanderdecken in *The Flying Dutchman*. His last appearance in opera was in the same part with the Carl Rosa Company at the

Lyceum Theatre in 1876. Santley died on Sept. 22, 1922. He had been knighted in 1907.

See his *Reminiscences of my Life* (1909).

SANTO DOMINGO (officially known as the Dominican Republic) occupies the eastern two-thirds of the island of Haiti and has an area of about 19,300 square miles. Its population was estimated to be 1,022,485 in 1927. There are several hundred Spanish and a few other European families living in the country



THE OLD FORTRESS AT THE MOUTH OF THE OZAMA RIVER, SANTO DOMINGO

but the mass of the population is mulatto and negro. In general, the people average a shade lighter than in the neighbouring Republic of Haiti. Spanish is the universal language and the cultural heritage is that of Spain.

The Dominican Republic is very mountainous (*see* HAITI). Extending north-west to south-east and almost in the centre of the country is the great Cordillera Central whose highest elevation exceeds 10,000 feet and whose maximum width is eighty miles. This great mountain mass is largely unoccupied and is heavily forested. It receives an abundant rainfall and is the chief drainage divide of the country. The mountains and valleys north of this central core are well watered as a rule and support nearly two-thirds of the population. Sugar, cacao, tobacco and coffee are the chief money crops, but as elsewhere in the republic, most of the land is held by small farmers and utilized for sustenance crops. This section contains the famous Vega Real of early Spanish days. South of the Cordillera Central much of the land is arid and has poor soils. However, a thriving sugar industry is found east and west of Santo Domingo city. It is the general opinion that the country as a whole is capable of supporting several times its present population. There are a number of good harbours in the republic. Docks are in operation at Santo Domingo, Puerto Plata, La Romana, San Pedro de Macorís and Barahona. At the other ports lighters must be used.

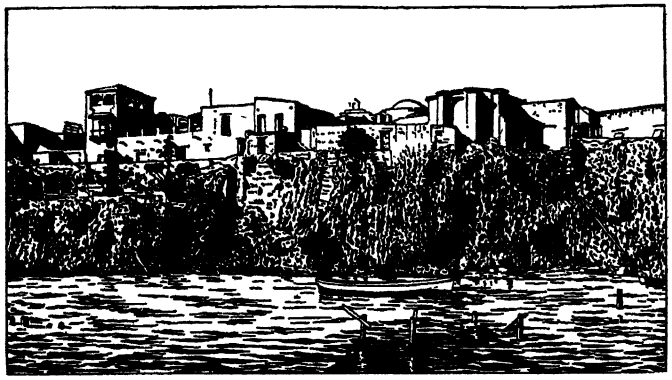
A representative government is established under the Constitution. All males over 18 years of age are qualified to vote. The administration is in the hands of three co-ordinate powers: the executive, the legislative and the judicial. The chief executive is the president. Prior to the Constitution of June 13, 1924, he was elected by indirect vote for six years and was not eligible for re-election to a second successive term. At that time, the term was reduced to four years and election was made by direct vote. The office of vice president was created for the first time. The president cannot be re-elected to the presidency nor elected to the vice presidency for the constitutional period following. He is assisted by a cabinet consisting of the secretaries of the seven departments: interior and police, foreign affairs, treasury and commerce, war and navy, justice and public instruction, agriculture and immigration, promotion and communications. There are 12 provinces, each of which elects by direct popular vote, for four periods, one senator and two members to the chamber of deputies. Each province has an appointed governor and is divided into communes, with necessary local officials. The supreme court is composed of a chief justice and six justices. Courts of appeal are located in two or three of the larger centres. A court of first instance is located in each province and in each commune there is at least one local court. The Policía Nacional Dominicana (Guardia) has the double function of police and army. This organization was trained by and largely modelled after the U.S. Marine Corps. Primary education is free and, in theory, compulsory and is largely supported by the local authorities. The efficiency of the system, however, may be judged by the fact that 90% of the population is illiterate. The higher schools are supported by the Government, including a university. Roman Catholicism is the state religion; all others are tolerated under restriction. The gold standard was adopted in 1897 and the United States gold dollar became standard currency in 1905. The collection of customs is supervised by an American official appointed by the president of the United States. This latter situation is to last until the retirement of the bond issue necessitated by the refunding scheme entered into between the United States and the Dominican Republic.

History.—The area now occupied by the Dominican Republic along with the portion now included in the Republic of Haiti was held by Spain as the colony of Hispaniola until the Treaty of Ryswick in 1697. After that date the Haitian portion was ceded to France and the Dominican portion remained under Spanish dominion and became known as Santo Domingo, after the patron saint of Columbus's father. At the end of the 18th century the Spanish control was lost and the entire island came under the French. When the French lost control of the colony in the early part of the 19th century, the empires of Toussaint L'Ouverture and Jean Jacques Dessalines for a time united the entire island under one government, independent of all European powers. During the second decade of the 19th century, Spain again asserted her dominion over the eastern end of the island but was forced out by a revolution in 1821. A republic was proclaimed under the guidance of Columbia. The following year, President Boyer of Haiti invaded the country and again united the island under one flag. In 1844, the year following Boyer's downfall, the Dominican Republic was founded and since that date two political entities have been maintained. The presidency of the new republic alternated, with one exception, between Buenaventura Báez and Pedro Santana until in 1861 when Spain, on the invitation of Santana, again annexed the country. Dissatisfaction with Spanish rule brought revolution and the Spanish withdrew for the last time in 1865. Four years later, when Báez was again president a treaty was negotiated by Gen. O. E. Babcock, U.S.A. for the annexation of the Dominican Republic to the United States. This treaty was ratified by the Dominican senate but was rejected by the United States. With the exception of the rule of Ulíses Heureaux, 1882–99, presidents followed each other in rapid succession and an unstable condition prevailed. An unusually violent revolution broke out following the election of Victoria in Feb. 1912 and the United States sent a mediatory commission which helped to effect a temporary agreement. Victoria resigned and the popular Archbishop, Adolfo A. Nouel, was elected president. He proved a poor executive and Bordas Valdes became provisional president. Revolution again became active and a second commission was sent from the United States. Bordas resigned and Báez became provisional president on Aug. 27, 1914. Jiminez took office as president in December of the same year. He was deposed in April 1916 by Arias, the secretary of war, who assumed power. On May 5, American forces were landed. Dr. Henríquez y Carvajal was then appointed as provisional president. More trouble followed and the United States felt compelled to intervene formally. On Nov. 29, 1916, "The Military Government of the United States in Santo Domingo" was created. Peace was soon established and improvements in finances, transportation, education and government machinery were carried out.

As the occupation was not undertaken with the object of destroying the sovereignty of the Dominican Republic, arrangements were made for the withdrawal of American forces as soon as conditions warranted. The military governor sailed on Oct. 24, 1922, when a satisfactory provisional government had been

set up. On June 26, 1924, the Dominican Republic ratified the treaty proposed by the United States and on July 12 the last of the U.S. forces were withdrawn, leaving only an American receiver of customs. Horacio Vásquez was at the same time inaugurated as president to serve for four years. On June 16, 1927, the Constitution was revised to extend the terms of President Vásquez, Vice President Velásquez and congress from 1928 to 1930.

Production and Trade.—The Dominican Republic is essentially and naturally an agricultural country gaining almost its



THE CITY OF SANTO DOMINGO AS SEEN FROM A VESSEL IN THE HARBOUR

entire income from the cultivation of the soil. The raising of sugar-cane and the manufacture of raw sugar is carried on upon a large scale and the export of sugar contributed 62% of the entire exports for the period 1923–27 inclusive. The production of this commodity is largely controlled by foreign capital. Cacao, tobacco and coffee, on the other hand, are produced on a small scale by many peasants and the wealth earned by them means a direct addition to the purchasing power. Consequently, the successful production and sale of these secondary crops is usually a truer index to local prosperity than is the sugar crop. In the larger towns small factories produce such articles as cigars, cigarettes, rum, matches, shoes, soap, straw hats, furniture and brick. These commodities are produced entirely for local consumption and in most cases the demand is only satisfied by imports of the same goods. Mineral resources are limited and their production is practically negligible. The more readily accessible timber stands have been quite thoroughly exploited. Lumbering is still carried on upon a small scale and the export of mahogany and lignum-vitae is of some importance. The fishing industries are carried on in a primitive way and supply but part of the local demand.

The export trade of the republic is indicated by the following data which are average figures for the five year period 1923–27 inclusive: Total value of exports, $27,830,200; exports to the United States, $7,839,800. Sugar exported, $17,438,200; cacao, $4,178,800; tobacco, $2,146,400; coffee, $1,245,200. It will be noted that the combined value of the four chief exports account for 90% of the total value of exports and that sugar alone makes up 62% of the total value of exports. The United States receives about 28% of the exports, including practically all of the cacao and about one-third of the tobacco export. Much of the sugar is shipped to the United States ports but is almost all re-exported to Canada and European countries. Considerable quantities of cane are sold to Porto Rican mills. Honey, hides and skins, lignum-vitae and mahogany are secondary exports of importance. San Pedro de Macorís, Santo Domingo and La Romana are the chief exporting ports of the republic. The total value of imports for the period indicated above was $23,325,400. The United States furnished $15,261,800 or 65%. Germany, the United Kingdom and France each furnished about 5%. Cotton cloth, iron and steel products, grain and flour, lard, mineral oils and automobiles constitute the chief imports. The public railroad mileage of the republic is 149 m. and in addition there are over 200 m. of unconnected narrow gauge lines owned by the sugar companies. There are about 550 m. of improved highway connecting Santo Domingo city with northern points and with the Republic of Haiti. Miserable trails are the only lines of transport in the greater part of the country and are serious handicaps to further development. The total external debt was $15,000,000 in 1927 or about $15 per caput. The average annual gross customs collections (1923–27) was $4,687,000. The entire banking business of the republic is carried on by branches of one American and two Canadian banks.

(R. B. H.)

SANTO DOMINGO, the capital of the Dominican Republic in the island of Haiti, West Indies. Pop. (1921), 30,957. It is situated on the south coast, at the mouth of the river Ozama. Founded in 1496, it is the oldest existing settlement of white men in the New World, and perhaps the most perfect example of a Spanish colonial town of the 16th century. It is surrounded by ancient walls with bastions. The streets are straight, narrow and intersect at right angles. The massive houses are built of stone with coloured walls pierced with huge doors and windows. The cathedral, in the Spanish Renaissance style, dates from 1512, and contains the reputed tomb of Columbus (*q.v.*). The cell in which he and his brother were confined by order of Bobadilla is still shown in the old fortress. The city is the seat of an archbishop. It has a small and rather poor harbour, but the river is navigable for 4 m. from its mouth.

SANTONIN, a drug used in the United States Pharmacopoeia and the British Pharmacopoeia, consisting of colourless flat prisms, turning slightly yellow from the action of light and soluble in alcohol, chloroform and boiling water. It is derived from santonica which is the unexpanded flower-heads of *Artemisia maritima.* The dose is 2 to 5 grs. The only B.P. preparation is the *trochiscus santonini,* but the preparation *sodii santoninas* is official in the U.S.P. Santonin is an anthelmintic used to poison the round worm *Ascaris lumbricoides.* It has no influence on tape-worms. It must be administered fasting and be followed by a purgative in order to expel the worm. The most convenient mode of administration is in capsules. For thread worms which infest the anus of young children, a suppository containing 2 to 3 grs. of santonin and used on alternate nights for three nights is effective. The U.S. preparation sodii santoninas is useless as a vermifuge and is used in diseased conditions of the optic nerve. Even small doses of santonin cause disturbances of vision, usually yellow vision or perhaps green (xanthopsia or chromatopsia). The urine also turns yellow and finally purple or red. These effects usually pass off in a few days. Large doses, however, produce toxic effects, aphasia, muscular tremors and epileptiform convulsions, and the disturbances of vision may go on to total blindness.

SANTORIN (corruption of St. Irene; anc. THERA), a volcanic island in the Aegean Sea, the southernmost of the Sporades. Officially it is a province in the Greek department of the CYCLADES (*q.v.*), divided into 9 communes.

In shape Santorin forms a crescent and encloses a bay on the north, east and south; on the western side lies the smaller island of Therasia. The encircling wall thus formed, elliptical, and 18 m. round its inner rim, is broken in two places—towards the N.W. by a strait a mile in breadth, where the water is not less than 1,100 ft. deep, and S.W. by an aperture about 3 m. wide, shallow, with Aspronisi (White Island) in the middle. From the bay cliffs rise perpendicularly to as much as 1,000 ft.; but towards the open sea, both in Santorin and Therasia, the ground slopes and has been converted into broad level terraces of tufaceous agglomerate, which though bare and ashen, produce the famous Santorin wine. The tufa itself is exported as cement especially for house-roofs. Towards the south-east, the limestone peak of Mount Elias (1,910 ft.) existed before the volcano was formed. In the middle of the bay lie three small volcanic islands, Palaea-Mikra- and Nea-Kaümene (Old, Little and New Burnt Island). The highest, Nea-Kaümene, was thrown up in 1707 and 1866 to 351 ft. above the sea. Owing to the depth at the foot of the cliff there is no anchorage, and vessels have to be moored to the shore, except at one point in the neighbourhood of the modern town, where there is a patch of shallow bottom. The cliffs show horizontal bands of black lava, white and yellow tufa, and other

volcanic strata, red, purple, brown and green, with but little herbage. The modern town of Thera (or Phera, as it is commonly pronounced) is built at the edge of these cliffs, overlooking the bay at a height of 900 ft. The foundations of the houses and in some cases their sides, are excavated in the tufa, so that they are hardly traceable except by their chimneys. Owing to the absence of timber—for, except the fig, cactus and palm, there are hardly any trees in the island—they are roofed with barrel vaults. Both wood and occasionally water are imported from neighbouring islands, for there are no wells, and the rain water, collected in cisterns, sometimes fails. The next largest village, Apanomeria ("Upper Part"), near the N. entrance, is crowded together in a whitewashed mass above the reddest rocks in the island.

Geology.—Most geologists agree that the whole of the bay was once covered by a single volcanic cone, represented by the outward slope of Santorin and Therasia, with its crater at the Kaümene Islands; and that the bay results from explosion and subsidence. The Kaümene Islands arose subsequently, and Palaea-Kaümene is considered to be prehistoric. Principal eruptions in historic times are those of 196 B.C. (Strabo 57), when flames arose from the water between Thera and Therasia for four days and an island appeared; of A.D. 726, when again an island was thrown up; of 1570, when Mikra-Kaümene arose; of 1650, which destroyed many lives by noxious exhalations, and ended in the upheaval of an island in the sea to the north-east of Santorin, which is now a reef below sea-level; that of 1707, when Nea-Kaümene arose; and that of 1866, when Nea-Kaümene was extended towards the south and enlarged threefold.

In the southern parts both of Santorin and Therasia prehistoric dwellings have been found underneath the layer of tufa and between the stones branches of wild olive, a mode of building that still prevails in the island, to resist earthquake. Vases of imported Cretan ware date this settlement to the middle Minoan period, and connect the volcanic explosion with the earthquake which wrecked the first Palace at Cnossus.

In Greek legend the island of Thera originated from a clod of earth presented to the Argonauts by Triton (Apoll. Rhod., *Argonaut,* iv., 1551 *seq.* 1731 *seq.*). A colony was left there by Cadmus (Herod. iv. 147.). Subsequently a colony from Sparta, including Minyan refugees from Lemnos, was brought by Theras, who gave the island his own name, in place of Calliste. But the chief event in Thera's history was the planting of its famous colony of Cyrene on the north coast of Africa by Battus in 631 B.C., in accordance with a command of the Delphic oracle. Thera, as a member of the League of the Cyclades, was from 308 to 145 B.C. under the protectorate of the Ptolemies.

The ancient capital occupied a site on the eastern coast now called Mesavouno, between Mount Elias and the sea. It has been excavated since 1895 by Baron Hiller von Gärtringen. There are extensive cemeteries; a Heroum of Artemidorus; an Agora; a Royal Portico; a temple of Dionysus and the Ptolemies, later dedicated to the Caesars; the Ptolemaic barracks and a gymnasium. The main street has narrow lanes to right and left; one leads to the sanctuary of the Egyptian gods. Near the street there is a small theatre, beneath the seats of which is a cistern into which rain-water drains from the auditorium: water was evidently scarce then as now. Farther south-east are the temples of Ptolemy Euergetes III., and of Apollo Carneius; finally, where the rocks fall precipitously, a gymnasium of the Ephebi. Numerous rock-carvings and inscriptions have been discovered, as well as statues and vases. Near the W. foot of Mount Elias is the temple of Thea Basileia, perfect even to the roof, now dedicated to St. Nicolas Marmorites.

Tournefort mentions that in his time nine or ten chapels were dedicated to St. Irene, the patron saint of the place; the name Santorin was given after the fourth crusade, when the island formed a portion of the duchy of the Archipelago.

BIBLIOGRAPHY.—L. Ross, *Inselreisen* (Stuttgart, 1840, vol. i.); C. Bursian, *Geographie von Griechenland* (Leipzig, 1872, vol. ii.); F. Fouqué, *Santorin et ses éruptions* (1879); Neumann and Partsch, *Physicalische Geographie von Griechenland* (Breslau, 1885); J. Th. Bent, *The Cyclades* (1885); H. F. Tozer, *The Islands of the Aegean* (1890); Hiller von Gärtringen, *Thera* (Berlin, 1899 foll.); Baedeker's *Greece,* 3rd Eng. ed. (1905).

SANTOS, a city and seaport of Brazil, in the State of São Paulo, about 230m. W.S.W. of Rio de Janeiro, and 49m. by rail S.E. of São Paulo city. Pop. (1920) 102,569. Santos covers an alluvial plain on the inner side of an island (São Vicente) formed by an inland tidal channel sometimes called the Santos river. The commercial part of the city is some miles from the mouth of the channel, but the residential sections extend across the plain and line the beach facing the sea. The city is only a few feet above sea-level, the island is swampy and deep, cement-lined channels drain the city. The Santos river is free from obstructions, and in front of the city widens into a bay deep enough for the largest vessels. The water front, formerly beds of mud and slime, the source of many epidemics of fever, is now faced by a wall of stone and cement. New docks extend for 3m. and can accommodate 50 steamers at one time; belt conveyors operated by steam load several thousand bags of coffee per hour. Many warehouses are splendidly equipped with machinery which replaces manual labour. The British-built railway to São Paulo ("heart of coffee land"), 40m. distant, transports the bulk of coffee of that region to Santos, making the line the best paying railway in South America. A good highway from São Paulo to Santos was completed by the State Government in 1919.

Santos has passed Rio de Janeiro in the amount of its exports and is now the world's greatest coffee port, shipping annually from 8,000,000 to 13,000,000 bags. The annual imports have increased in 20 years from about 500,000 to 1,500,000 tons. About 1,500 ships visit the port yearly, the busiest season being from August to January. The other exports include sugar, rice, rum, fruit, hides and manufactured goods. Bananas are grown in the vicinity for the River Plate markets.

An annual rainfall of about 77in. and a mean temperature of 69°, combined formerly to create unhealthful conditions, but the building of a series of drainage canals, extension of modern sanitation, paving of streets, construction of better houses and port improvements are largely responsible for the change to a healthful city. A suburban seaside resort, Guarujá, with new hotels, now draws many visitors from inland parts of Brazil.

The first settlement on the São Paulo coast was that of São Vicente in 1532, about 6m. S. of Santos on the same island. Other settlements soon followed, among them that of Santos in 1543–46, and later on the small fort at the entrance to its harbour, which was used for protection against Indian raids from the north. São Vicente did not prosper, and was succeeded (1681) by São Paulo as the capital and by Santos as the seaport of the colony. It was captured by the English privateer, Thomas Cavendish, in 1591, when São Vicente was burned.

SANTOS-DUMONT, ALBERTO (1873–), Brazilian aeronaut, was born at São Paulo, Brazil, on July 20, 1873. In 1897 he made his first balloon ascent from Paris. In 1898 he began to construct dirigible airships, and after many failures built one which, on Oct. 19, 1901, won the Deutsch prize and a prize from the Brazilian Government for the first flight in a given time from Saint Cloud to the Eiffel tower. In 1903 he erected at Neuilly the first airship station. Here he kept his fleet of dirigibles and travelled in them about the streets of Paris between the houses. The whole fleet was offered to France in the event of war with any country but America.

In 1905 Santos-Dumont turned his attention to heavier-than-air machines, and after experiment with a vertical-propeller model, he built in 1906 a machine on the principle of the box-kite, and with it won the Deutsch-Archdeacon prize in October, while in November he flew 220 metres in 21 seconds. In 1909 he produced his famous "demoiselle" or "grasshopper" monoplane, the forerunner of the modern light plane. On Dec. 3, 1928, after many years of residence in France, he returned to Brazil. On his arrival the government declared a half-holiday in his honour.

Santos-Dumont wrote *My Airships: A Story of My Life* (1904).

SANUTO or **SANUDO, MARINO,** the younger (1466–1533), Venetian historian, son of the senator, Leonardo Sanuto, was born on May 22, 1466. Marino Sanuto was elected a member of the Maggior Consiglio when only twenty years old, and

became a senator in 1498. He collected a fine library, which was rich in mss. and chronicles both Venetian and foreign, including the famous Altino chronicle, the basis of early Venetian history.

His chief works are: *Itinerario in terra ferma* (ed. Rawdon Brown, 1847); *I commentarii della guerra di Ferrara,* an account of the war between the Venetians and Ercole d'Este (pr. Venice, 1829); *La Spedizione di Carlo VIII.* (MS. in the Louvre); *Le Vite dei Dogi,* vol. xxii. of Muratori's *Rerum Italicarum Scriptores* (1733). The *Diarii,* his most important work, which cover the period from Jan. 1, 1496 to Sept. 1533, were edited by various scholars and published at Venice (58 vols., 1879–1903). Owing to the relations of the Venetian republic with the whole of Europe and the East it is practically a universal chronicle.

BIBLIOGRAPHY.—M. Rawdon Brown, *Ragguagli sulla vita e sulle opere di Marino Sanuto* (3 vols., Venice, 1837–38); G. Tiraboschi, *Storia della Letteratura Italiana,* vol. vi.; R. Fulin, *Marin Sanudo* (Turin, 1880); Ricotti, *I Diarii di Marin Sanudo* (Turin, 1880); and G. de Leva, *Marin Sanudo* (Venice, 1888).

SAN VICENTE, the capital of the department of San Vicente, Salvador; 30 m. E. of San Salvador, on the river Acahuapa, a left-hand tributary of the Lempa. Pop. (1925), 31,927. San Vicente is situated in a volcanic region abounding in hot springs and geysers. The volcano of San Vicente, the highest in the department, reaches an altitude of more than 7,000 feet. There are indigo and tobacco plantations. Shoes, hats, cloth, silk, spirits and cigars are manufactured. San Vicente was founded in 1634 on the site of Tehuacan, an ancient Indian city. For one year (1839–40) it was the capital of the republic.

SÃO FRANCISCO, a river of eastern Brazil rising in the south-west part of the state of Minas Geraes, about 20° 30′ S., 46° 40′ W., near the narrow valley of the Rio Grande, a tributary of the Paraná, and within 240 m. of the coast west of Rio de Janeiro. It flows in a general north-north-east direction across the great central plateau of Brazil to about lat. 9° 30′ S., long. 42° W., where it turns north-east and then south-east in a great bend, entering the Atlantic in lat. 10° 29′ S. It has a total length of about 1,800 m. and a fall of 2,700–2,800 ft. It is navigable from the Atlantic to Piranhas (148 m.) and is nearly 1 m. wide at Penedo, 22 m. from the sea. Above Piranhas, about 193 m. from its mouth, are the falls of Paulo Affonso, where the river plunges through a narrow gorge—in one place only 51 ft. wide—and over three successive falls, altogether 265 ft. The obstructed part of the river is about 190 m. long, and consists of a series of rapids above the falls and a deep cañon with whirlpools for some distance below. The Brazilian Government has built a railway around these falls from Piranhas (151 ft. elevation) to Jatobá (978 ft.) with an extension of 71 m.

Above Jatobá there is another series of rapids, called the Sobradinho, nearly 90 m. above the lower rapids, which are navigable at high water, and above these an unobstructed channel for light-draught river boats up to Pirapora, a little above the mouth of the Rio das Velhas, a distance of 984 m. Here the river runs through a barren, semi-arid region, sparsely settled. The rapids of Pirapora are 17 miles above the mouth of the Rio das Velhas, and this point, the head of navigation on the river, and 1,742 ft. above sea-level, is the objective-point of the Central do Brazil railway, the purpose being to create by rail and river a central route from Rio de Janeiro to the northern ports of Bahia and Recife.

The principal tributaries of the São Francisco are: on the right, the Pará, Paraopeba, Velhas and Verde-Grande; on the left, the Indayá, Abaeté, Paracatú, Urucuya, Carinhanha, Corrente and Grande. Several of these tributaries are navigable for long distances by small boats—the aggregate being a little over 1,000 m. Some authorities give the aggregate navigable channels of the São Francisco as 4,350 m. The upper valley of the São Francisco is partly forested, has a temperate climate, with a mean annual temperature of 85° F and a rainfall of 1,637 millimetres. The rainy season is from December to March, but on the lower river there are sometimes droughts covering several years.

An admirable description of this great river is given by Richard Burton in *The Highlands of Brazil* (1869), and a more technical description by E. Liais in *Hydrographie du Haut San-Francisco et du Rio das Velhas* (Rio de Janeiro, 1865).

SÃO LEOPOLDO, a city of the State of Rio Grande do Sul, Brazil, on the left bank of the Rio dos Sinos, 20½ m. by rail north of Porto Alegre. It is the chief town of a *municipio* (commune) of the same name, having an area of about 347 sq.m. and inhabited chiefly by German colonists. Pop. (1920) of the *municipio,* 47,501. São Leopoldo has river and railway communication with Porto Alegre and railway connection with Santa Maria. It is a prosperous industrial town, with broad straight streets, substantial buildings and good schools. Among the articles which it manufactures are matches, hats, boots and shoes, soap, liqueurs and artificial drinks, leather and leather-work and earthenware. In the surrounding districts cattle and hogs are raised, and jerked beef, hides, pork, lard, potatoes, beans, *farinha de mandioca* (cassava flour), Indian corn, tobacco and a great variety of vegetables and fruits are produced.

The city was originally a German colony founded by the emperor Pedro I. in 1824 and established at a place known as the Feitoria Real de Canhamo (Royal flax factory).

SÃO LUIZ or in full, **SÃO LUIZ DE MARANHÃO,** a seaport of northern Brazil, capital of the State of Maranhão, on the W. side of an island of the same name, in lat. 2° 30′ S., long. 44° 17′ W. of Greenwich, about 300 m. E.S.E. of Belém, (Pará). Population of the whole island, 1920, 52,929. An important part of the population is made up of the planters of the State, who live in town and leave their estates to the care of overseers. The island of Maranhão lies off the mouths of the rivers Mearim and Itapicurú, between the Bay of São Marcos on the W. and the Bay of São José on the E., and is separated from the mainland by a small channel called the *Canal do Mosquito.* It is irregular in outline, its greatest length from N.E. to S.W. being 34 m., and its greatest breadth 19 miles. Its surface is broken by a number of low hills and short valleys. The city is built upon a tongue of land between two small estuaries, Anil and Bacanga, which unite and open upon the Bay of São Marcos. It covers two low hills and the intervening valley, the transverse streets sloping sharply to the estuary on either side. These slopes make it difficult to use vehicles in the streets, but they afford a natural surface drainage which makes São Luiz cleaner and more healthful than are usually the coast towns of tropical Brazil. The buildings are of the old Portuguese type, with massive walls of broken stone and mortar, having an outside finish of plaster or glazed tiles and roofs of red tiles. The principal public buildings are the cathedral, a large and severely plain structure, the Episcopal palace, the Carmelite church, the Government palace, town hall, custom-house, hospital and a number of asylums, convents and charitable schools. There is an excellent lyceum and a church seminary. Its exports comprise cotton, sugar and rice. Communication with the mainland is carried on by means of small steamers, and by a railway which crosses the eastern part of the State to Senado Furtado on the Parnahyba river opposite Therezina.

São Luiz was founded in 1612 by La Rivardière, a French officer commissioned by Henri IV. to establish a colony in this vicinity. The French colony was expelled in 1615 by the Portuguese, who, in turn, surrendered to the Dutch in 1641. In 1644 the Dutch abandoned the island, when the Portuguese resumed possession and held the city to the end of their colonial rule in Brazil. The city became the seat of a bishopric in 1679.

SAÔNE (sōn), a river of E. France, 301 m. long, rising in the Faucilles mountains (Vosges), 15 m. S.W. of Épinal at a height of 1,300 ft. and uniting with the Rhône at Lyons. The name is derived from *Sauconna,* a 4th century name. Rising in the Vosges Hercynian massif, it meanders in the wide depression on Jurassic and Tertiary rocks between the Plateau of Langres, the Côte d'Or and the mountains of Charolais and Beaujolais on the west, and the western slopes of the Vosges and Jura and the plain of Bresse and the plateau of Dombes on the east. Near Allerey the Saône unites with the Doubs (left), which rivals it in volume and exceeds it in length at this point. At Chalon-sur-Saône it turns south, and passes Mâcon. Below Tréveux its valley narrows, winds past the Mont d'Or group and joins the Rhone at Lyons. The Saône is canalized from Corre to Lyons, a distance of 233 m.,

the normal depth of water being 6½ feet. At Corre (confluence with the Coney) it connects with the Eastern canal, at Heuilley (below Gray) with the Saône-Marne canal, at St. Symphorien (above St. Jean-de-Losne) with the Rhône-Rhine canal, and at St. Jean-de-Losne with the canal de Bourgogne and at Chalon with the Canal du Centre. (*See* RHÔNE.)

SAÔNE-ET-LOIRE, a department of east-central France formed from the districts of Autunois, Brionnais, Chalonnais, Charollais and Mâconnais, previously belonging to Burgundy. It is bounded north by the department of Côte d'Or, east by that of Jura, south-east by Ain, south by Rhône and Loire, west by Allier and Nièvre. Pop. (1926) 549,240. Area, 3,330 sq.m. The department extends down into the valley of the Loire on the west and into that of the Saône on the east, both with Pliocene deposits, from a high, but discontinuous, central north-to-south axis, stretching from the Côte d'Or (Jurassic) to the Beaujolais (largely granitic). The chief break in the highlands is used by the railway through the Charollais from Dijon through Beaune to Digoin on the Loire, and by the canal from Châlon-sur-Saône to Dijon. On the east the department extends beyond the Saône to include a large part of the region of Bresse which focuses chiefly on Châlon. The heights of the Morvan (2,959 ft. in the department) rise on the north-western border.

The average temperature at Mâcon (52° or 53° F), the most temperate spot in the department, is slightly higher than at Paris, the winter being colder and the summer hotter. At the same town the yearly rainfall is about 33 in., but both the rigour of the climate and the amount of rain increases in the hilly districts.

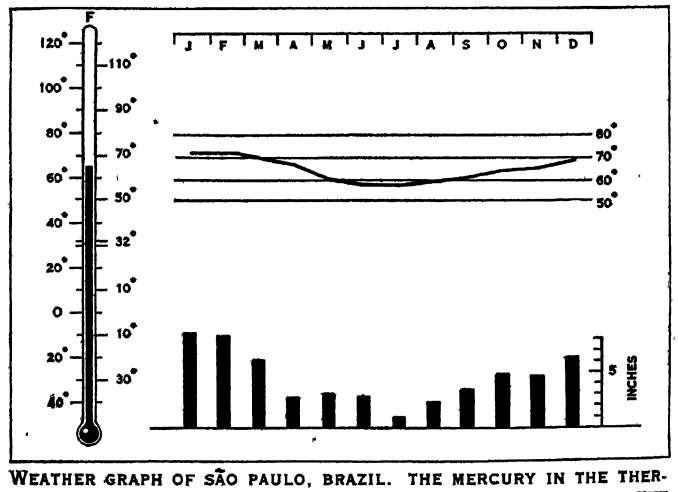
Agriculture prospers in Saône-et-Loire. Wheat, oats and maize are the chief cereals; potatoes, clover and other fodder, and mangold-wurzels are important, and beetroot, hemp, colza and rape are also grown. Excellent pasture is found in the valleys of the Saône and other rivers. The vine, one of the principal resources of the department, is cultivated chiefly in the neighbourhood of Châlon and Mâcon. Of the wines of Mâconnais, the vintage of Thorins is in high repute. The white Charollais oxen are one of the finest French breeds; horses, pigs and sheep are reared, and poultry farming is a thriving occupation in the Bresse. The industrial importance of the department is great, chiefly owing to its coal and iron mines; the chief coal mines are those near Creusot, Autun and Chapelle-sous-Dun. A pit at Épinac is over 2,600 ft. in depth. Iron is mined at Mazenay and Change, and manganese is found at Romanèche and there are quarries of various kinds. There are well-known warm mineral springs containing chloride of sodium and iron at Bourbon-Lancy. The iron and engineering works of Schneider and company at Le Creusot are the largest in France. The department also has many distilleries, potteries, porcelain-works (Digoin and Charolles), tile-works, oil-works and glass factories, and manufactures leather goods, esparto goods, sugar and fecula. Its commerce between the north and the midi is facilitated by navigable streams—the Loire, Saône, Doubs and Seille—the Canal du Centre, which joins Châlon-sur-Saône with Digoin on the Loire, and the canal from Roanne to Digoin and the lateral Loire canal, both following the main river valley. The chief railway of the department is the P.L.M.

Saône-et-Loire forms the diocese of Autun; it is part of the district of the VIII. army corps (Bourges); its educational centre is Lyons and its court of appeal that of Dijon. It is divided into 4 arrondissements—Mâcon, Châlon-sur-Saône, Autun, Charolles—51 cantons, and 589 communes. Mâcon, Châlon, Autun, Le Creusot, Cluny, Montceau-Les-Mines, Tournus, Paray-le-Monial, Louhans and Charolles (*qq.v.*) are the chief towns in the department. St. Marcel-lès-Châlon has a Romanesque church, once attached to an abbey where Abélard died; Anzy has a Romanesque church and other remains of an important monastery; Sully has a château of the 16th century; and Semur-en-Brionnais and Varennes-l'Arconce fine Romanesque churches. Prehistoric remains of the Old Stone Age have been found at Solutré near Mâcon, and have given the name *Solutrian* to a period of prehistoric time.

SÃO PAULO, a State of Brazil extending from 19° 54′ to 25° 15′ S. lat. and bounded north by Matto Grosso and Minas Geraes, east by Minas Geraes, Rio de Janeiro and the Atlantic, south by the Atlantic and Paraná, and west by Paraná and Matto Grosso. Pop. (1920) 4,592,188; area, 95,434 square miles. The State has a coast-line 373 m. long, skirted closely by the Serra do Mar, below which is a narrow coastal zone broken by lagoons, tidal channels and mountain spurs. Above is an extensive plateau, 1,500 to 3,000 ft. above sea-level. Isolated ranges of low elevation break the surface in places, but in general the State may be described as a table-land with an undulating surface sloping westward to the Paraná. The extreme eastern part, however, has an eastward slope and belongs to the Parahyba basin. The State is traversed by a number of large rivers, tributaries of the Paraná, the largest of which are the Rio Grande, Dourados, Tieté, Aguapehy, Tigre and Paranapanema. The eastern slopes of the Serra do Mar are well wooded but there are wide grassy plains (*campos*) on the plateau. A large part of western São Paulo is still unsettled. The coastal zone has a hot climate, and it also has a heavy rainfall. On the plateau the rainfall is sufficiently abundant, but the air is drier and more bracing, the sun temperature being high and the nights cool. The open country is singularly healthy, but the river lowlands are generally not so.

The great industries are agricultural, and the most conspicuous is coffee production. São Paulo produces more than one-half the total Brazilian crop and its one great port, Santos, is the largest coffee-shipping port in the world. The *terra roxa* (red earth) lands of the central and northern parts of the State are peculiarly favourable. This soil is ferruginous, pasty and free from stone, and it covers the higher surface of the plateau with a thick layer. The best plantations are on the high divides between the river courses, and not in their eroded valleys. The "Institute for the Permanent Defence of Coffee" which stores the crop in huge warehouses in the interior, from which it is released only on order, controls entries to Santos and attempts to influence the demand for Brazilian coffee in foreign countries.

The other agricultural products of the State include sugar, cotton, rice, tobacco, Indian corn, beans, mandioca, bananas and other fruits, and many of the vegetables of the temperate zone. Cereals can be grown, but climatic conditions have been considered unfavourable. Sugar-cane was the first exotic to be cultivated



WEATHER GRAPH OF SÃO PAULO, BRAZIL. THE MERCURY IN THE THERMOMETER INDICATES THE NORMAL ANNUAL MEAN TEMPERATURE, THE CURVE SHOWS THE NORMAL MONTHLY MEAN TEMPERATURE, AND THE COLUMNS INDICATE THE NORMAL MONTHLY PRECIPITATION

in São Paulo, and was its principal product in colonial times. Cotton was largely produced, especially during the American Civil War. The industry nearly disappeared, but now is again improving because of the demand for fibre by the national cotton factories. The cultivation of rice also is increasing, under the stimulus of protective duties. Although São Paulo is not classed as a pastoral region, the State possesses large herds of cattle, which are being improved by the importation of pure-bred stock from Europe. Butter and cheese are produced to a limited extent, and the supply of fresh milk to the cities is attracting some attention.

Attention is also given, to a limited extent, to the breeding of horses and mules. The most general and profitable of the animal industries is the breeding of swine, which thrive remarkably on the plateau. The State has an excellent agricultural school and experiment station at Piracicaba, and there is also a zootechnic station near the capital.

The principal manufactures are cotton and woollen textiles, jute bagging, *aramina* fabrics, furniture, iron and bronze, coffee machinery and agricultural implements, artificial liquors and food products. Steam power is generally used, though both electric and hydraulic power are employed. The iron mines and works at Ypanema, near Sorocaba, a Government enterprise, are one of the oldest industries of the State, dating back to the first quarter of the 19th century.

São Paulo is well provided with railways, which include the pioneer line from Santos to Jundiahy (an English enterprise) which has a double track from Santos to the city of São Paulo, the Paulista lines which are a continuation of the English line into the interior, the Mogyana lines running northward from Campinas through rich coffee districts to Uberaba in Minas Geraes and into Goyaz, the São Paulo branch of the Central do Brazil line which passes through the eastern part of the State and provides communication with the national capital, the São Paulo and Rio Grande which crosses the States of Paraná, Santa Catharina and Rio Grande and connects with the railways of Uruguay, and the line from São Paulo to Puerto Esperança. The ports of the State are Santos, which is visited by large steamers in the foreign trade, and Cananéa, Iguape, São Sebastião and Ubatuba which are engaged in the coasting trade only. Cananéa and Iguape are chiefly known for the rice grown in their vicinity.

The capital of the State is São Paulo (*q.v.*) and its principal port and second city in importance is Santos (*q.v.*). The chief cities and towns, with populations in 1920 where not otherwise stated, are as follow, the enumeration being for municipalities or parishes, including large rural areas and sometimes including separate villages: Campinas (*q.v.*); Guaratinguetá (43,101), on the Parahyba, 120 m. E.N.E. of São Paulo; Piracicaba (67,732), 85 m. N.W. of São Paulo; Limeira (32,550), in a fertile thickly-settled district; Rio Claro (50,416), 135 m. N.W. of Santos, on a branch of the Paulista railway, in a fertile coffee-producing region, 2,030 ft. above the sea; Taubaté (45,445), one of the oldest cities of the State, on the Parahyba 80 m. E.N.E. of the capital, in a rich agricultural district, with works for refining oil from the petroleum-bearing shales which are in the vicinity; Bragança (55,719), 50 m. N. of São Paulo in a fertile country partly devoted to sugar production and stock; São José dos Campos (30,681); Tieté (25,125), on the Tieté river north-west of São Paulo; Pindamonhangaba (26,493), on the Parahyba river and Central do Brazil railway 105 m. N.E. of São Paulo in a long settled district, 1,770 ft. above the sea, producing coffee, sugar, rice, Indian corn, beans, rum and cattle; Sorocaba (43,323), a prosperous manufacturing and commercial town on the Rio Sorocaba and Sorocabana railway, 50 m. W. of São Paulo; Itú, or Ytú (30,392) about 70 m. W.N.W. of São Paulo on the Tieté river and Ituana railway, with water-power derived from the Salto (falls) do Itú, and with important manufactures; São Carlos do Pinhal (54,225); Casa Branca (26,397), in the northern coffee region; Parahybuna (19,435); Pirassununga (19,692); Batataes (21,816); Franca (44,308); Jacaréhy (18,135); Botucatú (33,405); Jundiahy (44,437), 86 m. N. of Santos, an important manufacturing town and railway junction, 2,320 ft. above sea-level; Ribeirão Preto (68,838), 197 m. N. of Campinas on the Mogyana railway in a fertile coffee-producing region; Iguape (39,107), a port on the southern coast of the State, on a tide-water channel of sufficient depth for coastwise steamers, with exports of rice and timber; Lorena (15,645), 130 m. N.E. of São Paulo, beautifully situated, 1,760 ft. above the sea, a station on the Central do Brazil railway, and the junction of a branch railway to the Campos do Jordão where the national Government has established a military sanatorium because of its dry, bracing climate.

São Paulo was settled in 1532 by the Portuguese under Martim Affonso de Souza, who established a colony near Santos, at São Vicente, now an unimportant village. It was originally called the *capitania* of São Vicente (organized 1534) and covered the whole of southern Brazil from Rio de Janeiro south. After the suppression of the captaincy grants, parts of this enormous territory were cut off from time to time to form other captaincies, from which developed the present States of Rio de Janeiro, Minas Geraes, Matto Grosso, Paraná, Santa Catharina and Rio Grande do Sul. In 1681 São Paulo succeeded São Vicente as the capital of the captaincy.

SÃO PAULO, a city of Brazil, capital of a State of the same name, and seat of a bishopric, on the Tieté river 49 m. by rail N.W. of the port of Santos and 308 m. by rail W. of Rio de Janeiro. Its population in 1920 was 579,033. São Paulo is connected by rail with Santos, its port, with Rio de Janeiro, and with other inland cities. In great part the city occupies an elevated open stretch of tableland commanding extensive views of the surrounding country; and a small part of it is in the low alluvial land bordering the Tieté. The upper part has several slight elevations forming healthful residential districts. The city is just within the tropics, but its elevation (2,500 ft. above the sea) gives it a temperate climate, bracing in the cool season and yet with high sun temperatures in summer. The city is singularly healthful. The streets are well paved and lighted with gas and electricity, and have a good system of electric tramways. Excellent motor roads have been built out into the neighbourhood. The water-supply is derived from the Cantareira hills, and there is a modern sewerage system, constructed by an English company. The more important public buildings are the new government palace, the palaces of agriculture, finance and justice, the executive residence, the immense Polytechnic School, the Normal School, the School of Agriculture, the public hospital called the Isolamento, the charity hospital, the São Paulo railway station, and the theatre, rivalling some of the best in Europe. There are several excellent educational and scientific institutions among which are the Mackenzie College (an American school), a school of law, a Pasteur institute, and a bacteriological institute.

The police force of the State is a military organization and consists of a brigade of about 5,000 men (infantry, cavalry, civic guards, firemen, and a body of hospital attendants for public emergency cases), under a colonel of the regular army. Its manufactures include textiles, footwear, clothing, food products, artificial liquors, furniture, domestic utensils, etc. The São Paulo Light and Power Co., whose works are situated at the falls of the Tieté a considerable distance N.W. of the city, supplies about 8,000 h.p. to local industries in addition to what is needed for the electric railway (108 m.), the oldest enterprise of this character in Brazil. The city has a large Italian population and many Italian shops and industries.

São Paulo was founded by the Jesuits under Manoel de Nobrega in 1554 and at first bore the name of Piratininga. In 1681 it succeeded São Vicente as the capital of the captaincy. The declaration of Brazilian independence occurred on Sept. 7, 1822, on the plain of Ypiranga, near the city, where a monument commemorates the event.

SÃO SALVADOR: *see* BAHIA.

SAPAJOU, an alternative name for the American capuchin monkeys (*q.v.*), comprising the genus *Cebus*. (*See* also PRIMATES.)

SAPAN WOOD, a soluble red dyewood (Malay *sapang*), from a tree belonging to the leguminous genus *Caesalpinia* (*C. sappan*), a native of tropical Asia and the Indian archipelago. The wood is somewhat lighter in colour than Brazil wood and its other allies, but the same tinctorial principle, brazilin, appears to be common to all.

SAPARUA, the name of the chief island, and capital, of the Uliassers, a group of islands lying east of the island of Amboyna, in the Moluccas, Dutch East Indies.

SAPOTACEAE, a family of tropical dicotyledonous plants, most of which are trees with leathery leaves. There are 35 genera and about 600 species, many of which are of economic importance as sources of gutta-percha (*q.v.*), balata, shea butter, ironwood, etc. *Chrysophyllum Cainito* is the West Indian star-

apple. *Mimusops elata* is the Brazilian milk-tree (*q.v.*). *Sapota Achras* yields the luscious sapodilla or naseberry and the elastic gum chicle (*q.v.*). *Achras Zapota,* of Central America, is the sapote or marmalade-plum. *Lucuma nervosa* is the egg-fruit or canistel, of South America, now naturalized in Florida and the West Indies.

SAPPHIC METRE, certain forms of quantitative verse, named after their supposed originator, the Aeolic poetess Sappho (*cf.* ALCAICS). For two of her famous metres *see* CHORIAMBIC VERSE. Characteristic of all these metres is the emergence of a choriambus (- ⏑ ⏑ -), or perhaps a dactyl (- ⏑ ⏑), in the midst of what appears to be a series of feet of other lengths, especially trochees (- ⏑) (*q.v.*). The best-known employment of lines of this sort is in the Sapphic stanza, three Sapphic hendecasyllables followed by an Adonic, thus:

iām satīs terrīs nivīs atque dirae
grandinis misit pater et rubenti
dextera sacras iaculatus arces
terruit urbem.

This is used occasionally in Latin by Catullus, frequently by Horace, who introduced some small modifications (fourth syllable always long, fifth syllable almost always the end of a word), and by later writers; in the Middle Ages it was much used for hymns, notably by Gregory the Great.

In modern languages, the Sapphic stanza has been imitated, sometimes with fair success, as by Swinburne:

Heard the flying feet of the Loves behind her
Make a sudden thunder upon the waters,
As the thunder flung from the strong unclosing
Wings of a great wind.

But it remains an exotic, not well suited to our methods of versification.

SAPPHIRE, a blue transparent variety of corundum (*q.v.*), or native alumina, much valued as a gem-stone. It is essentially the same mineral as ruby, from which it differs chiefly in colour which, normally, varies from palest blue to deep indigo, the most esteemed tint being that of the blue cornflower. Many crystals are parti-coloured, but by skilful cutting, the deep-coloured portion may be caused to colour the entire gem. As the sapphire crystallizes in the rhombohedral system it is dichroic, but in pale stones this character may not be well marked. In a deep-coloured stone the colour may be resolved, by the dichroscope, into an ultramarine blue and a bluish or yellowish green. In blue tourmaline and in iolite—stones sometimes mistaken for sapphire—the dichroism is much more distinct. The blue of sapphire has been referred to the presence of oxides of chromium, iron or titanium, whilst an organic origin has also been suggested. On exposure to high temperature, sapphires usually lose colour, but, unlike rubies, do not regain it on cooling. A. Verneuil succeeded in imparting a sapphire-blue colour to artificial alumina by addition of 1·5% of magnetic oxide of iron and 0·5% of titanic acid (*Comptes rendus,* Jan. 17, 1910). According to F. Bordas, sapphire exposed to the action of radium changes to green and then to yellow.

Under artificial illumination many sapphires appear dark and inky, and in some cases the blue changes to a violet. In spite of its hardness, which slightly exceeds that of ruby, it has been sometimes engraved as a gem.

Sapphires occur, with many other gem-stones, as pebbles or rolled crystals in the alluvial deposits of sand and gravel of Ceylon, the gem-gravel being known locally as *illam.* The principal localities are Ratnapura, Rakwana and Matara. Some of the slightly-cloudy Ceylon sapphires, usually greyish-blue, display when cut with a convex face a chatoyant luminosity, sometimes forming a luminous star of six rays, or "star-sapphires" (*see* ASTERIA). The asterism seems due to the presence of microscopic tubular cavities, or to enclosure of crystalline minerals, arranged in a definite system. In 1875 sapphires were discovered in deposits of clay and sand in Battambang (Siam), where they have been worked on a considerable scale; they occur also with rubies in the provinces of Chantabun and Krat. Many of the Siamese sapphires are very dark, some being so deeply tinted as to appear almost black by reflected light. In Upper Burma sapphires occur in association with rubies, but are much less important (*see* RUBY), and they are also found in the Zanskar range, Kashmir, especially near the village of Soomjam, associated with tourmaline. Madagascar yields sapphires as rolled crystals generally of very deep colour. They are widely distributed through the gold-bearing drifts of Victoria, New South Wales and Queensland, but the blue of the Australian stones is usually dark, and it is notable that green tints are not infrequent. The Anakie sapphire-fields of Queensland are situated to the west of Emerald and east of the Drummond Range. Coarse sapphire is found in many parts of the United States, and the mineral occurs of gem quality in North Carolina and Montana. The great corundum deposits of Corundum Hill, Macon county, N.C., have yielded good sapphires, and they are found also at Cowee Creek in the same county. In Montana, sapphires were found in washing for gold in 1865, and have been worked on a large scale. The rolled crystals of sapphire occur, with garnet and other minerals, in glacial deposits, and have probably been derived from dikes of igneous rocks, like andesite and lamprophyre. They display much variety of colour, and exhibit peculiar brilliancy when cut, but are often of pale tints. The principal localities are at Missouri Bar, Ruby Bar and other places near Helena, where they were first worked, and also at Yogo Gulch, near Utica. The Helena crystals are of tabular habit, being composed of the basal pinacoid with a very short hexagonal prism, whilst at Yogo Gulch many of the crystals affect a rhombohedral habit. The Montana sapphires and the matrix have been described by Dr. G. F. Kunz, Professor L. V. Pirsson and Dr. J. H. Pratt (*Amer. Jour. Sc.,* ser. 4 vol. iv., 1897). The sapphire occurs also in Europe, being found in the Iserweise of Bohemia and in the basalt of the Rhine valley, Le-Puy-en-Velay in France, and in tholeiite intrusions in the island of Mull, but the European stones have no interest as gems.

SAPPHO (or as she calls herself PSAPPHO), the greatest poetess of Greece, was a native of Lesbos. In spite of her fame almost every detail in her history is doubtful. Only a few of the many and often conflicting statements made about her by ancient authors can be checked by her own writings. It would seem probable that she came of an aristocratic Mytilenean family (another account connects her with Eresus) and was born round about 600 B.C., so that she was contemporary with Pittacus and with the poet Alcaeus, with whom she may have exchanged verses. No less than eight versions of her father's name are recorded by Suïdas, of which Scamandronymus, the form given by Herodotus (ii. 135), may be taken as the most acceptable. Her mother is said to have been named Cleïs, and if the fragment *inc. lib.,* 17 is rightly ascribed, the statement is supported by the fact that her daughter also was a Cleïs. There is more certainty about her brothers, or at any rate about two of the three, Charaxus and Larichus. She speaks of Larichus as being cupbearer, a position filled by youths of good family, and Charaxus (though not mentioned by name in the extant remains) is evidently the "brother" referred to in $\bar{\alpha}$ 3. We learn from Herodotus and others that he sailed to Egypt and bought out a courtesan, Rhodopis or Doricha, for which Sappho attacked him. $\bar{\alpha}$ 3 seems to be a prayer for his safe return from overseas and a reconciliation with his sister and $\bar{\alpha}$4b perhaps contained a prayer that Doricha may not entangle him again. The poetess's family is of less interest than the pupils, friends and rivals with whom we meet repeatedly in the fragments of the poems, with their references on the one hand to Atthis, once loved but now estranged, Anactoria, gone far away, Dica, "lovelier than soft Gyriuno," on the other to Andromeda, who stole Atthis away, Gorgo and others. In $\bar{\alpha}$11 there seems to be a hint of some enmity towards the house of Penthilus, with which Pittacus was connected by marriage, but it happens most frequently that where we have names the thought cannot be followed far, and that in the longer pieces, where affection is most touchingly, or distaste most cuttingly expressed, no names have survived. Apart from the relations just referred to we know next to nothing of the life of Sappho. She is said to have been banished, like other aristocrats, and to have gone to Sicily, but this flight has left no trace in the

remains unless the reference to Aphrodite of Panormus in ἀγ *App.* be such. As for the story of her passion for Phaon and her leap from the Leucadian rock, it bears every sign of being pure fiction. There are two references to the advance of old age; we cannot tell whether her own or another's. Of the end of her life we know nothing at all.

Sappho's poems are said by Tullius Laurea to have been arranged in nine books. Suidas says there were nine books of lyrical poems, but epigrams, elegeia, etc., besides. The author of P. Oxy, 1800, also counts a separate book of elegeia, but his figure for the books of lyrical poems is lost. From the fragments we know of only eight books of lyrical poems. It appears that these books were, as far as possible, arranged according to metre (Bk. 1, for instance, containing only pieces in the so-called Sapphic stanza, and so on), but in the case of one book (the Epithalamia, perhaps Bk. 8) according to subject. The language seems to be no literary dialect, but the ordinary speech used by the contemporaries of the poetess, and so to differ in a greater or less degree from almost all the other Greek poetry that has come down to us. The conjunction of extreme simplicity of language with intensity of emotion, from which the poetry derives its peculiar effect, as well as the perfection of the form, has hitherto completely baffled translators, Swinburne among the rest.

Until comparatively recent times the poetry of Sappho survived only in the quotations made by ancient authors. The number of the fragments thus preserved was not inconsiderable, but their text was often seriously depraved, and, with two exceptions—the complete or nearly complete poems cited by Dionysius of Halicarnassus "Longinus"—their extent was insignificant. Within the last 50 years, however, there have been recovered from the soil of Egypt papyrus rolls and vellum codices, written at dates ranging from the 2nd to the 6th or 7th centuries A.D., which contain authentic texts of Sappho, terribly mutilated indeed, but remarkable for the integrity of their tradition. These remains are now preserved in Oxford, Berlin, London, Florence, Halle and Graz, and photographic facsimiles of parts of them may be seen in the publications of the Egyptian Exploration Society, the Berlin academy, the Società Italiana and the Graeca Halensis. Of the older editors, who were concerned only with the quotations, none but Bergk need be mentioned (*Poetae lyricae graecae,* 4th ed., Leipzig, 1882). Those who have done most for the editing and interpretation of the book texts are Professors W. Schubart and U. von Wilamowitz Moellendorff in Germany and A. S. Hunt in England. The only complete collection of all the known material is in Σαπφοῦς μέλη (Oxford, 1925), by E. Lobel, but a reference may be made to Diehl's *Anthologia Lyrica,* iv. (Leipzig, 1923), though the text is uncritical and much of the illustrative material irrelevant. In the introductions to Σαπφοῦς μέλη and its companion volume Ἀλκαίου μέλη (Oxford, 1927), will be found an attempt to establish the proper method of constituting the text. There is an article on Sappho by W. Aly in Pauly-Wissowa, *Realencyklopädie,* which collects the material for the life work of the poetess, but its conclusions should be treated with caution.

BIBLIOGRAPHY.—J. A. Symonds, *Studies of the Greek Poets* (3 vols., 1873–76, new ed. 1921); H. W. Smyth, *Greek Melic Poets* (1900); P. Brandt, *Sappho* (Leipsic, 1905); B. Steiner, *Sappho* (1907); *Sappho: Life and Work* (1910); J. M. F. Bascoul, *La chaste Sappho de Lesbos et le mouvement féministe à Athènes au 4ème siècle av. J.-C.* (1911), and *La chaste Sappho et Stesichore* (1913); M. M. Patrick, *Sappho and the Island of Lesbos* (1912); J. M. Edmonds, *Sappho in the added light of the new fragments* (1912); U. von Wilamowitz-Moellendorff, *Sappho und Simonides* (1913); E. M. Cox, *Sappho and the Sapphic Metre in English, with bibliographical notes* (1916). Text, J. M. Edmonds, *Lyra-Graeca* (3 vols., 1922–27). (E. Ll.)

SAPPORO, the official capital of the island of Yezo, Japan, situated in 43° 4′ N. and 141° 21′ E. Pop. (1925) 145,065. It was chosen in 1870, and owed its prosperity at the outset chiefly to the public institutions established by the Japanese government in connection with the colonization bureau, which had for its object the development of the resources of Yezo. It is now a garrison town and has an agricultural college, a museum, saw-mills, flour-mills, breweries and hemp and flax factories.

SAPROPHYTES, the name given in botany to plants which grow upon decaying organic matter, the products of the decay of which they absorb. Many fungi (*q.v.*) are saprophytic, as are some orchids (*q.v.*) and other flowering plants.

SAPRU, SIR TEJ BAHADUR (1875–), Indian jurist and politician, was a Kashmiri Brahmin born on Dec. 8, 1875. He was a successful advocate of the high court of Allahabad from 1896; a member of the United Provinces legislative council (1913–16); and a member of the Imperial legislative council (1916–20). When the Montagu-Chelmsford reforms were under consideration he served on Lord Southborough's committee to define the functions of the central, and the two sides of the provincial governments under the dyarchial scheme, and he was a member of the Moderate deputation which supported the reforms before the joint committee of both houses of parliament in 1919. He had long been connected with the Indian national congress, and when the Liberal wing broke away in 1919–20 he became president of the United Provinces Liberal League. In Dec. 1920 he was appointed law member of the governor general's executive council, but resigned to resume his practice in February 1923. Later in the year he was a representative of India at the Imperial conference in London. A member of the Reforms Inquiry committee set up on a vote of the legislative assembly in 1924, he encouraged a large portion of the Liberal wing to join hands with the Congress party in active promotion of the boycott of the statutory commission under Sir John Simon. A man of great gifts of expression, he had a leading share in the drafting of the "Nehru Report" of the so-called All-Parties Conference formulating a scheme of Dominion self-government for India approved at a conference held at Lucknow in August 1928. He was active in the promotion of education and was a member of the Benares Hindu university court, senate and syndicate. (F. H. Br.)

SAPSUCKER, the name given to American woodpeckers of the genus *Sphyrapicus;* there are three North American species—*S. varius,* the yellow-bellied sapsucker of eastern U.S.A.; *S. ruber,* the red-breasted sapsucker, and *S. thyroideus,* the Williamson sapsucker, the two latter inhabiting the western mountain ranges of Canada and U.S.A. All species have a habit of girdling trees with rows of holes. *S. ruber* has head and breast a dull red; this tint is confined to the head and (in the males) throat in *S. varius,* and to the throat alone in the male *S. thyroideus,* which has the belly bright yellow.

SAPULPA, a city of north-eastern Oklahoma, U.S.A., on Federal highways 66 and 75; the county seat of Creek county. It is served by the Frisco and the Oklahoma Union railways. The population was 11,634 in 1920 (85% native white and 11% negroes) and was 10,533 in 1930 by the Federal census. It is in one of the principal oil and gas producing areas of the Mid-Continent Field. The city was founded in 1888 and incorporated in 1898. Since 1922 it has had a commission-manager form of government.

SARABAND, a slow dance, generally believed to have originated in Spain in the earlier half of the 16th century. The most probable account of the word is that the dance was named after Zarabanda, a celebrated dancer of Seville. Its music is in triple time, generally with three minims in the bar. Many examples occur in the Suites and Partitas of Handel and J. S. Bach.

SARACENS, the current designation among the Christians in the middle ages for their Muslim enemies, especially for the Muslims in Europe. In earlier times the name *Saraceni* was applied by Greeks and Romans to the nomad Arabs of the Syro-Arabian desert who harassed the frontier of the empire. Σαρακηνή, being a district in the Sinaitic peninsula (Ptolemy v. 16).

SARAGOSSA (*Zaragoza*), an inland province of northern Spain, one of the three into which Aragon was divided in 1833; bounded on the north by Logroño and Navarre, north-east and east by Huesca, south-east by Lérida and Tarragona, south by Teruel and Guadalajara and west by Soria. Pop. (1920) 494,550; area, 6,726 sq.m. Saragossa belongs wholly to the basin of the Ebro (*q.v.*). The main valley is bounded on the south-west by the Sierra de Moncayo (with the highest elevation 7,707 ft.).

Saragossa is traversed by the Ebro Valley Railway, which connects Miranda with Lérida, Barcelona and Tarragona, and has a branch to Huesca; it also communicates via Calatayud with

Madrid and Sagunto; and there are local lines to Cariñena (south-west from Saragossa) and to Tarazona and Borja (near the right bank of the Ebro). The only towns with over 5,000 inhabitants in 1920 were Saragossa (141,350) (*q.v.*) and Calatayud (12,001) (*q.v.*); Tarazona (8,321), an episcopal see, with a curious 13th-century cathedral; Caspe (9,202); Egea (7,313); Épila (5,447); and Borja (5,058). (For an account of the inhabitants and history of this region, *see* ARAGON.)

SARAGOSSA (*Zaragoza*), the capital of the Spanish province of Saragossa and formerly of the kingdom of Aragon, seat of an archbishop, of a court of appeal, and of the captain-general of Aragon; on the right bank of the river Ebro, 212 m. by rail N.E. of Madrid. Pop. (1920) 141,350. Saragossa (Celtiberian, *Salduba*) was made a colony by Augustus at the close of the Celtiberian War (25 B.C.), and renamed *Caesarea Augusta* or *Caesaraugusta*, from which "Saragossa" is derived. Under the Romans it was the chief commercial and military station in the Ebro valley, and the seat of one of the four *conventus juridici* (assizes) of Hither Spain. It was captured in 452 by the Suebi, and in 476 by the Visigoths, whose rule lasted until the Moorish conquest in 712, and under whom Saragossa was the first city to abandon the Arian heresy. In 777 its Moorish ruler, the viceroy of Barcelona, appealed to Charlemagne for aid against the powerful caliph of Cordova, Abd-ar-Rahman I. Charlemagne besieged the Cordovan army in *Sarkosta*, as the city was then called; but a rebellion of his Saxon subjects compelled him to withdraw his army. The Moors were finally expelled by Alphonso I. of Aragon in 1118, after a siege lasting nine months. As the capital of Aragon, Saragossa prospered greatly until the second half of the 15th century, when the court was transferred to Castile.

In 1710 the allied British and Austrian armies defeated the forces of Philip V. at Saragossa in the war of the Spanish Succession; but it was in the Peninsular War (*q.v.*) that the city reached the zenith of its fame. An ill-armed body of citizens, led by José de Palafox y Melzi (*see* PALAFOX), held the hastily-entrenched city against Marshal Lefebvre from June 15 to Aug. 15, 1808. The siege was then raised in consequence of the reverse suffered by the French at Bailén (*q.v.*), but it was renewed on Dec. 20 and on the 27th of January the invaders entered the city. Even then they encountered a desperate resistance, and it was not until Feb. 20 that the defenders were compelled to capitulate. Thousands of people perished in the city, largely through famine and disease. Among the defenders was the famous "Maid of Saragossa," Maria Agustín, whose exploits were described by Byron in *Childe Harold* (1, 55 *sqq.*).

Saragossa is an important railway junction; it is connected by direct main lines with Valladolid, Madrid and Valencia in the west and south, and by the Ebro Valley Railway with Catalonia and the Basque Provinces; also with France, via the Somport tunnel and with the northern districts of Aragon and Cariñena on the south-west. The city is built in an oasis of highly cultivated land, irrigated by a multitude of streams which distribute the waters of the Imperial Canal, and surrounded by an arid plain exposed to the full sweep of violent gales which blow down, hot in summer and icy in winter.

One of its two stone bridges, the seven-arched Puente de Piedra, dates from 1447; there is also an iron bridge for the railway to Pamplona. The two most important buildings of Saragossa are its cathedrals, to each of which the chapter is attached for six months in the year. La Seo ("The See") is the older of the two, dating chiefly from the 14th century; its prevailing style is Gothic, but the oldest portion, the lower walls of the apse, is Byzantine. The Iglesia Metropolitana del Pilar is the larger building, dating only from the latter half of the 17th century; it was built after designs by Herrera el Mozo, and owes its name to one of the most venerated objects in Spain, the "pillar" of jasper on which the Virgin is said to have alighted when she manifested herself to St. James as he passed through Saragossa. The university was founded in 1474.

SARAJEVO (sah-rah′yā-vō), capital of Bosnia, Yugoslavia. Pop. (1921) 66,337, chiefly Serbo-Croatians. It lies in a fine situation in a valley 1,800 ft. above sea-level.

Though it is still half Oriental, and wholly beautiful with its hundred mosques, its ancient Turkish bazaar, picturesque wooden houses, and cypress groves, it was largely rebuilt after western fashion in 1878. Sarajevo is the seat of a Roman Catholic bishop, an Orthodox metropolitan, the highest Moslem ecclesiastical authority, and the supreme court. Notable in the town are the *Begava Djamia* (Džamia), or mosque of Husref Bey, founded in 1465, and among the three most beautiful mosques in Europe, the Roman Catholic and Orthodox cathedrals, the hospitals, the town hall, the museum, the State-maintained Scheriat school for Moslem law students; a gymnasium; secondary schools; a technical institute and a teachers' training college. Near the picturesque bazaar is the oldest church in Bosnia, containing a 14th century picture of the Virgin, venerated throughout the kingdom. The industries include potteries, silk, and flour mills, a sugar beet factory, timber, and, under State control, a brewery, tobacco, embroidery and carpet factories, a model farm, a bee-keepers' association, a stud farm and a race course. Weaving on hand looms is an important industry.

Founded in 1262 by the Hungarian general Cotroman, under the name of Bosnavar or Vrhbosna, Sarajevo was enlarged two centuries later, and takes its name from the palace (Turkish, *serai*) which he founded. During the wars between Turkey and Austria, its ownership was often contested; and it fell before King Matthias I. of Hungary in 1480, and before Prince Eugene of Savoy in 1697. Destructive fires laid it waste in 1480, 1644, 1656, 1687 and 1789. It was chosen as the seat of Turkish government in 1850 instead of Travnik. In 1878 it became the seat of the Austro-Hungarian administration of Bosnia-Hercegovina and subsequently of the Bosnian Diet. Under Austrian rule it was largely modernized, but the schools now established also served as a focus of Serb nationalist feeling. Students at Sarajevo perpetrated the murder of the Archduke Francis Ferdinand (*q.v.*) which led to the World War. As the Archduke motored from manoeuvres to a gala lunch in the city a bomb was thrown unsuccessfully in the suburbs. The fatal shots were fired as the Archduke's car reversed out of a narrow street leading off the quays, opposite the chief bridge.

In Nov. 1918 the Diet at Sarajevo proclaimed union with Yugoslavia. Sarajevo now became capital of a province of Yugoslavia, but its insufficient communications with Belgrade were at first unfavourable to its growth.

SARAKOLLE. A tall, long-headed, dark-skinned, prognathous people with coarse features and broad noses, in Sénégal, Mauritania and the French Sudan, who speak a much-debased Mandinga dialect, and claim a white ancestry, their forbears having once ruled over the Gana empire. Their villages are grouped in confederations under a paramount chief (*Tunka*). Formerly the extended family group was everywhere the social unit and marriage was endogamous and restricted to the village and the same caste; it is still restricted to the same caste but may be contracted outside the village. Betrothal, dowry and dower are all customary, and the first wife has authority over the rest and may own personal property and freely dispose of it. Descent is patrilineal, and inheritance is according to the Malekite code. The caste system consists of three distinct castes: (*a*) freemen; (*b*) artisans (smiths, shoemakers, fiddlers and *griots*); (*c*) descendants of slaves.

See Saint-Père, *Les Sarakolle du Guidimaka* (1925).

SARAN, a district of British India, in the Tirhut division of Behar and Orissa. Area, 2,683 sq.m. Pop. (1921) 2,339,953. It is a vast alluvial plain with a general inclination towards the south-east, as indicated by the flow of the rivers in that direction. The principal rivers, besides the Ganges, are the Gandak and Gogra, which are navigable throughout the year. The district has long been noted for its high state of cultivation and dense population. It yields large crops of rice, besides other cereals, pulses, oil seeds, poppy and sugar-cane.

The indigo industry, formerly of the first importance, has declined, and sugar refining has in great part taken its place. The production of saltpetre is an industry of some importance. Saran is exposed to drought and flood. It suffered from famines in 1874

and 1897, and from floods in 1921, when 20 inches of rain fell in a single night. A scheme for irrigation from the river Gandak, started in 1878, proved a failure, after a capital expenditure of Rs. 7,000,000 and the canals have long been closed to irrigation. At Manjhi there are the remains of a fort, with ramparts still 30 ft. high, which date back to about the 6th century A.D. The administrative headquarters are at Chapra (pop. 42,415).

SARANAC LAKE, a village of north-eastern New York, U.S.A., in the Adirondack mountains, near Lower Saranac lake, on the boundary line between Essex and Franklin counties; served by the Delaware and Hudson and the New York Central railways. Pop. 1930, 8,020 Federal census. It is a summer and a winter resort, for both health and pleasure. Near the village, at an altitude of 1,650 ft., is the Trudeau sanatorium, founded in 1884 as the Adirondack Cottage sanatorium by Dr. Edward L. Trudeau (1848–1915), the first semi-charitable institution in America for the open-air treatment of early tuberculosis. Dr. Trudeau, attacked by tuberculosis soon after beginning practice in New York city in 1872, had gone to the Adirondacks to die in a place he loved, but before the first winter was over was surprised to find his health greatly improved. He stayed on, making Saranac Lake his home for the remaining 40 years of his busy life, and out of his personal experience developed a method of treatment which has had a wide influence. The sanatorium has grown to a small village in itself, and Saranac Lake has become a resort for private patients. Within ten years not one in 20 of the applicants could be received. Robert Louis Stevenson spent the winter of 1887–88 at Saranac Lake, under Dr. Trudeau's care, writing some of his finest essays while there. In 1894 Dr. Trudeau established the Saranac laboratory for research in tuberculosis (the first of its kind in America) and after his death an endowment was raised for it (under the name of the Trudeau Foundation) as a memorial to him. In 1916 the Trudeau School of Tuberculosis was opened (also the first institution of its kind) to give specialized instruction in the diagnosis and treatment of the disease to practising physicians. The village of Saranac lake was incorporated in 1892, and now has accommodations for an average of 1,500 patients. Other institutions in the vicinity are the New York State sanatorium (1904), the Stony Wold sanatorium (1903), Sanatorium Gabriels (1897) and the National Vaudeville Artists' sanatorium, which together have a capacity of 675 beds.

SARAPUL, a town of North Russia, in the Uralsk Area on the river Kama, in 56° 32′ N., 53° 45′ E. Pop. (1926) 24,959. It is the centre for an agricultural district, and has oil-pressing, rope-making, brewing and leather industries. Like other towns in the Uralsk Area, it depends on Asiatic Russia for a market for its manufactured products.

SARASATE Y NAVASCUES, PABLO MARTIN MELITON DE (1844–1908), Spanish violinist, was born at Pamplona on March 10, 1844. At the age of 12 he began to study under Alard at the Paris conservatoire. His first public appearance as a concert violinist was in 1860. He paid the first of many visits to London, where he enjoyed great popularity, in 1861, and in the course of his career he visited all other parts of Europe and also both North and South America. He was one of the first and most fascinating violinists of modern times, his playing being remarkable equally for purity and sweetness of tone, and for facility of execution. He died at Biarritz on Sept. 20, 1908.

SARASIN or **SARRAZIN, JEAN FRANÇOIS** (1611?–1654), French author, son of Roger Sarasin, treasurer-general at Caen, was born at Hermanville near Caen. He was on terms of intimate friendship with Scarron, with whom he exchanged verses, with Ménage, and with Pellisson. In 1639 he supported Georges de Scudéry in his attack on Corneille with a *Discours de la tragédie.* He accompanied Léon Bouthillier, comte de Chavigny, secretary of state for foreign affairs, on various diplomatic errands until 1643–44. He joined in the pamphlet war against Pierre de Montmaur, against whom he directed his satire, *Bellum parasiticum* (1644). He was accused of writing satires on Mazarin, and for a short time gave up the practice of verse. In 1648 he entered the household of Armand de Bourbon, prince de Conti, whose marriage with Mazarin's niece he helped to negotiate. He died at Pézénas, on Dec. 5, 1654. The most considerable of his poems were the epic fragments of *Rollon conquérant, la guerre espagnole,* with *Dulot vaincu* and the *Pompe funèbre* in honour of Voiture. As a poet he was overrated, but he was the author of two excellent pieces of prose narration, the *Histoire du siége de Dunkerque* (1649) and the unfinished *Conspiration de Walstein* (1651).

His *Oeuvres* appeared in 1656, *Nouvelles Oeuvres* (2 vols.) in 1674. His *Poésies* were edited in 1877 by Octave Uzanne with an introductory note. Much of his correspondence is preserved in the library of the Arsenal, Paris. *See* Albert Mennung's *Jean François Sarasins Leben und Werke* (2 vols., Halle, 1902–04).

SARASOTA, a city on the west coast of Florida, U.S.A., 40 m. S. of Tampa; the county seat of Sarasota county and one of the most charming resorts of the State. It is on Federal highway 41 and the Tamiami trail; has a municipal airport, a deep-water harbour and municipal docks; and is served by the Atlantic Coast Line and the Seaboard Air Line railways. Pop. 5,529 in 1925 (State census); in 1930, 8,398 by the Federal census. The city lies on the east shore of Sarasota bay, connected by causeways with long palm-studded keys to the west (St. Armand, Longboat and Lido). The assessed valuation in 1927 was $50,848,478. Sarasota was founded in the early '80s by a Scotch syndicate of which Sir John Gillespie was president. In 1885 his son, J. Hamilton Gillespie, laid out here the first golf course in America.

SARASWATI, a river in the Punjab frequently mentioned in the *Rig-Veda.* Its meaning "abounding in pools" suggests that it was even at that early period a larger river than now. It is lost in the desert sands towards Rājpūtāna. Corresponding phonetically to the Iranian *Haraqaiti* (the modern Helmand), the name may have been applied to the Indus by the invading Aryans before they reached the eastern Punjab, but it soon ceased to refer to that river. As the Sarsūti, its present name, it joins the Ghaggar, the dry bed of the Hakra, the lost river of the Indian desert which can still be traced to its junction with the Indus. With the Drishadwati the Saraswati formed the west boundary of Brahmavarta, and was the holy stream of Vedic India. As "fluent" it became the personified goddess of eloquence, learning and wisdom, wife of Manu, mother of the *Vedas,* and a daughter of Brahman. From her the Sarsūt Brahmans (*q.v.*) claim their name. Another Saraswati, in Guzerāt, also loses itself in the sand.

See A. A. Macdonell and A. B. Keith, *Vedic Index* (1912); A. A. Macdonell, *Vedic Mythology,* and E. W. Hopkins, *Epic Mythology,* Strassburg (1897 and 1915).

SARATOGA, BATTLES OF. The plan of campaign for the British in America in 1777 sought to isolate New England by occupying the Hudson valley. Burgoyne, the author of the plan, coming down from Canada via Lakes Champlain and George, was to meet Howe, marching up from New York, at Albany. A third, but much smaller force, under St. Leger, was to advance from Oswego down the Mohawk valley and join the other two columns. The plan failed because Howe, the British commander-in-chief, marched on Philadelphia—Germaine, the secretary of State, having failed to give him definite instructions. Burgoyne, with about 8,000 men, including seven regiments of British regulars and 3,000 Germans, reached Ticonderoga (July 1), which was evacuated by its weak garrison (July 6). He reassembled his army after the pursuit at Skenesborough and marched through the woods and swamps to Fort Edward, which was evacuated by the American commander, Schuyler, who retreated across the Hudson to Stillwater, 30 m. above Albany (July 31). The march was most laborious, involving the construction of 40 bridges, and necessitated a long halt at Fort Edward. Burgoyne should have taken his army back to Ticonderoga, and transferred it to Fort George, where a direct road led to Fort Edward. Had he taken this route, it is reckoned that he might have reached Albany by the 16th.

A German detachment, on the advice of "Colonel" Skene, who was also responsible for the recent march, was sent to Bennington to seize horses and supplies, but was surrounded and almost annihilated by the Green Mountain Militia, under John Stark (Aug. 16). Burgoyne now became uneasy; he had left nearly 1,000 men to garrison Ticonderoga; he had heard from Howe of his intention to invade Pennsylvania; and St. Leger was held up

before Fort Stanwix (actually St. Leger retreated Aug. 22). But he considered himself bound by his orders to press on to Albany. Having collected 30 days' rations, he crossed the Hudson (Sept. 13) and encamped near Saratoga. The Englishman, Gates, who had displaced Schuyler in command (Aug. 19), was encamped 4 m. away, on Bemis's Heights, with 12,000 men and was daily receiving reinforcements. Burgoyne advanced to the attack (Sept. 19). But Arnold came out with 3,000 men to meet him at Freeman's Farm. After 4 hours' fierce fighting Arnold retired, and Burgoyne encamped on the battlefield, but he had lost over 500 men, including a large number of officers, victims of Morgan's sharpshooters. Burgoyne heard (Sept. 21) from Clinton, who had been left in command at New York, that he was about to make a diversion up the Hudson. He sent a despatch to Clinton (Sept. 27) asking for orders. The answer was never received. Clinton started with a small force (Oct. 3) and captured two forts on the west bank, but he never had any intention of penetrating to Albany.

Burgoyne had now under 5,000 "effectives" left, and his supplies were running short. He reckoned that they might last till the 20th. He led out 1,500 men on reconnaissance (Oct. 7), but the Americans made a fierce counter-attack, and led by Arnold, inflicted a severe defeat upon the British army. Next day Burgoyne began his retreat, but Gates, with 20,000 men, surrounded him at Saratoga. Burgoyne opened negotiations on the 14th and the Convention of Saratoga was signed (Oct. 17), Burgoyne insisting that it was not a capitulation, and finding a precedent in the Seven Years' War.

See F. J. Hudleston, *Gentleman Johnny Burgoyne* (1928).

SARATOGA SPRINGS, a city of Saratoga county, New York, U.S.A., 30 m. N. of Albany and 12 m. W. of the Hudson river; served by the Boston and Maine and the Delaware and Hudson railways. Pop. 1930, 13,169 Federal census. The city is in a region of great historic interest, and has been famous for its medicinal mineral springs since colonial days. It is a pleasure resort in summer, a health resort at all seasons, and is the seat of Skidmore college for women (1911). Adjoining the city is "Yaddo," the beautiful estate of Katrina Trask (Mrs. George Foster Peabody), which since her death in 1922 has been made a summer retreat for a limited number of painters, writers and other creative artists. Saratoga lake (6 m. long) is 3 m. S.E. of the city. The August races of the Saratoga Association for the Improvement of the Breed of Horses (organized 1863) draw a brilliant attendance. Among the long established hotels are the United States (800 rooms) and the Grand Union (900 rooms). The Convention hall seats 5,000. The 122 springs (heavily charged with carbonic acid gas and containing in varying proportions bicarbonates of lime, sodium, magnesium, chloride of sodium and other minerals) are in a reservation of 1,100 ac., owned and controlled by the State. The State bath houses have a capacity of about 5,000 treatments daily, and the bottling plant can fill 6,000,000 pint bottles in a year. The therapeutic value of the springs was known to the Indians, and the Saratoga country was a favourite summer camping ground of the Iroquois. It became a theatre of hostilities between the French and English colonists and their Indian allies. In 1693 a French expedition was checked in a sharp conflict near Mt. McGregor by an English and colonial force. In 1745 the settlement on the Hudson directly east of the present city of Saratoga Springs (called Saratoga at first, later Old Saratoga and now Schuylerville) was attacked by French and Indians, who massacred many of its inhabitants. The battles of Saratoga (*q.v.*) in the Revolutionary War were fought at Bemis Heights, 12 m. S.E. of Saratoga Springs. Most of the battlefield has been acquired by the State of New York, and Congress in 1926 authorized making it a national military park. The first white man known to have benefited from the Saratoga waters was Sir William Johnson, whose Indian friends carried him to the springs in 1767. A log house for the lodging of visitors was built in 1771; in 1783 Gen. Philip Schuyler and his family camped at the springs through the summer; in 1791 Gideon Putnam bought a large tract of land and put up the first inn; and in 1793 Dr. Valentine Seaman published a book about the waters which spread the knowledge of their curative properties. Other hotels (large barn-like wooden structures) were built early in the 19th century, and by 1820 the Springs had become a popular resort. The Civil War brought depression, and cut off the patronage from the South; but soon afterwards, with the establishment of the races and the rebuilding of the United States hotel, it again became popular, and in the 1870's and '80s was one of the most fashionable watering-places of America ("the Queen of Spas"). Commercial exploitation of the springs (bottling the water and liquefying the carbonic acid gas) diminished their flow until they almost disappeared, and the resort was again depressed until the State intervened, first prohibiting the pumping and later acquiring the property (1909) and placing it in charge of the conservation commission (1916). Under State management the flow and mineral strength of the springs have been restored, and the patronage has increased tenfold in a decade. Saratoga Springs was incorporated as a village in 1826 and as a city in 1915.

SARATOV, a province of Russia, much smaller than the former Saratov province, lying on the right bank of the Volga river, with Ulianovsk and Penza on the north, Tambov on the west, Stalingrad on the south, and the German Volga republic and Samara on the east. Its area is 90,863 sq.km. and its population 2,891,404, almost entirely agricultural. A small portion of it, the Novo-Uzensk district, lies east of the German Volga republic. The province occupies the eastern part of the great central plateau of Russia, which slopes gently to the south until it merges imperceptibly into the steppe region; its eastern slope, deeply cut into by ravines, falls abruptly to the Volga. The higher parts range from 700 to 900 ft. above the sea, while the Volga flows at an elevation of 20 ft. only at Khvalynsk in the north, and thus the river banks have a hilly appearance.

Every geological formation from the Carboniferous to the Miocene is represented, though the older formations are concealed under Cretaceous deposits of fossiliferous marls, flint-bearing clays and iron-bearing sandstones. The boulder clay of the Finland and Olonets ice sheets penetrates into the east of the province, and loess and other post-glacial deposits are found in the south-east. Iron-ore is abundant and chalk, lime and white pottery clay are obtained in some parts.

The province is comparatively well drained, the upper course of the Sura, a tributary of the Volga, lies in the north and the upper Medvedyitsa and Khoper flow south and drain into the Don. They are navigable in spite of their shallows, and ready made boats are brought in pieces from the Volga, and put together on their shores. The forest has almost disappeared; houses are made of clay and dung is used for fuel.

The climate is severe and continental, with a recorded range of temperature of 119° F in some parts; at Saratov the average January temperature is 12·4° F, the average July temperature 71·5° F. The Volga at Saratov is frozen for 162 days in the year. Rainfall is scanty and irregular, varying between 8 and 16 in. in normal years and much less in drought years, the rain falling mainly in spring and early summer. The region is arid and rapid desiccation is progressing. In the north and west are sandy black-earth soils, interspersed with dark grey forest lands and grey wooded clays (Volsk, Khvalynsk, the northern part of Petrovsk). In Petrovsk, Serdobsk, Atkarsk and Balashov counties are clayey black-earths, while Balashov contains a strip of rich black-earth with a high humus content, but even here there are patches of salt land and salt marshes.

The yield of the soil in Saratov province has become stabilized at a low level because although the soil contains about 6–10% of humus, its friability disappears after a few years of persistent planting with cereals. The great variability of crop yield, sometimes so low as to reduce the district to starvation (*e.g.*, in 1921), and the appearance of salting indicate the need for more intensive methods of agriculture. Attempts are being made to increase the friability of the soil, to put large areas under grass for several years, and to introduce plough culture and better types of crop rotation, with less fallow, and to introduce the sowing of the more drought resisting types of grain. Marmots, mice and insects are great pests to agriculture. Experimental stations have been

established at eight points and the agronomical faculty of the University of Saratov has an experimental institute. In the Novo-Uzensk district east of the German Volga republic the soil and drought problem is even more acute; here are light brown and brown clayey soils, with some chestnut brown soil and sands and salty areas. In good years crops are successful, in drought years famine is severe. For 50 years the peasants here have been practising a form of irrigation and plans are now in hand for lagoon irrigation of an extensive area above the town of Novo-Uzensk and near the settlement of Alexandrov-Gai, utilizing the waters of the Great Uzen.

Winter rye is the main crop, summer wheat, millet, oats and sunflower seed come next and potatoes are increasingly grown. Barley forms a very small percentage of the harvest. The province has not yet recovered from the terrible 1917–21 years, though conditions have improved rapidly in the last two or three years. There is a fair amount of stock raising in the district, sheep and working cattle occupy the first place and horses and pigs are also bred, but on the whole this is a diminishing industry. Cucumbers, melons, water-melons, and vegetables are grown around Saratov, Volsk, Atkarsk and Kamyshin, and in the Novo-Uzensk district. Beetroot cultivation is increasing.

Poultry raising of an export character is carried on, but dairy produce is not much developed. Fishing and the preparation of caviare are important at Kamyshin. A more intensive development of cattle breeding for meat and dairy purposes would lead to greater development of local production of bran and cattle foods, with a probable development of the bacon industry in dependence on by-products from the dairying industry. Flour-milling is the main industry, oil-pressing from oleaginous seeds is an export industry and there is some tobacco manufacture. There are metal works dependent on the local iron, and the State electrification scheme includes the development of a shale using electric plant at Saratov to supplement the small station now working. The shale is to be obtained from the Kashpir beds near Syzran and can be brought cheaply by water.

The railway net includes the line from Tambov to Kamyshin, with a branch linking with Penza, a line from Tambov to Saratov, one from Volsk on the Volga going through Petrovsk and Atkarsk to Balanda, part of the Penza-Syzran line, and the branch from the Volga through Novo-Uzensk to Alexandrov-Gai. The region is thus better supplied than the Samara province and has a good deal of transit trade between shipping and railway lines.

The rate of literacy is considerably higher than in the Samara province, though it is low amongst women. Saratov university helps to spread a higher standard of culture in the district. The chief towns are Saratov, Balachov, Volsk and Kuznetsk (*qq.v.*), the remaining centres having less than 20,000 inhabitants.

The district of Saratov has been inhabited since at least the Neolithic period. The inhabitants of a later epoch have left numerous bronze remains in their *kurgans* (burial-mounds) but their ethnological position is still uncertain. In the 8th and 9th centuries the semi-nomad Burtases peopled the territory and recognized the authority of the Khazar princes.

SARATOV, a town of Russia in the province of Saratov in 51° 35′ N., 46° 1′ E., on the Volga river, and on the plateau slopes near that river. Landslips from the Sokolova hill (560 ft.) often occur. Two ravines divide the town into three parts. The streets are wide and regular, with broad squares and there are some fine buildings. There is a university, an art gallery and a museum. Pop. (1926) 211,756. Its industries include iron-smelting, the making of nails and bolts, saw-milling, using timber floated down the river, flour-milling and railway repair shops. An electric plant using shale fuel from the Syzran beds is under construction. The shallowness of the Volga opposite the town, and the immense shoals along its right bank are drawbacks, but it has some importance as a river port. It is linked by rail with Tambov, and through Pokrovsk, on the opposite side of the river in the German Volga Republic, with Uralsk and the Central Asiatic Republics. It has an extensive collecting and entrepôt trade.

The town of Saratov was founded at the end of the 16th century, 7 m. above the present site, to which it was removed about 1605. Sary-tau or Yellow Mountain on which it stands has been inhabited from remote antiquity.

SARAWAK (sah-rah′wak), an independent State in north-west Borneo (*q.v.*), with an area of some 50,000 sq.m. (about the size of England and Wales), a coast line of about 500 miles and a population estimated at half a million. It is bounded on the northwest by the China sea, on the northeast by British North Borneo and on the southeast by Dutch Borneo. Sarawak was originally part of the dominion of the Sultan of Brunei. In 1840 Rajah Muda Hasim the uncle and heir-presumptive of the Sultan prevailed upon James Brooke (*q.v.*), an English officer, to help him in suppressing a rebellion and in return for his services he ceded Sarawak to Brooke who became Rajah in September 1841. His appointment was acclaimed by the people and was confirmed by the Sultan in 1842. In 1863 Sarawak was recognized by the British Government as an independent State, and in 1888 a treaty was concluded by which, in return for British protection, H.M. Government took control of the relations of Sarawak with foreign states, but left the internal administration entirely in the hands of the Rajah. Sarawak differs in this respect from other Protectorates which are administered by British officials appointed by the Crown, and its status and government are unique in the Empire. There are Government Offices in Westminster where the affairs of Sarawak in England are managed by a Government agent in conjunction with an Advisory council.

Originally the area of Sarawak was about 7,000 sq.m., but since 1841 further territory has been obtained, notably, additions to the coast line in 1861 and 1882, the Trusan river in 1884, the Limbang river in 1890 and the Lawas river in 1904. Sir James Brooke, who was created K.C.B. in 1863, was succeeded in 1868 by his nephew, Sir Charles Johnson Brooke, G.C.M.G. who in turn was succeeded in 1917 by his son, Sir (Charles) Vyner Brooke, G.C.M.G., the present Rajah. Three generations of Brookes have thus administered the country with the aid of a civil service of British officials and Sarawak is a notable instance of a native state which has been developed under an enlightened policy into a highly organized community. The principal sources of revenue are customs, Government monopolies, rents and mineral royalties. The economic and financial position of the country is sound and there is no public debt. In recent years progress has been rapid. Various Departments of Government have been established, *e.g.*, Public Works, Land, Trade and Customs, Forestry and Education, and there are European and General hospitals under a medical department which includes a Department of Public Health. Waterworks have been constructed in several places, wireless installations in communication with Singapore have been set up at various centres and considerable progress has been made in surveying the country by land and air. Churches and missions of different denominations have been established and the Anglican Bishop of Labuan and Sarawak has his headquarters at Kuching.

Ethnology.—The native population of Sarawak is composed of different races comprising Mohammedan Malays and various pagan tribes including Ibans or Dayaks, Muruts, Kayans, Kenyahs, Punans and Klemantans. There are also large numbers of Chinese and a few other immigrants. The practice of head hunting which was once prevalent is now practically extinct. Slavery has also been abolished.

Climate, Physical Features and Fauna.—The climate of Sarawak, though tropical, is healthy for Europeans and the heat is never extreme. The thermometer rarely rises above 90° F and falls to 70° F at night, and the heat is often tempered by a cool breeze. The average annual rainfall at Kuching is 160 in. There is no marked division into wet and dry seasons but there is more rain from October to March. The country is mountainous and very well watered. The chief rivers are the Rejang, Baram, Limbang and Batang Lupar, all of which are navigable. The fauna is varied and includes anthropoid apes, monkeys, lemurs, wild cattle, deer, pigs and rhinoceros. Snakes and crocodiles are numerous.

Industry.—Sago and pepper of the best quality are cultivated, and both plantation rubber and jungle rubber (Jelutong) are

largely exported. The coco-nut palm is grown and the illipe nut (engkabang) is another valuable product. There are more than 20 varieties of rattans some of which are of high quality. Camphor and various other medicinal products are extracted from trees and plants. Coal is also found, but is not at present worked in large quantities, though there is a field, known to contain bituminous coal analogous to high grade Welsh coal, which may become important in the future. The principal mineral wealth is the oil field at Miri where the first well was sunk in 1910. The production in 1926 was 681,760 tons. At the instance of the late Rajah a reserve of oil is kept in store for the use of the British Navy.

Chief Towns.—Sarawak, distant nearly 9,000 miles from London, lies north of the equator and Kuching, the capital (1° 33′ 10″ N., 110° 20′ 13″ E.), is situated on the Sarawak river about 23 miles inland. There are Government offices and a Court house, and a museum with a fine collection of Bornean exhibits. The European population of Kuching consists chiefly of Government officers and their families. Sibu, on the Rejang river has a large population of Chinese traders. Miri, in the north, is the headquarters of the Sarawak Oilfields Ltd. and has grown in 13 years from a small village to a town with a population (1927) of about 10,600 of which some 5,000 are employees of the company and about 300 are Europeans.

Communications.—Communication is chiefly by water, but there are good roads round Kuching, one of which stretches some 25 miles into Upper Sarawak. About 13 miles of railway are now open for traffic. There is a weekly service of steamers between Kuching and Singapore (40 hours) and a weekly service also between Miri and Singapore (about 2½ days).

The following figures show the development of Sarawak in recent years.

Year	Revenue		Expenditure	Imports	Exports	Shipping entered
	Customs	Total				
	Million dollars					Million tons
1916 .	0·422	1·624	1·501	9·532	11·776	0·151
1919 .	0·832	2·531	1·722	20·265	23·958	0·154
1922 .	0·639	2·734	2·653	16·540	25·575	0·241
1923 .	1·016	3·344	2·873	23·256	39·825	0·437
1924 .	0·955	4·125	3·122	16·728	36·845	0·616
1925 .	1·401	5·095	3·900	21·073	56·011	0·606
1926 .	1·659	6·358	4·651	24·195	53·467	0·730

BIBLIOGRAPHY.—J. C. Templer, *Private Letters of Sir James Brooke* (1855); C. Brooke, *Ten Years in Sarawak* (1866); G. L. Jacob, *The Raja of Sarawak* (1876); S. St. John, *The Life of Sir James Brooke, Rajah of Sarawak* (1889); and *Rajah Brooke, the Englishman, as Ruler of an Eastern State* (1899); H. L. Roth, *The Natives of Sarawak and British North Borneo* (1896); A. Ireland, *The Far Eastern Tropics* (1905); Baring Gould and C. A. Bampfylde, *A Short History of Sarawak under its two White Rajahs* (1909); O. Beccari, *Wanderings in the Great Forests of Borneo* (1909); C. Hose and W. McDougall, *The Pagan Tribes of Borneo* (1912); Ranee Margaret of Sarawak, *My Life in Sarawak* (1913), R. W. C. Shelford, *A Naturalist in Borneo* (1916); C. Hose, *Natural Man* (1927).

(C. W. J.)

History.—Sarawak was a relatively small and ill-defined area before 1840 and was in rebellion against the Malay officials. The insurgents were entrenched at Blidah fort and here Sir James Brooke first took part in the affairs of the territory. After suppressing the insurrection Brooke became rajah of Sarawak in the place of Muda Hassim, who resigned. In 1843–44 Captain (later Admiral Sir Henry) Keppel and Rajah Brooke expelled the Malay and Dayak pirates from Saribas and Batang Lupan rivers. In 1857 there was a Chinese rising in which Rajah Brooke all but lost his life. Sir James Brooke died in 1868 and was succeeded as rajah by his nephew, Sir Charles Johnson Brooke (b. 1829). In 1888 the latter was created G.C.M.G. and Sarawak was made a British protectorate and in 1904 King Edward VII. formally recognized the title of his highness the rajah of Sarawak. In 1917 Rajah H. H. Charles Vyner Brooke succeeded.

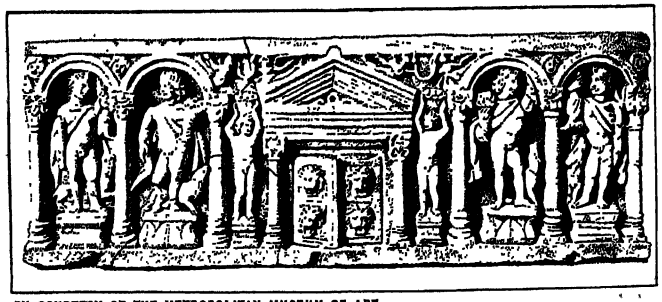
SARCOPHAGUS, the name given to a coffin in stone, which on account of its caustic qualities, according to Pliny (H.N. xxxvi. 27), consumed the body in 40 days (Gr. *σαρκοφάγος*, literally "flesh-eating," from *σάρξ*, flesh, *φαγεῖν*, to eat); also by the Greeks to a sepulchral chest, in stone or other material, which was more or less enriched with ornament and sculpture. One of the finest examples known is the sarcophagus of Tutankhamun (*c.* 1550 B.C.) made of granite and ornamented with angels with outspread wings. Of later date are the green porphyry sarcophagus and the terra-cotta sarcophagus from Clazomenae; both of these date from the early 6th century B.C., and are in the British Museum. The finest Greek examples are those found at Sidon in 1887 by Hamdy Bey, which are now in the Imperial Museum at Constantinople. (*See* GREEK ART.) Of Etruscan sarcophagi there are numerous examples in terra-cotta; occasionally they are miniature representations of temples, and are sometimes in the form of a couch on which rest figures of the deceased; one of these is in the British Museum. The earliest Roman sarcophagus is that of Scipio in the Vatican (3rd century B.C.), carved in peperino stone.



BY COURTESY OF THE METROPOLITAN MUSEUM OF ART

AN ETRUSCAN TERRA COTTA URN OF THE THIRD CENTURY, B.C., IN THE FORM OF A SARCOPHAGUS

Of later Roman sarcophagi, there is an immense series enriched with figures in high relief, of which the chief are the Niobid example in the Lateran, the Lycomedes sarcophagus in the Capitol, the Penthesilea sarcophagus in the Vatican, and the immense sarcophagus representing a battle between the Romans and the barbarians, in the Museo delle Terme. In later Roman work there was a great decadence in the sculpture, so that in the following centuries recourse was had to the red Egyptian porphyry, of which the sarcophagi of Constantia (A.D. 355) and of the empress Helena (A.D. 589), both in the Vatican, are fine examples. Later, during the Byzantine period, there is a large series, either in museums or in the cloisters of the Italian churches. They are generally decorated with a series of niches with figures in them, divided by small attached shafts with semicircular or sloping covers carved with religious emblems, one of the best examples being the sarcophagus of Sta. Barbara, dating from the beginning of the 6th century, at Ravenna, where there are many others.



BY COURTESY OF THE METROPOLITAN MUSEUM OF ART

THE FRONT OF A SMALL ROMAN SARCOPHAGUS, OF THE THIRD CENTURY B.C., DEPICTING THE FOUR SEASONS

SARDANAPALUS or SARDANAPALLUS, according to Greek fable, the last king of Assyria, the thirtieth in succession from Ninyas. The name is derived from that of Assur-danin-pal, the rebel son of Shalmaneser II., whose reign ended with the fall of Nineveh in 823 B.C. (or perhaps from that of Assur-dan III., the last king but one of the older Assyrian dynasty); his character is that ascribed to Assur-bani-pal. He was the most effeminate and corrupt of a line of effeminate princes; hence Arbaces, satrap of Media, rebelled and, with the help of Belesys, the Babylonian priest, besieged Nineveh. Sardanapalus now threw off his sloth and for two years the issue was doubtful. Then, the Tigris having undermined part of the city wall, he collected his wives and treasures and burned them with himself in his palace (880 B.C.).

His fate is an echo of that of Samassum-yukin, the brother of Assur-bani-pal (*q.v.*).

See J. Gilmore, *Fragments of the Persika of Ktesias* (1888).

(A. H. S.)

SARD AND SARDONYX. These semi-precious stones are colour-varieties of chalcedony (*q.v.*). Sard is a variety of carnelian; its colour is brown by reflected and red by transmitted light. (*See* CARNELIAN.) Sardonyx is a variety of onyx (*q.v.*) having white layers alternating with strata of sard. Both sard and sardonyx were esteemed by the ancients and by the craftsmen of the Renaissance for use in gem-cutting.

SARDICA, COUNCIL OF, an ecclesiastical council convened in 343 by the emperors Constantius and Constans, to attempt a settlement of the Arian controversies, which were then at their height. Of the hundred and seventy bishops assembled, about ninety (principally from the West) were Athanasians, while on the other side were eighty Eusebians from the East. The anticipated agreement, however, was not attained; and the result of the council was simply to embitter the relations between the two great religious parties, and those between the Western and Eastern halves of the Empire. For as Athanasius and Marcellus of Ancyra appeared on the scene, and the Western bishops declined to exclude them, the Eusebian bishops of the East absolutely refused to take part, and contented themselves with formulating a written protest addressed to numerous foreign prelates.

Especial importance attaches to this council through the fact that Canons 3–5 invest the Roman bishop with a prerogative which became of great historical importance, as the first legal recognition of his jurisdiction over other sees and the basis for the further development of his primacy.

The canons are printed in C. Mirbt, *Quellen zur Geschichte des Papsttums* (1901), p. 46 f.; Hefele, *Conciliengeschichte*, ed. 2, i. 533 *sqq.*

SARDINE: *see* PILCHARD.

SARDINIA, an island of the Mediterranean sea, belonging to Italy. It lies 7½ m. S. of Corsica, from which it is separated by the Strait of Bonifacio, some 50 fathoms deep. The harbour of Terranova, in the north-eastern portion of the island, is 125 m. south-west of Civitavecchia, the nearest point on the mainland of Italy. Sardinia lies between 8° 7′ and 9° 49′ E., and extends from 38° 52′ to 41° 15′ N. The length from south-west to north is about 160 m., the breadth about 68 miles. The area of the island is 9,187 sq.m. or including the small islands adjacent, 9,294 sq.m. and it has 864,174 inhabitants. It is divided into three provinces, Cagliari, Nuoro and Sassari. The density of population is lower than that of any other part of Italy, coming slightly below that of Basilicata (for details *see* ITALY).

The island is mountainous, almost continuously so along the coast, and largely granitic with lofty upland plains in the east, and volcanic in the west. The highest point in the north-east group of the island (called Gallura) is Monte Limbara (4,468 ft.) south-east of Tempio. The valleys on the south-east and south-west are followed by the railway from Golfo degli Aranci to Chilivani and Sassari. The north-western portion of the island, called the Nurra, is entirely volcanic; so are the mountains to the south of it, near the west coast; the highest point is the Monte Ferru (3,448 feet). East of the railway from Chilivani to Oristano, on the other hand, the granitic mountains continue. The highest points are Monte Rasu (4,127 ft.), south of Ozieri, in the district called Logudoro, and, farther south, in the region called Barbargia, the Punta Bianca Spina, the highest summit of the chain of Gennargentu (6,016 feet). These two groups are divided by the deep valley of the Tirso, the only real river in Sardinia, which has a course of 94 miles, South of Gennargentu, in the district of the Sarcidano, is the Monte S. Vittoria (3,980 feet). Still farther west is the volcanic upland plain of the Giara (1,988 ft.) and south of the Sarcidano are the districts known as the Trexenta, with lower, fertile hills, and the Sarrabus, which culminates in the Punta Serpeddi (3,507 ft.), and the Monte dei Sette Fratelli (3,333 ft.), from the latter of which a ridge descends to the Capo Carbonara, at the south-east extremity of the island. South of Oristano, traversed by the railway to Cagliari, is the Campidano (divided into the Campidano of Oristano and the Campidano of Cagliari), a low plain, the watershed of which is only about 100 ft. above sea-level. It is 60 m. long by 7–14 broad, and is the most fertile part of the island. South-west of it are the fine mountain groups around Iglesias (4,055 feet). In this south-western portion of the island the mining industry of Sardinia is carried on.

Coast.—The coast of Sardinia contains few seaports, but a good proportion of these are excellent natural harbours. At the north-eastern extremity is a group of islands, upon one of which is the naval station of La Maddalena: farther south-east is the well-protected Gulf of Terranova, the port of arrival for the mail steamers from Civitavecchia. To the south of Terranova there is no harbour on the east coast until Tortoli is reached, nor on the south coast before Cagliari, the most important harbour on the island. In the south-western portion of Sardinia the island of S. Antioco, joined by a narrow isthmus and a group of bridges to the mainland, forms a good natural harbour to the south of the isthmus, the Golfo di Palmas; while the north section of the peninsula, with the island of S. Pietro, forms a more or less protected basin, upon the shores of which are several small harbours (the most important being Carloforte), which are centres of the export of minerals and of the tunny fishery. Not far from the middle of the west coast is the Gulf of Oristano, into which, besides the Tirso, several streams fall, forming considerable lagoons. Bosa has only an open roadstead; and at the southern extremity of the Nurra come the Gulf of Alghero and the Porto Conte to the west. Porto Torres is the chief port on the north-west coast of Sardinia.

Geology.—Geologically Sardinia consists of two hilly regions of pre-Tertiary rock, separated by a broad depression filled with Tertiary deposits. This depression runs nearly from north to south, from the Gulf of Asinara to the Gulf of Cagliari. Physically its continuity is broken by Monte Urticu and smaller hills, remains of Tertiary volcanoes. In the south the depression is known as the Campidano. In the north it forms the plain of Sassari. Both east and west of this depression the Archaean and Palaeozoic rocks are strongly folded, except the Permian beds. In the eastern region this was the last folding which has affected the country, and the Mesozoic and Tertiary beds are almost undisturbed. In the western region, on the other hand, all the Mesozoic beds are involved in a later system of folds; but here also the Tertiary beds lie nearly horizontal. In the western region all the Mesozoic systems, including the Trias, are well developed. The Trias does not belong, as might have been expected, to the Alpine or Mediterranean type; but resembles that of Germany and northern Europe. In the eastern region the Trias is absent; the Mesozoic series begins with the Upper Jurassic.

Granite and Archaean schists form nearly the whole of the eastern hills from the Strait of Bonifacio southwards to the Flumendosa river, culminating in the Monti del Gennargentu. The Palaeozoic rocks form two extensive masses, one in the south-east, the other in the south-west. They occur also on the extreme north-western coast, in the Nurra. Cambrian, Ordovician and Silurian beds have been recognized, the Upper Cambrian consisting of a limestone which is very rich in metalliferous ores (especially galena and calamine). The Permian, which contains workable coal seams, lies unconformably upon the older beds and seems to have been deposited in isolated basins (*e.g.*, at Fondu Corrongiu and San Sebastiano), like those of the Central Plateau of France. The Mesozoic beds are limited in extent, the most extensive areas lying around the Gulf of Orosei on the east and west of Sassari in the north. The Tertiary deposits cover the central depression.

Climate.—The climate of Sardinia is more extreme than that of Italy, but varies considerably in different districts. The mean annual temperature is 62° F at Cagliari and 61° F at Sassari, the respective maxima and minima (for a period of 30 years) being 98·5° F and 97° F and 36·5° F and 38·5° F. The island is subject to strong winds, which are especially felt at Cagliari owing to its position at the south-east end of the Campidano, and the autumn rains are sometimes of almost tropical violence. There are comparatively few streams and no inland lakes. Snow hardly ever

falls near the coast, but is abundant in the higher parts of the island, though none remains throughout the summer. The rainfall in the south-west portion of the island is considerably greater than in other districts, in which it is extremely low, about 19 in. at Cagliari and 24 in. at Sassari.

Malaria.—This scourge has considerably diminished, but the undrained coast swamps still provide breeding-places for the malaria-carrying mosquito. The number of cases of malaria for 1926 is given as 76,158, which is more than double the figure (36,203) for Apulia, the next highest.

Customs and Dress.—The population of Sardinia appears to have belonged since ancient times to the so-called Mediterranean race. (*See* G. Sergi, *La Sardegna,* Turin, 1907.) The race has probably suffered less here than in most parts of the Mediterranean basin from foreign intermixture, except for a few Catalan and Genoese settlements on the coast (Alghero and Carloforte are respectively the most important of these); and the population in general seems to have deteriorated slightly since prehistoric times, the average cranial capacity of the prehistoric skulls from Anghelu Ruju being 1,490 c.c. for males and 1,308 for females, while among the modern population 60% of males and females together fall below 1,250 c.c. and the stature is generally lower than in other parts of Italy. In the province of Cagliari 29·99% of the recruits born in 1862 were under 5 ft. 1 in., and in that of Sassari 21·99%, the percentage for ten provinces of south Italy being 24·35. These small individuals present apparently no other differences, and Sergi maintains that the difference is racial, these being descendants of a race of pygmies who had emigrated from central Africa. But the lowness of stature extends to the lower animals—cattle, horses, donkeys, etc.—and this may indicate that climatic causes have some part in the matter also.

The dialects differ very much in different parts of the island, so that those who speak one often cannot understand those who speak another, and use Italian as the medium of communication. They contain a considerable number of Latin words, which have remained unchanged. The two main dialects are that of the Logudoro in the north and that of Cagliari in the south.

The native costumes also vary considerably. In the south-east they have largely gone out of use, but elsewhere, especially in the mountainous districts, they are still habitually worn. In the Barbargia the men have a white shirt, a black or red waistcoat and black or red coat, often with open sleeves; the cut and decorations of these vary considerably in the different districts. They have a kind of short kilt, stiff, made of black wool, with a band from back to front between the legs; under this they wear short linen trousers, which come a little below the knee, and black woollen leggings with boots. They wear a black cap, about 1½ ft. long, the end of which falls down over one side of the head. In other districts the costume varies considerably, but the long cap is almost universal. Thus at Ozieri the men wear ordinary jackets and trousers with a velvet waistcoat; the shepherds of the Sulcis wear short black trousers without kilt and heavy black sheepskin coats, and the two rows of waistcoat buttons are generally silver or copper coins. The costume of the women is different (often entirely so) in each village or district. Bright colours (especially red) are frequent, and the white chemise is an integral part of the dress. The skirts are usually of the native wool (called *orbacia*) and two are often worn, one over the other. For widows or deep mourning the peculiar cut of the local costume is preserved, but carried out entirely in black. The native costume is passing out of use in many places (especially among the women, whose costume is more elaborate than that of the men), partly owing to the spread of modern ideas, partly owing to its cost; and in the Campidano and in the mining districts, it is now rarely seen. The curious customs, too, of which older writers tell us, are gradually dying out. But the festivals, especially those of mountain villages or of pilgrimage churches, attract in the summer a great concourse of people, all in their local costumes. There may be seen the native dances and bare-back horse-races through the main street of the village.

Agriculture.—The greater part of the island is devoted to agriculture; according to the statistics of 1901, 151,853 individuals out of a total rural population of 708,034 (*i.e.*, deducting the population of Cagliari and Sassari) were occupied in it. Of these 41,661 cultivated their own land, 15,408 were fixed tenants, 24,031 were regular labourers, and no less than 72,753 day labourers; while there were 35,056 shepherds.

Much of the island is stony and unproductive; but cultivation has not been extended nearly as much as would be possible. Where rational cultivation has been introduced, it has been often by non-Sardinian capitalists. Two-fifths of the land belong to the state, and two-fifths more to the various communes; the remaining fifth is minutely subdivided among a large number of small proprietors. Comparatively little grain is now produced, whereas under the republic, Sardinia was one of the chief granaries of Rome, and most of the soil, except the rugged mountain regions, is adapted to corn growing. The Campidano and other fertile spots, such as the so-called Ogliastra on the east side of the island, inland of Tortoli, the neighbourhood of Oliena, Bosa, etc., produce a considerable quantity of wine, the sweet, strong, white variety called Vernaccia, produced near Oristano, being especially noteworthy. The cultivation of olives is widespread in the districts of Sassari, Bosa, Iglesias, Alghero and the Gallura. Tobacco, vegetables, and other garden produce are much cultivated.

The following list gives the acreage under cultivation and the various products (in tons) for 1927:

Products	Acres	Tons
Wheat	453,250	151,600
Barley	108,250	33,600
Oats	29,500	10,680
Maize	11,500	3,300
Beans	70,500	14,640
Other vegetables	15,500	7,170
Garden produce	11,275	37,450
Potatoes	5,750	10,400
Tobacco	308	132
Hay	..	1,207,300
Grapes	75,200	78,900
Wine	..	10,824,000 (gallons)
Olives	25,125	27,150
Olive oil	..	902,000 (gallons)
Citrous fruits	1,800	14,600
Various fruits	..	12,920
Chestnuts	14,450	6,910

Live Stock.—A considerable portion of Sardinia, especially in the higher regions, is devoted to pasture. The native Sardinian cattle are small, but make good draught oxen. A considerable amount of cheese is manufactured, but largely by Italian capitalists. Sheep's milk cheese (*pecorino*) is largely made, but sold as the Roman product. Horses are bred to some extent, while the native race of donkeys is remarkably small in size. Pigs, sheep, and goats are also kept in considerable numbers. In 1908 there were 56,626 horses, 32,871 donkeys, 158,511 mules, 377,706 cattle, 158,022 pigs, 1,876,741 sheep and 506,566 goats.

Of wild animals may be noted the moufflon (*Ovis Ammon*), the stag, and the wild boar, and among birds various species of the vulture and eagle in the mountains, and the pelican and flamingo (the latter coming in August in large flocks from Africa) in the lagoons.

Fisheries.—The tunny fishery is considerable, and it is centred principally in the south-west. A special fishing harbour and market are to be built here. The sardine fishery at present serves mainly for local consumption. Lobsters are exported, especially to Paris. The coral fishery—mainly on the west coast—has lost its former importance. Neither the tunny nor the coral fishery is carried on by the Sardinians themselves, who are not sailors by nature; the former is in the hands of Genoese and the latter of Neapolitans. The unhealthy lagoons contain abundance of fish. The mountain streams often contain small but good trout.

Hydro-electric Power.—This is at present derived from two artificial lakes—that which collects the waters of the Tirso, in the centre of the island (capacity 450 million cubic metres, generating up to 25,000 h.p.) and that of Coghinas, in the north (capacity 342 million cu. metres, generating 24,000 horse power.

Minerals.—The mining industry in Sardinia is confined in the main to the south-western portion of the island. The mines were known to the Carthaginians, as discoveries of lamps, coins, etc. (now in the museum at Cagliari), testify. The Roman workings too, to judge from similar finds, seem to have been considerable. The centre of the mining district (*Metalla* of the itineraries) was probably about 5 m. south of Fluminimaggiore, in a locality known as Antas, where are the remains of a Roman temple dedicated to an emperor, probably Commodus. After the fall of the Roman empire the workings remained abandoned until the days of the Pisan supremacy, and were again given up under the Spanish government, especially after the discovery of America. When the island passed to Savoy in 1720 the mines passed to the state; but in the period up to 1840 only 14,620 tons of galena were extracted and 2,772 of lead. In 1840 the freedom of mining was introduced, the state giving perpetual concessions in return for 3% of the gross production.

The following tonnage of minerals was extracted in 1926:

Minerals	Tons
Iron	8,124
Manganiferous iron	500
Manganese	540
Copper	620
Lead	49,802
Zinc:	
Calamine	100,943
Blende	28,312
Antimony	2,613
Arsenic	200
Iron pyrites	257
Anthracite	10,598
Lignite	56,940

The most important minerals are lead and zinc, obtained in lodes in the forms of galena and calamine respectively. In most cases, owing to the mountainous character of the country, horizontal galleries are possible. The Monteponi company smelts its own zinc, but the lead is almost all smelted at the furnaces of Pertusola near Spezia. Lignite is mined at Bacu Abis, near Gonnesa, and anthracite near Seui.

The salt-pans at Cagliari and of Carloforte are of considerable importance; they are let by the Government to contractors, who have the sole right of manufacture, but are bound to sell the salt necessary for Sardinian consumption at a low rate; the Government does not exercise the salt monopoly in Sardinia any more than in Sicily, but in the latter island the right of manufacture is unrestricted. The salt-pans of Cagliari produce 300,000 tons of salt annually, potash (for manure), magnesium sulphate and other kindred salts.

Communications.—The railway system of Sardinia is in the hands partly of the State and partly of two private companies. The State lines of the ordinary gauge run from Cagliari, past Macomer, to Chilivani (with a branch at Decimomannu for Iglesias). From Chilivani the line to Sassari and Porto Torres diverges to the north-west and that to Golfo degli Aranci to the north-east. The Terranova and narrow-gauge lines run from Cagliari to Mandas (whence lines diverge north to Sorgono and east to Tortoli, the former having a branch south-south-west to Villamar, and thence to Ales or Sanluri, on the main line from Cagliari to Macomer and the latter a short branch from Gairo to Ierzu), from Macomer east to Nuoro and west to Bosa, from Sassari south-west to Alghero, from Chilivani south to Tirso (on the line between Macomer and Nuoro), and from Monti (on the line from Chilivani to Golfo degli Aranci) north-west to Tempio. From Iglesias there is a line to Palmas-Suergiu with branches to Siliqua and Calasetta. There is a steam tramway from Cagliari to Quartu S. Elena. The trains are few and the speed on all these lines is moderate, but the gradients are often very heavy. The main road system, which dates from 1828, previous to which there were only tracks, is good, and the roads well engineered; many of them are traversed by road motor services. There is a daily steam communication with Civitavecchia from Terranova (the mail route), and weekly steamers run from Cagliari to Naples, Genoa (via the east coast of the island), Palermo and Tunis, and from Porto Torres to Genoa (calling at Bastia in Corsica and Leghorn) and Leghorn direct. A fortnightly line also runs along the west coast of the island from Cagliari to Porto Torres. There is also a weekly French service between Porto Torres and Ajaccio in Corsica. There is an air service twice a week between Rome and Cagliari via Terranova and twice direct.

The archiepiscopal sees of the island are: Cagliari (under which are the suffragan sees of Galtelli-Nuoro, Iglesias and Ogliastra), Oristano (with the suffragan see of Ales and Terralba) and Sassari (under which are the suffragan sees of Alghero, Ampurias and Tempio, Bisarchio and Bosa).

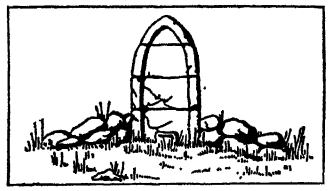
Education.—In 1925–26, 56% of the males and 46% of the females (or 51% of the total population over 6 years) were able to read. The percentage of the total population for the whole of Italy is 72. The university of Cagliari had 411 students in 1925–26 and that of Sassari 203. The mining school of Iglesias had 22 students. (T. A.)

HISTORY

Archaeology.—No trace of palaeolithic man is recorded in Sardinia, and the earliest evidence of human occupation dates from the time when metal was first coming into use in the Western Mediterranean. There are, it is true, a few coastal stations in the south of the island that have yielded purely lithic industries, but in the greater number of the simple cave-dwellings wherein the earliest civilization is to be recognized, there are abundant copper implements together with the usual stone and obsidian tools. Indeed, it was probably the natural richness of the island in copper and lead that was responsible for the first settlements therein. This first civilization is, in a sense, the only prehistoric civilization of the island, for it continued without any remarkable alteration not only until the advent of the Greeks and the Carthaginians, but even until the coming of the Romans. In character it betrays a somewhat different aspect from the contemporary culture of its nearest neighbour, for whereas the affinities in Corsica pointed to a Ligurian source, here the ties are closer with central Italy and Sicily, and also, it has been argued, with North Africa.

The first habitations were perhaps cave-dwellings, but it was not long before stone-built huts were erected. Many villages of such huts are known, one of the best examples being that at Gonessa in the south-west of the island. The little houses themselves were mostly round, and about 20ft. in diameter; inside they were furnished with benches, stalls for animals, and an altar near the entrance. In a strategic position near the huts were dwellings of grander character, perhaps the residences of chieftains, but fortified so that they might serve as watch-tower, refuge and defence for the whole village in times of danger. These are the *nuraghi,* double-storeyed towers in the shape of a truncated cone and built of large stones laid in regular horizontal courses, sometimes with the aid of a clay mortar. They are generally about 25 to 35ft. in diameter and about 40ft. in height, and in their usual form they contain an upper and lower chamber with tall and pointed corbelled roofs connected by a winding staircase; but sometimes they have several communicating chambers built bastion-wise against the tower on the ground level; or, again, the nuraghi proper may form part of a completely fortified enclosure that is protected by an additional tower. The nuraghi are sometimes furnished with embrasures or loop-holes, as at Losa, Giara and Santa Vittoria, and there is no doubt that they were primarily forts, all the constructional details being arranged with a view to tactical advantage in defence. The nuraghi, however, were not exclusively used in times of war, for many show abundant evidence of ordinary domestic occupation, and of use as bronze foundries; *e.g.,* Ortu Commidu near Sardara. The intimate connection between village-life and the nuraghi is best illustrated on the plateau Giara di Gesturi, for this has no less than seventeen nuraghi set round its edge to defend the big cluster of huts on the top of the plateau. Here there is evidence of occupation extending from the copper age until the Roman period.

Though the earliest settlers lived in caves, and it is in caves that their burials are found, the tombs of the nuraghi-civilization are artificially constructed, and of three different kinds. The best-known are the *Domus de Gianas* (witches' houses), complicated artificial grottoes of which there are famous examples at Anghelu Ruju and S. Andrea Priu. In plan they show a nest of burial-cells communicating by means of narrow passages with an antechamber. This last was seemingly used for devotional and religious purposes, for it is sometimes painted red and decorated with carvings; while inside are pillars, also carved with cult-symbols, and stone troughs and hearths. The dead were buried in the cells in a crouched position and accompanied by rich grave-goods including stone axes, mace-heads, arrowheads, copper daggers, axes and awls, personal ornaments and amulets of many varieties, and pottery that included (at Anghelu Ruju) bell-beakers, a supposed link with the Spanish beaker-culture. The second and contemporary type of grave is a polygonal or rectangular megalithic structure, at first little better than a stone-lined pit, but passing into regular cist-forms. These rectangular chambers, however, are not numerous, and much more common is the third type, an obvious derivative of the cist, known as *Tombe dei Giganti* (giants' graves). In these a rectangular chamber with a corbelled roof is encased in a stone-edged mound with crescentic horns, and in the centre of this curved façade, and at the head of the chamber, is a gabled and panelled portal slab with a small hole at its foot, or, alternatively, a door of two uprights and a lintel. The chambers vary from 24ft. in length to as much as 50ft., and doubtless served as graves for whole families, or even whole villages. In addition to these villages and graves, it remains to note the existence of a number of menhirs.



FROM TINDALE, "THE ISLAND OF SARDINIA" (MACMILLAN)

"GIANTS' GRAVE" SHOWING FAÇADE WITH GABLED SLAB; SARDINIA

There was no Greek colonization in the formal sense although Greek historians have recorded that such colonization was projected (Herodotus, I., 170) and was achieved (Pausanias, X., 17, 5). Nevertheless, Olbia and Neapolis, as their names imply, were doubtless founded by Greeks, and there must have been more than one short-lived Greek settlement in the island. But the first serious interruption of the nuraghi-civilization was an occupation by Carthage about 500 to 480 B.C. that resulted in the exploitation of Sardinia as an important grain-growing land, and in the foundation of such towns as Cornus, Tharro and Sulci. The island remained a Carthaginian colony until 238 B.C. when it was ceded to Rome, and a struggle began between the natives and their new masters. Roman conquest was, however, inevitable, and in a short while the island was organized as a province that ultimately became one of the main corn-supplies for Rome.

BIBLIOGRAPHY.—For the prehistoric antiquities in general *see* T. E. Peet, *The Stone and Bronze Ages in Italy*, Oxford, 1909, pp. 143 ff. and pp. 225 ff., also Von Duhn in Evert's *Reallexikon, s.v. Italien B, Domus de Gianas, Nuraghe, etc.* For the nuraghi *see* A. Taramelli in *Bolletino di Palentologia Italiana*, S.5 I (1916), 123, and other papers of this author, most of which are cited by Von Duhn in *Italische Gräberkunde*, Heidelberg, 1924, pp. 94 ff. For the megaliths *see* Duncan Mackenzie, *Papers of the British School in Rome*, V. (1910), p. 89, VI. (1913), p. 127. (T. D. K.)

Roman Period.—In 238 B.C. the Carthaginian mercenaries revolted, and the Romans took advantage of the fact to demand the surrender of the island. The native tribes opposed the Romans, but were conquered after several campaigns; the island became a province under the government of a *praetor* or *propraetor*, to whose jurisdiction Corsica was added soon afterwards. A rebellion in 215 B.C., fostered by the Carthaginians, was quelled by T. Manlius Torquatus (Livy xxiii. 40). After this the island began to furnish considerable supplies of corn; it was treated as a conquered country, not containing a single free city, and the inhabitants were obliged to pay a tithe in corn and a further money contribution. It was classed with Sicily and Africa as one of the main sources of the corn-supply of Rome. There were salt-works as early as about 150 B.C., as is attested by an inscription assigned to this date in Latin, Greek and Punic. There were two insurrections of the mountain tribes, in 181 and in 114 B.C., but even in the time of Strabo there was considerable brigandage.

In the division of provinces made by Augustus, Sardinia and Corsica fell to the share of the senate, but in A.D. 6, Augustus, owing to the frequent disturbances, took them over and placed them under a *praefectus*. In A.D. 67 Nero restored Sardinia to the senate (but not Corsica) in exchange for Achaea, and the former was then governed by a *legatus pro praetore;* but Vespasian took it over again before A.D. 78, and placed it under an imperial *procurator* as *praefectus*. It returned to the senate, not before A.D. 83 but certainly before the reign of M. Aurelius, when we find it governed by a proconsul, as it was under Commodus; the latter, or perhaps Septimius Severus, took it over again and placed it under a *procurator* as *praefectus* once more (D. Vaglieri in *Notizie degli scavi*, 1897, 280). A bronze tablet discovered in 1866 near the village of Esterzili is inscribed with a decree of the time of Otho with regard to the boundaries of three tribes, the Gallienses, Patulienses and Campani, who inhabited the eastern portion of the island. Carales was the only city with Roman civic rights in Sardinia in Pliny's time (when it received the privilege is unknown). A Roman colony had been founded at Turris Libisonis (Porto Torres) and others, later on, at Usellis and Cornus. We hear little of the island under the empire, except as a granary and as remarkable for its unhealthiness and the audacity of its brigands. It was not infrequently used as a place of exile.

Byzantine Period.—After the time of Constantine, the administration of Sardinia was separated from that of Corsica, each island being governed by a *praeses* dependent on the *vicarius urbis Romae*. In 456 it was seized by Genseric. It was retaken for a short time by Marcellianus, but was not finally recovered until the fall of the Vandal kingdom in Africa in 534, by Cyril. In 551 it was taken by Totila, but reconquered after his death by Narses for the Byzantine Empire. Under Byzantium it remained nominally until the 10th century, when we find the chief magistrate still bearing the title of ἄρχων.

Saracens.—In the 8th century (720) the period of Saracen invasion began; but the Saracens never secured a firm footing in the island. In 725 Liutprand purchased and removed to Pavia the body of St. Augustine of Hippo from Cagliari, whither it had been brought in the 6th century by the exiled bishop of Hippo. In 815 Sardinia submitted to Louis the Pious, begging for his protection; but the Saracens were not entirely driven out, and about A.D. 1000 the Saracen chief Musat established himself in Cagliari. Pope John XVIII. preached a crusade in 1004, promising to bestow the island (when or whether it had ever definitely passed into the power of the papacy is not absolutely clear) upon who ever should drive out the Saracens. The Pisans took up the challenge, and Musat was driven out of Cagliari with the help of the Genoese in 1022 for the third time. The Pisans and Genoese now disputed about the ownership of Sardinia, but the pope and the emperor decided in favour of Pisa. Musat returned to the island once more and made himself master of it, but was defeated and taken prisoner under the walls of Cagliari in 1050, when the dominion of Pisa was established.

Pisan Period.—The island had (probably since the end of the 9th century) been divided into four districts—Cagliari, Arborea, Torres (or Logudoro) and Gallura—each under a *giudice* or judge, in whom the dignity became hereditary. *Judices* are already mentioned as existing in the account of the mission sent by Nicholas I. in 864, as though the single authority of the Byzantine ἄρχων was already weakened. The three ἄρχοντες who appear in 10th-century inscriptions bear alternately the names Torcotorius and Salusius; and, inasmuch as this is the case with the *judices* of Cagliari from the 11th to the 13th century, there seems no doubt that they were the successors of these Byzantine ἄρχοντες, who were perhaps the actual founders of the dynasty. These names, indeed, continue even after the Pisan family of Lacon-Massa had by marriage succeeded to the judicature. The Greek language occurs in their official seals down to the 13th century. Intermarriage (sometimes illicit) was apparently freely used by the dominant

families for the concentration of their power. Thus we find that after the failure of Musat members of the family of Lacon-Unali filled all the four judicatures of the island. In the continual struggles between Pisa and Genoa some of these princes took the side of the latter. In 1164 Barisone, *giudice* of Arborea, was given the title of king of the whole island by Frederick Barbarossa, but his supremacy was never effective. In 1241 Adelasia, heiress of Gallura and Logudoro, was married as her third husband to Enzio, the natural son of Frederick II., who received the title of king of Sardinia from his father, but fell into the hands of the Bolognese in 1249, and remained a prisoner at Bologna until his death. After this the Pisan supremacy of the island seems to have become more of a reality, but Arborea remained independent, and after the defeat of the Pisans by the Genoese at the naval battle of Meloria in 1284 they were obliged to surrender Sassari and Logudoro to Genoa. In 1297 Boniface VIII. invested James II., the king of Aragon, with Sardinia; but it was not until 1323 that he attempted its conquest, nor until 1326 that the Pisans were finally driven out of Cagliari, which they had fortified in 1305–1307 by the construction of the Torre di S. Pancrazio and the Torre dell' Elefante, and which became the seat of the Aragonese government. To the Pisan period belong a number of fine Romanesque churches, among which may be specially mentioned those of Ardara, S. Giusta near Oristano, La Trinità di Saccargia and Tratalias.

Aragonese Period.—The Aragonese enjoyed at first the assistance of the *giudici* of Arborea, who had remained in power; but in 1352 war broke out between Mariano IV. and the Aragonese, and was carried on by his daughter Eleonora, wife of Brancaleone Doria of Genoa, until her death in 1403. Peter IV. had meanwhile in 1355 called together the *cortes* (parliament) of the three estates (the nobles, the clergy and the representatives of the towns) for the first time after the model of Aragon. After 1403 the Aragonese became masters of Arborea also. The title of *giudice* was abolished and a feudal marquisate substituted. The code of laws issued by Eleonora was in 1421 extended to the whole island by the *cortes* under the presidency of Alphonso V., who visited Sardinia in that year. In 1478 the marquisate of Oristano was suppressed, and henceforth the island was governed by Spanish viceroys with the feudal régime of the great nobles under them, the *cortes* being convoked once every ten years. Many of the churches show characteristic Spanish Late Gothic architecture which survived until a comparatively recent period. The Renaissance had little or no influence on Sardinian architecture and culture.

Modern History.—The island remained a Spanish province until the War of the Spanish Succession, when in 1708 Cagliari capitulated to an English fleet, and the island became Austrian; the *status quo* was confirmed by the peace of Utrecht in 1713. In 1717, however, Cardinal Alberoni retook Cagliari for Spain; but this state of things was short-lived, for in 1720, by the Treaty of London, Sardinia passed in exchange for Sicily to the dukes of Savoy, to whom it brought the royal title. The population was at that time a little over 300,000; public security and education were alike lacking, and there were considerable animosities between different parts of the island. Matters improved considerably under Charles Emmanuel III., in whose reign of 43 years (1730–73) the prosperity of the island was much increased. The French attacks of 1792–93 were repelled by the inhabitants, Cagliari being unsuccessfully bombarded by the French fleet. But the refusal by Victor Amadeus III. to grant the Sardinians privileges promised in consideration of their bravery led to the revolution of 1794–96. In 1799 Charles Emmanuel IV. of Savoy took refuge in Cagliari after his expulsion by the French, but soon returned to Italy. In 1802 he abdicated in favour of his brother Victor Emmanuel I., who in 1806 returned to Cagliari and remained there until 1814, when he retired, leaving his brother, Carlo Felice, as viceroy. Carlo was successful in repressing brigands, but had to deal with much distress from famine. In 1821 he became king of Savoy by the abdication of his brother, and the construction of the highroad from Cagliari to Porto Torres was begun (not without opposition on the part of the inhabitants) in 1822. Feudalism was abolished in 1836, and in 1848 complete political union with Piedmont was granted, the viceregal government being suppressed, and the island being divided into three divisions of which Cagliari, Sassari and Nuoro were the capitals. The later history of Sardinia is bound up with that of Piedmont and Italy. Victor Emmanuel II. (*q.v.*), king of Sardinia, became the king of a united Italy in 1861.

BIBLIOGRAPHY.—G. Manno, *Storia della Sardegna* (1825); A. de La Marmora, *Voyage en Sardaigne* (Paris and Turin, 1826–57); Valery, *Viaggi alle isole di Corsica e di Sardegna* (Milan, 1842) Tyndal, *The Island of Sardinia* (1849); G. Spano, *Bollettino archeologico Sardo* (1855–64) and other works; A. Bresciani, *Dei costumi dell' isola di Sardegna* (Naples, 1861); Pais, "La Sardegna avanti al dominio dei Romani" in *Memorie dei Lincei* (1881); R. Tennant, *Sardinia and its Resources* (1885); G. Strafforello, *Sardegna* (Turin, 1895); F. Pais-Serra, *Relazione del l' inchiesta sulle condizioni economiche della Sardegna* (1896); D. Scano, *Storia dell' arte in Sardegna dal XI. al XIV. secolo* (Cagliari and Sassari, 1907); D. Mackenzie, *Ausonia*, iii. (1908), 18, and *Memnon*, ii. (Leipzig, 1909); and "Dolmens, Tombs of the Giants and Nuraghi of Sardinia," in *Papers of the British School at Rome*, v. 89 (1910). *See* also *Cambridge Ancient History* vol. 2.

(T. A.)

SARDIS, more correctly SARDES (*αἱΣάρδεις*), the capital of the ancient kingdom of Lydia, the seat of a *conventus* under the Roman Empire, and the metropolis of the province Lydia in later Roman and Byzantine times, was situated in the middle Hermus valley, at the foot of Mt. Tmolus, a steep and lofty spur of which formed the citadel. It was about 2½ m. S. of the Hermus. The earliest reference to Sardis is in Alcman (Bergk, *Fr.* 24, *c.* 650 B.C.); in the *Iliad* the name Hydē seems to be given to the city of the Maeonian (*i.e.*, Lydian) chiefs, and in later times, Hydē was said to be the older name of Sardis, or the name of its citadel. It is, however, more probable that Sardis was not the original capital of the Maeonians, but that it became so amid the changes which produced the powerful Lydian empire of the 8th century B.C. The city was captured by the Cimmerians in the 7th century, by the Persians and by the Athenians in the 6th, and by Antiochus the Great at the end of the 3rd century. Once at least, under the emperor Tiberius, in A.D. 17, it was destroyed by an earthquake; but it was always rebuilt, and was one of the great cities of Asia Minor till the later Byzantine period. As one of the Seven Churches of Asia, it was addressed by the author of the Apocalypse in terms which seem to imply that its population was notoriously soft and faint-hearted. Its importance was due, first to its military strength, secondly to its situation on an important highway leading from the interior to the Aegean coast, and thirdly to its commanding the wide and fertile plain of the Hermus.

The early Lydian kingdom was far advanced in the industrial arts (*see* LYDIA), and Sardis was the chief seat of its manufactures. The most important of these trades was the manufacture and dyeing of delicate woollen stuffs and carpets.

In the Hellenistic and Roman periods Sardis was eclipsed by Pergamum (the Attalid capital), by Ephesus (the capital of the province of Asia) and probably also by Smyrna. After Constantinople became the capital of the East a new road system grew up connecting the provinces with the capital. Sardis then lay rather apart from the great lines of communication and lost some of its importance. It still, however, retained its titular supremacy and continued to be the seat of the metropolitan bishop of the province of Lydia, formed in A.D. 295. It is enumerated as third, after Ephesus and Smyrna, in the list of cities of the Thracesian *thema* given by Constantine Porphyrogenitus in the 10th century; but in the actual history of the next four centuries it plays a part very inferior to Magnesia ad Sipylum and Philadelphia (*see* ALA-SHEHR), which have retained their pre-eminence in the district. The Hermus valley began to suffer from the inroads of the Seljuk Turks about the end of the 11th century; but the successes of the Greek general Philocales in 1118 relieved the district for the time, and the ability of the Comneni, together with the gradual decay of the Seljuk power, retained it in the Byzantine dominions. The country round Sardis was frequently ravaged both by Christians and by Turks during the 13th century. Soon after 1301 the Seljuk amirs overran the whole of the Hermus and Cayster valleys, and a fort on the citadel of Sardis

was handed over to them by treaty in 1306. Finally in 1390 Philadelphia, which had for some time been an independent Christian city, surrendered to Sultan Bayezid's mixed army of Ottoman Turks and Byzantine Christians, and the Seljuk power in the Hermus valley was merged in the Ottoman empire. The latest reference to the city of Sardis relates its capture (and probable destruction) by Timur in 1402. Its site is now practically deserted.

The ruins of Sardis, so far as they are now visible, are chiefly of the Roman time; but though few ancient sites offered better hope of results, the necessity for heavy initial expenditure was a deterrent (*e.g.*, to H. Schliemann). On the banks of the Pactolus two columns of a great Ionic temple, now known to be that of Cybele-Artemis were still standing. More than one attempt to excavate this temple, the last by G. Dennis in 1882, was made and prematurely brought to an end by lack of funds. In 1910–1914 and also in 1922, the temple site and part of the necropolis were studied by H. C. Butler and others, of the American Society for the Excavation of Sardis.

See reports in *Am. Journal of Archaeology*, 1911–27, and the volumes of *Sardis*, especially I. and II. (H. C. Butler) on the history of the excavations down to 1914, and VI. pts. 1–2 (E. Littmann-W. H. Buckler) on the Lydian inscriptions; results and bibliography in Pauly-Wissowa *R. Enc.* XIII. 2123 f. (Bürchner-Deeters-J. Keil); for the city's history in early Christian times, W. M. Ramsay, *Letters to the Seven Churches* (1904), V. Schultze, *Altchristliche Städte* II. 2,145 f. (1926).

SARDOU, VICTORIEN (1831–1908), French dramatist, was born in Paris on Sept. 5, 1831. The Sardous were settled at Le Cannet, a village near Cannes, where they owned an estate, planted with olive trees. A night's frost killed all the trees and the family was ruined. Victorien's father, Antoine Léandre Sardou, came to Paris, and earned his living in a succession of employments. Victorien had to make his way as best he could. A play of his, *La Taverne des étudiants*, produced at the Odéon on April 1, 1854, was withdrawn after five nights. Many disappointments followed; some plays were rejected, others were accepted and not performed.

Sardou was now in actual want, and his misfortunes culminated in an attack of typhoid fever. He was dying in his garret, surrounded with his rejected manuscripts. A lady named Mlle. de Brécourt nursed him back to health, and introduced him to Mlle. Déjazet. Then fortune began to smile on the author. It is true that *Candide*, the first play he wrote for Mlle. Déjazet, was stopped by the censor, but *Les Premières Armes de Figaro*, *Monsieur Garat*, and *Les Prés Saint Gervais*, produced almost in succession, had a splendid run, and *Les Pattes de mouche* (1860: afterwards anglicized as *A Scrap of Paper*) obtained a similar success at the Gymnase. *Fédora* (1882) was written expressly for Sarah Bernhardt, as were many of his later plays. He soon ranked with Augier and Dumas. He ridiculed the vulgar and selfish middle-class person in *Nos Intimes* (1861: anglicized as *Peril*), the gay old bachelors in *Les Vieux Garçons* (1865), the modern Tartufes in *Séraphine* (1868), the rural element in *Nos Bons Villageois* (1866), old-fashioned customs and antiquated political beliefs in *Les Ganaches* (1862), the revolutionary spirit and those who thrive on it in *Rabagas* (1872) and *Le Roi Carotte* (1872), and the then threatened divorce laws in *Divorçons* (1880).

He struck a new vein by introducing a strong historic element in some of his dramatic romances. Thus he borrowed *Théodora* (1884) from Byzantine annals, *La Haine* (1874) from Italian chronicles, *La Duchesse d' Athènes* from the forgotten records of mediaeval Greece. *Patrie* (1869) is founded on the rising of the Dutch *gueux* at the end of the 16th century. The scene of *La Sorcière* (1904) was laid in Spain in the 16th century. The French Revolution furnished him with three plays, *Les Merveilleuses*, *Thermidor* (1891) and *Robespierre* (1902). The last named was written expressly for Sir Henry Irving, and produced at the Lyceum theatre, as was *Dante* (1903). The imperial epoch was revived in *La Tosca* (1887) and *Madame Sans Gêne* (1893). Later plays were *La Piste* (1905) and *Le Drame des poisons* (1907).

Sardou married his benefactress, Mlle. de Brécourt, but eight years later he became a widower, and soon after the revolution of 1870 was married again, to Mlle. Soulié. He was elected to the French Academy in 1878. He died at Paris on Nov. 8, 1908.

See L. Lacour, *Trois théâtres* (1880); Brander Matthews, *French Dramatists* (New York, 1881); R. Doumic, *Écrivains d'aujourd'hui* (Paris, 1895); F. Sarcey, *Quarante ans de théâtre* (vol. vi., 1901).

SARGASSO SEA, a tract of the North Atlantic ocean covered with floating seaweed (*Sargassum*, originally named *sargaço* by the Portuguese). This tract is bounded approximately by 25° and 31° N. and by 40° and 70° W., but its extent and density are influenced by winds and ocean currents. The weed, known as Gulf Weed (*Sargassum Bacciferum*), belongs to the brown algae (*q.v.*), and is easily recognized by small berry-like bladders. The floating masses are believed to be replenished by additional supplies torn from the coasts to the south-west and carried by currents to the great whirl of the Sargasso sea. The weed supports a considerable amount of somewhat low forms of animal life of a type always more characteristic of the littoral zone than of the open ocean. The Sargasso sea was first reported by Columbus, who on his initial "West Indies" voyage was involved in it for several days. The widely credited story of ships becoming embedded in the weed beyond possibility of escape was disproved by the "Michael Sars" expedition (1910).

SARGENT, JOHN SINGER (1856–1925), Anglo-American painter. For 40 years before his death John Singer Sargent was too towering a personality for his contemporaries to judge either him or his work in true perspective. A tall commanding presence, with a small head well set on broad shoulders, with large, somewhat prominent grey eyes, kindly in expression though nothing escaped them, with a close-cut beard at a time when nine men out of 10 were clean-shaven, he made an instant impression upon those who came into contact with him. During the last years of his life, with his great size, his dark hair and beard turned silver-white, his florid complexion, and an air about him of singular freshness and calm, he had a look as of some serene and beneficent Jove.

That he was a great artist is universally acknowledged, but that he was a great man his life attested—in its austerity, its generous highmindedness, its breadth of vision, and above all in its independence of praise, fame or wealth.

Essentially a cosmopolitan, he was of American descent. His father, Dr. Fitzwilliam Sargent, was born in Gloucester, Massachusetts, where his ancestors, emigrating from Gloucester, England, settled before 1650. For his medical training Fitzwilliam Sargent went to Philadelphia, and married Miss Mary Newbold Singer, a member of an old Philadelphia family. In 1854 the young couple went for change of air and scene to Europe, with no premonition that this journey would result in their permanent establishment abroad. Two years later, on Jan. 12, 1856, in Florence, at the Casa Arretini, on the Lungarno Guicciardini, their son, John Singer Sargent, was born. He showed his special aptitudes from his earliest childhood, which was spent at Nice, in Rome, in Dresden, with periodical returns to Florence. Whenever possible he took drawing lessons of a desultory kind, interrupted by the exigencies of schooling and a life of constant travel. His mother, who all her life loved to sketch in water-colours, recognised and encouraged his unusual gifts.

His own awakening to the enchantment of being able to express his delight in the visual world came to him, he once mentioned, at Mürren, in the summers of 1868 to 1870. His early drawings were carefully painstaking efforts to show every variation in rock forms, or in the verdure that sprang from their crevices. In 1873 he won a prize for drawing at the Accademia in Florence.

In 1876 he paid the first of many visits to America, but before the short interruption of this trip he had begun his artistic education in earnest, having entered the studio of Carolus Duran, in Paris, in 1874, at the age of eighteen.

A fellow student described him as a tall, slenderly built, rather silent youth, with a friendly, somewhat shy manner, who could, on occasions, in spite of his diffidence, express himself with startling decision. His industry was no less remarkable than his youthful strength which was not unduly taxed by the strain of

attending the classes not only at Duran's studio, but the Beaux Arts and evening life classes as well.

Contrary to many published recollections, Sargent himself declared, perhaps with characteristic modesty, that he was by no means a brilliant pupil, and that he only acquired his amazing technical skill by continued concentrated effort. What he did recognise, with instant appreciation and lifelong acknowledgment, was the scientific precision of the method taught by Carolus Duran, who had based his theories on a close study of Franz Hals and Velasquez. John Sargent, not without struggle, made this technique his own, and it gave him, at the start, the assured mastery of his materials.

His first picture, exhibited in the Salon of 1878, won an honourable mention. It was called "En route pour la Pêche," and is now in the Corcoran Gallery at Washington. In the next year's Salon he showed the portrait of his master, which he had painted in 1877, at the age of 21, and which was instantly acclaimed as of extraordinary promise. Shortly after, emancipated from schools, he made a pilgrimage to Spain, which he had already visited as a boy, and the studies done in the Prado Gallery, which, after his death, were sold at Christie's at such phenomenal prices, were painted on this occasion.

Immediately after his return to Paris he painted the beautiful canvases "El Jaleo" (Salon 1882), now at Fenway Court, Boston, and "The Children of E. D. Boit" (Salon 1883), now in the Boston Fine Arts Museum. Of "The Lady of the Rose" (Miss Burkhardt), which was shown in 1881 and gained a second class medal, Henry James wrote that it was the work of "a talent which on the very threshold of its career has nothing more to learn." This was a phrase, for to the end of his days Sargent remained the student, making even briefer the span between brain and hand, between conception and achievement; yet these early canvases are remarkably mature, with a beauty of surface texture he rarely excelled, and with the atmospheric "quality" he had learned from Velasquez. He had the special readiness of genius to absorb great traditions, to take valuable hints from every source, and incorporate them into his own work with the freshness and vigour of a deeply original mind.

From the outset commissions came to him unsought. He had to knock at no doors; but it was not till the Salon of 1884, when he showed the portrait of Madame Gautreau (Metropolitan Museum of New York), that the painter awoke to find himself famous—or infamous. Madame Gautreau was the friend of Gambetta, acclaimed by the Republican party, and Sargent was accused of having purposely done a caricature. The journalists outdid each other in senseless abuse.

This experience, with its astounding unreason, probably laid the foundation for his almost incredible independence of critical comment. Irritated by adulation, detesting every form of publicity, he could never be induced, unless it was forced upon him, to read any criticism of his own work, appreciative or the reverse.

So furious and so prolonged was the outcry in the French Press that finally, in a fit of disgust, Sargent left Paris and moved to London. His first studio was in Kensington, but in 1885 he had already settled at 33 Tite Street, Chelsea. In 1901 he bought the adjacent house (No. 31), and a door was cut through between the two studios. Here he lived and worked till his death on April 15, 1925.

Into these 40 years of his London domicile was crowded the experience of a dozen ordinary lifetimes. His first exhibited study of childhood: "Carnation, Lily, Lily, Rose," was bought in 1887, by the Chantrey bequest, for the Tate Gallery. A few years later the Luxembourg acquired the picture of the Spanish dancer "Carmencita," painted 1890, shown at the Royal Academy 1891. In spite of adverse criticism, it was not long before he was in great demand as a portrait painter, and the unflagging zeal of his industry kept pace with every triumph of public recognition. He numbered among his sitters princes and princesses, musicians, actors, teachers, writers, statesmen and diplomats. Many of his distinguished models he painted in their habit as they lived. The great groups of "The Duke of Marlborough and his Family" (1905), the "Ladies Acheson," (1902), the "Daughters of the Hon. Percy Wyndham" (1900), the "Misses Hunter" (1902), etc., and a noble series of single portraits, notably those of the Duke and Duchess of Connaught (1908), the Duke (1901) and Duchess of Portland (1902), Lord Russell of Killowen (1900); of Francis Penrose, Esq. (1898), and of innumerable beautiful women: The Duchess of Sutherland (1904), the Countess of Warwick (1904), Lady Agnew (1893), Lady (Ian) Hamilton (1896), Mrs. Hammersley (1893), increased his every-growing prestige.

In 1894 he was elected an associate, in 1897 to full membership of the Royal Academy, and at the exhibitions at Burlington House his portraits were the centre of interest and of controversy. It became a high distinction to be painted by him, and hundreds clamoured for the honour in vain. Universities offered him degrees, he had as many medals as a war veteran. Quite unmoved by all this acclamation, he retained the serene simplicity of manner that made him so exceptional and so distinguished a figure.

In the sense of being generally understood John Sargent was never a popular painter. Painting is the most outspoken of the arts, but its language is not easy to read. Its apparent simplicity and the directness of its appeal to the eyes are misleading, and in the case of pictures so incisive and brilliant, so uncompromising in their truth, so unerring and authoritative in their presentation of character, it was no wonder that they awakened as much resentment as admiration. There are mysteries of light, as well as of darkness, and the secrets of this accomplishment were no less inscrutable, became actually more tantalising, because the method of expression was so frank, and looked so amazingly easy to imitate. And he was imitated, inevitably, but in no single instance with any distinction. Referred to as a psychologist or a satirist, he was frequently accused of deliberately accentuating the less pleasing qualities in his sitters—a foolish legend he dismissed with a shrug of his shoulders. "I chronicle," he once said, "I do not judge." Though his outlook on life was essentially indulgent, his sense of humour was irrepressible, and the unerring rectitude of his realism struck at a deep-rooted human weakness—a preference to be seen not as we are but as we should like to be.

In that its conclusions are so little deliberate painting differs from literature. John Sargent did not sum up his characters, he painted what he saw; but he caught, subconsciously perhaps, each fugitive betrayal of a passing thought, a restless movement, a smile or a glance. This subtle power of definition has been, in all ages, the peculiar gift of great portrait painters.

In recalling the astonishing variety and scope of his work, it may be assumed that he was almost indifferent to the form in which he was called upon to portray the modern spirit. His only prayer must have been that that spirit should not be utterly commonplace. For dullness he had no talent, even his magic touch failed to enliven it. Before the strange, the unexpected, the bizarre, his resource and his freshness were unfailing. No happy invention was permitted to degenerate into a formula. He never repeated himself. For the extremes of youth and of age he had undeniable tenderness; with incredible delicacy he portrayed the flower-like freshness of one, and if he did not disguise in the other the hint of decrepitude it was generally illumined by more than a suggestion of wisdom and dignity.

At the very height of his fame, in 1910, he decided to give up the painting of portraits. He had grown tired of the tyranny of sitters, and had begun to lose interest in his work. This decision, so typical of his artistic integrity, he lived up to. Only in exceptional instances was he afterwards induced to break his rule, and then never for considerations of money. Though he lived on a generous scale, he was never a wealthy man. Always ready to give a helping hand to a student, or to a brother artist, he was at once too busy and too impatient of all forms of implied superiority ever to want to teach. Deliberately then, perhaps, he set his face against the scattering of his energies over too wide a field. An omnivorous reader and a passionate musician, an excellent host and a most entertaining guest, his rare leisure was all too adequately filled.

In a holiday spirit he began to play with water-colour (in which medium he had made his earliest efforts at painting) and the result of his first summer of freedom may be seen in the sparkling

brilliance, the irresistible gaiety of the 80 sketches bought *en bloc* by the Brooklyn Fine Arts Museum. His disciplined hand had acquired an almost miraculous lightness and certainty of touch.

But a heavier task had already for years been engaging his energies, and the last 20 years of his life were given more and more to the magnificent series of decorations which illustrate the range of his great gifts. It was said of his "History of Religion," begun in 1890 and not completed till 1916 (the subject for the great Hall in the Boston Public Library known as Sargent Hall), that his work here was not only a monument to the picturesque possibilities of his colossal subject, but to the sheer erudition of the painter. This task took him on several journeys to Egypt, Palestine, etc., as well as for a few months almost every year to America, where he had a studio in Boston, in the Columbus Avenue Building; and he had also another studio in London, for these huge decorations, at The Avenue Studios, 75 Fulham Road.

In 1914, at the outset of the War, he was on holiday in Austria, and he witnessed with horror the disintegration of the Europe he had known. He gave without stint; and when the opportunity offered went to the front to record his impressions at first hand. In his famous war picture "Gassed" (London War Museum) he testified to his deep admiration for the invincible pluck of the British soldier. In the background, through the waning light of the late afternoon, we see the ground carpeted by writhing figures; while a tragic procession of wounded men, blinded by gas, staggers towards the dressing station.

The quieter life in London suited Sargent's temperament better than the more lavish social exactions of Boston. In London finally he was to know an honour no living painter had hitherto experienced. The magnificent series of portraits, bequeathed to the nation by Asher Wertheimer, were hung in the National Gallery. A wing in the Tate Gallery, the gift of Sir Joseph Duveen, now houses these, and such other works by Sargent as are already in national possession—the portraits of Lord Ribblesdale (1902), of Coventry Patmore (1895), of Henry James (1914), Octavia Hill (1899), of Ellen Terry as Lady Macbeth (1899), and many others. Sargent is represented in the principal galleries of the world, but the Metropolitan in New York, and the Boston Fine Arts Museum, are particularly rich in fine examples. The decorations for the Boston Library, for the Boston Fine Arts Museum, for the Harvard Memorial Chapel, absorbed him till, fortunate to the end, death overtook him in his sleep, in his 70th year, with no evident diminution of his forces, no weakening of his physical or mental energy.

In looking back over his immense achievement, his extraordinary vitality strikes one first. His slightest sketch pulsates with life. The beautiful suavity of his style, acquired through the iron discipline of years, never sacrificed its spontaneity. He shirked no labour, and knew no greater joy in life than this concentration on work provided him. He would paint a head twenty times over in order to establish an appearance of fluency and ease. His insight into character went far beyond ordinary perception either of artists or of laymen; at its best it became a miracle of intuition as of skill in its rendition.

What he lacked entirely may be called, for lack of a better term, the feminine touch. Beauty or charm that were not in direct relation with his subject he could not entertain. This severity was his strength in contradistinction to the weakness of much of the art of the period which perpetuated the worship of purely irrelevant sweetness.

Taken as a whole his portraits, drawn from every class of society, in their great number and variety, in the boldness, the wit, the keen incisiveness and the distinction of their presentation, must come to be considered an epitome of the age he lived in—of its stateliness and splendour, of its elegance and grace, of its pretentiousness and its vulgarity. The human panorama, in its every manifestation, he found endlessly diverting and delineating it as he did with uncompromising directness, his work, in its unflinching yet happy realism, bears the very stamp of truth.

Mr. Sargent had never married. He had been a devoted son and brother, and was survived by his two sisters, Miss Emily Sargent and Mrs. Francis Ormond. His body was interred at Brookwood Cemetery. Memorial services were held at Westminster Abbey, at the request of the Royal Academy, and a replica in bronze of the Crucifixion in the Boston Library, with a memorial tablet, has been placed in the Crypt of St. Paul's Cathedral. (J. Hn.)

SARGON, more correctly Sarru-Kinu ("the legitimate king"), an Assyrian general who, on the death of Shalmaneser IV., during the siege of Samaria, seized the crown on the 12th of Tebet 722 B.C. He claimed to be the descendant of the early kings, and accordingly assumed the name of a famous king of Babylonia who had reigned about 2,000 years before him. His first achievement was the capture of Samaria, 27,200 of its inhabitants being carried into captivity. Meanwhile Babylon had revolted under a Chaldaean prince, Merodach-baladan, who maintained his power there for twelve years. In 720 B.C. Yahu-bihdi of Hamath led Arpad, Damascus and Palestine into revolt: this was suppressed, and the Philistines and Egyptians were defeated at Raphia (mod. er-Rafa). In 719 B.C. Sargon defeated the Minni to the east of Armenia, and in 717 overthrew the combined forces of the Hittites and Moschi (Old Testament Meshech). The Hittite city of Carchemish was placed under an Assyrian governor, and its trade passed into Assyrian hands.

The following year Sargon was attacked by a great confederacy of the northern nations—Ararat, the Moschi, Tibareni, etc.—and in the course of the campaign he marched into the land of the Medes in the direction of the Caspian. In 715 B.C. the Minni were defeated, and one of their chiefs, Dāyuku or Daiukku (Deioces), transported to Hamath. In 714 B.C. the army of Rusas of Ararat was annihilated, and a year later five Median chiefs, including Arbaku (Arbaces) became tributary. Cilicia and the Tibareni also submitted as well as the city of Malatia, eastern Cappadocia being annexed to the Assyrian Empire. A league was now formed between Merodach-baladan and the princes of the west, but before the confederates could move, an Assyrian army was sent against Ashdod, and Edom, Moab and Judah submitted to Sargon, who was thus free to turn his attention to Babylonia, and Merodach-baladan was accordingly driven from Babylon, where Sargon was crowned king. Shortly after this Sargon sent a statue of himself to Cyprus and annexed the kingdom of Commagene. He was murdered in 705 B.C., probably in the palace he had built at Dur-Sargina, now Khorsabad, which was excavated by P. E. Botta.

Bibliography.—F. Thureau-Dangin, *Huitième Campagne de Sargon* (714 B.C.) (1912); A. T. Olmstead, *History of Assyria* (1923), 206–208; Sydney Smith, *Cambridge Ancient History,* vol. iii. (1925), 43–60. For Sargon the Ancient, founder of the Accadian Empire, *see* S. Langdon, *Cambridge Ancient History,* vol. i. (1923), 402–408.

SARI BAIR, BATTLE OF, 1915: *see* Dardanelles Campaign.

SARIPUL or Siripul, a town and khanate of Afghan Turkestan. The town lies 100 m. S.W. of Balkh; estimated pop. 18,000. Two-thirds of the people are Uzbegs and the rest Hazaras. The khanate, which lies between Balkh and Maimana, was allotted to the Afghans by the Anglo-Russian boundary agreement of 1873.

SARI QAMISH, BATTLE OF, 1914. This battle in Dec. 1914, between the Russians and the Turks in the Caucasus, is described under Caucasus, Campaigns in the, 1914–1918. It arose out of Enver's (*q.v.*) rash project for a wide enveloping manoeuvre in mid-winter, and although almost carried to success by the astonishing fortitude of the Turkish troops, ended in a disaster which almost annihilated the Turkish III. Army.

SARK, one of the smaller Channel Islands, lying 7 m. E. of Guernsey. It is 3 m. long and 1½ m. in extreme breadth. Area, 1,274 ac.; pop. (1921) 611. It is divided into two unequal parts, Great Sark (the more northern) and Little Sark, connected by the Coupée, an isthmus, more than 100 yd. long and six ft. wide, with precipices on each side going down 300 ft. to the sea. The coastal scenery, commemorated in art by the painter Toplis, is of surpassing beauty, with fretted crystalline rocks, rocky islets, natural arches, caverns, etc. Creux, the harbour of Sark, on the east side, has its only communication with the interior by two tunnels, one

dating from 1588, the other 1868. The fauna of the surrounding seas is rich. The island is highest (375 ft.) about the centre of Great Sark, where stand the church, a few dwellings and a mill. Groups of houses at La Ville, Valette, Collinette, Discart and in Little Sark, suggest much earlier settlements. About the 6th century the Celtic saint, St. Magloire, founded a monastery here. There is little record of permanent settlement until the 16th century, when Elizabeth granted the lordship to Helier de Cartaret who repeopled the island, dividing the land among 40 farmers in strips from east to west. De Cartaret set up a scheme of government—partly manorial, partly parochial, which still holds. The island is included in the bailiwick of Guernsey, but has a court of justice of its own, the officers being appointed by the court of Guernsey under recommendation of the seigneur. There is also a court of chief pleas, whose members are the holders of the 40 original properties. Farming and fishing are the chief occupations.

SARMATAE or **SAUROMATAE** (the second form is mostly used by the earlier Greek writers, the other by the later Greeks and the Romans), a people whom Herodotus (iv. 21, 117) puts on the eastern boundary of Scythia (*q.v.*) beyond the Tanais (*Don*). He says expressly that they were not pure Scythians, but, being descended from young Scythian men and Amazons (iv. 110–117), spoke an impure dialect and allowed their women to take part in war and to enjoy much freedom. Hippocrates classes them as Scythian. From this we may infer that they spoke a language cognate with the Scythic. The greater part of the barbarian names occurring in the inscriptions of Olbia, Tanais, and Panticapaeum are supposed to be Sarmatian, and as they have been well explained from the Iranian language now spoken by the Ossetes of the Caucasus, these are supposed to be the representatives of the Sarmatae and can be shown to have a direct connection with the Alani (*q.v.*), one of their tribes. By the 3rd century B.C. the Sarmatae appear to have supplanted the Scyths proper in the plains of south Russia, where they remained dominant until the Gothic and Hunnish invasions. Their chief divisions were the Rhoxolani (*q.v.*), the Iazyges (*q.v.*), with whom the Romans had to deal on the Danube and Theiss, and the Alani. M. I. Rostovtzev has put serious difficulties in the way of the assumption that Sauromatae and Sarmatae were actually the same people; *see* his *Iranians and Greeks in S. Russia* (1922), and *Skifiya i Bospor* (1925).

SARMIENTO, DOMINGO FAUSTINO (1811–1888), Argentine educator, author, journalist and president of the republic, was born in San Juan de la Frontera on Feb. 14, 1811. He had little formal education and at an early age, because of his political opinions, took refuge in Chile, where he earned a precarious livelihood. In 1836 he returned to San Juan and was imprisoned for propaganda, but escaped to Chile in 1839 and engaged in journalism, editing *El Mercurio* of Valparaiso and founding *El Nacional* in Santiago. In 1841 he went back to Argentina to join the resistance to the dictator Rosas, but perceiving it to be useless, returned to Chile, where he added politics to journalism, founded the first Chilean normal school, was a member of the faculty of the university and waged violent polemics in behalf of liberal government and public instruction. His interest in public education was intense and in 1846 led him to make a several years' visit to Europe, Africa and the United States to study educational methods. In 1852 Gen. Urquiza's rebellion against Rosas drew him once more to Argentina and on Feb. 3, 1852, he assisted in overthrowing the dictator at the battle of Monte Caseros. Unwilling, however, to acknowledge Urquiza's political domination, he withdrew to Chile, but in 1856 reappeared in Buenos Aires, thrust himself into the journalistic arena and commenced a far-sighted campaign for public education. Elected governor of San Juan in 1862, while representing Buenos Aires in the national senate, he surrendered this position in 1864 to become minister to Chile and Peru and, in 1865, to the United States. While there he was elected president of Argentina for the term Oct. 12, 1868, to Oct. 12, 1874. As president he maintained political, economic and social stability, successfully terminated the War of the Triple Alliance against Paraguay (1865–70) and completely reorganized and amplified the national system of public instruction. Soon after he retired from the presidency he was re-elected to the senate and then appointed director of education in the province of Buenos Aires. He continued to maintain an aggressive journalistic stand on all debatable questions. In 1878 he became editor of *El Nacional;* was appointed minister of the interior in President Avellaneda's government in 1879 and in 1881 was made national superintendent of schools, in which capacity he was able to carry to its logical conclusion much of his long campaign for universal education. He died in Asunción, Paraguay, on Sept. 11, 1888. In the first instance an educator, Sarmiento achieved fame also as an author. His complete works fill 52 volumes, and *Facundo ó la civilización y la barbarie* (1845), a portrait of Argentina in the epoch of Rosas, is the best known work in Argentina's literature and has been frequently translated. Notable also are: *Recuerdos de provincias* (Santiago de Chile, 1850), *Viajes* (Santiago, 1849), *Vida de Lincoln* (New York, 1866), *Las escuelas: base de la prosperidad y de la república en los Estados Unidos* (New York, 1866).

See J. G. Guerra, *Sarmiento su vida y sus obras* (Santiago de Chile, 1901); J. P. Paz Soldan, *Domingo Faustino Sarmiento* (Buenos Aires, 1911); A. Coester, *The Literary History of Spanish America* (New York, 1916); R. Blanco-Fombona, *Grandes escritores de América* (Madrid, 1917); *Enciclopedia Universal Ilustrada* (Madrid, 1927).

(W. B. P.)

SARNATH, 4 m. from Benares city, in India, is the scene of the richest of the recent archaeological discoveries in the United Provinces. It was known to occupy the place of the Deer Park, where Gautama Buddha first launched his reforming faith and preached the "eight-fold path"; but except for a vast dismantled stupa, there was, at the beginning of this century, little indication of its buried treasures. The Chinese pilgrim, Hiuen Tsang, in the 7th century, had visited the Deer Park, and describes a monastery for 1,500 monks, a stupa, and in front of it a memorial pillar which Asoka had built, 70 feet high and polished like a mirror. In 1904, with Lord Curzon's active encouragement, the shapeless ruins of Sarnath were opened up by skilled hands, and the work of excavation went on for years. To-day the visitor can walk about the courts of the monastery. Asoka's monumental column unfortunately is broken and fallen, though its surface still retains its wonderful polish. A small museum has been built in the vicinity, to house the finds of the diggers.

SARNEN, the capital of the western half (or Obwalden) of the Swiss canton of Unterwalden. It stands 1,558 ft. above sea-level, at the north end of the lake of Sarnen (3 sq.m. in extent), and is 4½ m. by rail from Alpnachstad, its port on the lake of Lucerne. Pop. (1920), 4,980. In the archives is preserved the famous ms. the *White Book of Sarnen,* which contains one of the earliest known versions of the Tell legend. (*See* TELL.)

SARNIA, a town and port of entry, Ontario, Canada, capital of Lambton county, 55 m. N.E. of Detroit, on the left bank of the river St. Clair. Pop. (1931) 18,191. It is on the Canadian National and Pere Marquette railways, and is a port of call for steamers plying on the Great Lakes. It contains a large oil-refinery which handles the greater part of the product of the Ontario oil region. The Canadian National railway crosses the river at this point by the St. Clair tunnel, 6,025 ft. long or, including the approaches, 2¼ m., which connects the town with the American city of Port Huron (Michigan).

SARNO (anc. *Sarnus*), a town of Campania, Italy, in the province of Salerno, 15 m. N.E. from that city and 30 m. E. of Naples by the main railway. Pop. (1921), 14,681 (town), 19,100 (commune). It lies at the foot of the Apennines, 92 ft. above sea-level, near the sources of the Sarno (anc. *Sarnus*), a stream connected by canal with Pompeii and the sea. Teias was defeated here by Narses in A.D. 552. Sarno has the ruins of a mediaeval castle, which belonged to Count Francesco Coppola, who took an important part in the conspiracy of the barons against Ferdinand of Aragon in 1485. Walter of Brienne is buried in the ancient church of S. Maria della Foce rebuilt in 1701. The travertine which forms round the springs of the Sarno was used even at Pompeii as building material.

SARONNO, a town of Lombardy, Italy, in the province of Milan, from which city it is distant 13 m. N.N.W. by rail. Pop.

(1921), 13,118 (town); 14,015 (commune). The pilgrimage church of the Madonna dei Miracoli, begun in 1498 by Vincenzo dell' Orto, has a dome of rich architecture; the campanile dates from 1516. Internally it is decorated with fine frescoes by Gaudenzio Ferrari, representing a concert of angels, while those in the choir are by Bernardino Luini and are among his finest works. The place is well known for its gingerbread (*amaretti*) and is also a manufacturing town.

SARPEDON, in Greek legend, son of Zeus and Laodameia, Lycian prince and hero of the Trojan war. He fought on the side of the Trojans and was slain by Patroclus. Apollo rescued his body and, by the command of Zeus, handed it over to Sleep and Death, by whom it was conveyed for burial to Lycia, where a sanctuary (Sarpedoneum) was erected in his honour. In later tradition, Sarpedon was the son of Zeus and Europa and the brother of Minos. Having been expelled from Crete by the latter, he and his comrades sailed for Asia, where he finally became king of Lycia.

See Homer, *Iliad,* v. 479, xii. 292, 419–683; Apollodorus iii. 3 ff.

SARPI, PAOLO (1552–1623), Venetian patriot, scholar and church reformer, was born at Venice, on Aug. 14, 1552. Against the wish of his relatives, he entered the order of the Servi di Maria, a minor Augustinian congregation of Florentine origin, at the age of thirteen. He assumed the name of Paolo, by which, with the epithet *Servita,* he was always known to his contemporaries. In 1570 he sustained no fewer than three hundred and eighteen theses at a disputation in Mantua, with such applause that the duke made him court theologian. Sarpi spent four years at Mantua, applying himself to mathematics and the Oriental languages. After leaving Mantua, he repaired to Milan, where he enjoyed the protection of Cardinal Borromeo, but was soon transferred by his superiors to Venice, as professor of philosophy at the Servite convent. In 1579 he was sent to Rome on business connected with the reform of his order, which occupied him several years, and brought him into intimate relations with three successive popes, as well as the grand inquisitor and other persons of influence. He returned to Venice in 1588, and passed the next seventeen years in study, occasionally interrupted by the part he was compelled to take in the internal disputes of his community. He was twice recommended for preferment to a bishopric, but the pope refused his sanction in each case. Sarpi, therefore, continued to occupy himself with mathematics, metaphysics and anatomy. The only certain physiological discovery which can be safely attributed to him is that of the contractility of the iris. It must be remembered, however, that his treatises on scientific subjects are lost, and only known from imperfect abstracts.

In the dispute which arose between Paul V. (*q.v.*) and Venice on the extent of the papal jurisdiction in the Venetian State, Sarpi prepared on behalf of the republic a memoir, pointing out that the threatened censures might be met in two ways—*de facto,* by prohibiting their publication, and *de jure,* by an appeal to a general council. The document was received with universal applause, and Sarpi was immediately made canonist and theological counsellor to the republic. In the following April Paul excommunicated the Venetians and sought to lay their dominions under an interdict. Sarpi now republished the anti-papal opinions of the famous canonist Gerson. In an anonymous tract published shortly afterwards (*Risposta di un Dottore in Teologia*) he laid down principles which struck at the very root of the pope's authority in secular things. This book was promptly put upon the *Index,* and the republication of Gerson was attacked by Bellarmine with a severity which obliged Sarpi to reply in an *Apologia.* The *Considerazioni sulle censure* and the *Trattato dell' interdetto,* the latter partly prepared under his direction by other theologians, speedily followed. Numerous other pamphlets appeared, inspired or controlled by Sarpi, who had received the further appointment of censor over all that should be written at Venice in defence of the republic. The Venetian clergy, a few religious orders excepted, disregarded the interdict, and discharged their functions as usual. The Catholic powers refused to be drawn into the quarrel. At length (April 1607) a compromise was arranged through the mediation of the king of France, which, while salving over the pope's dignity, conceded the points at issue.

The republic rewarded Sarpi by making him state counsellor in jurisprudence, and giving him access to the state archives. On Oct. 5 he was attacked by a band of assassins and left for dead, but the wounds were not mortal. The bravos found a refuge in the papal territories. "Agnosco stylum Curiae Romanae," Sarpi himself pleasantly said, when his surgeon commented upon the ragged and inartistic character of the wounds.

The remainder of Sarpi's life was spent peacefully in his cloister, though plots against him continued to be formed, and he occasionally spoke of taking refuge in England. In 1615 a dispute between the Venetian government and the Inquisition respecting the prohibition of a book led him to write on the history and procedure of the Venetian Inquisition; and in 1619 his chief literary work, the *History of the Council of Trent,* was printed at London under the name of Pietro Soave Polano, an anagram of Paolo Sarpi Veneto. Sarpi never acknowledged his authorship. He survived the publication four years, dying on Jan. 15, 1623. His posthumous *History of the Interdict* was printed at Venice the year after his death, with the disguised imprint of Lyons.

Great light has been thrown upon Sarpi's real belief and the motives of his conduct by the letters of Christoph von Dohna, envoy of Christian, prince of Anhalt, to Venice, published by Moritz Ritter in the *Briefe und Acten zur Geschichte des dreissigjährigen Krieges,* vol. ii. (Munich, 1874). These letters seem to show that Sarpi was a patriot first and a religious reformer afterwards. His scientific attainments must have been great; and, though Sarpi did not, as has been asserted, invent the telescope, he immediately turned it to practical account by constructing a map of the moon.

Sarpi's life was written by his enthusiastic disciple, Father Fulgenzio Micanzio, whose work is meagre and uncritical. Bianchi-Giovini's biography (1836) is greatly marred by digressions, and is inferior in some respects to that by Arabella Georgina Campbell (1869), which is enriched by numerous references to MSS. unknown to Bianchi-Giovini. T. A. Trollope's *Paul the Pope and Paul the Friar* (1861) is in the main a mere abstract of Bianchi-Giovini, but adds a spirited account of the conclave of Paul V. The incidents of the Venetian dispute from day to day are related in the contemporary diaries published by Enrico Cornet (Vienna, 1859). Giusto Fontanini's *Storia arcana della vita di Pietro Sarpi* (1863), a bitter libel, is nevertheless important for the letters of Sarpi it contains, as Griselini's *Memorie e aneddote* (1760) is from the author's access to Sarpi's unpublished writings, afterwards unfortunately destroyed by fire. Foscarini's *History of Venetian Literature* is important on the same account. Sarpi's memoirs on state affairs remain in the Venetian archives. Portions of his correspondence have been printed at various times, and inedited letters from him are of frequent occurrence in public libraries. The King's library in the British Museum has a valuable collection of tracts in the Interdict controversy, formed by Consul Smith.

[In addition to the above works *see* Balan, *Fra Paolo Sarpi* (Venice, 1887) and Pascolato, *Fra Paolo Sarpi* (Milan, 1893). Some hitherto unpublished letters of Sarpi were edited by Karl Benrath and published, under the title *Paolo Sarpi. Neue Briefe, 1608–16* (at Leipzig in 1909).] (R. G.)

SARPSBORG, a seaport and manufacturing town of Norway, in Smaalenene *amt* (county), 68 m. S.S.E. of Oslo on the Gothenburg railway. Pop. (1927) 12,695. It became important through the utilization of the falls in the river Glommen for driving sawmills and generating electric power. The Sarpsfos is a majestic fall, descending 74 ft. with a width of 120 ft., and providing 50,000 h.p. for factories for calcium carbide (used for manufacturing acetylene gas), paper, cellulose, zinc, wood pulp and aluminium; and spinning and weaving mills. The port is at Sannesund; its quays can be reached by vessels drawing 20 feet. The town was founded in the 11th century, and destroyed by the Swedes in 1567. The existing town dates from 1839.

SARRACENIA or **SIDE-SADDLE FLOWER,** a genus of pitcher-plants of the family Sarraceniaceae with seven species native in the eastern states of North America. They are perennial herbaceous marsh-plants with a rosette of leaves from the centre of which springs a tall stalk bearing a large single nodding flower. The leaves are erect and in the form of long slender pitchers, with a longitudinal wing and a terminal hood, to which insects are attracted by the bright colouring of the upper parts and the nectar which is secreted there. The interior of the pitcher is half-filled with water and the wall is lined internally in the lower part with

stiff downward pointing hairs, which prevent the escape of insects. The insects which are drowned in the pitcher become decomposed, and the products are ultimately absorbed by the walls of the pitcher and serve as a source of nitrogenous food. (*See* DARLINGTONIA; INSECTIVOROUS PLANTS; PITCHER PLANTS.)

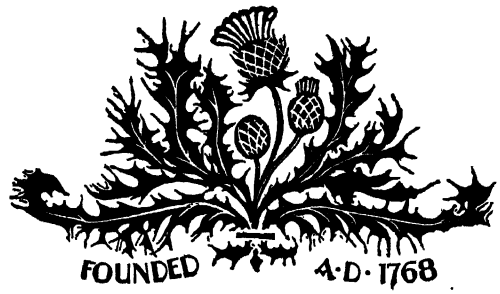
SARRAIL, MAURICE PAUL EMMANUEL (1856–1929), French soldier, was born at Carcassonne (Aude) on April 6, 1856. He passed out from the St. Cyr Military Academy in 1877, and after a series of promotions was appointed in 1907 director of infantry at the War Office. In 1911 he was promoted general of division and on Nov. 1, 1913, was given command of the VIII. Army Corps, being later (April 24, 1914) transferred to the VI. Corps which he commanded on the outbreak of the World War. On Sept. 2, 1914, after leading the VI. Corps with credit at the battle of the Frontiers, he succeeded Ruffey as commander of the III. Army which played a brilliant part during the retreat to the Marne. During the trench-warfare operations of 1914–15 he was less successful, however, and he was transferred to the chief command of the French Army of the East. He later became commander-in-chief of the Allied forces on that front (*see* SALONIKA CAMPAIGNS). After the World War he devoted himself to politics and stood, unsuccessfully, as Radical deputy for Paris. He was in Jan. 1925 appointed high commissioner in Syria. His administration was severely criticised; during the rebellion which broke out among the Jebel Druses he bombarded the native quarter of Damascus. In Oct. 1925, as a result of the report by General Dupont, he was relieved of his post. He died on March 23, 1929.

SARRAUT, ALBERT PIERRE (1872–), French politician, was born at Bordeaux, graduated in law, and became *conseiller-général* of the Canton of Lezignan. He attached himself to the radical-socialist group, and worked on the *Dépêche de Toulouse*, of which his brother, Maurice Sarraut, was one of the editors. He was poet and author as well as journalist. In 1906 he was included in the Clemenceau administration as under-secretary of state for the Interior, but resigned in consequence of difficulties in his constituency of Narbonne. He returned to politics in 1909 as under-secretary at the War ministry in the first Briand cabinet. In 1911 he was appointed to succeed Klobukowski as governor-general of Indo-China. On the outbreak of war in 1914 he returned to France, and became minister of public instruction; later he served in the 30th infantry regiment, and then became again governor-general of Indo-China. He was wounded at Hanoi (Tongking) by a shot fired by a discharged official. In 1922 he became minister for the colonies in the Poincaré Government, and in that capacity drew up an important scheme for the development of each of the units of the French colonial empire. He was sent in 1925 to Angora as French ambassador for a short time. In 1926 he was elected senator for Aude (which he had represented in the Chamber), and entered the Poincaré Government of July 1927 as minister of the interior. He was now a member of the Left Democratic Republican party.

SARRAZIN, JACQUES (1588–1660), French painter, born at Noyon in 1588. He went to Rome where he obtained employment from Cardinal Aldobrandini at Frascati, where he won the friendship of Domenichino, with whom he afterwards worked on the high altar of St. Andrea della Valle. He decorated the great portal and the dome of the western façade of the interior court of the Louvre. He died on Dec. 3, 1660.

SARREBOURG, a town of France, in the department of Moselle 44 m. north-west from Strasbourg. Pop. (1925) 5,674. It has been identified with the Pons Saravi of the Romans; it belonged to the bishops of Metz and the dukes of Lorraine.

SARREGUEMINES (SAARGEMÜND), a town of France, in the department of Moselle at the confluence of the Blies and the Saar, 40 m. E. of Metz, 60 m. N.W. of Strasbourg by rail. Pop. (1926) 12,908. Sarreguemines, originally a Roman settlement, obtained civic rights early in the 13th century. In 1297 it was ceded by the count of Saarbrücken to the duke of Lorraine, and passed with Lorraine in 1766 to France, being transferred to Germany in 1871 and to France in 1919. It makes faience, plush, velvet, porcelain and earthenware.



END OF NINETEENTH VOLUME

F
PRINTED IN THE U. S. A. BY R. R. DONNELLEY & SONS CO.

PRESIDENT'S
SECRETARIAT

LIBRARY